



Proposed Gas Pipeline Project (MOD2)

**Geotechnical - creek bank stability,
contamination and acid sulfate soil
assessment**

Manildra Group

24 February 2022

→ **The Power of Commitment**



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Executive summary

Manildra Group Pty Ltd (Manildra) was previously granted project approval for Concept Plan (MP10_0144) and Project Application (MP_10_0108) for the Shoalhaven Starches Gas Pipeline Project in 2012 by the Independent Planning Commission.

Manildra submitted a Modification Application (Modification No. 1 (Mod 1)) to the NSW Department of Planning, Industry and Environment (DPIE) in March 2021 (ref: MP06_0228, dated 26 March 2021). GHD Pty Ltd (GHD) prepared a Geotechnical assessment of Riverbank Stability (Abernethy's Creek); Acid Sulfate Soil (ASS) and Contamination assessments as part of the supporting documents required for Mod 1 (report reference: 12548413-55889-10, dated 2 July 2021) (GHD, 2021b).

Manildra is seeking a second modification (Mod 2) changing the alignment of the gas pipeline due to constraints posed to the Mod 1 alignment by existing underground services and infrastructure. The new alignment extends east from the Gas Pressure Reduction Facility (GPRF), passing under Abernethy's Creek, then continues south under Bolong Road terminating near Fermenter No. 2 (the site).

Manildra has commissioned GHD to carry out a geotechnical assessment of the effects of the gas pipeline construction on the stability of the banks of Abernethy's Creek; and Acid Sulfate Soil (ASS) and contamination assessments at the site to support the modified application.

GHD understand the assessment objectives were to:

- Geotechnical:
 - Assess the ground conditions on the eastern and western side of Abernethy's Creek in relation to the proposed Horizontal Directional Drill (HDD) crossing under the creek for the low pressure gas pipeline.
 - Provide geotechnical advice on the anticipated ground conditions with respect to the proposed development works.
 - Provide geotechnical advice in relation to the pipeline where it is proposed to pass under and Abernethy's Creek and potential effects of the proposed modifications on the stability of the creek banks.
- Preliminary Site Investigation (PSI) for contamination:
 - Assess the likelihood for contamination to exist on the site from past or present activities and provide recommendations for further investigation and/or options management (if applicable) with respect to the proposed development based on the findings of the assessment.
- Preliminary ASS assessment:
 - Provide a preliminary ASS assessment to assess the potential for acid sulfate soils to be present in the area of the proposed works within the anticipated depth of disturbance with recommendations on the need for management.

The scope of work developed to meet these objectives included a desktop study of site history and review of previous investigation reports, site walkover, intrusive investigation, interpretation of results and make conclusions and recommendations in relation to the above objectives.

Based on the previous and current investigation results, the assessment findings and conclusions are as follows:

Geotechnical

The new alignment extends east from the GPRF, passing under Abernethy's Creek, then continues south across Bolong Road terminating near Fermenter No. 2. The objective of the geotechnical assessment was to advise on the effects on the stability of the banks of Abernethy's Creek due the proposed underboring (HDD) for the gas pipeline.

In regard to the HDD crossing under Abernethy's Creek, our recent subsurface investigation has confirmed the presence of soft to very soft soils and likely ASS at this location. The soft soils were found to overlie stiff alluvial clays. The underside of soft clay soils and/or loose clayey sands occurred at approximately 3.5m on the western side of the creek to 2.5 m on the eastern side. The HDD design and construction methodology will need to take into account these soil conditions and proximity to the creek bed in order to manage the risk of frac-out and collapse of the soft soils during the pipe installation. An experienced HDD contractor has been engaged by Manildra to undertake the pipeline installation and the contractor will provide a detailed design and a construction methodology prior to commencement.

Based on the additional subsurface information on the western and eastern sides of the creek and the recommended control measures to be implemented by the HDD contractor, the proposed HDD crossing for the low pressure gas pipeline under the creek should not result in an increased risk of slope instability of the creek banks for this section of Abernethy's Creek.

It is noted that the presence and depth of soft or very soft soils can vary significantly within the alluvial plain area within and around the Manildra Plant due to the presence of paleochannels (ancient infill channels).

Contamination

Site history information indicated that between 1949 and 1984 the area where the site is located appeared undeveloped and vegetated with grass. Bolong Road was evident since 1949, initially as an unsealed road but becoming sealed at some stage in the 1960's. The site formed of a larger parcel of land, which extended north-east which appeared to be used for agricultural purposes. Between 2002 and 2012, the site and surrounding areas were developed. By 2002, the carbon dioxide gas installation and natural gas installation facilities had been installed north-east of the site. By 2010, the gas station had been constructed along with demountable buildings, gravel carpark and turning lane off Bolong Road. Between 2012 and 2021, shipping containers, toilet block and additional demountable structures were progressively added to the site and surrounding area. Imported gravel fill for the carpark and below buildings was classified as Virgin Excavated Natural Material (VENM). No other fill has been imported to the site.

Previous investigations did not identify soil contamination at the site that exceeded commercial / industrial assessment criteria (NEPC, 2013). For groundwater, lead and zinc concentrations exceeded the adopted assessment criteria (ANZECC/ARMCANZ, 2000). The source of zinc and lead was not identified but could have been associated with background concentrations. Faecal coliform concentrations were below the reporting limit suggesting leaks from the sewer main were not occurring in the vicinity of the groundwater monitoring well. It was concluded that the heavy metal impacts were not significant and did not warrant further investigation (ES, 2016).

Based on previous and current investigation results, potential for contamination was identified in three areas of environmental concern (AECs), which included:

- AEC 1: Fill of unknown quality and origin.
- AEC 2: Potential leaks from toilet block above ground sewerage tanks
- AEC 3: Treated effluent releases into Abernethy's Creek and impacted catchment water.

Based on review of the potential source-pathway-receptor (SPR) linkages, the proposed development and future site works may provide direct contact / inhalation (i.e., vapours, dust) exposure opportunities for human and ecological receptors to contamination, if present within these AECs. Based previous and current investigation results, the likelihood for contamination to exist at the site is assessed as low and very low. Therefore, due to the likely absence of contamination at the site, the SPR linkages are considered incomplete. No further investigation is warranted.

Although the likelihood for contamination was assessed as low, it is recommended that a Construction Environmental Management Plan (CEMP) be prepared to manage the occurrence of potential contamination, buried waste, demolition waste, ACM, etc. in all parts of the site during construction. The CEMP should also include an Unexpected Finds Protocol (UFP). It is noted that GHD has prepared a CEMP on behalf of the National Australian Pipelines Pty Ltd (contracted by Manildra), for the installation of the proposed gas pipeline.

Acid sulfate soil

Based on previous investigation results, ASS are likely to be encountered within the lower lying areas, in the north and east, adjacent to Abernethy's Creek. ASS are likely to be sporadic and possibly occur in lenses. Soft to very soft soils were encountered approximately adjacent to Abernethy's Creek, to depths between 4.0 m and 9.8 m bgl. The clays were estuarine and described as dark grey high plasticity with silts, sands and shell fragments. The section of the proposed gas pipeline crossing Abernethy's Creek will pass through these soft soil areas and is likely to intercept ASS, and groundwater. The additional geotechnical assessment encountered a zone of soft alluvial soils at GBH01 consistent with the presence of ASS.

An acid sulfate soil management plan (ASSMP) should be prepared to appropriately manage the disturbance of ASS and mitigating potential acid generation and impacts to groundwater and adjacent waterbodies. It is noted that GHD has prepared an ASSMP on behalf of the National Australian Pipelines Pty Ltd (contracted by Manildra) for the installation of the proposed gas pipeline. The ASSMP is a subplan to the CEMP.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout this report.

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Abbreviations and definitions

Abbreviation	Definition
ACM	Asbestos containing material
AEC	Area of environmental concern
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guideline
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid sulfate soils
ASSMP	Acid sulfate soil management plan
BTEXN	Benzene, toluene, ethyl benzene and xylenes plus naphthalene
CEMP	Construction Environmental Management Plan
CLM Act	Contaminated Land Management Act 1997 (incorporating amendments made by the Contaminated Land Management Amendment Act 2003)
COPC	Contaminant of potential concern
CSM	Conceptual Site Model
DCP	Dynamic Cone Penetrometer
DP	Deposited Plan
DPIE	Department of Planning, Industry and Environment
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
ENM	Excavated Natural Material
EPL	Environmental Protection Licence
ESL	Ecological Screening Level
FoS	Factor of safety
<	Less than (laboratory reporting limit)
GHD	GHD Pty Ltd
GPRF	Gas Pressure Reduction Facility
Ha	Hectare
HDD	Horizontal Directional Drill
HIL	Health Investigation Level (relating to defined land use scenario)
HSL	Health Screening Levels
LOR	Limit of reporting
mAHD	Elevation in metres from Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per kilogram
NAP	National Australian Pipelines Pty Ltd
NATA	National Association of Testing Authorities of Australia
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NSW EPA	New South Wales Environmental Protection Authority

Abbreviation	Definition
OEH	Office of Environment and Heritage
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyl
pH	-log[H]
PID	Photoionisation detector
ppm	Parts per million
PSI	Preliminary Site Investigation
RAP	Remediation Action Plan
SPOS	Peroxide Oxidisable Sulfur
SPR	Source Pathway Receptor
SPT	Standard Penetration Tests
SWL	Standing water level
TAA	Total Actual Acidity
TEQ	Toxicity Equivalence Quotient
TPA	Total Potential Acidity
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
UCL	Upper Confidence Limit
UFP	Unexpected Find Protocol
ug/L	Micrograms per litre
VENM	Virgin Excavated Natural Material
VOC	Volatile Organic Compound
WHSE	Work Health Safety and Environment

1. Introduction

1.1 General

Manildra Group Pty Ltd (Manildra) was previously granted project approval for Concept Plan (MP10_0144) and Project Application (MP_10_0108) for the Shoalhaven Starches Gas Pipeline Project in 2012 by the Independent Planning Commission.

Manildra submitted a Modification Application (Modification No. 1 (Mod 1)) to the NSW Department of Planning, Industry and Environment (DPIE) in March 2021 (ref: MP06_0228, dated 26 March 2021). GHD Pty Ltd (GHD) prepared a Geotechnical assessment of Riverbank Stability (Abernethy's Creek); Acid Sulfate Soil (ASS) and Contamination assessments as part of the supporting documents required for Mod 1 (report reference: 12548413-55889-10, dated 2 July 2021) (GHD, 2021b).

Manildra is seeking a second modification (Mod 2) changing the alignment of the gas pipeline due to constraints posed to the Mod 1 alignment by existing underground services and infrastructure. The new alignment extends east from the Gas Pressure Reduction Facility (GPRF), passing under Abernethy's Creek, then continuing south across Bolong Road terminating near Fermenter No. 2 (the site). The proposed development modification to the existing approval is shown on drawings in Appendix C.

Manildra has commissioned GHD to carry out a geotechnical assessment of the effects of the gas pipeline construction on the stability of the banks of Abernethy's Creek; and ASS and contamination assessments at the site to support the modified application.

The geotechnical assessment relates to the stability of the banks of Abernethy's Creek at the location of the proposed underbore for the pipeline. The site location is shown in Figure 1, Appendix B. The portion of the pipeline west of Abernethy's Creek and south of Bolong Road have been previously assessed and do not form part of this current assessment (GHD, 2021b) (Coffey, 2008).

These assessments have been carried out in general accordance with GHD's proposal ref: 12548413-39813-18, dated 24 November 2021 and subsequently approved variations to the scope of work.

1.2 Purpose of this report

The purpose of this report is to document the findings of the assessment, which will support the Modification Application and address anticipated requirements from the Department of Planning, Industry and Environment (DPIE). The requirements anticipate for the Modification Application are listed in a letter from Cowman Stoddart Pty Ltd (letter reference: ref: 21/109, dated 26 October 2021, pp. 7-8).

1.3 Objectives

GHD understand the assessment objectives were to:

- Geotechnical comprising creek bank stability:
 - Assess the ground conditions on the eastern and western side of Abernethy's Creek in relation to the proposed Horizontal Directional Drill (HDD) crossing under the creek for the low pressure gas pipeline.
 - Provide geotechnical advice on the anticipated ground conditions with respect to the proposed development works.
 - Provide geotechnical advice in relation to the proximity of the pipeline proposed under Abernethy's Creek and potential effects of the proposed modifications on the stability of the creek banks.
- Preliminary Site Investigation (PSI) for contamination:
 - Assess the likelihood for contamination to exist on the site from past or present activities and provide recommendations for further investigation and/or options management (if applicable) with respect to the proposed development based on the findings of the assessment.

- Preliminary ASS assessment:
 - Provide a preliminary ASS assessment to assess the potential for acid sulfate soils to be present in the area of the proposed works within the anticipated depth of disturbance with recommendations on the need for management.

1.4 Scope of work

The scope of work for this assessment comprised the following:

- Desktop study including a review of existing subsurface information in the vicinity of the proposed structures.
- Review previous reporting/advice by Coffey, SMEC and GHD on geotechnical, contamination and ASS assessments in the plant area.
- Site visit and observations, from publicly accessible areas, by a GHD Geotechnical Technical Director to visually assess potential sources of contamination, proximity of structures to the western bank of Abernethy's Creek, the general condition of the creek bank, observe surrounding land uses, topography, drainage, nearby sensitive environments to confirm the findings from previous reports and assess any major changes to site conditions since our last report.
- Intrusive investigations:
 - Site walkover to assess drilling rig access and service location. Service location was undertaken by an accredited service locator.
 - One borehole drilled on the western side of Abernethy's Creek to a maximum depth of 11 m below ground level (bgl) with Standard Penetration Tests (SPTs) carried out at 1 m intervals.
 - Two Dynamic Cone Penetrometer (DCP) tests were carried out on the eastern side of Abernethy's Creek to depths of 3.9 m and 4.8 m bgl.
- Report on desktop review, drawing upon information within recent reports prepared adjacent to the proposed development areas, including site observations and intrusive investigations, and provide recommendations and conclusions in accordance with the objectives outlined above.

1.5 Limitations

This report: has been prepared by GHD for Manildra Group and may only be used and relied on by Manildra Group for the purpose agreed between GHD and Manildra Group as set out in Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Manildra Group 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.

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 Manildra Group 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.

This report is to be read in conjunction with document titled "General Notes" (Ref: DS5.5.1 Issue 0 Date: 05/10/2018), located in Appendix A of this report.

2. Site setting

2.1 Site identification

The section of the proposed pipeline route assessed passes below and east of Abernethy's Creek, and hereafter is referred to as 'the site'. The site location is shown in Figure 1, Appendix B. Site identification details are summarised in Table 2.1.

Table 2.1 Summary of site details

Identification item	Detail
Site address:	No. 171 Bolong Road, Bomaderry, NSW and Bolong Road (and road reserve)
Site dimensions	Approximately 70 m long
Site identification	– Part Lot 2 DP1130535 – Road reserve
Current zoning	IN1 – General industrial under the Shoalhaven City Council Local Environment Plan (LEP) 2014 (LEP, 2014)
Current land use	Mostly grass covered except for the eastern end which passes through a gravel carpark
Surrounding land use	– Abernethy's Creek exists north and south of the proposed gas pipeline crossing. – East of Abernethy's Creek, the Manildra Gas Station and Natural Gas Installation facilities are located north and north-east of the proposed gas pipeline, respectively. – A gravel carpark and office buildings exist immediately east of the eastern extent of the proposed gas pipeline. – Bolong Road exists east and west of the proposed gas pipeline crossing – The proposed gas pipeline terminates on the southern side of Bolong Road within the main Starches plant at Fermenter No. 2.

2.2 Topography and drainage

Google Earth indicates that the site for the gas pipeline has an elevation between 3 m and 4 m above Australian Height Datum (AHD). The site and surrounding areas form part of an alluvial plain.

The closest waterbody relative to the site is Abernethy's Creek where part the proposed gas pipeline route passes below the creek. Surface water runoff is directed into Abernethy's Creek. Minor flooding periodically occurs within areas adjacent to Abernethy's Creek.

2.3 Soil landscape

Reference to the 1:100,000 Kiama Soil Landscape Series Sheet (9028, First Edition) (DECCW, 2010) indicates that the site is located on the Shoalhaven soil landscape. The soils are described as moderately deep Prairie Soils on levees, Red Earths and Yellow and Red Podzolic Soils on terraces and Alluvial Soils and Gleyed Podzolic soils on the floodplains. The soil landscape map also indicates that this group is subject to flood hazard, seasonal water logging, permanently high water table, hardsetting, acid sulphate potential (subsoil), strongly acidic and moderate shrink-swell potential.

2.4 Acid sulfate soil occurrence

ASS is naturally occurring soil and sediment containing iron sulfides which when exposed to oxygen can generate sulfuric acid.

Reference to the Burrier/Berry 1:25,000 Acid Sulfate Soil Risk Map (1997) Edition 2, prepared by the Department of Land and Water Conservation (DLWC) (DLWC, 1997), indicates that the site is mapped within an area having a low probability of ASS occurrence. The site is situated within alluvial plain areas (Figure 2.1). The depth of ASS occurrence is expected between 1 and 3 m below the ground surface.

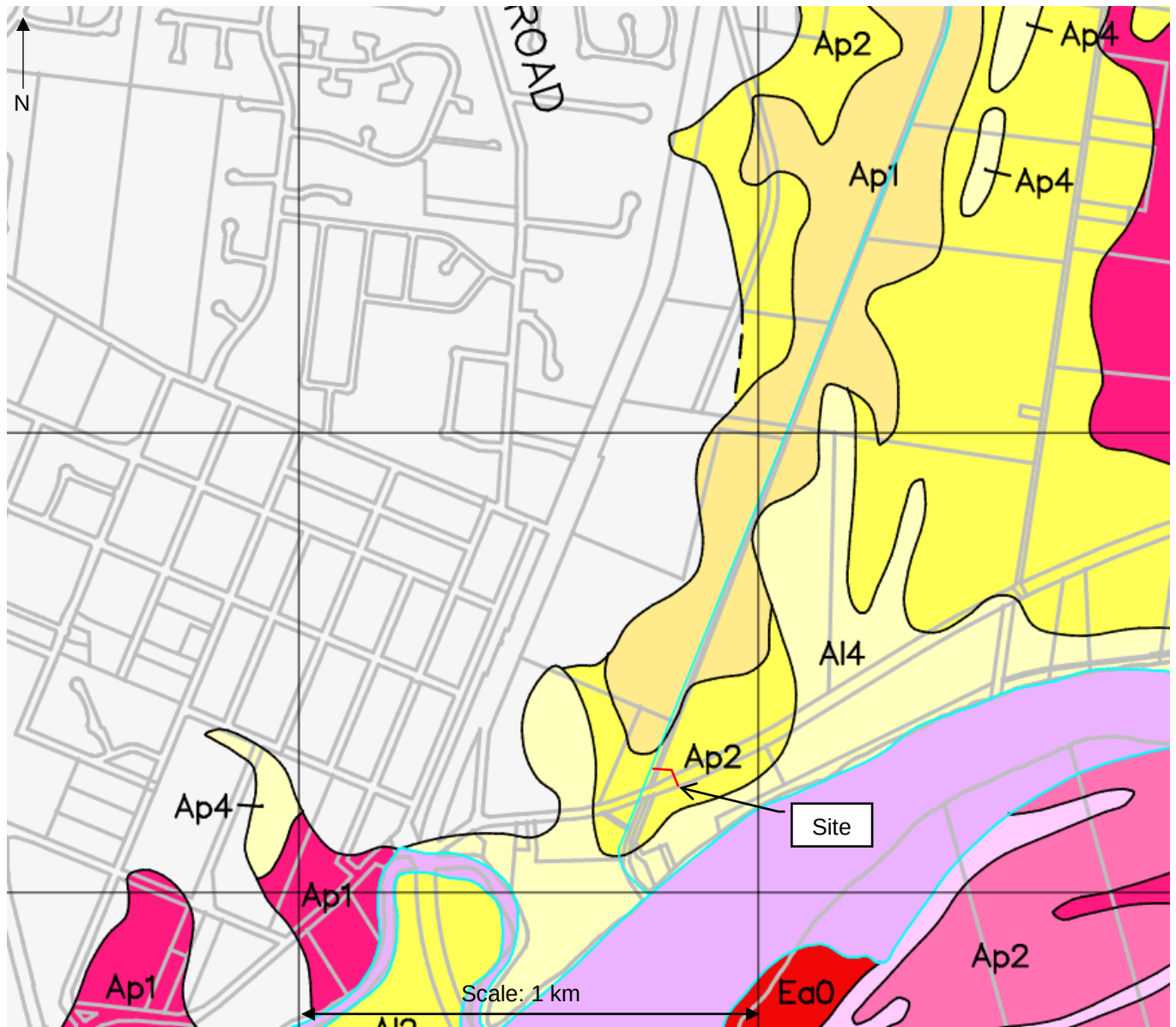


Figure 2.1 ASS Occurrence approximately shown relative to the site (red line) (DLWC, 1997)

The previous Coffey (2008) investigation indicated that actual ASS were not encountered however screening results suggested that unoxidised sulfides may be present. Chromium reducible sulfur testing was carried out on soil sample CTP30/1.0-1.1, which is about 20 m from the proposed gas pipeline immediately west of Abernethy's Creek. Chromium reducible sulfur concentrations for sample CTP30/1.0-1.1 were below laboratory reporting limits, indicate RIS was not present.

Abernethy's Creek crossing from eastern side north of Bolong Road:

- Total Actual Acidity (TAA) concentration exceeded action criteria of 18 moles H⁺/tonne in the following samples:
 - CBH14/0.7-0.8 m (clayey silt)
 - CBH15/1.7-1.9 m (silty clay)
 - CBH16/0.7-0.9 m (clayey silt)
 - CBH16/1.8-1.9 m (silty clay)
- Total Potential Acidity (TPA) concentration exceeded action criteria of 18 moles H⁺/tonne in the following samples:
 - CBH15/1.7-1.9 m (silty clay)
 - CBH16/0.7-0.9 m (clayey silt)
 - CBH16/1.8-1.9 m (silty clay)
- SPOS between 0.04% and 0.07% marginally exceeded action criterion of 0.03% at in samples from borehole locations CBH15 and CBH16.

Based on the results of the Coffey (2008) investigation, ASS are likely to be encountered within the lower lying areas, in the north and east, adjacent to Abernethy's Creek. ASS are likely to be sporadic and possibly occur in lenses.

Soft and very soft clay soils were encountered at borehole locations SBH01, SBH02 and SBH03 to depths of 4 m, 6.5 m and 9.8 m bgl, respectively. The clays were estuarine and described as dark grey high plasticity with silts, sands and shell fragments (SMEC, 2020). No other ASS indicators were recorded by SMEC.

2.5 Geology

2.5.1 Regional

Reference to the 1:250,000 Wollongong Geological Series Sheet (S1 56-9, Second Edition) (NSW Department of Mines, 1966) indicates the site is likely to be underlain by Quaternary Alluvium, gravel, swamp deposits and sand dunes.

2.5.2 Site specific

Four investigations locations by Coffey were used to assess the subsurface conditions for the gas facility (CBH14 to CBH16) and gas pipeline along Bolong Road (CBH110) (Coffey, 2008). The gas facility (Manildra Gas Station) and gas pipeline have since been constructed.

The Coffey (2008) provided to GHD was incomplete and did not include borehole logs. The depth of the boreholes has been inferred from samples tested and other comments made throughout the report. Borehole location CBH110 was advanced with a hand auger and refused on a possible underground service at 1.2 m below ground level (bgl). One sample was collected from this location from the upper 0.06 m and described the soil as topsoil/fill. Borehole locations CBH14 to CBH16 appear to have been drilled to a depth of at least 1.9 m bgl. Five soil samples were collected and analysed from these boreholes were described as follows:

- CBH14/0.7-0.8 m: clayey silt
- CBH15/0.0-0.2 m: topsoil
- CBH15/1.7-1.9 m: silty clay
- CBH16/0.7-0.9 m: clayey silt
- CBH16/1.8-1.9 m: silty clay

Soft and very soft clay soils were encountered at borehole location SBH01 to a depth of 4 m bgl, west of Abernethy's Creek. The clays were estuarine and described as dark grey high plasticity with silts, sands and shell fragments. No anthropogenic materials were noted (SMEC, 2020). Stiff alluvial soil described as clay, with silt trace sand, high plasticity, orange-brown mottled red-brown; becoming very stiff to hard residual clay with gravel from 6.4 m bgl. Highly weathered sandstone was encountered from 13.2 m bgl.

2.6 Hydrogeology

A search of the WaterNSW groundwater bore database indicates that there are 19 groundwater bores within 500 m of the site (Figure 2.2). Three of these bores (GW110107, GW110108, GW110109) are registered within the Shoalhaven Starches property located between 50 m and 260 m south of the site. The remaining 16 bores were located between 380 m and 460 m west and north-west of the site.

Table 2.2 Summary of registered groundwater bores

Bore ID	Installation date	Registered purpose	Depth of bore (m bgl)	Standing water level (m bgl)
GW110109	2009	Monitoring	4.0	1.27 (in 2009)
GW110108	2009	Monitoring	4.5	0.644 (in 2009)
GW110107	2009	Monitoring	6.0	4.02 (in 2009)
GW113119	2008	Monitoring	5.2	Not recorded
GW113120	2008	Monitoring	6.2	Not recorded
GW113121	2008	Monitoring	5.2	Not recorded
GW113122	2008	Monitoring	5.2	Not recorded
GW113123	2008	Monitoring	4.9	Not recorded
GW113124	2008	Monitoring	4.0	Not recorded
GW113125	2008	Monitoring	4.2	Not recorded
GW113126	2008	Monitoring	4.0	Not recorded
GW114453	2011	Monitoring	6.0	2.5 (in 2011)
GW114454	2011	Monitoring	7.0	3.7 (in 2011)
GW114455	2011	Monitoring	6.0	4.5 (in 2011)
GW113052	2000	Monitoring	5.1	Not recorded
GW113053	2000	Monitoring	4.5	Not recorded
GW113054	2000	Monitoring	5.0	Not recorded
GW113055	2000	Monitoring	5.1	Not recorded
GW113056	2013	Monitoring	6.0	Not recorded

Groundwater was encountered at borehole locations SBH01, SBH02 and SBH03 at depths of 0.6 m, 0.6 m and 0.5 m bgl, respectively, which were immediately west of Abernethy's Creek (SMEC, 2020).

The standing water level at groundwater monitoring well MW1/CBH108 was measured 1.290 m bgl on 10/4/2008 and is located approximately 150 m north-west of the closest point to the site (Coffey, 2008).

Based on topography, the groundwater is expected to flow in a westerly direction towards Abernethy's Creek.



Figure 2.2 Groundwater bores closest to sites (source: WaterNSW)

3. Site history

3.1 General

Information on the site history was obtained from:

- Review of selected aerial photographs (1949 to 2021).
- A search of NSW EPA register for listings of the site and nearby properties.
- A review of Section 10.7 planning certificate.
- Chemical storage inventory provided by Manildra.
- A review of previous investigation reports and summarising the relevant sections.
- Interview with a Manildra representative, John Studdert.

A summary is provided below. Relevant historical details are shown in Figure 2 (Appendix B).

3.2 Historical aerial photography

The review of aerial photography is summarised in the sections below. Aerial photographs for the site are included in the Lotsearch report (ref: LS013205EA, dated 30 June 2020 (Lotsearch, 2020)) presented in Appendix D. Aerial photographs that were on file and captured the site were also reviewed have been included in Appendix D. Additional aerial photographs were accessed via Google Earth and MinView and reviewed.

Bolong Road was evident since 1949, initially as an unsealed road but becoming sealed at some stage in the 1960's. The Starches Plant was evident on the banks of the Shoalhaven River and Bomaderry Creek. The Plant progressively expanded over time, developing surrounding paddocks previously used for agricultural purposes.

Between 1949 and 1984 the area where the site is located appeared undeveloped and vegetated with grass. The site formed of a larger parcel of land, which extended north-east which appeared to be used for agricultural purposes. The grass strip immediately north of Bolong Road appeared thicker than grass in the remainder of the paddock. This thicker grass strip also contained power poles and was fenced off from the adjoining paddock, suggesting it may be an easement and not used for agricultural purposes. Trees and/or shrubs were evident in Abernethy's Creek where the gas pipeline route is proposed to cross the creek. The remaining sections of the creek appeared to have grass banks and contained little to no vegetation such as trees and shrubs. By 1984, a significant increase in trees and/or shrubs lining Abernethy's Creek was evident. The vegetation extended to the sewerage treatment pond approximately 170 m north of the site.

In 1993, ground disturbance was evident within the easement and extend east adjacent to Bolong Road, suggesting a possible underground service installation. A section of disturbed ground extended north-west from the easement, perpendicular to Bolong Road, terminating near to the centre of the site. The surround ground surface appeared to be grass but a lighter shade of green relative to the adjoining paddock north-east of the site. Approximately 50 m north of the site appears to be an object, possibly a footbridge, that crosses Abernethy's Creek. In 1997, grass cover on-site and areas immediately north-east were brown relative to other grass paddocks in the general area. A grey rectangular area was evident about 50 m north-east of the site. Bolong Road appeared to have been widened.

By 2002, the carbon dioxide gas installation and natural gas installation facilities had been installed north-east of the site. A driveway connecting the natural gas installation with Bolong Road was evident and occupies part of the subject site. Remaining areas of the site appear generally grassed covered however some minor ground disturbance was evident.

By 2012, the gas station had been constructed along with a small rectangular building, gravel carpark and turning lane off Bolong Road. The north-east portion of the site falls within the gravel carpark. The remaining areas of the site appear relatively unchanged since 1997.

In the 2013 aerial photograph, Abernethy's Creek was green suggesting an algal bloom.

Between 2015 and 2021, the area where the site is located appears relatively unchanged since 2012 except for small rectangular object, possibly a shed, that occupied the north-eastern part of the site from July 2015. A possible shipping container was evident north of the small building adjacent to the gas station. The development for the packing plant, west of Abernethy's Creek, was evident in 2019 and was still in progress in the 2021 aerial photograph.

3.3 NSW EPA registers

GHD carried out a search of the NSW EPA registers on 19 December 2021. The results of that search are summarised in Table 3.1. Search results are included in Appendix E.

Table 3.1 Summary of NSW EPA search results

Search	Result
Contaminated Land Record of Notices	No record for site or up to 2.0 km surrounding the site.
Notified Sites under the <i>Contaminated Land Management Act 1997</i> (CLM Act, 1997)	No record for site or up to 390 m surrounding the site. The closest record was 390 m north-west of the site. The record pertains to a Former Shell Depot located at 44 Railway Street, Bomaderry, NSW. The record states regulation under the CLM Act is not required.
Environmental protection licenses under the <i>Protection of the Environment Operations Act 1997</i> (POEO, 1997)	Manildra (Shoalhaven Starches) has an EPL for plant operations which includes the production of dangerous goods, general chemicals storage and general agricultural processing. A copy of the EPL is included in Appendix E. A number of licence variations also exist. A penalty notice was issued to Shoalhaven Starches in May 2018 for contravening a condition of the licence. No further details were provided on the EPA website. The penalty notice was issued to Shoalhaven Starches in May 2018 for contravening a condition of the licence was associated with a release of water containing starch into Abernethy's Creek, which is outside the sites. The release was caused by a power failure which occurred in 2017 (GHD, 2021a, p. 21). The following licences were located within 500 m of the site: – Bomaderry Sewage Treatment Plant, Operated by Shoalhaven Water – approximately 120 m north-west of the site. – Cleary Bros – Concrete works – approximately 240 m south-west of the site at its closest point. – BOC Limited – Dangerous goods production and storage (carbon dioxide associated with the Manildra Plant) – approximately 75 m north-east of site at its closest point.
EPA PFAS Investigation Program	The Shoalhaven River, which is located approximately 160 m south of the site, forms part of the PFAS investigation program. Detectable concentrations of PFOS+PFHxS were reported in water samples collected from the river on 30 May 2019 but did not exceed assessment criteria for drinking water and recreational. The NSW PFAS Taskforce <i>"advised that no new or additional precautionary dietary advice is required for the area, based on the results"</i>. Refer to https://www.epa.nsw.gov.au/your-environment/contaminated-land/pfas-investigation-program/pfas-investigation-sites/shoalhaven-river for more detail.

3.4 Section 10.7 Planning Certificate

The Section 10.7 Planning Certificate pertaining to Part Lot 241 DP1130535 was reviewed, and results summarised in Table 3.2 and included in Appendix F.

Table 3.2 Summary of Section 10.7 regarding contamination matters

Search	Result
Part (2) matters under section 59 (2) of the Contaminated Land Management Act 1997	Council has not been advised that the land is significantly contaminated, subject to a: management order; voluntary management proposal; ongoing maintenance order or site audit statement.
Part (5) Former land use identification	No records for current planning certificates.
Loose-filled asbestos insulation Division 1A of Part 8 of the Home Building Act 1989	The land does not include any residential premises that are listed on the register that are required to be maintained under that Division.

3.5 Chemical storage inventory

Manildra provided a copy of the chemical storage map for the plant and has been included in Appendix G. The map indicates that no chemicals are stored on or near the site. Chemical storage occurs within the main Shoalhaven Starches plant area south of the site. It is noted that the carbon dioxide storage associated with the BOC gas facility is not listed in the chemical storage inventory.

3.6 Previous reports

The closest previous investigation locations to the site are listed in Section 2.5.2 and shown on Figure 2 in Appendix B. The following sections summarise relevant information pertaining to contamination aspects for the site.

3.6.1 Preliminary environmental site assessment and geotechnical investigation (Coffey, 2008)

The Coffey (2008) investigation assessed contamination aspects within the proposed packing plant which includes the majority of the current investigation area.

The 2008 investigation assessed the likelihood for contamination to exist in areas where upgrade works are proposed from past or present activities and to make recommendations on the need for further investigation and/or remediation should contamination be present. The scope of work carried out to achieve this objective included a desktop and site history study, site walkover, intrusive investigations, from which soil and groundwater samples were collected and analysed for identified contaminants of potential concern (COPC).

Site history information indicated that prior to 1950, the sites and surrounding areas were possibly used for rural land use.

At the time of the 2008 investigation, the site and immediate surrounds were covered with thick grass that was knee high. The grass cover precluded detailed observations of the ground surface. The BOC (carbon dioxide) facility was noted east of the site. Observations were also made of the road verge where the proposed gas pipeline continues south crossing Bolong Road. The road verge was grass covered but there was evidence of underground services within the road verge. The site was not identified as previously being used to grow crops.

Based on site history and site observations, seven areas of environmental concern (AEC) were identified, one of which had relevance to the current investigation area. This AEC included:

- AEC 4: Fill of unknown quality and origin. Based on site history, extensive filling was not expected. Significant filling for the site was not identified, however GHD infers some filling around services along the road verge may be present. Therefore, the likelihood for contamination was assessed as low.

Four investigation locations by Coffey were used to assess the subsurface conditions for the gas facility (CBH14 to CBH16) and gas pipeline along Bolong Road (CBH110) (Coffey, 2008). The gas facility (Manildra Gas Station) and gas pipeline have since been constructed. Two samples, CBH15/0.0-0.2m (topsoil) and CBH110/0.0-0.06m (topsoil/fill), were collected from these boreholes to assess the gas facility and gas pipeline areas. Sample from CBH15 was analysed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes (BTEX), organochlorine pesticides (OCP), organophosphorus pesticides (OPP), and pH, and the sample from CBH110 was analysed for OCP, OPP and heavy metals.

Concentrations of TPH, BTEX, OCP and OPP were below the laboratory reporting limits, and heavy metal concentrations were relatively low and were consistent with published background concentrations (Olszowy, Torr, & Imray, 1995, p. 17). All concentrations were below the adopted criteria for commercial / industrial land use. Concentrations were compared to the current assessment criteria for industrial / commercial land use, ASC NEPM (NEPC, 2013); no exceedances were reported. Laboratory results were consistent with field observations where no obvious evidence of contamination was observed.

Elevated concentrations of zinc and lead were noted in groundwater sampled from one well (CBH108/MW1) within the proposed packing plant, approximately 143 m from the site at its closest point and downgradient of the sewer main. Concentrations exceeded drinking water (NHMRC/ARMCANZ, 2004) and/or protection of freshwater aquatic ecosystem trigger values (ANZECC/ARMCANZ, 2000). The source of zinc and lead was not identified but could have been associated with background concentrations. Faecal coliform concentrations were below the reporting limit suggesting leaks from the sewer main were not occurring in the vicinity of the groundwater monitoring well.

The report concluded that *“based on the results of this assessment, the potential for widespread soil contamination that would preclude these areas from being redeveloped for industrial land use is considered to be low”*.

3.6.2 Site audit statement, proposed packing plant (ES, 2016)

NSW EPA accredited Site Auditor, Tim Chambers, was appointed in March 2016 to prepare a Site Audit Report (SAR) and Site Audit Statement (SAS) in relation to the proposed packing plant development on Lot 16 DP 1121337 and Lot 2 DP 538289. The site audit was required to satisfy condition 20 of the consent issued by the NSW Minister for Planning and was therefore a statutory audit under the CLM Act 1997.

The auditor noted, in relation to exceeding zinc and lead concentration in groundwater, that these heavy metals were widespread urban pollutants and can also be naturally occurring. There was no apparent source identified on-site in the past or present to explain these impacts. Therefore, the auditor was satisfied that the minor heavy metal impacts were not significant and did not warrant further investigation (ES, 2016, p. 15).

3.7 Interviews

An interview was undertaken with Mr John Studdert on 22 December 2021. Mr Studdert has worked at the Manildra Plant since 2000 and has been involved with plant operations over this time. Mr Studdert was stationed at the demountable office building between 2010 and 2020. Mr Studdert provided the following information, to the best of his knowledge, for the site:

- The site and immediate surrounds have been occupied by demountable buildings, shipping containers and gravel carpark since at least 2010. Prior to this time, and prior to the construction of the adjoining gas facility, the site was a grass paddock. The demountable buildings are primarily used for office space, with some used to store small quantities (5-10L) of cleaning products (i.e. detergents and disinfectants), cleaning equipment and dry product samples. The dry product samples, once sieved, are stored at the demountable building located next to the toilet block. The toilet block is not connected to septic tank or sewer. Waste is collected in an above ground tank situated below the toilet building. The tank has a volume of about 3,000 to 5,000L and emptied once per week by a waste contractor where it is disposed offsite at a licenced waste facility. No leaks from the tank have occurred. Refer to **Error! Reference source not found.** in Section 4.
- The shipping containers are used to store cleaning equipment (e.g. paper towel, scourers, mops, brooms, buckets, etc.) and archived records associated with contractors involved with the packing plant development. No fuels or other chemicals are stored on-site.
- The grey circular pit located next to the south-western corner of the gravel carpark is a Council inspection pit. A similar pit is located in the gravel carpark east of the site.
- Quarry product has been imported to the site to form the gravel carpark and placed below the demountable buildings to support the building foundations. The gravel was compacted and the building foundations, primarily concrete blocks, were placed on top of the compacted gravel. The material is likely to have been sourced from Boral Quarry at Bombo, NSW. The road base was sourced from Boral Quarry at Bombo, NSW, and was classified as VENM¹. No other fill has been imported to the site. Refer to **Error! Reference source not found.** to **Error! Reference source not found.** in Section 4.
- The brown grass observed in the 1997 aerial photograph may have been associated with the cutting of the grass paddock. The cut grass is likely to have been collected to form hay bales.
- No pesticide application or chemical storage (apart from detergents and disinfectants) have occurred at or adjacent to the site.
- No accidental releases of fuels or oils have occurred.
- Prior to the Council sewerage treatment works upgrade, treated effluent would enter Abernethy's Creek during heavy rainfall and flood events, temporarily impacting water quality of the Creek. Since the sewerage treatment system upgrades effluent releases to the creek are less common.

3.8 Gaps in the site history

Limited information is available for land use activities prior to 1949.

Limited sampling and analysis of site soils has been previously undertaken.

¹ The NSW EPA has provided advice that "commercially quarried material is not considered a waste material and therefore would not be required to be classified under the waste classification process or require a VENM certificate" (NSW EPA, 2020)

3.9 Site history summary

Site history information indicated that between 1949 and 1984 the area where the site is located appeared undeveloped and vegetated with grass. Bolong Road was evident since 1949, initially as an unsealed road but becoming sealed at some stage in the 1960's. The site formed of a larger parcel of land, which extended north-east which appeared to be used for agricultural purposes. The grass strip immediately north of Bolong Road appeared thicker than grass in the remainder of the paddock. This thicker grass strip also contained power poles and was fenced off from the adjoining paddock, suggesting it may be an easement and not used for agricultural purposes. Trees and/or shrubs were evident in Abernethy's Creek where the gas pipeline route is proposed to cross the creek. The remaining sections of the creek appeared to have grass banks and contained little to no vegetation such as trees and shrubs.

In 1993, ground disturbance was evident within the easement and extend east adjacent to Bolong Road, suggesting a possible underground service installation. Between 2002 and 2012, the site and surrounding areas were developed. By 2002, the carbon dioxide gas installation and natural gas installation facilities had been installed north-east of the site. By 2010, the gas station had been constructed along with demountable buildings, gravel carpark and turning lane off Bolong Road. Between 2012 and 2021, shipping containers, toilet block and additional demountable structures were progressively added to the site and surrounding area.

The demountable buildings are primarily used for office space, with some used to store small quantities (5-10L) of cleaning products (i.e. detergents and disinfectants), cleaning equipment and dry product samples. The shipping containers are used to store cleaning equipment and archived records associated with contractors involved with the packing plant development. The toilet block is not connected to septic tank or sewer. Waste is collected in an above ground tank situated below the toilet building. The tank has a volume of about 3,000 to 5,000L and emptied once per week by a waste contractor where it is disposed offsite at a licenced waste facility. No leaks from the tank have occurred.

In the 2013 aerial photograph, Abernethy's Creek was green suggesting an algal bloom.

Quarry product, classified as VENM, has been imported to the site to form the gravel carpark and placed below the demountable buildings to support the building foundations. No other fill has been imported to the site.

Limited sampling and analysis of samples representing topsoil and near surface fill (upper 0.2 m of soil profile) reported concentrations of TPH, BTEX, OCP, OPP and / or heavy metals below the adopted assessment criteria for industrial/commercial land use. Concentrations of TRH, BTEX, OCP and OPP were below the laboratory reporting limits, and heavy metal concentrations were relatively low were consistent with published background concentrations (Olszowy, Torr, & Imray, 1995, p. 17). Laboratory results were consistent with field observations where no obvious evidence of contamination was observed.

For groundwater, lead and zinc concentrations exceeded the adopted assessment criteria (ANZECC/ARMCANZ, 2000). The source of zinc and lead was not identified but could have been associated with background concentrations. Faecal coliform concentrations were below the reporting limit suggesting leaks from the sewer main were not occurring in the vicinity of the groundwater monitoring well. It was concluded that the heavy metal impacts were not significant and did not warrant further investigation (ES, 2016).

No pesticide application or chemicals, apart from detergents and disinfectants, fuels or oils, have been stored at the site. No accidental releases of fuels or oils has occurred.

Manildra (Shoalhaven Starches) has an Environmental Protection Licence (EPL) for plant operations which includes the production of dangerous goods, general chemicals storage and general agricultural processing. A penalty notice was issued to Shoalhaven Starches in May 2018 for contravening a condition of the licence was associated with a release of water containing starch into Abernethy's Creek, which is outside the sites. The release was caused by a power failure which occurred in 2017. This release occurred off-site and not considered to impact the site.

There are no Contaminated Land Record of Notices, Notified Sites under the Contaminated Land Management Act 1997 associated with the site.

4. Site observations

The site walkover was carried out by a technical director for geotechnical engineering from publicly accessible areas. Photographs have been selected to show the general site conditions observed as presented in the sections below. Relevant observations are shown on Figure 3 in Appendix B and discussed below.

The proposed pipeline route is situated between the proposed pressure reduction unit in the west and Fermenter No. 2 on the southern side of Bolong Road within the main plant area. The proposed route is generally east-west in orientation passing below Abernethy's Creek, then once east of the creek it continues in a southerly direction crossing Bolong Road to connect with Fermenter No. 2.

The area west of Abernethy's Creek was not directly accessible at the time of the site visit. Since GHD's previous site visit on 16 June 2021, additional fill material has been placed as part of the packing plant development. The fill material appeared to comprise grey gravel in the northern half of the packing plant development area. A large stockpile of brown-orange material was stockpiled south of the grey gravel emplacement area. This material has previously been classified as VENM (refer to Section 3.7). Construction materials associated with the packing plant development were stored between the fill area and Abernethy's Creek. Refer to Photo 1 and Photo 2.

Site surface conditions along the section of the proposed gas pipeline within the riparian corridor adjacent to Abernethy's Creek are shown in Photo 3 to Photo 6 below, with relevant descriptive captions.

The section of pipeline east of Abernethy's Creek, passes through an area which is near level and occupied by a gravel carpark, demountable office building, toilet block and shipping containers (refer to Section 3.7). Limited vegetation exists between these structures and Abernethy's Creek and comprises grass areas and lantana line the eastern creek bank. North-east of the demountable office building was an existing gas facility. Refer to Photo 7 to Photo 12.

No evidence of contamination such as asbestos containing materials (ACM), odours or staining was observed. No potentially contaminating activities were observed.

Obvious visual evidence of ASS such as scald areas, iron leaching or jarosite staining were not noted on the surface.



Photo 1: Looking north towards the packing plant development area at imported fill material (24/11/2021)



Photo 2: Brown-orange stockpile sourced from the Nowra Gaol construction site, classified as VENM (24/11/2021)



Photo 3: Looking north along Abernethy's Creek (24/11/2021)



Photo 4: Looking at the western bank of Abernethy's Creek (24/11/2021)



Photo 5: Looking south-west at the western bank of Abernethy's Creek in the vicinity of the proposed underbore (24/11/2021)



Photo 6: Example of existing services crossing Abernethy's Creek (24/11/2021)



Photo 7: Looking north towards the eastern bank of Abernethy's Creek (left) and area where shipping containers and demountable buildings area located (right). In the foreground is the approximate location of the proposed gas pipeline route (24/11/2021)



Photo 8: Area north of the site showing fill (grey gravel) imported as part of the temporary installation of demountable buildings and shipping containers (24/11/2021)



Photo 9: Looking east at the demountable buildings, noting gravel fill below and surrounding these structures (24/11/2021)



Photo 10: Looking south at Fermenter No's. 1 and 2 and approximate area where the proposed gas pipeline route is located. Note gravel fill, temporary buildings and shipping containers, which also occupy this area (24/11/2021)



Photo 11: Looking west at the approximate gas pipeline route (24/11/2021)



Photo 12: Looking north-east of the site at the existing gas facility located immediately north-east of the demountable buildings (24/11/2021)

5. Additional geotechnical assessment

5.1 Intrusive investigations

In view of the limited subsurface information close to the proposed alignment of the low pressure gas pipeline where it is proposed to pass under Abernethy's Creek, intrusive investigations were undertaken on the eastern and western sides of the creek close to the pipeline alignment. Fieldwork for the investigations was undertaken by GHD on 6, 7 and 11 February 2022, managed by a geo-environmental scientist from GHD.

One borehole, GBH01, was drilled using a track mounted drilling rig equipped with 100 mm solid flight augers fitted with a tungsten carbide (TC) bit to a maximum depth of 11 m bgl. SPTs were carried out at 1 m intervals to assess density and consistency of the soil profile. Borehole GBH01 was drilled at approximately 3 m offset from the proposed HDD alignment and approximately 20m south-west of the SMEC borehole location SBH01. Upon removal of the augers, the borehole collapsed to approximately 1 m bgl. The upper 1 m was reinstated with bentonite to 0.5 m bgl followed by concrete for the remaining 0.5 m.

Due to access constraints on the eastern side of Abernethy's Creek, two DCP tests were carried out, DCP01 and DCP02, to depths of 3.9 m and 4.8 m bgl, respectively. DCP01 was positioned close to the proposed underbore alignment and DCP02 was approximately 15 m north-east of the alignment. DCP test results are included in Appendix I.

Logging of the borehole was carried out according to Australian Standard AS1726-2017 and GHD's standard operating procedures. Engineering logs for borehole locations GBH01 and SBH01 are included in Appendix H. The approximate location of boreholes and DCPs are shown in Figure 2 (Appendix B). GHD recorded the approximate location with a handheld GPS with coordinates shown on the borehole log for GBH01 and have marked the actual position of the borehole on-site with a wooden stake. The DCP locations are also marked by wooden stakes.

5.2 Results

5.2.1 Western side of Abernethy's Creek

Previous geotechnical investigations have been carried by SMEC out in the general vicinity of the proposed gas pipeline relating to the proposed packing plant. Soft and very soft clay soils were encountered at SMEC borehole location SBH01 to a depth of 4 m bgl, west of Abernethy's Creek and approximately 20 m north of the proposed HDD alignment. The clays were estuarine and described as dark grey high plasticity with silts, sands and shell fragments. No anthropogenic materials were noted (SMEC, 2020). Stiff alluvial soil described as clay, with silt and trace sand, high plasticity, orange-brown mottled red-brown, becoming very stiff to hard residual clay with gravel from 6.4 m bgl. Highly weathered sandstone was encountered from 13.2 m bgl.

The subsurface conditions encountered in the recent GHD borehole (GBH01) differed from those at SBH01, however the consistency was similar where soft to very soft clayey silt was encountered between 0.1 m and 2.8 m bgl, overlying loose clayey sands from 2.8 m to 3.5 m bgl. Stiff sandy clays were encountered below 3.5 m, becoming very stiff from 5.9 m bgl. Dark grey estuarine clays with shell fragments were not encountered at GBH01. The lithology comprised alluvium overlying residual/extremely weathered rock. SBH01 appears to be situated in a transition zone for an alluvial plain deposit and an associated ASS occurrence within 1 m of the ground surface. The mapped depth to ASS increases towards Bolong Road to between 1 m and 3 m below ground surface, at the position of GBH01. This may account for the differences in lithology observed between the two boreholes.

Groundwater inflow occurred in GBH01 at 2.7 m which was deeper than the groundwater inflow observed at SBH01 which was recorded at 0.6 m bgl. The water level in Abernethy's Creek measured from the underside of the pedestrian footbridge adjacent to Bolong Road, was approximately 3.2 m. The creek bed was measured at approximately 3.45 m below the underside of the footbridge deck.

No fill or evidence of contamination such as odours, staining or asbestos containing materials (ACM) were observed at GBH01.

The soft alluvial soils encountered at GBH01 are consistent with the presence of ASS however no further testing to assess ASS has been undertaken at this stage.

5.2.2 Eastern side of Abernethy's Creek

DCP results for DCP01, close to the HDD alignment, indicate soft soils occur between 0.9 m and 1.9 m bgl, with soft to firm soils from 1.9 m to 2.5 m. DCP results for DCP02 were similar to DCP01 where soft soils occurred between 0.9 m and 2.1 m bgl. Deeper soft soils are known to occur further to the east below the BOC gas plant and on the eastern side of the plant.

6. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM is developed using information obtained from site history, site observations, land use and expected ground conditions. Once the contamination status is understood through the sampling and analysis process, the CSM then allows the assessor to evaluate the risk posed by the contamination to the identified receptor, and whether actions are required to manage that risk.

6.1 Potential sources

Site history information and site observations indicate a number of potentially contaminating activities that have occurred at the site. These activities have been identified as areas of environmental concern (AEC), which are shown on Figure 3 in Appendix B and discussed below.

6.1.1 On-site sources

- AEC 1: Fill of unknown quality and origin:
 - Based on site history, extensive filling was not expected. Fill was identified within the service trench at CBH110. Quarry product, classified as VENM, has been imported to the site to form the gravel carpark and placed below the demountable buildings to support the building foundations. Engineered fill (quarried road base) is also expected within the Bolong Road pavement. No other fill has been imported to the site. No fill or evidence of contamination such as odours, staining or ACM were observed at GBH01.
 - Limited sampling and analysis of samples representing topsoil and near surface fill (upper 0.2 m of soil profile) reported concentrations of TPH, BTEX, OCP, OPP and / or heavy metals below the adopted assessment criteria for industrial/commercial land use. Concentrations of TRH, BTEX, OCP and OPP were below the laboratory reporting limits, and heavy metal concentrations were relatively low were consistent with published background concentrations (Olszowy, Torr, & Imray, 1995, p. 17). Laboratory results were consistent with field observations where no obvious evidence of contamination was observed.
 - The section of proposed gas pipeline that connects the Shoalhaven Starches plant with the pressure reduction station is likely to pass through potential fill areas associated with the road pavements. The depth of impact and extent associated with the fill will be governed by the thickness and distribution of fill used in a particular area of a site.
 - Fill below the gravel carpark and Bolong Road is expected to be less than 0.5 m thick.
 - Based on previous investigation results and the source of fill imported to the site, the likelihood for contamination is assessed as low².
- AEC 2: Potential leaks from toilet block above ground sewerage tanks:
 - The toilet block is not connected to septic tank or sewer. Waste is collected in an above ground tank situated below the toilet building. The tank has a volume of about 3,000 to 5,000L and emptied once per week by a waste contractor where it is disposed offsite at a licenced waste facility. No leaks from the tank have occurred.
 - Contamination, if present, is expected to be localised and near surface.
 - The toilet block is a relatively new installation and therefore the likelihood for leaking sewerage tanks is low. Therefore, the likelihood of contamination was assessed as very low².

² Likelihood is the probability of contamination being present and subject to exposure during the proposed installation, categorised on a scale from high (near 100% probability of being present) to very low (near 0% probability of being present).

- AEC 3: Treated effluent releases into Abernethy's Creek and impacted catchment water:
 - Anecdotal information indicated that prior to the Council sewerage treatment plant upgrade treated effluent releases into Abernethy's Creek would occur during heavy rainfall periods. A possible algal bloom was observed in 2013 indicating a nutrient source entering the creek.
 - It is anticipated that Abernethy's Creek is regularly flushed with rainfall events, several of which have cause localised flooding (GHD, 2021b). Creek sediment may have higher nutrient and heavy metal concentrations relative to published background concentrations (Olszowy, Torr, & Imray, 1995), as it receives runoff from the adjoining catchment.
 - Based on site history and surrounding land uses, the likelihood of contamination was assessed as low².

6.1.2 Off-site sources

Historically on-site migration of treated effluent may have occurred from the sewerage treatment plant potentially impacting Abernethy's Creek. The creek also receives stormwater runoff from the adjoining catchment. Refer to AEC 3 in Section 6.1.1.

6.1.3 Contaminants of potential concern

A broad suite of contaminants of potential concern (COPC) is potentially associated with the identified sources, including:

- AEC 1: Total recoverable hydrocarbons (TRH), BTEX, polycyclic aromatic hydrocarbons (PAH), OCP, OPP, asbestos and heavy metals.
- AEC 2 and AEC 3: TRH, faecal coliforms, pathogens, nutrients, heavy metals.

6.2 Pathways

The primary pathways by which potential receptors could be exposed to the COPC outlined above, if present, are considered to be:

- Dermal contact with contaminated soils.
- Incidental ingestion of contaminated soil or dust.
- Inhalation of dust from contaminated soils.
- Inhalation of vapours/gases generated by soil contaminated by volatiles and/or semi-volatiles.
- Leaching of contaminants from impacted soil and migration into groundwater and/or surface water.

6.3 Receptors

This assessment focuses on the proposed land use associated the installation of the gas pipeline and ongoing maintenance. Accordingly, the key receptors of interest include:

- Future workers/visitors: the primary receptor is considered to be workers involved with the associated earthworks, such as those working directly working with soil and groundwater. Groundwater is likely to be encountered during drilling of the underbore below Abernethy's Creek. Individuals may also be involved in potential future construction and maintenance of site infrastructure. Other site activities are above ground for example workers walking throughout the site.
- Groundwater users: groundwater bores within 500 m were registered for monitoring purposes. The Bomaderry area uses reticulated water.
- Ecological receptor: transitory wildlife, such as frog, snakes and birds may exist within trees, shrubs grassed areas and near water bodies at or adjacent to the site. Aquatic species are likely to exist in Abernethy's Creek.

6.4 Source-pathway-receptor (SPR) linkages

For the proposed gas pipeline, the primary receptor is considered to be workers involved with the associated earthworks, such as those working directly with soil and groundwater. Earthworks associated with the installation of gas pipeline are likely to involve excavations to depths between 1 m and 3.5 m. Based on discussions with National Australian Pipelines Pty Ltd the underbore may be deeper than 3.5 m. Groundwater is likely to be intercepted in excavations deeper than 0.6 m adjacent to Abernethy's Creek. The depth to groundwater is likely to increase with increasing distance from Abernethy's Creek. Future maintenance activities may require earthworks. This exposure scenario provides an increased likelihood that workers will be in direct contact with soil, groundwater and exposed to dust and vapours via inhalation generated during excavation. Therefore, the SPR linkages could be complete if contamination exists.

Remaining activities carried out by site workers/visitors do not involve direct contact with below ground structures, soil or groundwater. Therefore, SPR linkages are considered incomplete for this scenario.

Nineteen (19) groundwater bores, registered for monitoring purposes, exist within 500 m of the site. Given that groundwater does not appear to be beneficially used within 500 m of the sites and the surrounding areas use reticulated water, groundwater users have not been identified as a receptor, therefore the SPR linkages are incomplete.

Transitory wildlife, such as frogs, snakes and birds may have direct contact with soil and surface water bodies at or adjacent to the site. Aquatic species are likely to exist in Abernethy's Creek. If contamination were present in soil or entered the waterbodies, then the SPR linkages could be complete.

6.5 CSM conclusions

Based on review of the potential source-pathway-receptor (SPR) linkages, the proposed development and future site works may provide direct contact / inhalation (i.e., vapours, dust) exposure opportunities for human and ecological receptors to contamination, if present within these AECs. Based previous and current investigation results, the likelihood for contamination to exist at the site is assessed as low and very low. Therefore, due to the likely absence of contamination at the site, the SPR linkages are considered incomplete.

7. Previous slope stability analysis

7.1 Proposed modification to pipe alignment

The proposed modification to the gas pipeline route comprises a change in direction as the pipeline approaches Bolong Road, turning to the east to cross perpendicular to Abernethy's Creek, and then continue to the gas storage plant, before crossing under Bolong Road. A slope stability analysis had previously been carried out for the portion of the pipeline aligned parallel to Abernethy's Creek to assess the potential influence of the proposed gas pipeline construction on the stability of the western bank of Abernethy's Creek (GHD, 2021b).

Assumptions made in undertaking the previous slope stability analyses were as follows:

- Subsurface conditions are based on Section A and D slope stability models in the SMEC (2020) report.
- The geometry, extent and properties of materials of the embankment at Section A, and the magnitude and locations of different loads for section A are based on the design provided in SMEC (2020) report.
- The geometry, extent and properties of materials of the third rail embankment, and the magnitude and location of different loads for Section D are based on similar assumptions included in section 4.3 in the GHD (2020) report.
- During trench excavation for gas pipeline installation, heavy equipment may be positioned along the perimeter road and will be represented by a 20 kPa load applied on the perimeter road. Construction loads are assumed to be represented and will not exceed this loading assumption.
- Any additional loading upslope (towards the perimeter road) and downslope (towards Abernethy's Creek) of the trench during construction, which are not represented by the previous bullet point (20 kPa load applied on the perimeter road), will need to be analysed at the time of construction. These possible additional loads include stockpiles, gas pipeline material, excavated material, cranes, individual heavy plant and other heavy equipment.
- The perimeter road will be founded on a structural fill embankment. However, consistent with the SMEC (2020) design, it appears that this embankment will not be constructed with a drainage layer and will not be subjected to preloading. If this is the case the road may settle differentially relative to the rail sidings.
- The preloading surcharge will involve the placement of a significant volume of fill over the structural fill placed for the rail embankments and will extend over the perimeter road formation while in place. It is assumed that SMEC has considered the rate of placement of the surcharge and subsequent likely settlement of the perimeter road formation.
- We understand the gas pipeline will not be installed prior or during preloading duration to avoid any differential settlement.
- We have not conducted settlement/consolidation analysis for the third rail siding embankment, perimeter road and on the trench excavation post reinstatement.
- If the creek bank profile changes significantly (e.g., by erosion causing collapse or undercutting of bank, formation of a steeper profile below water, or significant loss of vegetation over the banks), then the stability of the creek bank should be re-assessed.
- If the overall embankment formation between the Packing Plant and Abernethy's Creek (e.g., thickness of the structural fill material, geometry) changes from the current design, then the stability of the embankment and the creek bank should be re-assessed.

7.2 Results of previous stability analysis

The results of the stability analyses previously undertaken for the section of pipeline running parallel to Abernethy's Creek are summarised in Table 7.1 below, including resulting Factors of Safety (FoS) for the different sections and groundwater conditions, and the required minimum FoS. The required minimum FoS are reasonable values for the embankment life stage and groundwater conditions which are consistent with the SMEC (2020) report.

We note that the FoS values for section A that include the trench excavation are lower compared to section A without trench excavation which is expected. The FoS values for section D with trench excavation are higher than section D without trench excavation, due to the slip surface in the former intersecting the perimeter road embankment.

Table 7.1 *Summary of slope stability analyses*

Scenario No.	Section	Groundwater condition	FoS with trench excavation	FoS without trench excavation	Required minimum FoS
1	A	Normal	2.33	2.64	1.30
2	A	Flood	1.53	1.60	1.20
3	D	Normal	1.84	1.73	1.50
4	D	Flood	1.71	1.61	1.20

The analyses showed that the failure scenarios are driven by slope instability within the rail embankment and are limited to the perimeter road embankment. All scenarios considered have an FoS greater than the required minimum, indicating stable conditions based on the current design of the rail embankment and proposed trench excavation depth for the gas pipeline construction.

Hence, we concluded that excavation of 1 m deep trench for the gas pipeline construction within or adjacent to the Packing Plant development will not adversely affect the stability of the western bank of Abernethy's Creek.

The slope stability analyses are based on the assumptions outlined above. If any aspects of the assumptions made are incorrect or significant changes occur to the current site conditions or proposed development, then GHD should be notified, and the analyses should be re-assessed.

7.3 **Effect of modified gas pipeline route on stability of banks of Abernethy's Creek**

The proposed modification to the gas pipeline route to the east and west of Abernethy's Creek (as shown in Figure 1 in Appendix B) should not adversely affect the stability of the banks of Abernethy's Creek, as the pipeline will be aligned perpendicular to the creek.

In regard to the HDD crossing under Abernethy's Creek, our recent subsurface investigation has confirmed the presence of soft to very soft soils and likely ASS at this location. The soft soils were found to overlie stiff alluvial clays. The underside of soft clay soils and/or loose clayey sands occurred at approximately 3.5 m on the western side of the creek to 2.5 m on the eastern side. The HDD design and construction methodology will need to take into account these soil conditions and proximity to the creek bed in order to manage the risk of frac-out and collapse of the soft soils during the pipe installation. An experienced HDD contractor has been engaged by Manildra to undertake the pipeline installation and the contractor will provide a detailed design and a construction methodology prior to commencement.

It is noted that the presence and depth of soft or very soft soils can vary significantly within the alluvial plain area within and around the Manildra Plant due to the presence of paleochannels (ancient infill channels).

8. Discussion and conclusions

8.1 Geotechnical

The new alignment extends east from the GPRF, passing under Abernethy's Creek, then continues south across Bolong Road terminating near Fermenter No. 2. The objective of the geotechnical assessment was to advise on the effects on the stability of the banks of Abernethy's Creek due the proposed underboring (HDD) for the gas pipeline.

In regard to the HDD crossing under Abernethy's Creek, our recent subsurface investigation has confirmed the presence of soft to very soft soils and likely ASS at this location. The soft soils were found to overlie stiff alluvial clays. The underside of soft clay soils and/or loose clayey sands occurred at approximately 3.5m on the western side of the creek to 2.5m on the eastern side. The HDD design and construction methodology will need to take into account these soil conditions and proximity to the creek bed in order to manage the risk of frac-out and collapse of the soft soils during the pipe installation. An experienced HDD contractor has been engaged by Manildra to undertake the pipeline installation and the contractor will provide a detailed design and a construction methodology prior to commencement.

Based on the additional subsurface information on the western and eastern sides of the creek and the recommended control measures to be implemented by the HDD contractor, the proposed HDD crossing for the low pressure gas pipeline under the creek should not result in an increased risk of slope instability of the creek banks for this section of Abernethy's Creek.

It is noted that the presence and depth of soft or very soft soils can vary significantly within the alluvial plain area within and around the Manildra Plant due to the presence of paleochannels (ancient infill channels).

8.2 Contamination

Site history information indicated that between 1949 and 1984 the area where the site is located appeared undeveloped and vegetated with grass. Bolong Road was evident since 1949, initially as an unsealed road but becoming sealed at some stage in the 1960's. The site formed of a larger parcel of land, which extended north-east which appeared to be used for agricultural purposes. Between 2002 and 2012, the site and surrounding areas were developed. By 2002, the carbon dioxide gas installation and natural gas installation facilities had been installed north-east of the site. By 2010, the gas station had been constructed along with demountable buildings, gravel carpark and turning lane off Bolong Road. Between 2012 and 2021, shipping containers, toilet block and additional demountable structures were progressively added to the site and surrounding area. Imported gravel fill for the carpark and below buildings was classified as VENM. No other fill has been imported to the site.

Previous investigations did not identify soil contamination at the site that exceeded commercial / industrial assessment criteria (NEPC, 2013). For groundwater, lead and zinc concentrations exceeded the adopted assessment criteria (ANZECC/ARMCANZ, 2000). The source of zinc and lead was not identified but could have been associated with background concentrations. Faecal coliform concentrations were below the reporting limit suggesting leaks from the sewer main were not occurring in the vicinity of the groundwater monitoring well. It was concluded that the heavy metal impacts were not significant and did not warrant further investigation (ES, 2016).

Based on previous and current investigation results, potential for contamination was identified in three areas of environmental concern (AECs), which included:

- AEC 1: Fill of unknown quality and origin.
- AEC 2: Potential leaks from toilet block above ground sewerage tanks.
- AEC 3: Treated effluent releases into Abernethy's Creek and impacted catchment water.

Based on review of the potential source-pathway-receptor (SPR) linkages, the proposed development and future site works may provide direct contact / inhalation (i.e., vapours, dust) exposure opportunities for human and ecological receptors to contamination, if present within these AECs. Based previous and current investigation results, the likelihood for contamination to exist at the site is assessed as low and very low. Therefore, due to the likely absence of contamination at the site, the SPR linkages are considered incomplete. No further investigation is warranted.

Although the likelihood for contamination was assessed as low, it is recommended that a Construction Environmental Management Plan (CEMP) be prepared to manage the occurrence of potential contamination, buried waste, demolition waste, ACM, etc. in all parts of the site during construction. The CEMP should also include an Unexpected Finds Protocol (UFP). It is noted that GHD has prepared a CEMP on behalf of the National Australian Pipelines Pty Ltd (contracted by Manildra), contracted by Manildra for the installation of the proposed gas pipeline.

8.3 Acid sulfate soil

Based on previous investigation results, ASS are likely to be encountered within the lower lying areas, in the north and east, adjacent to Abernethy's Creek. ASS are likely to be sporadic and possibly occur in lenses. Soft to very soft soils were encountered approximately adjacent to Abernethy's Creek, to depths between 4.0 m and 9.8 m bgl. The clays were estuarine and described as dark grey high plasticity with silts, sands and shell fragments. The section of the proposed gas pipeline crossing Abernethy's Creek will pass through these soft soil areas and likely to intercept ASS, and groundwater. The additional geotechnical assessment encountered a zone of soft alluvial soils at GBH01 consistent with the presence of ASS.

An acid sulfate soil management plan (ASSMP) should be prepared to appropriately manage the disturbance of ASS and mitigating potential acid generation and impacts to groundwater and adjacent waterbodies. It is noted that GHD has prepared an ASSMP on behalf of the National Australian Pipelines Pty Ltd (contracted by Manildra), for the installation of the proposed gas pipeline. The ASSMP is a subplan to the CEMP.

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Appendices

Appendix A

General Notes

GENERAL NOTES



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To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the report are excluded unless they are expressly stated to apply in the report.

TEST HOLE LOGGING

The information on the test hole logs (boreholes, test pits, exposures etc.) is based on a visual and tactile assessment, except at the discrete locations where test information is available (field and/or laboratory results). The test hole logs include both factual data and inferred information. Moreover, the location of test holes should be considered approximate, unless noted otherwise (refer report). Reference should also be made to the relevant standard sheets for the explanation of logging procedures (Soil and Rock Descriptions, Core Log Sheet Notes etc.).

GROUNDWATER

Unless otherwise indicated, the water depths presented on the test hole logs are the depths of free water or seepage in the test hole recorded at the given time of measuring. The actual groundwater depth may differ from this recorded depth depending on material permeabilities (i.e. depending on response time of the measuring instrument). Further, variations of this depth could occur with time due to such effects as seasonal, environmental and tidal fluctuations or construction activities such as a change in ground surface level. Confirmation of groundwater levels, phreatic surfaces or piezometric pressures can only be made by appropriate surveys, instrumentation techniques and monitoring programmes.

INTERPRETATION OF RESULTS

The discussion or recommendations contained within this report normally are based on a site evaluation from discrete test hole data, often with only approximate locations (e.g. GPS). Generalised, idealised or inferred subsurface conditions (including any geotechnical cross-sections) have been assumed or prepared by interpolation and/or extrapolation of these data. As such these conditions are an interpretation and must be considered as a guide only.

CHANGE IN CONDITIONS

Local variations or anomalies in ground conditions do occur in the natural environment, particularly between discrete test hole locations or available observation sites. Additionally, certain design or construction procedures may have been assumed in assessing the soil-structure interaction behaviour of the site. Furthermore, conditions may change at the site from those encountered at the time of the geotechnical investigation through construction activities and constantly changing natural processes.

Any change in design, in construction methods, or in ground conditions as noted during construction, from those assumed or reported should be referred to GHD for appropriate assessment and comment.

GEOTECHNICAL VERIFICATION

Verification of the geotechnical assumptions and/or model is an integral part of the design process - investigation, construction verification, and performance monitoring. Variability is a feature of the natural environment and, in many instances, verification of soil or rock quality, or foundation levels, is required. There may be a requirement to extend foundation depths, to modify a foundation system and/or to conduct monitoring as a result of this natural variability. Allowance for verification by appropriate geotechnical personnel must be recognised and programmed for construction.

FOUNDATIONS

Where referred to in the report, the soil or rock quality, or the recommended depth of any foundation (piles, caissons, footings etc.) is an engineering estimate. The estimate is influenced, and perhaps limited, by the fieldwork method and testing carried out in connection with the site investigation, and other pertinent information as has been made available. The material quality and/or foundation depth remains, however, an estimate and therefore liable to variation. Foundation drawings, designs and specifications should provide for variations in the final depth, depending upon the ground conditions at each point of support, and allow for geotechnical verification.

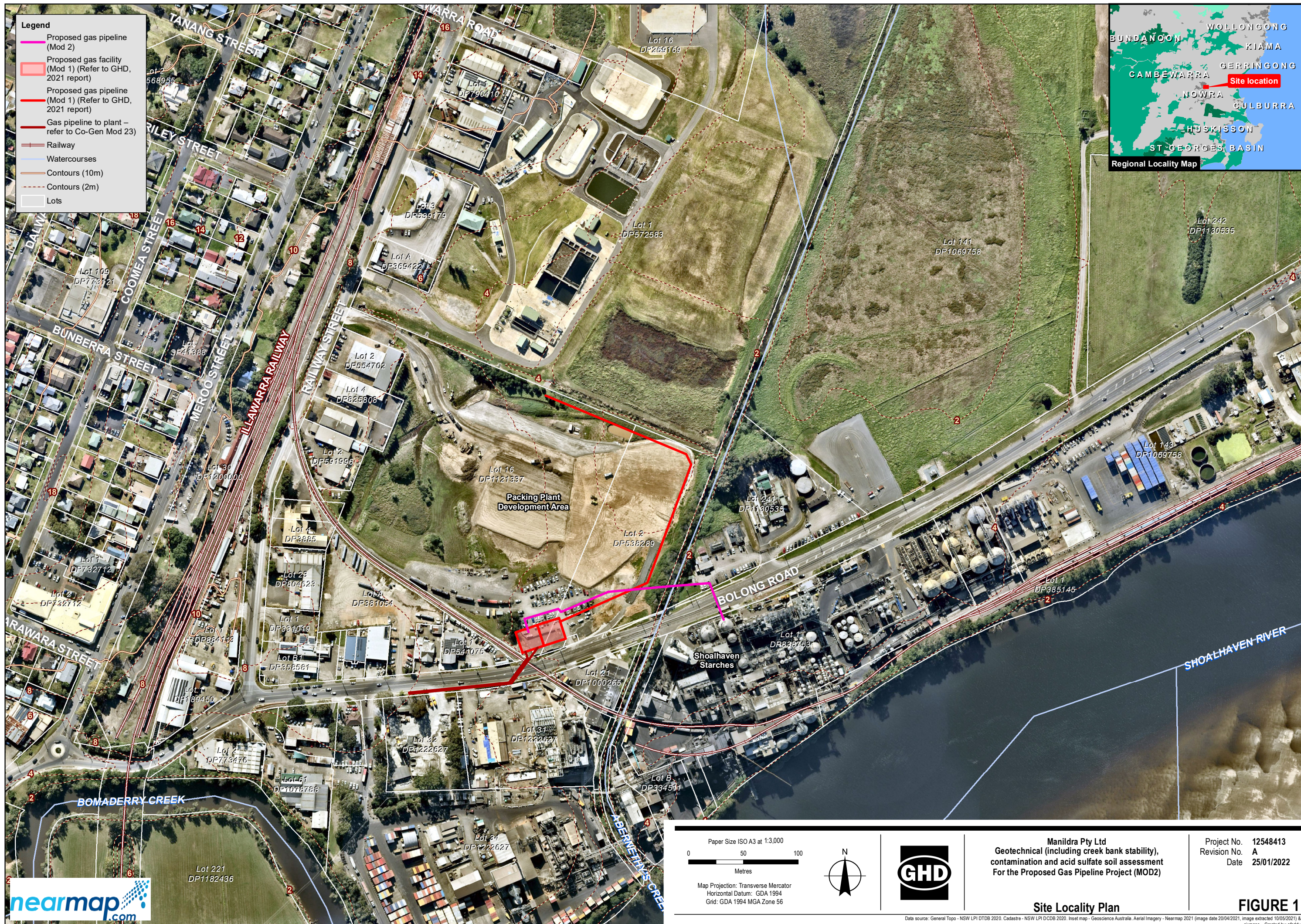
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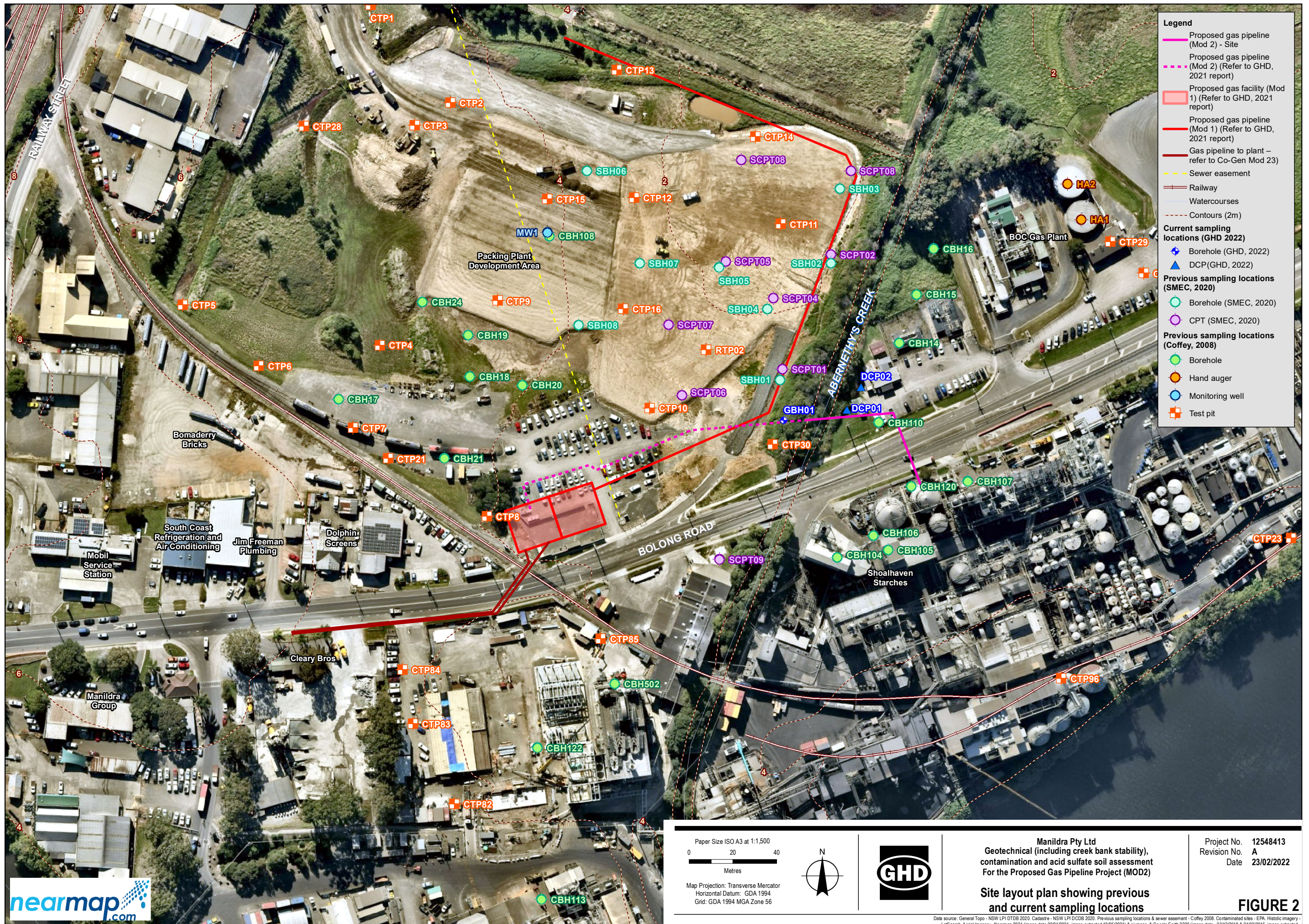
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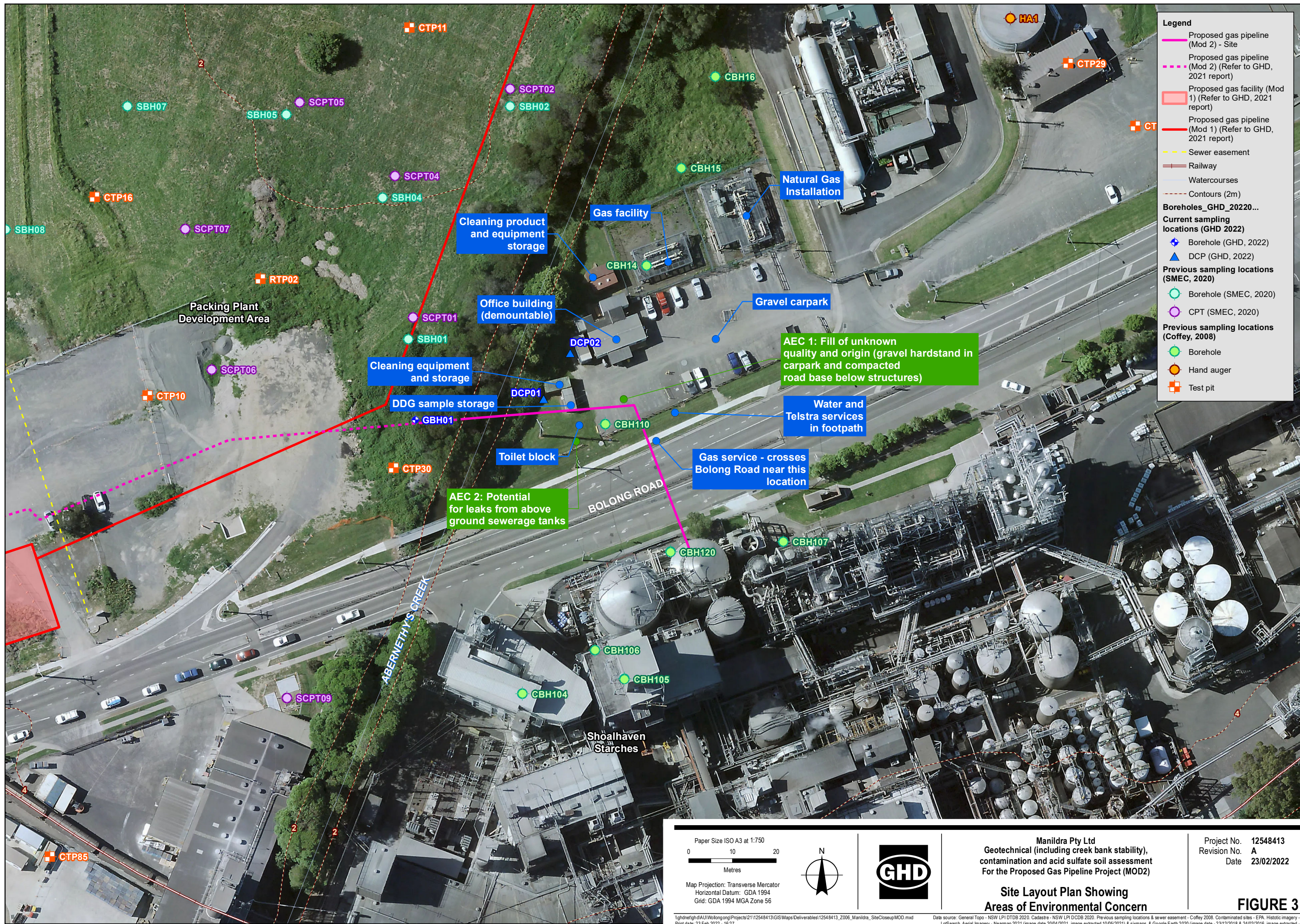
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Appendix B

Figures

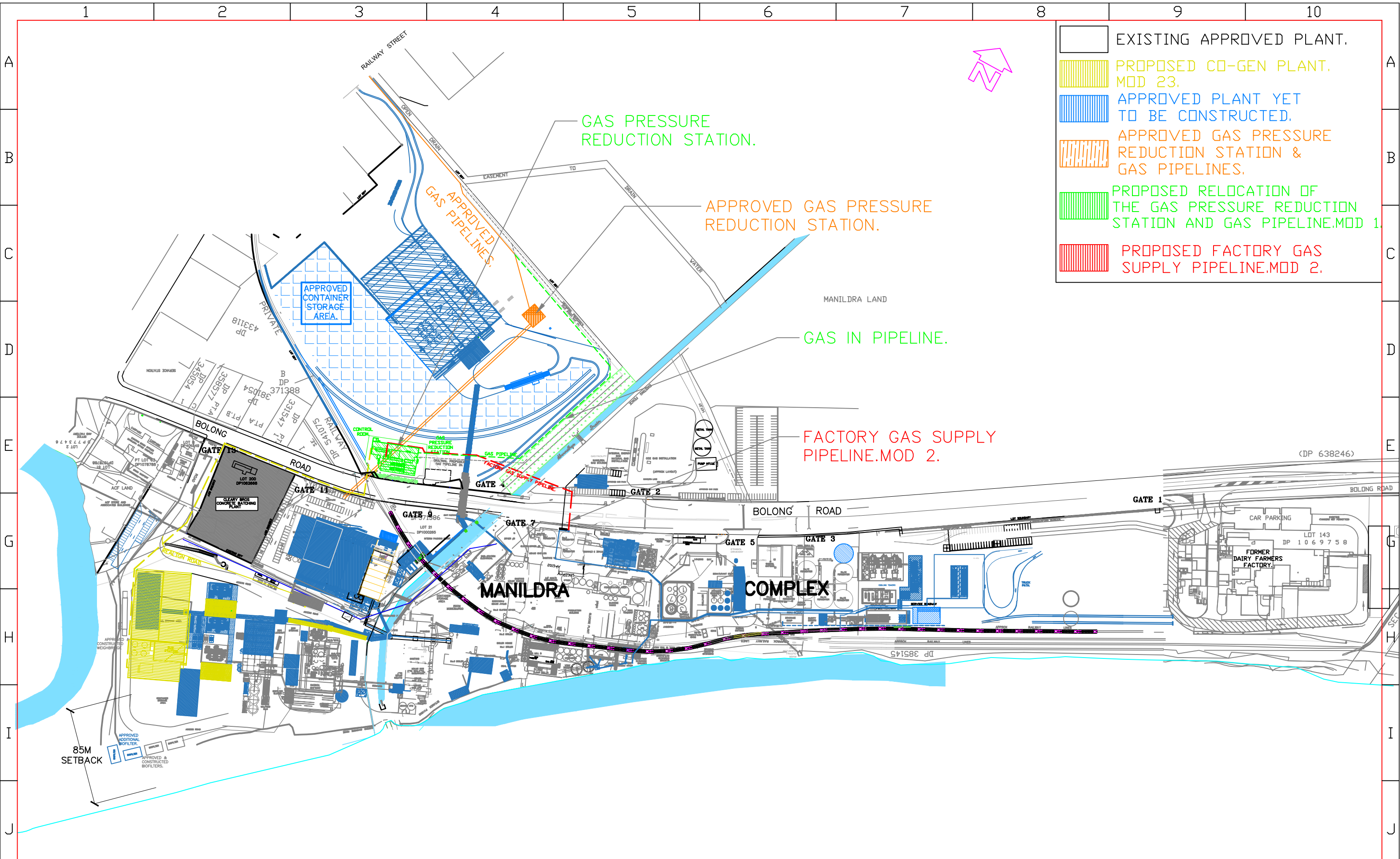






Appendix C

Proposed development drawings



REV	ZONE	DETAILS	DRN	DATE	CHKD	APPD
P05	E5	Gas pipeline moved to 19m from creek bdy.	P.C.	17-12-21	B.H.	
P04	E3	Fence realigned.	P.C.	2-11-21	B.H.	
P03	E3	Station refined.	P.C.	27-10-21	B.H.	
P02	ALL	Low pressure realigned.	P.C.	06-10-21	B.H.	
P01	ALL	Mod 2.	P.C.	06-10-21	B.H.	



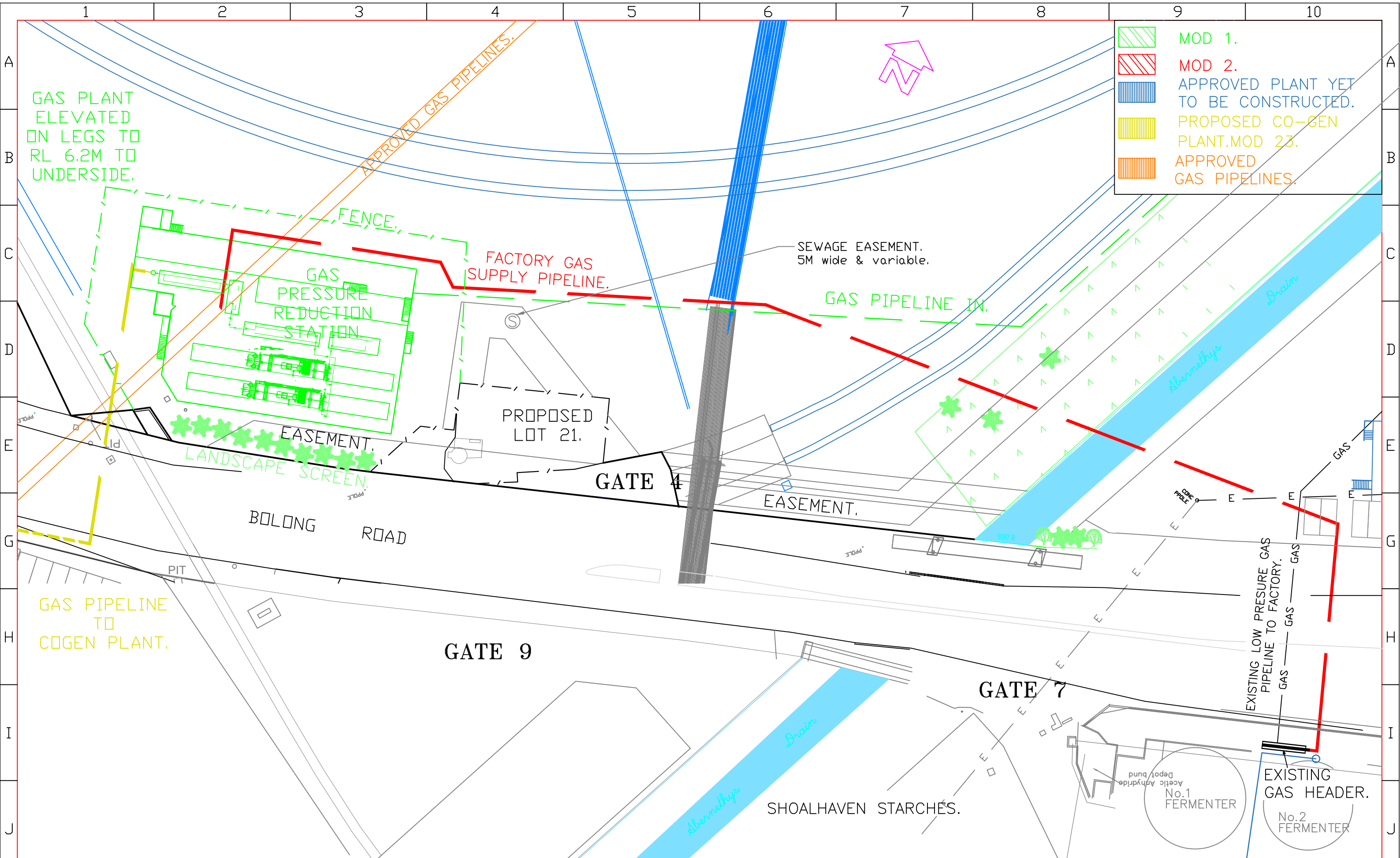
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DRAWN PC	DATE 06-10-21	SITE MANILDRA-SHOALHAVEN STARCHES PTY LTD	SHT SIZE A3
DESIGNED. PW	DATE	JOB TITLE NOWRA PLANT.	SHEET
CHKD SR	DATE	DWG TITLE GAS FACILITY.MOD 2.	OF
APPD BH	DATE	OVER ALL PLANT PLAN.	REV. P05
SCALE 1:3000	PROJECT No. 7208A	DWG No. MN7297-100	



K	P06	G10	Gas line in setback was 15m from creek.	P.C.	17-12-21	B.H.
	P05	G5	Fence realigned.Lot 21 now proposed.	P.C.	3-11-21	B.H.
	P04	G5	Fence realigned.	P.C.	2-11-21	B.H.
	P03	ALL	Station refined lot boundary/easements defined. Station raised 500mm.	P.C.	27/10/21	B.H.
	P02	ALL	Low pressure realigned.	P.C.	6/10/21	B.H.
	P01	ALL	Mod 2.	P.C.	6/10/21	B.H.
	REV	ZONE	DETAILS	DRN	DATE	CHKD



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P.C.	DATE	SHOALHAVEN STARCHES.BOMADERRY.	A3
CHKD B.H.	06/10/21	DWG TITLE GAS FACILITY.MOD 2.	
APPD	DATE	FACTORY GAS SUPPLY PIPELINE.SITE PLAN.	REV.
SCALE 1:500	PROJECT No.	7297	MN7297-101
			P06

Appendix D

Aerial photographs



LOTSEARCH

LOTSEARCH AERIALS

Date: 30 Jun 2020

Reference: LS013205 EA

Address: 160 Bolong Road, Bomaderry, NSW 2541

Aerial Imagery 2019

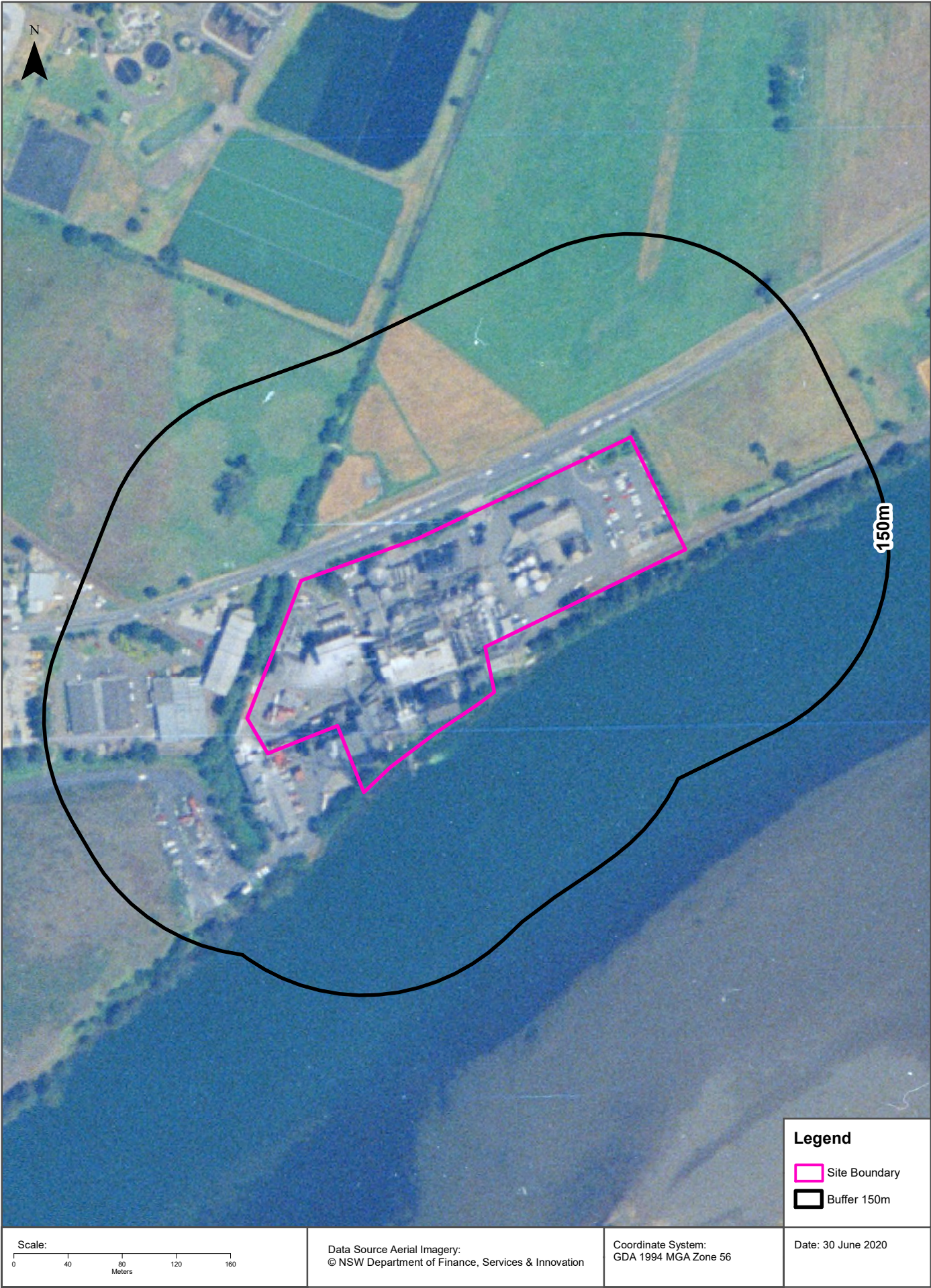
160 Bolong Road, Bomaderry, NSW 2541



Aerial Imagery 2012

160 Bolong Road, Bomaderry, NSW 2541











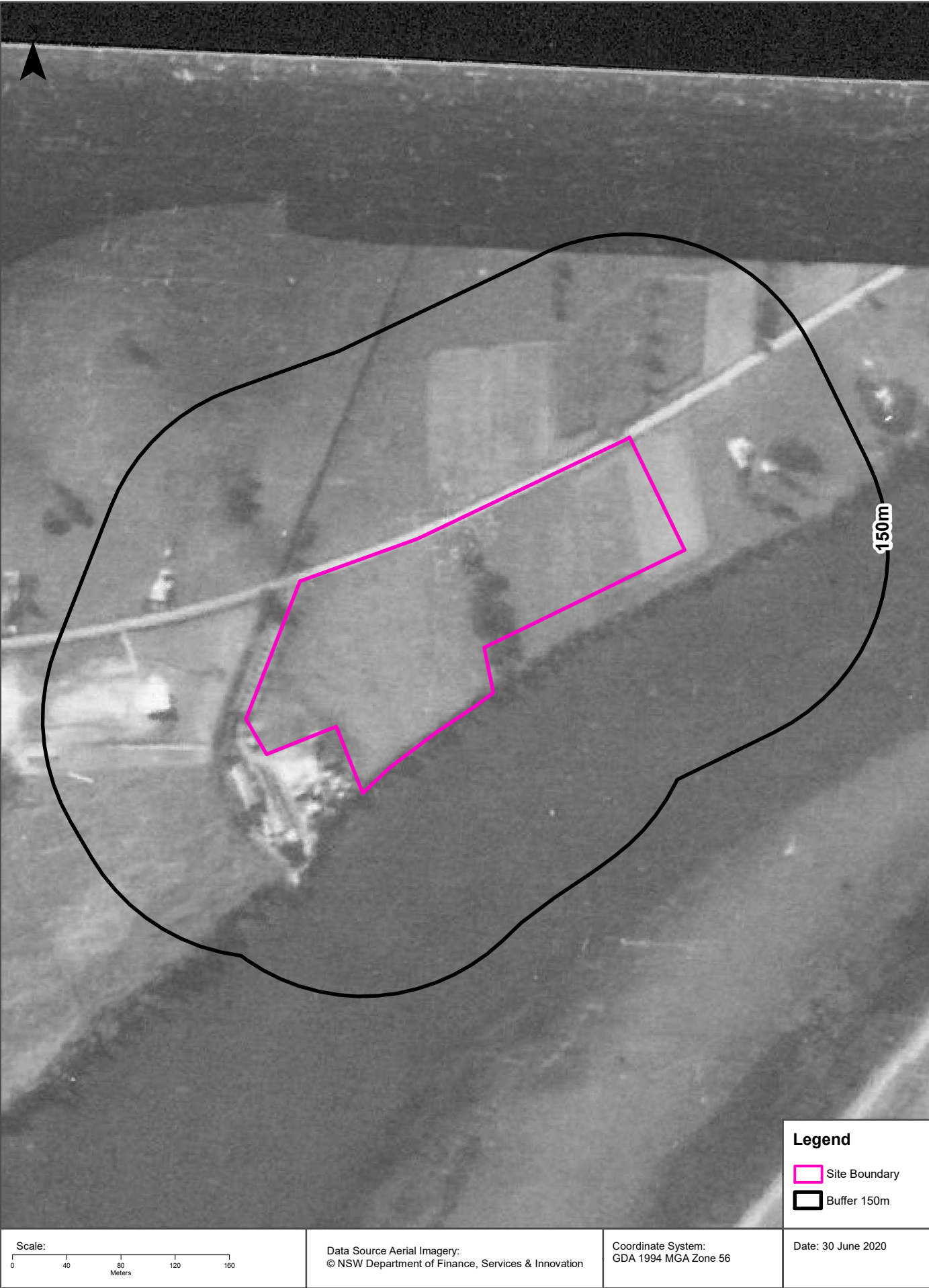






Aerial Imagery 1949

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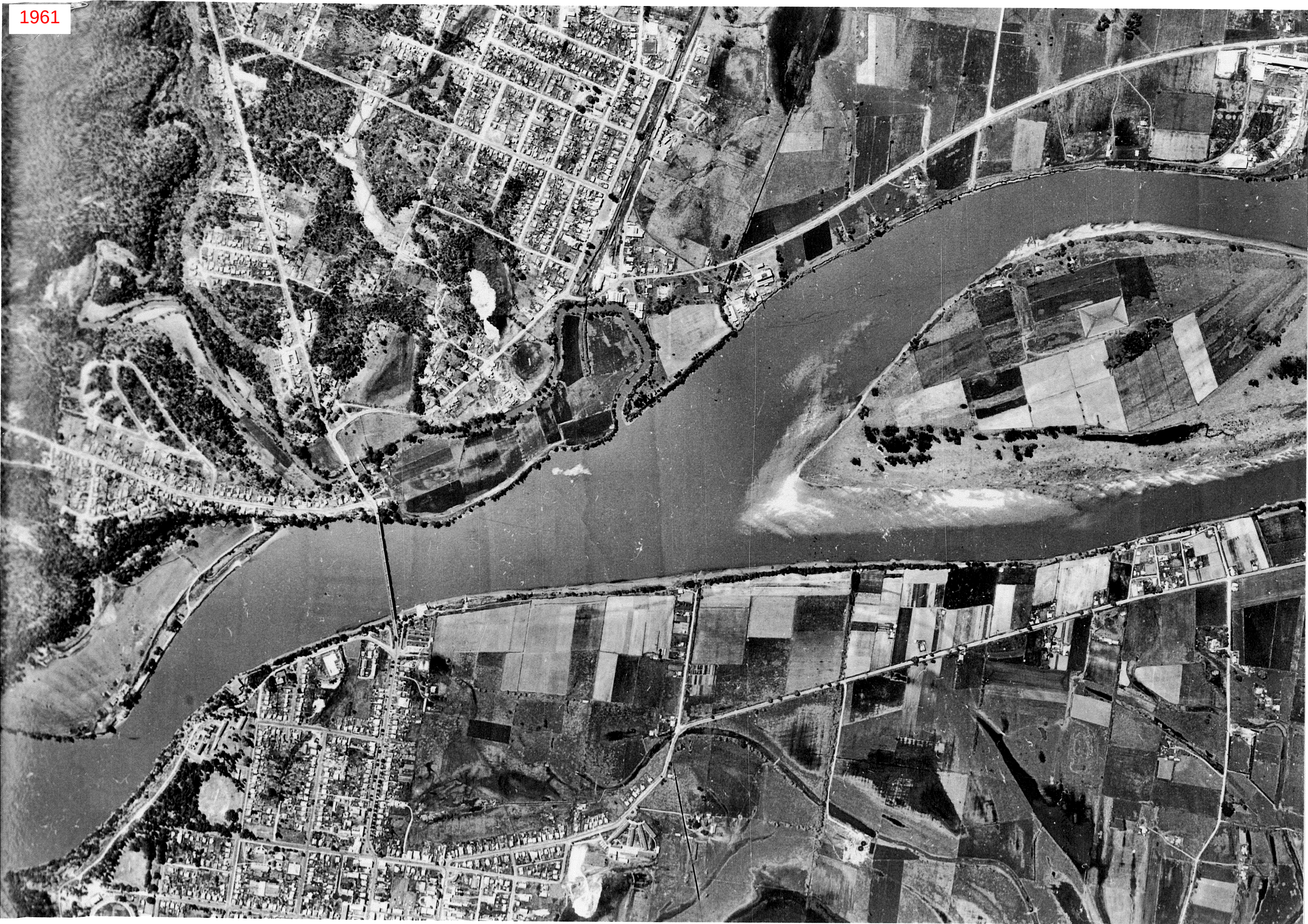
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 - (b) any loss of profit, loss of revenue, loss of interest, loss of data, loss of goodwill or loss of business opportunities, business interruption arising directly or indirectly out of or in relation to the Report or these Terms,irrespective of how that liability arises including in contract or tort, liability under indemnity or for any other common law, equitable or statutory cause of action or otherwise.
 12. These Terms are subject to New South Wales law.

1960's



1961



1974



1979



1984



1984



1993



2002



Appendix E

NSW EPA Registers

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
BOMADERRY	Caltex Service Station	341 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.84561952	150.5946978
BOMADERRY	Caltex Service Station Bomaderry	246 Princes HIGHWAY	Service Station	Regulation under CLM Act not required	-34.83833824	150.5958799
BOMADERRY	Former Mobil Emoleum Depot	7 Victa WAY	Other Petroleum	Regulation under CLM Act not required	-34.84454618	150.6139462
BOMADERRY	Former Shell Depot	44 Railway STREET	Other Petroleum	Regulation under CLM Act not required	-34.85193621	150.6117038
BOMADERRY	SRA Land	Lot 2 Merroo STREET	Unclassified	Regulation under CLM Act not required	-34.85314813	150.6099573
BOMADERRY	Bomaderry Works Depot	10 McIntyre WAY	Other Petroleum	Regulation under CLM Act not required	-34.84576748	150.6131411
BOMADERRY	Commercial Land	320 Princes HIGHWAY	Other Industry	Contamination currently regulated under CLM Act	-34.84424073	150.5958149

Search results

Your search for:LGA: SHOALHAVEN CITY COUNCIL

Matched 14 notices relating to 3 sites.

[Search Again](#)

[Refine Search](#)

Suburb	Address	Site Name	Notices related to this site
BOMADERRY	320 Princes HIGHWAY	Commercial Land	2 current
NOWRA	Lamonds LANE	Former gasworks	1 current and 5 former
NOWRA EAST	Lot 3 Kalandar STREET	Mobil Service Station	6 former

Page 1 of 1

19 December 2021

For business and industry ^

For local government ^

Contact us

131 555 (tel:131555)

Online (<https://yoursay.epa.nsw.gov.au/epa-website-feedback>)

info@epa.nsw.gov.au (<mailto:info@epa.nsw.gov.au>)

EPA Office Locations (<https://www.epa.nsw.gov.au/about-us/contact-us/locations>)

Accessibility (<https://www.epa.nsw.gov.au/about-us/contact-us/website-service-standards/help-index>)

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NSW EPA - EPL Search Results for Bomaderry

Number	Name	Location	Type	Status	Issued date
1587374		PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	7-Nov-19
1590386		PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	20-Feb-20
1598968		8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	22-Oct-20
1602470		PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	18-Nov-20
1606327		PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	4-Mar-21
1614613		PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	8-Dec-21
2534	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	POEO licence	Surrendered	9-Oct-00
1003065	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	4-Jan-01
1012594	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	21-Jul-03
1035240	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	17-May-04
1043465	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	10-Feb-05
1059795	AUSTRALIAN CO-OPERATIVE FOODS LIMITED	220 BOLONG ROAD, BOMADERRY, NSW 2541	s.80 Surrender of a Licence	Issued	3-May-06
11164	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	POEO licence	Issued	12-Dec-00
1035676	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	25-Jun-04
1048156	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	17-Jun-05
1513148	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	2-Apr-13
1516480	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	26-Aug-13
1514411	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	26-Aug-13
1529674	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	8-Apr-15
1580777	BOC LIMITED	LOT 241 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	25-Jun-19
58	CLEARY BROS (BOMBO) PTY LTD	LOT 3 BOLONG ROAD, BOMADERRY, NSW 2541	POEO licence	No longer in force	19-Nov-99
1009284	CLEARY BROS (BOMBO) PTY LTD	LOT 3 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	6-Aug-01
21029	DOWNER EDI WORKS PTY LTD	PRINCES HIGHWAY, BOMADERRY, NSW 2541	POEO licence	Issued	25-May-18
1567284	DOWNER EDI WORKS PTY LTD	PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	18-Sep-18
1572434	DOWNER EDI WORKS PTY LTD	PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	30-Nov-18
1577345	DOWNER EDI WORKS PTY LTD	PRINCES HIGHWAY, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	19-Mar-19
566	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	POEO licence	Surrendered	15-Feb-00
1004205	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	27-Feb-01
1010261	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	10-Jan-02
1035034	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	5-Mar-04
1044586	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	14-Mar-05
1071922	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	3-Apr-07
1084599	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	2-May-08
1085840	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	27-Jun-08
1516476	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	23-Aug-13
1513902	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	10-Sep-13
1517150	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	17-Sep-13

1531909	PAPER AUSTRALIA PTY LTD	340 BOLONG ROAD, BOMADERRY, NSW 2541	s.80 Surrender of a Licence	Issued	16-Sep-15
20759	QSSR PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	POEO licence	Issued	7-Oct-16
3173528912	QSSR PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	Penalty Notice	Issued	9-Apr-20
1735	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	POEO licence	Issued	5-Jan-01
1013003	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	4-Apr-02
1029195	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	14-Aug-03
1048456	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	21-Jun-05
1060655	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	26-Jun-06
1085947	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	16-May-08
1514246	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	Compliance Audit	Complete	25-Jul-14
1526880	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	10-Dec-14
1531920	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	7-Jul-15
1539716	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	11-May-16
1548579	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	19-Jan-17
1573990	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	19-Dec-18
1575832	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	17-Apr-19
1588625	SHOALHAVEN CITY COUNCIL	RAILWAY STREET, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	13-May-20
883	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	POEO licence	Issued	24-Oct-00
1004267	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	4-Apr-01
1007313	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	11-May-01
1015342	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	26-Feb-02
1019838	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	15-Aug-02
1024268	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	11-Feb-03
1026281	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	17-Apr-03
1027489	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	26-Nov-03
1033645	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	1-Mar-04
1036799	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	29-Jun-04
1039275	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	20-May-05
1048817	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	28-Jul-05
1051704	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	31-Oct-05
1054751	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	21-Feb-06
1080589	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	31-Mar-08
1091373	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.96 Prevention Notice	Issued	4-Sep-08
1093973	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	27-Nov-08
1097588	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	10-Feb-09
1098548	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	9-Apr-09
1104957	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	14-Aug-09
1113256	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.91 Clean Up Notice	Issued	3-May-10

1500684	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	4-Aug-11
1501899	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	30-Sep-11
1513143	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	28-Mar-13
1505439	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	8-Nov-13
1521553	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	28-Apr-14
1522954	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	27-Jun-14
1513905	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	25-Jul-14
1523522	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	30-Jul-14
1525338	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	8-Oct-14
1530188	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	23-Jul-15
1536447	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	18-Dec-15
1546622	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	15-Nov-16
3173525621	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	Penalty Notice	Issued	18-May-18
1564529	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	20-Jun-18
1571114	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	23-Oct-18
1599081	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	Compliance Audit	Complete	21-Aug-20
1609025	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	1-Jun-21
1613002	SHOALHAVEN STARCHES PTY LTD	160 BOLONG ROAD, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	9-Nov-21
1559940	SOUTH COAST PLANT HIRE PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	s.91 Clean Up Notice	Issued	22-Dec-17
3173525310	SOUTH COAST PLANT HIRE PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	Penalty Notice	Issued	19-Apr-18
3173525704	SOUTH COAST PLANT HIRE PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	Penalty Notice	Issued	24-May-18
3173525740	SOUTH COAST PLANT HIRE PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	Penalty Notice	Issued	24-May-18
1576498	SOUTH COAST PLANT HIRE PTY LTD	8, 9, 10 & 11 Victa Way, BOMADERRY, NSW 2541	s.58 Licence Variation	Issued	8-May-19
21178	SUPAGAS PTY LIMITED	220 Bolong Road, BOMADERRY, NSW 2541	POEO licence	Issued	23-Oct-18

Licence Variation

Licence - 883



SHOALHAVEN STARCHES PTY LTD
ABN 94 000 045 045
PO BOX 123
NOWRA NSW 2541

Attention: John Studdert

Notice Number 1613002
File Number EF13/3577
Date 09-Nov-2021

NOTICE OF VARIATION OF LICENCE NO. 883

BACKGROUND

- A. SHOALHAVEN STARCHES PTY LTD ("the licensee") is the holder of Environment Protection Licence No. 883 ("the licence") issued under the *Protection of the Environment Operations Act 1997* ("the Act"). The licence authorises the carrying out of activities at 160 BOLONG ROAD, BOMADERRY, NSW, 2541 ("the premises").
- B. On 17 August 2021, the Licensee submitted a Discharge Characterisation Assessment in accordance with Condition U1: Part 1 - Characterising the discharge and receiving environment as part of a Pollution Reduction Study (PRS) on the licence. The Environment Protection Authority (EPA) has reviewed the assessment and have considered it appropriate to proceed into Part 2 - Mixing zone assessment and modelling.
- C. The EPA have also considered it appropriate to remove Condition E1 Post Commissioning Air Emissions Report as the Licensee has met all requirements of this condition.

VARIATION OF LICENCE NO. 883

1. By this notice the EPA varies licence No. 883. The attached licence document contains all variations that are made to the licence by this notice.
2. The following variations have been made to the licence:
 - Removal of Part 1 of the Pollution Reduction Study: "Discharge Characterisation Assessment";
 - Addition of Part 2 of the Pollution Reduction Study: "Mixing Zone Assessment and Modelling";
 - Removal of Condition E1

Licence Variation



.....
Matthew Rizzuto
Acting Manager
Environment Protection Authority
(by Delegation)

INFORMATION ABOUT THIS NOTICE

- This notice is issued under section 58(5) of the Act.
- Details provided in this notice, along with an updated version of the licence, will be available on the EPA's Public Register (<http://www.epa.nsw.gov.au/prpoeo/index.htm>) in accordance with section 308 of the Act.

Appeals against this decision

- You can appeal to the Land and Environment Court against this decision. The deadline for lodging the appeal is 21 days after you were given notice of this decision.

When this notice begins to operate

- The variations to the licence specified in this notice begin to operate immediately from the date of this notice, unless another date is specified in this notice.
- If an appeal is made against this decision to vary the licence and the Land and Environment Court directs that the decision is stayed the decision does not operate until the stay ceases to have effect or the Land and Environment Court confirms the decision or the appeal is withdrawn (whichever occurs first).



Environment Protection Licence

Licence - 883

<u>Licence Details</u>	
Number:	883
Anniversary Date:	30-April

<u>Licensee</u>
SHOALHAVEN STARCHES PTY LTD
PO BOX 123
NOWRA NSW 2541

<u>Premises</u>
SHOALHAVEN STARCHES PTY LTD
160 BOLONG ROAD
BOMADERRY NSW 2541

<u>Scheduled Activity</u>
Agricultural processing
Chemical production
Chemical storage

<u>Fee Based Activity</u>	<u>Scale</u>
Dangerous goods production	> 25000 T annual production capacity
General agricultural processing	> 250000 T annual processing capacity
General chemicals storage	0-5000 kL storage capacity

<u>Contact Us</u>
NSW EPA
4 Parramatta Square
12 Darcy Street
PARRAMATTA NSW 2150
Phone: 131 555
Email: info@epa.nsw.gov.au
Locked Bag 5022
PARRAMATTA NSW 2124



Environment Protection Licence

Licence - 883

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Environment Protection Licence

Licence - 883

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Environment Protection Licence

Licence - 883

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).



Environment Protection Licence

Licence - 883

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

SHOALHAVEN STARCHES PTY LTD
PO BOX 123
NOWRA NSW 2541

subject to the conditions which follow.

Environment Protection Licence

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1 Administrative Conditions

A1 What the licence authorises and regulates

- A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Chemical production	Dangerous goods production	> 25000 T annual production capacity
Agricultural processing	General agricultural processing	> 250000 T annual processing capacity
Chemical storage	General chemicals storage	0 - 5000 kL storage capacity

A2 Premises or plant to which this licence applies

- A2.1 The licence applies to the following premises:

Premises Details
SHOALHAVEN STARCHES PTY LTD
160 BOLONG ROAD
BOMADERRY
NSW 2541
SEE LOCALITY PLAN TITLED "MANILDRA GROUP - LANDHOLDING - BOMADERRY" (REFERENCE NO. 23134B) PREPARED BY ALLEN PRICE & ASSOCIATES DATED 23 JULY 2013 FOR FULL LIST OF DEPOSITED PLANS AND LOT DETAILS - EPA FILE REFERENCE DOC14/133146.

- A2.2 This licence does not apply to the section of land on Lot 143 DP 1069758 as identified in EPA file DOC18/772565 and to which Environment Protection Licence Number 21178 applies.

A3 Other activities

- A3.1 This licence applies to all other activities carried on at the premises, including:

Ancillary Activity
Non-scheduled activity -Meat processing at 220 Bolong Rd, Bomaderry, Lot143 DP1069758 as per DA14/1327 issued by SCC 9/7/14

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A4 Information supplied to the EPA

- A4.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:

- a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

- P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

<i>Air</i>			
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
8	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 1 gluten dryer baghouse emission point labelled "8" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
9	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 2 gluten dryer/starch dryer baghouse emissions point labelled "9" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
10	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 3. gluten dryer baghouse emissions point labelled "10" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
11	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 4 gluten dryer baghouse emissions point labelled "11" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
12	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 1 Starch dryer scrubber discharge point labelled "12" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
13	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 3 Starch dryer scrubber discharge point labelled "13" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).

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14	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 4 Starch dryer scrubber discharge point labelled "14" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
16	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	Carbon dioxide scrubber discharge point labelled "16" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
19	Air emissions monitoring		Treated effluent storage dam 1 labelled "19" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
20	Air emissions monitoring		Treated effluent storage dam 2 labelled "20" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
21	Air emissions monitoring		Treated effluent storage dam 3 labelled "21" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
23	Air emissions monitoring		Treated effluent storage dam 5 labelled "23" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
24	Air emissions monitoring		Treated effluent storage dam 6 labelled "24" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
25	Air emission monitoring		Sulphur oxidisation pond labelled "25" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
33	Meteorological monitoring		Weather monitoring station located within the utilisation area labelled "33" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" 23 July 2013 (DOC13/75672).
35	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	Combined boiler stack for number 5 and 6 boilers labelled "35" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
39	Air emissions monitoring		Inlet pipe to biofilters A and B labelled "39" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
40	Air emissions monitoring		Outlet of biofilter A labelled "40" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
41	Air emissions monitoring		Outlet of biofilter B labelled "41" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
42	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	Boiler number 4 discharge point labelled "42" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).

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44	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	Air emissions point of fermenter labelled "44" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
45	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	Boiler number 2 discharge point labelled "45" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
46	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	DDG pellet plant stack emission point labelled "46" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
47	Air emissions monitoring / Discharge to air	Air emissions monitoring / Discharge to air	No. 5 Starch dryer scrubber discharge point labelled "47" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).

P1.2 The following utilisation areas referred to in the table below are identified in this licence for the purposes of the monitoring and/or the setting of limits for any application of solids or liquids to the utilisation area.

P1.3 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.

Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to waters / Discharge quality and volume monitoring	Discharge to waters / Discharge quality and volume monitoring	The 50 centimetre diameter metal pipe discharging at the end of the salt water jetty labelled "1" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
2	Effluent quality and volume monitoring.		Irrigation water monitoring point as labelled "2" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" dated 23 July 2013 (DOC13/75672).
3	Discharge to waters / Discharge quality and volume monitoring	Discharge to waters / Discharge quality and volume monitoring	The 50 centimetre diameter pipe discharging onto gabion spillway labelled "3" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).
36	Ambient water monitoring		Cooling water intake 50cm diameter pipe at the end of the salt water jetty labelled as "36" on map titled "Monitoring & Discharge Points Factory Area" dated 5 June 2018 (DOC18/371657).

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43	Discharge to utilisation area / Soil Monitoring	Discharge to utilisation area / Soil Monitoring	Soil monitoring point from within the approved irrigation area as labelled "43" on map titled "Manildra Group - Landholding - Bomaderry, Monitoring and Discharge Points" 23 July 2013 (DOC13/75672).
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3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L1.2 Only:

- a) river water passed through the boiler condensers and the primary side of the heat exchangers;
- b) boiler water treatment plant regeneration waters; and
- e) pH adjusted glucose plant ion exchange unit regeneration waters;

is permitted to be discharged from Points 1 & 3.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table\ below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\.

L2.4 Air Concentration Limits

POINT 35

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Opacity	percent	20	As per note below		6 minutes rolling
Total Solid Particles	milligrams per cubic metre	30	Dry, 273 K, 101.3 kPa	7%	1 hour
Sulfur dioxide	milligrams per cubic metre	600	Dry, 273 K, 101.3 kPa	7%	1 hour block

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Nitrogen dioxide	milligrams per cubic metre	500	Dry, 273 K, 101.3 kPa	7%	1 hour block
Oxygen (O ₂)	percent	>5			
volatile organic compounds as n-propane equivalent	milligrams per cubic metre	40	Dry, 273 K, 101.3 kPa	7%	1 hour rolling
Cadmium	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
Mercury	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	1	Dry, 273 K, 101.3 kPa	7%	1 hour

POINT 42

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Opacity	percent	20	As per note below		6 minutes rolling
Total Solid Particles	milligrams per cubic metre	30	Dry, 273 K, 101.3 kPa	7%	1 hour
Sulfur dioxide	milligrams per cubic metre	600	Dry, 273 K, 101.3 kPa	7%	1 hour block
Nitrogen dioxide	milligrams per cubic metre	500	Dry, 273 K, 101.3 kPa	7%	1 hour block
volatile organic compounds as n-propane equivalent	milligrams per cubic metre	40	Dry, 273 K, 101.3 kPa	7%	1 hour rolling
Cadmium	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
Mercury	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	1	Dry, 273 K, 101.3 kPa	7%	1 hour

POINT 45

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	1	Dry, 273 K, 101.3 kPa	7%	1 hour

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Mercury	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
Cadmium	milligrams per cubic metre	0.2	Dry, 273 K, 101.3 kPa	7%	1 hour
volatile organic compounds as n-propane equivalent	milligrams per cubic metre	40	Dry, 273 K, 101.3 kPa	7%	1 hour rolling
Nitrogen dioxide	milligrams per cubic metre	500	Dry, 273 K, 101.3 kPa	7%	1 hour block
Sulfur dioxide	milligrams per cubic metre	600	Dry, 273 K, 101.3 kPa	7%	1 hour block
Total Solid Particles	milligrams per cubic metre	30	Dry, 273 K, 101.3 kPa	7%	1 hour
Opacity	percent	20	As per note below		6 minutes rolling

Note: For the purpose of the above table, reference conditions for Opacity being gas stream temperature above dew point. Path length corrected to stack exit diameter as per CEM-1.

L2.5 Water and/or Land Concentration Limits

POINT 1

Pollutant	Units of Measure	90 percentile in any 24 hour period	Averaging period	50 percentile	100 percentile concentration limit
Temperature	degrees Celsius				32

POINT 3

Pollutant	Units of Measure	90 percentile in any 24 hour period	Averaging period	50 percentile	100 percentile concentration limit
Temperature	degrees Celsius				32

L3 Volume and mass limits

- L3.1 For each discharge point or utilisation area specified below (by a point number), the volume/mass of:
- liquids discharged to water; or;
 - solids or liquids applied to the area;
- must not exceed the volume/mass limit specified for that discharge point or area.

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Point	Unit of Measure	Volume/Mass Limit
1	megalitres per day	100
3	megalitres per day	100

Note: Notwithstanding the volume limits specified in condition L3.1, the combined volume discharged from Point(s) 1 and 3 must not exceed 100 megalitres per day.

L4 Waste

L4.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.

Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.

Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.

This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Food waste	a) Non-liquid sugar products, solely for use in fermentation b) Biomass material sourced from the production and/or processing of food grade materials, solely for use in the Bulk Volume Fermentation unit	-	NA
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the Protection of the Environment Operations Act 1997, as in force from time to time	-	NA
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 51A of the Protection of the Environment Operations (Waste) Regulation 2005	As specified in each particular resource recovery exemption	NA

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L5 Noise limits

- L5.1 The LAeq (15 min) sound pressure level contribution generated from the premises must not exceed the following levels when measured at or near the boundary of any residential premises:

Location	Day (7am to 6pm) LAeq (15 min)	Evening (6pm to 10pm) LAeq (15 min)	Night (10pm to 7am) LAeq (15 min)	Night (10pm to 7am) LA1 (1 min)
At locations in Terrara on the south side of the Shoalhaven River	38	38	38	48
At locations in Nowra on the south side of the Shoalhaven River	38	38	38	48
At locations in Meroo Street, Bomaderry	42	42	42	52
At other residential locations in Bomaderry	40	40	40	50

- L5.2 Noise from the premises is to be measured at the most affected point or within the residential boundary, or at the most affected point within 30m of a dwelling where the dwelling is more than 30m from the boundary, to determine compliance with condition L5.1.

The modification factors in Fact Sheet C of the Noise Policy for Industry shall also be applied to the measured noise levels where applicable.

- L5.3 Noise from the premises is to be measured at 1 metre from the dwelling facade to determine compliance with the LA1(1 minute) noise limit in condition L5.1.
- L5.4 Where it can be demonstrated that direct measurement of noise from the premises is impractical, the EPA may accept alternative means of determining compliance (see Chapter 7 of the Noise Policy for Industry).
- L5.5 The noise emission limits identified in condition L5.1 apply under meteorological conditions of:
- Wind speed up to 3 metres per second at 10 metres about ground level; or
 - Temperature inversion conditions of up to 3°C/100 metres and wind speed up to 2 metres per second at 10 metres above ground level.

L6 Potentially offensive odour

- L6.1 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

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- L6.2 No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations Act 1997.

L7 Other limit conditions

- L7.1 Sulfur content of boiler 2, boiler 4 and boiler 5/6 coal must not exceed 0.4% by weight (air dried basis).

4 Operating Conditions

O1 Activities must be carried out in a competent manner

- O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

- O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

- O3.1 All operations and activities occurring at the premises must be carried out in a manner that will minimise dust at the boundary of the premises.

O4 Other operating conditions

- O4.1 Effluent Storage Dams 1, 2, 3, 5 and 6 must only be used to store effluent from the activities undertaken at the licensed premises:

- (a) that has been treated through the bulk volume fermenter and sulphur oxidation pond; or
- (b) that comprises retentate from the reverse osmosis water treatment plant.

- O4.2 Untreated effluent may only be stored within Effluent Storage Dam 4 and must be treated through the bulk volume fermenter and sulphur oxidation pond prior to any discharge to Effluent Storage Dams 1, 2, 3, 5 and 6 or direct to the irrigation area.

Note: For the purposes of conditions O4.1 and O4.2, Effluent Storage Dams 1,2,3,4,5 and 6 are as defined in condition P1.1 as points 19,20,21,22,23 and 24 respectively and the "irrigation area" is as defined in condition P1.3 as point 43.

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- O4.3 A suitably designed and constructed cover over Effluent Storage Dam 4 must be maintained in a proper and efficient condition at all times.

Explanatory Note: The cover over Effluent Storage Dam 4 is designed to assist in the containment of odours which can be generated from the storage of untreated effluent within that dam.

5 Monitoring and Recording Conditions

M1 Monitoring records

- M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.
- M1.2 All records required to be kept by this licence must be:
- a) in a legible form, or in a form that can readily be reduced to a legible form;
 - b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- a) the date(s) on which the sample was taken;
 - b) the time(s) at which the sample was collected;
 - c) the point at which the sample was taken; and
 - d) the name of the person who collected the sample.
- M1.4 A log book must be kept at the boiler house control room on the premises which records:
- a) the time, date and duration of any failure to meet the emission standards specified in the relevant clauses of the *Protection of the Environment Operations (Clean Air) Regulation 2021*; and
 - b) the reason for the failure to meet the standard; and
 - c) any consequent action taken to prevent or minimise the emission of air impurities from the boiler house stacks.

M2 Requirement to monitor concentration of pollutants discharged

- M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:
- M2.2 Air Monitoring Requirements

POINT 8,9,10,11,12,13,14,16,47

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Pollutant	Units of measure	Frequency	Sampling Method
Dry gas density	kilograms per cubic metre	Quarterly	TM-23
Flow	cubic metres per second	Quarterly	TM-2
Moisture	percent	Quarterly	TM-22
Molecular weight of stack gases	grams per gram mole	Quarterly	TM-23
Odour	odour units	Quarterly	OM-7
Oxygen (O ₂)	percent	Quarterly	TM-25
Temperature	degrees Celsius	Quarterly	TM-2
Velocity	metres per second	Quarterly	TM-2

POINT 19,20,21,23,24,25

Pollutant	Units of measure	Frequency	Sampling Method
Odour	odour units	Yearly	OM-7

POINT 35,42,45

Pollutant	Units of measure	Frequency	Sampling Method
Cadmium	milligrams per cubic metre	Quarterly	TM-12, TM-13 & TM-14
Mercury	milligrams per cubic metre	Quarterly	TM-12, TM-13 & TM-14
Moisture	percent	Quarterly	TM-22
Molecular weight of stack gases	grams per gram mole	Quarterly	TM-23
Nitrogen dioxide	milligrams per cubic metre	Quarterly	TM-11
Odour	odour units	Quarterly	OM-7
Opacity	percent	Continuous	CEM-1
Oxygen (O ₂)	percent	Quarterly	TM-25
Sulfur dioxide	milligrams per cubic metre	Yearly	TM-4
Temperature	degrees Celsius	Quarterly	TM-2
Total Solid Particles	milligrams per cubic metre	Quarterly	TM-15
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	Quarterly	TM-12, TM-13 & TM-14
Velocity	metres per second	Quarterly	TM-2
volatile organic compounds as n-propane equivalent	milligrams per cubic metre	Quarterly	TM-34
Volumetric flowrate	cubic metres per second	Quarterly	TM-2

POINT 39,40,41,44,46

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Pollutant	Units of measure	Frequency	Sampling Method
Odour	odour units	Quarterly	OM-7

M2.3 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
pH	pH	Continuous	In line instrumentation
Temperature	degrees Celsius	Continuous	In line instrumentation

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
BOD	milligrams per litre	Quarterly	Grab sample
Conductivity	deciSiemens per metre	Quarterly	Grab sample
Nitrogen (total)	milligrams per litre	Quarterly	Grab sample
pH	pH	Quarterly	Grab sample
Phosphorus (total)	milligrams per litre	Quarterly	Grab sample

POINT 3

Pollutant	Units of measure	Frequency	Sampling Method
pH	pH	Continuous	In line instrumentation
Temperature	degrees Celsius	Continuous	In line instrumentation

POINT 36

Pollutant	Units of measure	Frequency	Sampling Method
pH	pH	Continuous	In line instrumentation
Temperature	degrees Celsius	Continuous	In line instrumentation

POINT 43

Pollutant	Units of measure	Frequency	Sampling Method
Cation Exchange Capacity	centimoles of positive charge per kilogram of soil	Special Frequency 1	Composite sample
Electrical conductivity	deciSiemens per metre	Special Frequency 1	Composite sample
Exchangeable sodium percentage	percent	Special Frequency 1	Composite sample
Nitrate	milligrams per kilogram	Special Frequency 1	Composite sample
Nitrogen (total)	milligrams per kilogram	Special Frequency 1	Composite sample

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Organic carbon	milligrams per kilogram	Special Frequency 1	Composite sample
pH	pH	Special Frequency 1	Composite sample
Phosphorus (total)	milligrams per kilogram	Special Frequency 1	Composite sample

M2.4 For the purposes of the above table, Special Frequency 1 means:

- a) annual sampling of the topsoil profile (from a depth up to 300mm); and
- c) all soil samples being taken from representative locations within the utilisation area (as defined in condition P1.3).

Note: The monitoring requirements at point 46 do not take effect until the DDG pellet plant becomes operational.

M3 Testing methods - concentration limits

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

- a) any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or
- b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
- c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2021* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M4 Weather monitoring

M4.1 The licensee must at Point 33 (as defined in condition P1.1) monitor (by sampling and obtaining results for analysis) each weather parameter specified in column 1 of the below table. The licensee must use the sampling method, units of measure, and sampling frequency, specified opposite in the the other columns of the below table.

Parameter	Units of measure	Frequency	Sampling Method
Rainfall	millimetres	Daily	Instrumentation
Wind speed	metres per second	Continuous	Instrumentation
Wind direction	degrees	Continuous	Instrumentation



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M5 Recording of pollution complaints

- M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.
- M5.2 The record must include details of the following:
- a) the date and time of the complaint;
 - b) the method by which the complaint was made;
 - c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the licensee, the reasons why no action was taken.
- M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

- M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.
- M6.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

M7 Requirement to monitor volume or mass

- M7.1 For each discharge point or utilisation area specified below, the licensee must monitor:
- a) the volume of liquids discharged to water or applied to the area;
 - b) the mass of solids applied to the area;
 - c) the mass of pollutants emitted to the air;
- at the frequency and using the method and units of measure, specified below.

POINT 1

Frequency	Unit of Measure	Sampling Method
Continuous	megalitres per day	Magnetic flow meter

POINT 2

Frequency	Unit of Measure	Sampling Method
Monthly	megalitres per day	Estimate

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POINT 3

Frequency	Unit of Measure	Sampling Method
Continuous	megalitres per day	Magnetic flow meter

M8 Other monitoring and recording conditions

- M8.1 Noise levels emitted from the plant must be monitored at representative receiver locations in Bomaderry, Terara and Nowra at or around July and January each year. This noise monitoring must be conducted according to recognized protocols (including the NSW, Industrial Noise Policy) and by persons/organisations who hold membership with the Association of Australian Acoustical Consultants or a person with other appropriate professional qualifications.

6 Reporting Conditions

R1 Annual return documents

- R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

- R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.
- R1.3 Where this licence is transferred from the licensee to a new licensee:
- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
 - b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.
- R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
- a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
 - b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

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- R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').
- R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.
- R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
 - a) the licence holder; or
 - b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.
- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
 - a) where this licence applies to premises, an event has occurred at the premises; or
 - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
 and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
 - a) the cause, time and duration of the event;
 - b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making

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reasonable effort;

- e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
- f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
- g) any other relevant matters.

- R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Annual system performance report

- R4.1 The licensee must supply to the EPA an Annual System Performance Report not later than 60 days after the end of each reporting period.
- R4.2 The report is to supplement the Annual Return and must include but need not be limited to:
- a) all monitoring data required by this licence for the reporting period for each pollutant which has corresponding concentration limits specified in this licence;
 - b) graphical representations of the monitoring data as required by paragraph a) above including the corresponding limit specified for each pollutant;
 - c) the results including analysis, interpretation and odour dispersion modelling from the monitoring data for the reporting period for the pollutant Odour as required to be monitored by condition M2.1 for points 8, 9, 10, 11, 12, 13, 14, 16, 19, 20, 21, 23, 24, 25, 35, 39, 40, 41, 42, 44, 46 and 47;
 - d) the results including analysis, interpretation and graphical representations from the soil monitoring data for the reporting period for each pollutant required to be monitored by condition M2.1 for point 43;
 - e) graphical representations of the volume of treated effluent stored in Effluent Storage Dams 1, 2, 3, 5 and 6, and effluent stored in Effluent Storage Dam 4 for each month of the reporting period; and
 - f) graphical representation of the levels of sulfur content of the coal used at the premises including the corresponding limit specified in condition L7.1.

7 General Conditions

G1 Copy of licence kept at the premises or plant

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

8 Pollution Studies and Reduction Programs

U1 Mixing Zone Assessment and Modelling (Part 2)

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- U1.1 By 5 November 2021, the licensee must engage a suitable qualified person to undertake a *Mixing Zone Assessment* to determine if or how WQOs can be achieved either at the point of discharge, or at the edge of a near-field mixing zone.
- U1.2 For the purpose of Condition U1.1, a suitable mixing zone assessment method should be selected to predict the mixing zone processes relevant to the environmental outcome and the characteristics of the discharge and receiving environment, e.g. a 3-dimensional model such as Cormix.
- U1.3 For the purpose of Condition U1.1, the Licensee must consult with the EPA on the mixing zone assessment methodology before commencing the assessment.
- U1.4 By 31 January 2022, the licensee must provide the Mixing Zone Assessment report to the EPA. The report must be submitted to:

Manager - Regional Operations South
NSW EPA
PO Box 622
QUEANBEYAN NSW 2620

Or via email to:
EPA.Southopregional@epa.nsw.gov.au

Note: Consult the EPA for guidance at this stage to help inform suitable modelling parameters and outcomes.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .



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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Ms Debbie Maddison

Environment Protection Authority

(By Delegation)

Date of this edition: 24-October-2000

Environment Protection Licence

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End Notes

- 1 Licence varied by notice 1004267, issued on 05-Apr-2001, which came into effect on 30-Apr-2001.
- 2 Licence varied by notice 1007313, issued on 11-May-2001, which came into effect on 05-Jun-2001.
- 3 Licence varied by notice 1015342, issued on 26-Feb-2002, which came into effect on 23-Mar-2002.
- 4 Licence varied by notice 1019838, issued on 15-Aug-2002, which came into effect on 09-Sep-2002.
- 5 Licence varied by notice 1024268, issued on 11-Feb-2003, which came into effect on 11-Feb-2003.
- 6 Licence varied by notice 1026281, issued on 17-Apr-2003, which came into effect on 17-Apr-2003.
- 7 Licence varied by notice 1027489, issued on 27-Nov-2003, which came into effect on 22-Dec-2003.
- 8 Licence varied by notice 1033645, issued on 01-Mar-2004, which came into effect on 26-Mar-2004.
- 9 Licence varied by notice 1036799, issued on 29-Jun-2004, which came into effect on 01-Jul-2004.
- 10 Licence varied by notice 1039275, issued on 20-May-2005, which came into effect on 14-Jun-2005.
- 11 Licence varied by notice 1048817, issued on 29-Jul-2005, which came into effect on 23-Aug-2005.
- 12 Licence varied by notice 1051704, issued on 02-Nov-2005, which came into effect on 09-Nov-2005.
- 13 Licence varied by notice 1054751, issued on 24-Feb-2006, which came into effect on 02-Mar-2006.
- 14 Licence varied by change to DEC Region allocation, issued on 03-Mar-2006, which came into effect on 03-Mar-2006.
- 15 Licence varied by updating references to the Clean Air Reg, issued on 25-Jul-2006, which came into effect on 25-Jul-2006.
- 16 Licence varied by correction to DEC File number, issued on 07-Mar-2007, which came into effect on 07-Mar-2007.
- 17 Licence varied by notice 1080589, issued on 31-Mar-2008, which came into effect on 31-Mar-2008.
- 18 Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>

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19	Licence varied by notice 1093973, issued on 28-Nov-2008, which came into effect on 28-Nov-2008.
20	Licence varied by notice 1097588, issued on 10-Feb-2009, which came into effect on 10-Feb-2009.
21	Licence varied by notice 1098548, issued on 09-Apr-2009, which came into effect on 09-Apr-2009.
22	Licence varied by notice 1104957, issued on 14-Aug-2009, which came into effect on 14-Aug-2009.
23	Licence varied by correction to scheduled activity name, issued on 22-Dec-2010, which came into effect on 22-Dec-2010.
24	Licence varied by notice 1500684 issued on 04-Aug-2011
25	Licence varied by notice 1501899 issued on 30-Sep-2011
26	Licence varied by notice 1505439 issued on 08-Nov-2013
27	Licence varied by notice 1521553 issued on 28-Apr-2014
28	Licence varied by notice 1522954 issued on 27-Jun-2014
29	Licence varied by notice 1523522 issued on 30-Jul-2014
30	Licence varied by notice 1525338 issued on 08-Oct-2014
31	Licence varied by notice 1530188 issued on 23-Jul-2015
32	Licence varied by notice 1536447 issued on 18-Dec-2015
33	Licence varied by notice 1546622 issued on 15-Nov-2016
34	Licence varied by notice 1564529 issued on 20-Jun-2018
35	Licence varied by notice 1571114 issued on 23-Oct-2018
36	Licence varied by notice 1609025 issued on 01-Jun-2021

Appendix F

Section 10.7 Planning Certificates

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979
Certificate No: 2021/01676

Applicant: Colee Colette Quayle
4/39 McKenzie Avenue
Wollongong NSW 2500

Receipt No.: Ext: 120476
Date: 07/04/2021
Fee: \$133
Urgency Fee: \$0.00

Applicant reference: 12548413

The land to which this Certificate relates is:

Part Lot 241 DP 1130535, 171 Bolong Rd, BOMADERRY
Parish of BUNBERRA, County of CAMDEN

The above information is as recorded by Council.

DISCLAIMER AND CAUTION:

1. The information on zones, controls etc given below relates to the land for which the certificate was sought. If enquirers wish to know what zones, other controls, etc apply or are proposed on nearby land then they should make enquiries in person at Council's offices.
2. The information contained in this certificate is accurate as at the date of this certificate.
3. In providing this certificate Council has in good faith relied upon information provided to it or sourced from third parties. Where Council has obtained the information from third parties, either exclusively or in conjunction with information held by Council, the Certificate details the source of that third party information. Council cautions persons against relying upon information in the Certificate sourced from third parties as to its accuracy, applicability to specific lands and its currency without verification from the specified third party and, where appropriate, professional advice and the adoption of prudent land acquisition measures and appropriate professional advice. To the full extent permitted by law Council disclaims liability with respect to any information in this Certificate sourced from third parties.

The information contained in this certificate is prepared in accordance with the Environmental Planning and Assessment Act 1979 (as amended) and the Environmental Planning Assessment Regulation 2000 (as amended).

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

Certificate No: 2021/01676

This is a Planning Certificate issued by Shoalhaven City Council under Section 10.7(2) of the Environmental Planning and Assessment Act 1979 on the application of the person described above in respect of the land described above.

1 Names of relevant planning instruments and DCPs

- (1) The name of each environmental planning instrument that applies to the carrying out of development on the land:

Shoalhaven Local Environmental Plan 2014 (as amended)

State Environmental Planning Policies

Coastal Management 2018. Gazetted 3 April 2018

The policy applies to land within the "coastal zone" and identifies land within the coastal zone as one of four coastal management areas being the coastal wetlands and littoral rainforests area, the coastal vulnerability area, the coastal environment area, and the coastal use area. The policy also sets out matters to be considered when undertaking development in each of the coastal management areas.

Vegetation in Non-Rural Areas. Gazetted 25 August 2017 (& as amended)

Is to protect the biodiversity values of trees and other vegetation in non-rural areas of the State and to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation.

State Environmental Planning Policies affecting the City

State Environmental Planning Policy No. 21 – Caravan Parks

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 36 – Manufactured Home Estates

State Environmental Planning Policy No. 50 – Canal Estate Development

State Environmental Planning Policy No. 55 – Remediation of Land

State Environmental Planning Policy No. 64 - Advertising and Signage

State Environmental Planning Policy No. 65 – Design Quality of Residential Apartment Development

State Environmental Planning Policy No. 70 - Affordable Housing (Revised Schemes)

State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

State Environmental Planning Policy (Building Sustainability Index: Basix) 2004

State Environmental Planning Policy (State Significant Precincts) 2005

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Mining Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

State Environmental Planning Policy (Affordable Rental Housing) 2009

State Environmental Planning Policy (State and Regional Development) 2011

State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Primary Production and Rural Development) 2019

State Environmental Planning Policy (Koala Habitat Protection) 2020

State Environmental Planning Policy (Koala Habitat Protection) 2021

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979

Certificate No: 2021/01676

- (2) The name of each proposed environmental planning instrument that will apply to the carrying out of development on the land and that is or has been the subject of community consultation or on public exhibition under the Act (not including any proposed instrument where the Secretary has notified the Council that the making of the proposed instrument has been deferred indefinitely or has not been approved) is:

Draft State Environmental Planning Policies

Draft State Environmental Planning Policy (Environment) 2017

Draft State Environmental Planning Policy (Remediation of Land)

Draft State Environmental Planning Policy (Short-term Rental Accommodation)

Explanation of Intended Effect - State Environmental Planning Policies

Explanation of Intended Effect - Proposed Housekeeping Amendment to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

Explanation of Intended Effect - Proposed Activation Precincts SEPP

Explanation of Intended Effect - Amendment to Infrastructure SEPP

Explanation of Intended Effects - Housing Diversity State Environmental Planning Policy

Explanation of Intended Effects - Design and Place SEPP

Explanation of Intended Effect - Agritourism and small-scale agriculture development. Includes proposed amendments to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008

Explanation of Intended Effect - Building Business Back Better (proposed changes to State Environmental Planning Policy (Exempt and Complying Development Codes) 2008).

Explanation of Intended Effect - Review of clause 4.6 of the Standard Instrument LEP

Draft Local Environmental Plans and planning proposals for Local Environmental Plans

PLANNING PROPOSAL - PP026 TO AMEND SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 COASTAL HAZARDS REVIEW - PUBLIC EXHIBITION 6 FEBRUARY 2019 TO 8 MARCH 2019 (55961E) (MIN18.609)

This Planning Proposal (PP) seeks to remove the Coastal Risk Planning Map from Shoalhaven LEP 2014 and rely on Council's Coastal Hazard Interactive Mapping to identify areas at risk of coastal hazards. The PP will also amend Clause 7.4 Coastal risk planning to apply to all land at risk of coastal hazards instead of land identified in the Coastal Risk Planning Map, to allow for better identification and management of areas at risk of coastal hazards.

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979
Certificate No: 2021/01676

PLANNING PROPOSAL - PP029 TO AMEND SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 - HITCHCOCKS LANE BERRY RESIDENTIAL INVESTIGATION AREA - PUBLIC EXHIBITION 28 OCTOBER 2020 TO 8 JANUARY 2021 (56367E) (MIN20.619)

This Planning Proposal (PP) seeks to amend the land use zone, minimum lot size for subdivision and height of buildings provisions within Shoalhaven Local Environmental Plan 2014 to enable low density residential development on certain land located south of Hitchcocks Lane in Berry.

PLANNING PROPOSAL - PP035 TO AMEND SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 - 48 JERVIS BAY ROAD FALLS CREEK - COMMUNITY TITLE SUBDIVISION - PUBLIC EXHIBITION 6 JANUARY 2021 TO 5 FEBRUARY 2021 (57076E) (MIN20.253)

This Planning Proposal (PP) seeks to amend the land use zones, minimum lot size for subdivision and terrestrial biodiversity provisions as well as introduce a site-specific legal mechanism within Shoalhaven Local Environmental Plan 2014 to enable a community title subdivision (consisting of 13 housing lots and one neighbourhood environmental conservation lot) on the subject land.

PLANNING PROPOSAL - PP052 TO AMEND SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 - THE ARBOUR RETIREMENT VILLAGE BERRY - PUBLIC EXHIBITION 4 NOVEMBER 2020 TO 18 DECEMBER 2020 (63199E) (MIN20.161)

The Planning Proposal intends to rezone an area of approximately 7,665 m² at the north-eastern corner of Lot 6, DP 1204186 from RU1 - Primary Production to R2 - Low Density Residential to allow low-density residential use of the land for seniors housing. The Arbour Retirement Village is centrally located on the property. The PP seeks to also amend (reduce) minimum lot size and height of building controls currently applying to the land.

PLANNING PROPOSAL - PP054 TO AMEND SHOALHAVEN LOCAL ENVIRONMENTAL PLAN 2014 - REZONING OF RIPARIAN LAND AT TAYLORS LANE CAMBEWARRA - PUBLIC EXHIBITION 24 MARCH 2021 TO 23 APRIL 2021 (60737E) (MIN20.387)

The Planning Proposal seeks to amend Shoalhaven Local Environmental Plan (LEP) 2014 to rezone part of Lot 1 DP 949932 from E2 Environmental Conservation to R1 General Residential to enable residential development. The PP also seeks to make corresponding changes to lot size controls, the riparian lands and watercourses map and the urban release area (URA) boundary within the LEP to enable the rezoned land to be included within the Moss Vale Road South URA. The subject land is currently identified as a watercourse and riparian corridor. An independent assessment of the identified watercourse and riparian area was undertaken and supports the changes sought by the PP.

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979
Certificate No: 2021/01676

- (3) The name of each development control plan that applies to the carrying out of development on the land is:

Shoalhaven Development Control Plan 2014 (as amended)

(Note: a copy of Shoalhaven Development Control Plan 2014 is available on the internet at www.dcp2014.shoalhaven.nsw.gov.au or can be inspected at Council's Nowra office during normal business hours.)

2 Zoning and land use under relevant LEPs

For Shoalhaven Local Environmental Plan 2014 (as amended)

- a. **The identity of the zone in which the land is included under Shoalhaven Local Environmental Plan 2014:**

Zone IN1 General Industrial

- b. **The purposes for which Shoalhaven Local Environmental Plan 2014 provides that development may be carried out within the zone without the need for development consent:**

Nil

- c. **The purposes for which Shoalhaven Local Environmental Plan 2014 provides that development may not be carried out within the zone except with development consent:**

Specialised retail premises; Depots; Freight transport facilities; Garden Centres; General industries; Hardware and Building Supplies; Industrial training facilities; Kiosks; Landscaping material supplies; Light industries; Markets; Neighbourhood shops; Oyster aquaculture; Places of Public Worship; Roads; Take away food and drink premises; Tank-based aquaculture; Timber yards; Warehouse or distribution centres; Any other development not specified in item b or d.

- d. **The purposes for which Shoalhaven Local Environmental Plan 2014 provides that development is prohibited within the zone:**

Agriculture; Air transport facilities; Airstrips; Amusement centres; Animal boarding or training establishments; Camping grounds; Caravan parks; Cemeteries; Charter and tourism boating facilities; Centre-based child care facilities; Correctional centres; Crematoria; Eco-tourist facilities; Educational establishments; Environmental facilities; Exhibition villages; Extractive industries; Farm buildings; Forestry; Function centres; Health services facilities; Highway service centres; Home-based childcare; Home businesses; Home occupations; Home occupations (sex services); Information and education facilities; Marinas; Mooring pens; Moorings; Office premises; Open cut mining; Pond-based aquaculture; Registered clubs; Residential accommodation; Respite day care centres; Restricted premises; Retail premises; Sex services premises; Tourist and visitor accommodation; Water recreation structures; Wharf or boating facilities.

PLANNING CERTIFICATE UNDER SECTION 10.7
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979
Certificate No: 2021/01676

- e. Development standards applying to the land under Shoalhaven Local Environmental Plan 2014 **DO NOT** fix minimum land dimensions for the erection of a dwelling-house on the land.

- f. The land **DOES NOT** include or comprise critical habitat under Shoalhaven Local Environmental Plan 2014.
(Note: Shoalhaven Local Environmental Plan 2014 does not identify areas of "critical habitat" as defined in Part 7A of the Fisheries Management Act 1994 (subject to section 5AA of the Environmental Planning and Assessment Act 1979). Enquiries about whether the land is "critical habitat" Part 7A of the Fisheries Management Act 1994 should be directed to the NSW Office of Environment and Heritage).

- g. The land **IS NOT** in a conservation area (however described) under Shoalhaven Local Environmental Plan 2014.
(Note: this item relates to "heritage conservation areas" as defined in the LEP).

- h. An item of environmental heritage (however described) under Shoalhaven Local Environmental Plan 2014 **IS NOT** situated on the land.
(Note: "environmental heritage" relates to matters/items of cultural heritage, for example, items listed on the State Register, items specifically listed in the LEP or matters subject to an "interim heritage order" under the Heritage Act 1977).

Other provisions under Shoalhaven Local Environmental Plan 2014 may also apply to the development of this land. You can view the Shoalhaven Local Environmental Plan 2014 at the website www.legislation.nsw.gov.au or at Council's offices.

2A Zoning and land use under State Environmental Planning Policy (Sydney Region Growth Centres) 2006

- (a) The land **IS NOT** within any zone (however described) under Part 3 of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (the 2006 SEPP), or
- (b) The land **IS NOT** within any Precinct Plan (within the meaning of the 2006 SEPP), or
- (c) The land **IS NOT** within a proposed Precinct Plan that is or has been the subject of community consultation or on public exhibition under the Act.

3 Complying development

Qualifying Statement on Council Data Affecting this Item

Shoalhaven City Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land, however specific land restrictions may not apply to all of the land. The information included in this Planning Certificate is provided in accordance with the Environmental Planning & Assessment Regulation 2000 (as amended). It is strongly suggested that you review the State Environmental Planning Policy (Exempt and Complying Developments Codes) 2008 and supporting information before proceeding with the lodgement of a Complying Development Certificate application to either Council or a private certifier. The NSW Department of Planning and Environment has provided a series of information sheets on its website

<http://www.planning.nsw.gov.au/exemptandcomplying>

Note: There are other provisions in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 that must be complied with in order for development on the land to be complying development.

Specific land exemptions for Housing Code, Rural Housing and Greenfield Housing Code

The extent to which the land is land on which complying development may be carried out under the codes of State Environmental Planning Policy (Exempt Complying Development Codes) 2008 **IS RESTRICTED** by the following provisions of clauses 1.17A (1)(c) to (e), (2), (3) and (4), 1.18(1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 but the restriction may not apply to all of the land and Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Under the Housing Code and the Rural Housing Code the land is affected by specific land exemptions -

Clause 1.19(1)(e)(i) & Clause 1.19(5)(f)(i) because the land is identified by an environmental planning instrument as being: within a buffer area.

Specific land exemptions for Housing Alterations Code and General Development Code

The extent to which the land is land on which complying development may be carried out under the codes of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 **IS NOT RESTRICTED** by the following provisions of clauses 1.17A (1)(c) to (e), (2), (3) and (4), 1.18(1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 but the restriction may not apply to all of the land, and Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

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Specific land exemptions for Commercial and Industrial (New Buildings and Additions) Code

The extent to which the land is land on which complying development may be carried out under the codes of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 **IS RESTRICTED** by the following provisions of clauses 1.17A (1)(c) to (e), (2), (3) and (4), 1.18(1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 but the restriction may not apply to all of the land and Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Under the General Commercial and Industrial Code the land is affected by specific land exemptions -

Clause 1.19(1)(e)(i) & Clause 1.19(5)(f)(i) because the land is identified by an environmental planning instrument as being: within a buffer area.

Specific land exemptions for Low Rise Housing Diversity Code

The extent to which the land is land on which complying development may be carried out under the codes of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 **IS RESTRICTED** by the following provisions of clauses 1.17A (1)(c) to (e), (2), (3) and (4), 1.18(1) (c3) and 1.19 of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 but the restriction may not apply to all of the land and Council does not have sufficient information to ascertain the extent to which complying development may or may not be carried out on the land.

Under the Low Rise Housing Diversity Code the land is affected by specific land exemptions -

Clause 1.19(1)(e)(i) & Clause 1.19(5)(f)(i) because the land is identified by an environmental planning instrument as being: within a buffer area.

4B Annual charges under Local Government Act 1993 for coastal protection services that relate to existing coastal protection works

The owner (or any previous owner) of the land **HAS NOT** consented in writing to the land being subject to annual charges under section 496B of the Local Government Act 1993 for coastal protection services that relate to existing coastal protection works (within the meaning of section 553B of that Act).

5 Mine subsidence

The land **HAS NOT** been proclaimed to be a mine subsidence district within the meaning of section 15 of the Mine Subsidence Compensation Act 1961.

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6 Road widening and road alignment

- (a) The land **IS NOT** affected by any road widening or road realignment under Division 2 of Part 3 of the Roads Act 1993
- (b) If the land is affected by any road widening or road realignment under any environmental planning instrument it will be listed below.
- (c) The land **IS NOT** affected by any road widening or road realignment under any resolution of Council.

Note: Information in item 6, relates to Council's road proposals; other authorities e.g. NSW Roads and Maritime Services, may have proposals not set out herein.

7 Council and other public authority policies on hazard risk restrictions

- (a) The land **IS** affected by the following policy or policies adopted by the Council that restrict the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulfate soils or any other risk (other than flooding).

Shoalhaven Development Control Plan 2014

Contaminated Land Policy 2013

Shoalhaven Coastal Zone Management Plan 2018

HAZARD RISK RESTRICTION

This property is identified as "sensitive area" on Shoalhaven LEP 2014 - Natural Resources Sensitivity land map and is affected by Clause 7.7 Landslide risk and other land degradation. Clause 7.7 applies to land comprising steep slopes and susceptible to other forms of land degradation.

- (b) The land **IS NOT** affected by a policy adopted by a public authority (other than the Council) and notified to the Council for the express purpose of its adoption by that authority being referred to in planning certificates issued by the Council, that restricts the development of the land because of the likelihood of land slip, bushfire, tidal inundation, subsidence, acid sulfate soils or any other risk (other than flooding).

7A Flood related development controls information

(1) Whether or not development on that land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) is subject to flood related development controls.

(2) Whether or not development on that land or part of the land for any other purpose is subject to flood related development controls.

(3) Words and expressions in this clause have the same meanings as in the Standard Instrument.

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(1) Development on the land or part of the land for the purposes of dwelling houses, dual occupancies, multi dwelling housing or residential flat buildings (not including development for the purposes of group homes or seniors housing) **IS** subject to flood related development controls as contained in Clause 7.3 of Shoalhaven Local Environmental Plan 2014; and/or Chapter G9 of Shoalhaven Development Control Plan 2014.

(2) Development on the land or part of the land for any other purpose **IS** subject to flood related development controls as contained in Clause 7.2A and Clause 7.3 of Shoalhaven Local Environmental Plan 2014; and/or Chapter G9, G10 of Shoalhaven Development Control Plan 2014.

For further information or to request a flood certificate, please contact Council's - City Development.

8 Land reserved for acquisition

The land **IS NOT** reserved for acquisition by a public authority, as referred to in section 3.15 of the Act under any environmental planning instrument, or proposed environmental planning instrument referred to in clause 1.

9 Contributions plans

The name of the contributions plan applying to the land is:

Shoalhaven Contributions Plan 2019 (as amended)

9a Biodiversity certified land

The land **IS NOT** biodiversity certified land under Part 8 of the Biodiversity Conservation Act 2016.

Note: Biodiversity certified land includes land certified under Part 7AA of the Threatened Species Conservation Act 1995 that is taken to be certified under Part 8 of the Biodiversity Conservation Act 2016.

10 Biobanking stewardship sites

The council **HAS NOT** been notified by the Chief Executive of the Office of Environment and Heritage whether or not the land is a biodiversity stewardship site under a biodiversity stewardship agreement under Part 5 of the Biodiversity Conservation Act 2016.

Note: Biodiversity stewardship agreements include biobanking agreements under Part 7A of the Threatened Species Conservation Act 1995 that are taken to be biodiversity stewardship agreements under Part 5 of the Biodiversity Conservation Act 2016.

10a Native vegetation clearing set asides

The land **DOES NOT** contain a set aside area under section 60ZC of the Local Land Services Act 2013.

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- 11 **Bush fire prone land**
The land **IS NOT** bushfire prone (as defined in the Environmental Planning and Assessment Act 1979).
- 12 **Property vegetation plans**
The Council **HAS NOT** been notified that the land is land to which a property vegetation plan approved under Part 4 of the Native Vegetation Act 2003 (and that continues in force) applies.
- 13 **Orders under Trees (Disputes Between Neighbours) Act 2006**
The Council **HAS NOT** been notified that an order has been made under the Trees (Disputes Between Neighbours) Act 2006 to carry out work in relation to a tree on the land.
- 14 **Directions under Part 3A**
There is no direction by the Minister in force under section 75P (2) (c1) of the 'Environmental Planning and Assessment Act 1979' that a provision of an environmental planning instrument prohibiting or restricting the carrying out of a project or a stage of a project on the land under Part 4 of the Act does not have effect.
- 15 **Site compatibility certificates and conditions for seniors housing**
The Council **IS NOT** aware of any current site compatibility certificate (seniors housing) in respect of proposed development on the land.
- 16 **Site compatibility certificates for infrastructure, schools or TAFE establishments**
The Council **IS NOT** aware of a current site compatibility certificate (Infrastructure) or site compatibility certificate (schools or TAFE establishments), in respect of proposed development on the land.
- 17 **Site compatibility certificates and conditions for affordable rental housing**
The Council **IS NOT** aware of a current site compatibility certificate (affordable rental housing), in respect of proposed development on the land.
- 18 **Paper subdivision information**
The land **IS NOT** affected by a development plan (proposed or adopted) or subdivision order as defined under Part 16C of the Environmental Planning & Assessment Regulation 2000
- 19 **Site verification certificates**
The Council **IS NOT** aware of a current site verification certificate (mining, petroleum production and extractive industries), in respect of this land.
- 20 **Loose-filled asbestos insulation**
The land **DOES NOT** include any residential premises (within the meaning of Division 1A of Part 8 of the Home Building Act 1989) that are listed on the register that is required to be maintained under that Division.

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21 Affected building notices and building product rectification orders

(1) The Council **IS NOT** aware of any affected building notice as defined under the Building Products (Safety) Act 2017 that is in force in respect of the land.

(2)(a) The Council **IS NOT** aware of any building product rectification order as defined under the Building Products (Safety) Act 2017 that is in force in respect of the land and has not been fully complied with, and

(2)(b) The Council **IS NOT** aware of any notice of intention to make a building product rectification order as defined under the Building Products (Safety) Act 2017 given in respect of the land and is outstanding.

Note: Contaminated Land Management Act 1997: The following matters are prescribed by Section 59(2) of the Contaminated Land Management Act 1997 as additional matters to be specified in a planning certificate:

- (a) The Council **HAS NOT** been informed by the Environment Protection Authority that the land is significantly contaminated land within the meaning of the Contaminated Land Management Act 1997.
- (b) The Council **HAS NOT** been informed by the Environment Protection Authority that the land is subject to a management order within the meaning of the Contaminated Land Management Act 1997.
- (c) The Council **HAS NOT** been informed by the Environment Protection Authority that the land is subject of an approved voluntary management proposal within the meaning of the Contaminated Land Management Act 1997.
- (d) The Council **HAS NOT** been informed by the Environment Protection Authority that the land is subject of an ongoing maintenance order within the meaning of the Contaminated Land Management Act 1997.
- (e) The land **IS NOT** the subject of a site audit statement within the meaning of the Contaminated Land Act 1997 that has been provided to the Council.

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Information under Section 10.7(5)

As at the date of this certificate, the abovementioned land is also affected as follows:

(NOTE: SECTION 10.7(6) STATES THAT A COUNCIL SHALL NOT INCUR ANY LIABILITY IN RESPECT OF ANY ADVICE PROVIDED IN GOOD FAITH PURSUANT TO SECTION 10.7(5))

DCPs, Contribution Plans & Planning Agreements

SHOALHAVEN CONTRIBUTIONS PLAN 2019 - DRAFT AMENDMENT NO 7 - MOSS VALE ROAD SOUTH URBAN RELEASE AREA PROJECT - PUBLIC EXHIBITION 24 MARCH 2021 to 23 APRIL 2021 (64284E) (MIN20.387)

The draft amendment to Shoalhaven Contributions Plan (CP) 2019 supports Planning Proposal PP054 which seeks to amend Shoalhaven LEP 2014 to rezone land at Taylors Lane, Cambewarra, from E2 Environmental Conservation to R1 General Residential to enable residential development. The PP seeks to make corresponding changes to lot size controls, the urban release area (URA) boundary and the riparian lands and watercourses map within the LEP to enable the rezoned land to be included in the Moss Vale Road South URA. The draft amendment to the CP 2019 has been prepared to include the subject land in the catchment area for roads, drainage and public open space projects in Moss Vale Road South URA.

SHOALHAVEN DEVELOPMENT CONTROL PLAN 2014 - DRAFT AMENDMENT NO 44 - CHAPTER N3 BERRY RESIDENTIAL SUBDIVISION - PUBLIC EXHIBITION 28 OCTOBER 2020 to 8 JANUARY 2021 (64037E) (MIN20.619)

Draft Chapter N3 Berry Residential Subdivision supports a proposed amendment to Shoalhaven Local Environmental Plan 2014 (PP029) to rezone land south of Hitchcocks Lane to enable residential development. The draft DCP Chapter N3 contains provisions to guide future subdivision and housing development on the land subject to PP029 and an updated Masterplan for land west of the Princes Highway at Berry.

SHOALHAVEN DEVELOPMENT CONTROL PLAN 2014 - DRAFT AMENDMENT NO 46 - CHAPTER NB3 MOSS VALE ROAD SOUTH URBAN RELEASE AREA - PUBLIC EXHIBITION 24 MARCH 2021 to 23 APRIL 2021 (64283E) (MIN20.387)

The draft DCP amendment supports Planning Proposal PP054 which seeks to amend Shoalhaven LEP 2014 to rezone part of Lot 1 DP 949932, Taylors Lane, Cambewarra, from E2 Environmental Conservation to R1 General Residential to enable residential development. The PP seeks to make corresponding changes to lot size controls, the urban release area (URA) boundary and the riparian lands and watercourses map within the LEP to enable the rezoned land to be included in the Moss Vale Road South URA. The draft DCP amendment includes the subject land in the indicative layout plan, staging plan and other relevant maps/figures of Chapter NB3.

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Matters Affecting This Land

HMAS ALBATROSS MILITARY AIRCRAFT OPERATING AREA

Advice to Council on 3 November 2006 confirms information previously provided by The Department of Defence, that the subject land is within HMAS Albatross Military Aircraft Operating Area. Specific heights can be obtained by contacting HMAS Albatross at Nowra.

NOWRA BOMADERRY STRUCTURE PLAN

This property is located in the area covered by the Nowra Bomaderry Structure Plan (NBSP). The NBSP was adopted by Council in 2006 and endorsed by State Government in 2008. The NBSP is not a legal document but rather one that provides strategic direction and guidance. The NBSP provides the planning framework for growth, development opportunities and conservation measures in the Nowra Bomaderry area for the next 20 years. It identifies potential areas for new living areas and industrial expansion as well as a future western bypass and the preferred road network required to support long-term growth. Landowners and prospective buyers are encouraged to view the Adopted and Endorsed Strategic Direction and Structure Plan Map.

Further information can be found on Council's website [Shoalhaven City Council Planning Register](#) or by contacting Council's Strategic Planning team on (02) 4429 5377.

Matters Affecting The Whole Of The City

ACID SULFATE SOILS - Large areas of the coastal zone of NSW have the potential to be affected by acid sulfate soils which become problematic if exposed during excavations or similar activities. The Dept of Land & Water Conservation have maps which indicate the potential occurrence of acid sulfate soils. Prior to undertaking work which involves substantial soil disturbance, you should ascertain the possibility of acid sulfate soils existing on your property. Enquiries to NSW Department of Planning, Industry and Environment.

INTERIM POLICY - DEVELOPMENT ADJOINING NARROW LANEWAYS

Council resolved on 6 November 2018 to adopt an interim policy position regarding development adjoining narrow laneways. The Interim Policy provides direction regarding access, servicing, design and use of narrow laneways as a primary frontage. Contact Council's - Strategic Planning for further information. (MIN18.891) (57914E)

POLICY - PROVISION OF WATER AND SEWERAGE INFRASTRUCTURE - DEVELOPMENT NOT INCLUDED IN DEVELOPMENT SERVICING PLANS

This Policy shall apply to all lands which have not been included in water supply and/or sewerage services development servicing plans.

POLICY - COMPANION ANIMALS (IMPACTS ON NATIVE FAUNA) - CONDITIONS OF DEVELOPMENT CONSENT

Council resolved on 21 February 2017, in order to protect populations of native fauna, including threatened species, from impacts associated with the keeping of domestic cats and dogs within certain development, that appropriate restrictions on title or conditions of consent for the management of companion animals may be applied in sensitive environmental locations (23139E)(MIN17.95)(MIN17.95)

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INFORMATION REGARDING LOOSE-FILLED ASBESTOS INSULATION

Some residential homes located in NSW have been identified as containing loose-fill asbestos insulation, for example in the roof space. NSW Fair Trading maintains a Register of homes that are affected by loose-fill asbestos insulation.

You should make your own enquiries as to the age of the buildings on the land to which this certificate relates and, if it contains a building constructed prior to 1980, Council recommends that any potential purchaser obtain advice from a licensed asbestos assessor to determine whether loose-fill asbestos is present in any building on the land and, if so, the health risks (if any) this may pose for the building's occupants.

Contact NSW Fair Trading for further information.

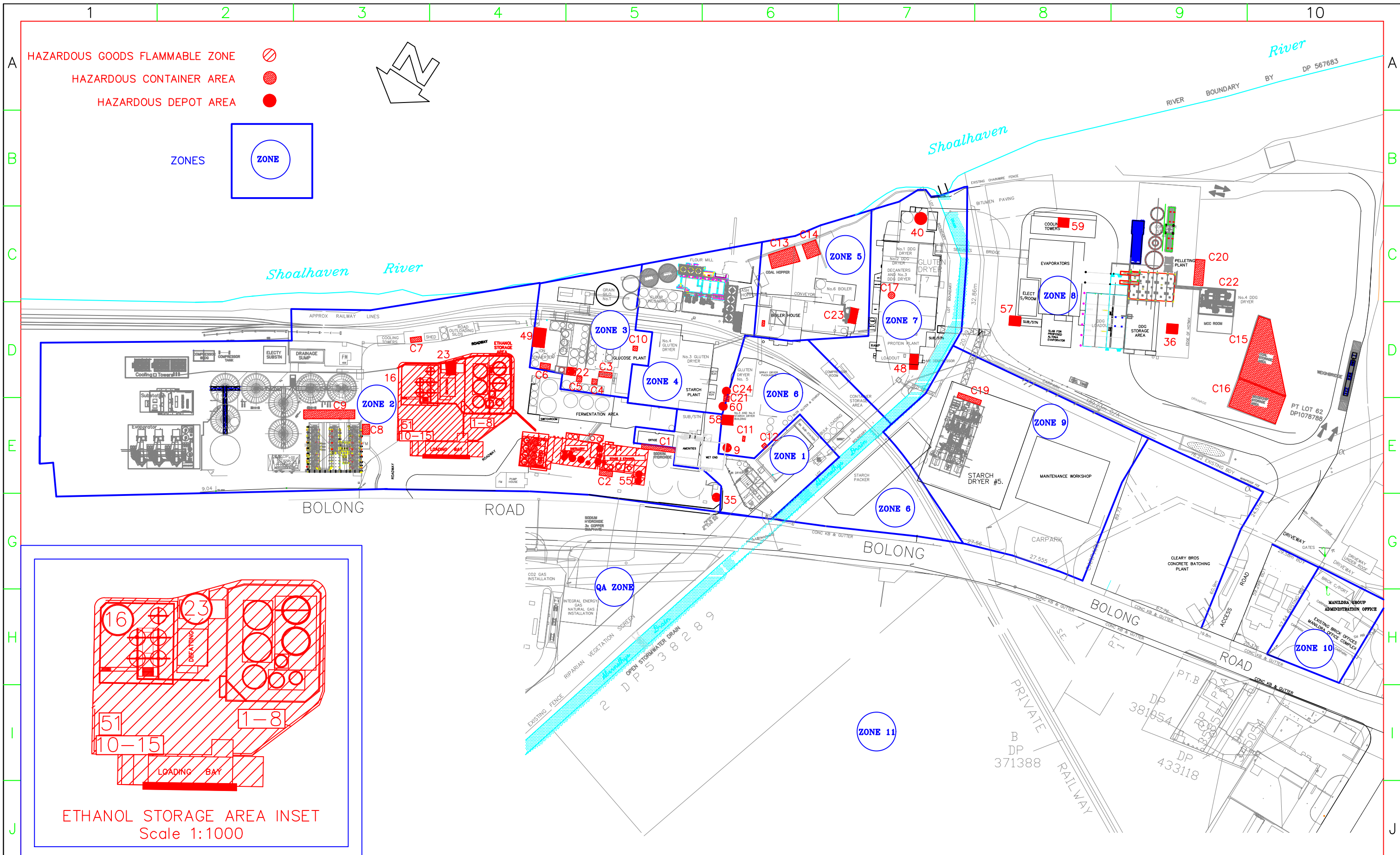
INFORMATION REGARDING FOSSICKING DISTRICT 68.

Pursuant to section 369A of the Mining Act 1992, the NSW Department of Planning, Industry and Environment have declared all land within the Shoalhaven City Council Local Government Area to be a Fossicking District (Fossicking District 68). Contact the NSW Department of Planning, Industry and Environment for further information.

for the CHIEF EXECUTIVE OFFICER

Appendix G

Chemical Storage Inventory



L	24-09-19	All	C24 was 61, C23 was 19, DDC #4 added & C22.	P.C.	J.S.
K	15-02-19	E6	9 was 8.	P.C.	Rowan
J	15-02-19	H1	16 was 62, 58 relocated.	P.C.	J.S.
I	14-02-19	H1	62 added to ethanol storage area.	P.C.	Rowan
H	09-11-18	All	C18 & emergency 150 tank storage removed.	P.C.	J.S.
G	10-04-18	All	Latest plant additions added.	P.C.	J.S.
F	30-12-16	C5	Starch dryer 5 added.	P.C.	J.S.
E	30-06-16	D2	Depot 1B & ethanol evaporator removed.	P.C.	J.S.
ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD

Commitment to Excellence



GEM OF THE WEST

MANILDRA GROUP

100% AUSTRALIAN



PC Drafting
0439 436508
14-000

DRAWN	PC	DATE	10/12/12	JOB TITLE	SHOALHAVEN STARCHES.	SHT SIZE	A3
CHKD	JS	DATE		DWG TITLE	OVERALL SITE PLAN. DANGEROUS GOODS AREAS.	REV.	L
APPD		DATE		PROJECT No.	4978	DWG No.	MN00-001
		SCALE	1 : 2000				

7. Inventory of Pollutants

The following tables list the potential pollutants kept on site, or used in carrying out activities at the premises. Risk assessments of chemicals are maintained by the WH&S team; refer to the WH&S management system for further details.

Refer to site maps 15.2 (factory) and 15.3 (farm) for the location of dangerous goods storage areas.

7.1 Dangerous Goods Storage Depots

Plant Location	Map 15 Ref. No.	Contents	Maximum Storage Quantity (L)	Dangerous Goods Classification	Storage Method
Ethanol	1-7	Ethanol	3,715,000	3. Flammable	Above-Ground Tank
Starch	8	Sulphuric Acid 50%	2,700	8. Corrosive	Above-Ground Tank
Ethanol	10	Methanol	5,000	3. Flammable	Above-Ground Tank
Ethanol	11	Methyl Isobutyl Ketone	5,000	3. Flammable	Above-Ground Tank
Ethanol	12	Petrol	5,000	3. Flammable	Above-Ground Tank
Ethanol	13	Tert Butyl Alcohol	5,000	3. Flammable	Above-Ground Tank
Ethanol	14	Petrol	5,000	3. Flammable	Above-Ground Tank
Ethanol	15	Petrol	5,000	3. Flammable	Above-Ground Tank
Ethanol	16	Ethanol	944,000	3. Flammable	Above-Ground Tank
Glucose	22	Sodium Hydroxide Solution	52,000	8. Corrosive	Above-Ground Tank
Ethanol	23	Xylene (DCI-11) N-Propyl Acetate Ethyl Acetate	6,000 6,000 6,000	3. Flammable 3. Flammable 3. Flammable	Roofed Store IBCs
Starch	35	Acetic Anhydride	3,000	8. Corrosive & 3. Flammable	Above-Ground Tank
Stillage	36	Sodium Hypochlorite	36,000	8. Corrosive	Above-Ground Tank
DDG	40	Hydrochloric Acid	10,000	8. Corrosive	Above-Ground Tank
DDG	48	Sodium Hydroxide	36,000	8. Corrosive	Above-Ground Tank
Glucose	49	Hydrochloric Acid	32,000	8. Corrosive	Above-Ground Tank
Ethanol	51	Methyl Isobutyl Ketone Methoxy Propanol Propyl Alcohol N Propyl Acetate Xylene (DCI-11)	50,000	3. Flammable	Tank (IBC)
Farm	53	Ferric Chloride Solution	20,000	8. Corrosive	Above-Ground Tank
Farm	54	Ammonia Solution Sodium Hydroxide Solution Hypochlorite Solution	2,000 2,000 12,000	8. Corrosive 8. Corrosive 8. Corrosive	Above-Ground Tank Above-Ground Tank Above-Ground Tank
Ethanol	55	Pentanol (Fusel Oil)	10,000	3. Flammable	Above-Ground Tank
Farm	56	L.P.G	2,800	3. Flammable	Above-Ground Tank
DDG	57	Nitric Acid	2,000	8. Corrosive	Tank (IBC)
Starch	58	Phosphorus Oxychloride	500	8. Corrosive	20Lt containers in cabinet
DDG	59	Propionic Acid	4,000	8. Corrosive	Tank (IBC)
Starch	60	Sodium Chlorite Solution	3,000	8. Corrosive	Above-Ground Tank

7.2 Hazardous materials stored in smaller quantities

Material	Map Ref	Hazard Classification	Capacity	Storage Location	DG Class
Ethanol	C1	Class 3 Flammable Liquid	-	Behind lab	3
Sodium Hypochlorite	C1	Corrosive Substance	-	Behind lab	8
Oxygen	C1	Non-Flammable Non-Toxic, Oxidising Agent	-	Behind lab	2
Hydrogen	C1	Flammable Gas	-	Behind lab	2.1

Material	Map Ref	Hazard Classification	Capacity	Storage Location	DG Class
Nitrogen	C1	Non-Flammable Non-Toxic Gas	-	Behind lab	2.2
Helium	C1	Non-Flammable Gas	-	Behind lab	2.2
Nalco 77393	C1	Bio-dispersant	1 m ³	Behind lab	-
Flammable Liquids	C1	Class 3 Flammable Liquid	-	Behind lab	3
Copper Sulphate	C2	Miscellaneous Dangerous Goods	3 m ³	Northern side of ethanol distillery	9
Sodium Hydroxide	C2	Corrosive Substance	1 m ³	Northern side of ethanol distillery	8
Enzymes	C3	Irritant / Sensitiser	3 m ³	Glucose plant	-
Sodium Metabisulphite	C4	Corrosive Substance	-	Glucose plant	-
Pearlite	C5	Irritant / Sensitiser	3 m ³	Glucose plant	-
Enzymes & Yeast	C6	Irritant / Sensitiser	2 m ³	Beside ion-converters	-
Enzymes & Yeast	C7	Irritant / Sensitiser	2 m ³	Southern side of ethanol recovery	-
Sodium Hypochlorite	C8	Corrosive Substance	8 m ³	Eastern side of denaturants	8
Cooling Water Dosing Chemicals	C7, C8, 59	Corrosive Substance	10 m ³	Ethanol, Glucose & DDG cooling towers	8
Fermasure XL (Sodium Chlorite Solution)	C8	Environmentally Hazardous	5 m ³	Eastern side of denaturants	9
Urea	C9		60t	Eastern side of denaturants	-
Nitric Acid	C10	Corrosive Substance	1 m ³	Glucose plant	8
Proxitane	C11	Oxidising, Corrosive	0.5 m ³	Stairwell SD3 & SD4	5.1 / 8
Hydrogen Peroxide and Peroxyacetic Acid	C12	Oxidising, Corrosive	1 m ³	Opposite Electrical Sub-station 13	5.1 / 8
Coal Storage Area 2	C13	Combustible	-	Northern side of boiler house	-
Woodchip Storage Area 2	C14	Combustible	-	Northern side of boiler house	-
Coal Storage Area 1	C15	Combustible	-	Next to shipping container storage	-
Woodchip Storage Area 1	C16	Combustible	-	Next to shipping container storage	-
Sodium Hydroxide	C17	Corrosive Substance	5 m ³	Southern side of DDG #3	8
TOPAX 686	C19	Corrosive Liquid, Basic, Inorganic	1 m ³	Southern side of SD5	8
Sodium Hypochlorite	C19	Corrosive Substance	1 m ³	Southern side of SD5	8
Sodium Hydroxide	C19	Corrosive Substance	3 m ³	Southern side of SD5	8
Nitric Acid	C19	Corrosive Substance	1 m ³	Southern side of SD5	5.1 / 8
RT + Levucell SC	C20	Irritant	5 m ³	Shed, western side of Pellet Plant	-
Magnesium Oxide Powder	C20	Irritant	10 m ³	Shed, western side of Pellet Plant	-
Hydrochloric Acid	C21	Corrosive Substance	2 m ³	Eastern side of SD3	8
Cooling Water Dosing Chemicals	C22	Corrosive Substance	1.5 m ³	DDG #4 cooling tower	8
Bisulfites, Aqueous Solution	C23	Corrosive Substance	1 m ³	Western side of Boiler house	8
Chlorine Dioxide Solution (0.3%)	C24	Non-hazardous at < 1% solution	2.5 m ³	Eastern side of SD3	8

Appendix H

Borehole logs with explanation sheets

GLOSSARY OF SYMBOLS



GHD

Specialist Services in Geotechnical Engineering,
Geology, Field/Laboratory Testing and Hydrogeology
www.ghd.com/Geotechnical

This standard sheet should be read in conjunction with all test hole log sheets and any idealised geological sections prepared for the investigation report.

GENERAL

Symbol	Description	Symbol	Description
D	Disturbed Sample	R	Rising Head Permeability Test
B	Bulk Sample	F	Falling Head Permeability Test
U(50)	Undisturbed Sampled (suffixed by sample size or tube diameter in mm if applicable)	PBT	Plate Bearing Test
CS	Core Sample (suffixed by diameter in mm)		Water Inflow (make)
ES	Soil sample for environmental sampling		Water Outflow (loss)
PID	Photoionisation Detector		Temporary Water Level
SPT	Standard Penetration Test (with blows per 0.15m)		Final Water Level
N	SPT Value		Point Load Test (axial)
HB/HW	SPT Hammer Bouncing/Hammer Weight		Point Load Test (diametric)
PP/HP	Pocket/Hand Penetrometer (suffixed by value kPa)	PL	Point Load (kPa)
PK	Packer Test (kPa)	IMP	Impression Device Test
PZ	Piezometer Installation	PM	Pressuremeter Test
SV/VS	Shear Vane Test (suffixed by value in kPa)		

SOIL SYMBOLS

Main Components				Minor Components			
	SAND		FILL		sandy		vegetation, roots
	GRAVEL		SILT		gravelly		silty
	CLAY		TOPSOIL		clayey	<i>Note: Natural soils are generally a combination of constituents, e.g. sandy CLAY</i>	

ROCK SYMBOLS

Sedimentary				Igneous			
	SANDSTONE		SILTSTONE		CONGLOMERATE		GRANITE C ROCK
	CLAYSTONE		SHALE		COAL		BASALT IC ROCK
							IGNEOUS DYKE

Note: Additional rock symbols may be allocated for a particular project

NATURAL DEFECTS (Coding)

Defect Type		Orientation					
Jt	Joint	For vertical non-oriented core ... "Dip" angle (eg. 5°) measured relative to horizontal.					
Pt	Parting	For inclined non-oriented core ... "Angle" measured relative to core axis.					
SS	Sheared Surface	For inclined oriented core ... "Dip" angle and "Dip Direction" angle (eg. 45°/225° mag.).					
WSm	Weathered Seam	Orientation (con't)		Roughness		Coating	
SSm	Sheared Seam	VT	Vertical	Pol	Polished	Cn	Clean
CSm	Crushed Seam	HZ or 0°	Horizontal	So	Smooth	Sn	Stained
ISm	Infilled Seam	d / °	Degrees	Rf	Rough	Ve	Veneer
SZ	Sheared Zone			VR	Very Rough	Co	Coating
VN	Vein			Slk	Slickensided		
Shape				Infilling / Common Materials			
Pln	Planar	St	Stepped	CLAY	Clay	Mi	Micaceous
Cu	Curved	Ir	Irregular	Ca	Calcite	Mn	Manganese
Un	Undulating	Dis	Discontinuous	X	Carbonaceous	Py	Pyrite
Others				Kt	Chlorite	Qz	Quartz
OP	Open	CL	Closed	Ti	Tight	Fe	Iron Oxide
						MU	Unidentified Mineral

SOIL DESCRIPTION AND CLASSIFICATION



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Soil is described in general accordance with Australian Standard AS 1726-2017 (Geotechnical Site Investigations) in terms of visual and tactile properties, with potential refinement by laboratory testing. AS 1726 defines soil as particulate materials that occur in the ground and can be disaggregated or remoulded by hand in air or water without prior soaking. Classification of the soil is undertaken following description.

SOIL DESCRIPTION

The soil description includes a) Composition, b) Condition, c) Structure, d) Origin and e) Additional observations. 'FILL', 'TOPSOIL' or a 'MIXTURE OF SOIL AND COBBLES / BOULDERS' (with dominant fraction first) is denoted at the start of a soil description where applicable.

a) Soil Composition (soil name, colour, plasticity or particle characteristics, secondary and then minor components)

Soil Name: A soil is termed a *coarse grained soil* where the dry mass of sand and gravel particles exceeds 65% of the total. Soils with more than 35% fines (silt or clay particles) are termed *fine grained soils*. The soil name is made up of the primary soil component (in BLOCK letters), prefixed by applicable secondary component qualifiers. Minor components are applied as a qualifiers to the soil name (using the words 'with' or 'trace').

Particles are differentiated on the basis of size. 'Boulders' and 'cobbles' are outside the soil particle range, though their presence (and proportions) is noted. While individual particles may be designated as silt or clay based on grain size, fine grained soils are characterised as silt or clay based on tactile behaviour or Atterberg Limits, and not the relative composition of silt or clay sized particles.

Colour: The prominent colour is noted, followed by (spotted, mottled, streaked etc.) then secondary colours as applicable. Roughly equally proportioned colours are prefixed by (spotted, mottled, streaked etc.). Colour is described in its moist condition, though both wet and dry colours may also be provided if appropriate.

Plasticity: Fine grained soils are designated within standard ranges of plasticity based on tactile assessment or laboratory assessment of the Liquid Limit.

Particle Characteristics: The particle shape, particle distribution and particle size range within a coarse grained soil is described using standard terms. Particle composition may be described using rock or mineral names, with specific terms for carbonate soils.

Secondary and Minor Components: The primary soil is described and modified by secondary and minor components, with assessed ranges as tabulated.

Carbonate Soils: Carbonate content can be assessed by use of dilute '10%' HCl solution. Resulting clear sustained effervescence is interpreted as a *Carbonate soil* (approximately >50% carbonate), while weak or sporadic effervescence indicates *Calcareous soil* (< 50% carbonate). No effervescence is interpreted as a non-calcareous soil.

Organic and Peat Soils: Where identified, organic content is noted. *Organic soil* (2% to 25% organic matter) is usually identified by colour (usually dark grey/black) and odour (i.e. 'mouldy' or hydrogen sulphide odour). *Peat* (>25% organic matter) is identified by a spongy feel and fibrous texture. Peat soils' decomposition may be described as '*fibrous*' (little / no decomposition), '*pseudo-fibrous*' (moderate decomposition) or '*amorphous*' (full decomposition).

Fraction	Components		Particle Size (mm)
Oversize	BOULDERS		> 200
	COBBLES		63 - 200
Coarse grained soil particles	GRAVEL	Coarse	19 - 63
		Medium	6.7 -19
		Fine	2.36 - 6.7
	SAND	Coarse	0.6 - 2.36
		Medium	0.21 - 0.6
		Fine	0.075 - 0.21
Fine grained soil particles	SILT		0.002 - 0.075
	CLAY		< 0.002

Plasticity Terms (Fine Grained Soils)		Laboratory Liquid Limit Range
Silt	Clay	
N/A	N/A	(Non Plastic)
Low Plasticity	Low Plasticity	≤ 35%
	Medium Plasticity	> 35% and ≤ 50%
High Plasticity	High Plasticity	> 50%

Particle Distribution Terms (Coarse Grained Soils)	
Well graded	good representation of all particle sizes
Poorly graded	one or more intermediate sizes poorly represented
Gap graded	one or more intermediate sizes absent
Uniform	essentially of one size

Particle Shape Terms (Coarse Grained Soils)		
Rounded	Sub-angular	Flaky or Platy
Sub-rounded	Angular	Elongated

Secondary and Minor Components for Coarse Grained Soils			
Fines (%)	Modifier (as applicable)	Accessory coarse (%)	Modifier (as applicable)
≤ 5	'trace silt / clay'	≤ 15	'trace sand / gravel'
> 5, ≤ 12	'with clay / silt'	> 15, ≤ 30	'with sand / gravel'
> 12	prefix 'silty / clayey'	> 30	prefix 'gravelly / sandy'

Secondary and Minor Components for Fine Grained Soils	
% Coarse	Modifier (as applicable)
≤ 15	add "trace sand / gravel"
> 15, ≤ 30	add "with sand / gravel"
> 30	prefix soil "sandy / gravelly"

SOIL DESCRIPTION AND CLASSIFICATION



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b) Soil Condition (moisture, relative density or consistency)

Moisture: Fine grained soils are described relative to plastic or liquid limits, while coarse grained soils are assessed based on appearance and feel. The observation of seepage or free water is noted on the test hole logs.

Moisture - Coarse Grained Soils			Moisture - Fine Grained Soils		
Term		Tactile Properties	Term		Tactile Properties
Dry	('D')	Non-cohesive, free running	Moist, dry of plastic limit	('w < PL')	Hard and friable or powdery
Moist	('M')	Feels cool, darkened colour, tends to stick together	Moist, near plastic limit	('w ≈ PL')	Can be moulded
			Moist, wet of plastic limit	('w > PL')	Weakened, free water forms on hands with handling
Wet	('W')	Feels cool, darkened colour, tends to stick together, free water forms when handling	Wet, near liquid limit	('w ≈ LL')	Highly weakened, tends to flow when tapped
			Wet, wet of liquid limit	('w > LL')	Liquid consistency, soil flows

Relative Density (Non Cohesive Soils): The Density Index is inherently difficult to assess by visual or tactile means, and is normally assessed by penetration testing (e.g. SPT, DCP, PSP or CPT) with published correlations. Assessment may be affected by moisture and *in situ* stress conditions. Density Index assessment may be refined by combination of *in situ* density testing and laboratory reference maximum and minimum density ranges.

Consistency (Cohesive Soils): May be assessed by direct measurement (shear vane, CPT etc.), or approximate tactile correlations. Cohesive soils include fine grained soils, and coarse grained soils with sufficient fine grained components to induce cohesive behaviour. A 'design shear strength' must consider the mode of testing, the *in situ* moisture content and potential for variations of moisture which may affect the shear strength.

Relative Density (Non-Cohesive Soils)			Consistency (Cohesive Soils)		
Term and (Symbol)		Density Index (%)	Term and (Symbol)		Undrained Shear Strength
Very Loose	(VL)	≤ 15	Very Soft	(VS)	< 12 kPa
Loose	(L)	> 15 and ≤ 35	Soft	(S)	12 - 25 kPa
Medium Dense	(MD)	> 35 and ≤ 65	Firm	(F)	25 - 50 kPa
Dense	(D)	> 65 and ≤ 85	Stiff	(St)	50 - 100 kPa
Very Dense	(VD)	> 85	Very Stiff	(VSt)	100 - 200 kPa
Consistency assessment can be influenced by moisture variation.			Hard	(H)	> 200 kPa
			Friable	(Fr)	-

c) Structure (zoning, defects, cementing)

Zoning: The *in situ* zoning is described using the terms below. 'Intermixed' may be used for an irregular arrangement.

'layer' (a continuous zone across the exposed sample)

'pocket' (an irregular inclusion of different material).

'lens' (a discontinuous layer with lenticular shape)

'interbedded' or "interlaminated" (alternating soil types)

Defects: Described using terms below, with dimension orientation and spacing described where practical.

'parting' (an open or closed surface or crack sub parallel to layering with little / no tensile strength - open or closed)

'softened zone' (in clayey soils, usually adjacent to a defect with associated higher moisture content)

'fissure' (as per a parting, though not parallel or sub parallel to layering – may include desiccation cracks)

'tube' (tubular cavity, singly or one of a large number, often formed from root holes, animal burrows or tunnel erosion)

'sheared seam' (zone of sub parallel near planar closely spaced intersecting smooth or slickensided fissures dividing the mass into lenticular or wedge shaped blocks)

'tube cast' (an infilled tube – infill may vary from uncemented through to cemented or have rock properties)

'sheared surface' (a near planar, curved or undulating smooth, polished or slickensided surface, indicative of displacement)

'infilled seam' (sheet like soil body cutting through the soil mass, formed by infilling of open defects)

Cementation: Soils may be cemented by various substances (e.g. iron oxides and hydroxides, silica, calcium carbonate, gypsum), and the cementing agent shall be identified if practical. Cemented soils are described as:

'weakly cemented' easily disaggregated by hand in air or water

'moderately cemented' effort required to disaggregate the soil by hand in air or water

Materials extending beyond 'moderately cemented' are encompassed within the rock strength range. Where consistent cementation throughout a soil mass is identified as a duricrust, it is described in accordance with duricrust rock descriptors. Where alternate descriptors of cementation development are applied for consistency with regional practices or geology, or client requirements, these are outlined separately.

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d) Origin

An interpretation is provided based on observations of landform, geology and fabric, and may further include assignment of a stratigraphic unit. The use of terms 'possibly' or 'probably' indicates a higher degree of uncertainty regarding the assessed origin or stratigraphic unit. Typical origin descriptors include:

<i>Residual</i>	Formed directly from in situ weathering with no visible structure or fabric of the parent soil or rock.
<i>Extremely weathered</i>	Formed directly from in situ weathering, with remnant and/or fabric from the parent rock.
<i>Alluvial</i>	Deposited by streams and rivers (may be applied more generically as transported by water).
<i>Estuarine</i>	Deposited in coastal estuaries, including sediments from inflowing rivers, streams, and tidal currents.
<i>Marine</i>	Deposited in a marine environment.
<i>Lacustrine</i>	Deposited in freshwater lakes.
<i>Aeolian</i>	Transported by wind.
<i>Colluvial and Slopewash</i>	Soil and rock debris transported down slopes by gravity (with or without assistance of water). Colluvium is typically applied to thicker / localised deposits, and slopewash for thinner / widespread deposits.
<i>TOPSOIL</i>	Surficial soil, typically with high levels of organic material. Topsoils buried by other transported soils are termed ' <i>remnant topsoil</i> '. Tree roots within otherwise unaltered soil does not characterise topsoil.
<i>FILL</i>	Any material which has been placed by anthropogenic processes (i.e. human activity).

e) Additional Observations

Additional observations may be included to supplement the soil description. Additional observations may consist of notations relating to soil characteristics (odour, contamination, colour changes with time), inferred geology (with delineation of soil horizons or geological time scale) or notes on sampling and testing application (including the reliability, recovery, representativeness, or condition of samples or test conditions and limitations). If the material is assessed to be not representative, terms such as 'poor recovery', 'non-intact', 'recovered as' or 'probably' are applied.

SOIL CLASSIFICATION

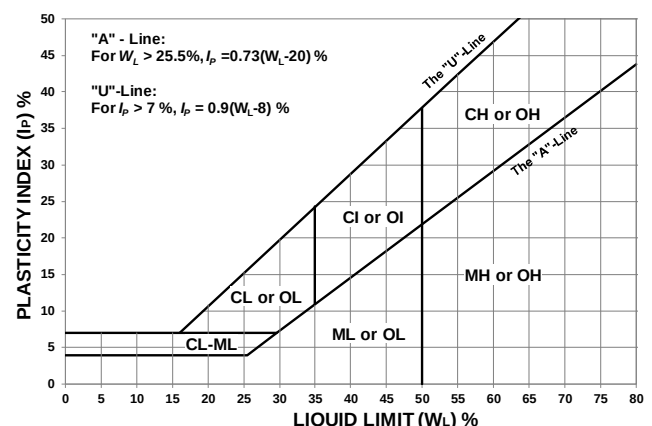
Classification allocates the material within distinct soil groups assigned a two character Group Symbol:

Coarse Grained Soils (sand and gravel: more than 65% of soil coarser than 0.075 mm)			Fine Grained Soils (silt and clay: more than 35% of soil finer than 0.075 mm)		
Major Division	Group Symbol	Soil Group	Major division	Group Symbol	Soil Group
GRAVEL (more than half of the coarse fraction is > 2.36 mm)	GW	GRAVEL, well graded	SILT and CLAY (low to medium plasticity)	ML	SILT, low plasticity
	GP	GRAVEL, poorly graded		CL	CLAY, low plasticity
	GM	Silty GRAVEL		CI	CLAY, medium plasticity
	GC	Clayey GRAVEL		OL	Organic SILT
SAND (more than half of the coarse fraction is < 2.36 mm)	SW	SAND, well graded	SILT and CLAY (high plasticity)	MH	SILT, high plasticity
	SP	SAND, poorly graded		CH	CLAY, high plasticity
	SM	Silty SAND		OH	Organic CLAY / SILT
	SC	Clayey SAND	Highly Organic	Pt	PEAT

Coarse grained soils with fines contents between 5% and 12% are provided a dual classification comprising the two group symbols separated by a dash, e.g. for a poorly graded gravel with between 5% and 12% silt fines (poorly graded 'GRAVEL with silt'), the classification is GP-GM.

For the purpose of classification, *poorly graded, uniform, or gap graded* soils are all designated as poorly graded. Soils that are dominated by boulders or cobbles are described separately and are not classified.

Classification is routinely undertaken based on tactile assessment with the soil description. Refinement of soil classification may be applied using laboratory assessment, including particle size distribution and Atterberg Limits. Atterberg Limits testing is applied to the sample portion finer than 0.425 mm. Fine grained soil components are assessed on the basis of regions defined within the Modified Casagrande Chart.



ROCK DESCRIPTION AND CLASSIFICATION



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Rock is described in general accordance with Australian Standard AS 1726-2017 (Geotechnical site investigations) in terms of visual and tactile properties, with potential refinement by laboratory testing. AS 1726 defines rock as any aggregate of minerals and/or organic materials that cannot be disaggregated by hand in air or water without prior soaking. The rock description and classification distinguishes between rock material, defects, structure and rock mass.

ROCK DESCRIPTION AND CLASSIFICATION

a) Description of rock material (rock name, grain size and type, colour, texture and fabric, inclusions or minor components, moisture content and durability)

Rock Name: Simple rock names are used to provide a reasonable engineering description rather than a precise geological classification. The rock name is chosen on the basis of origin, with common types summarised below. Additional, non-exhaustive, terminology is included in AS 1726. Rock names not described within AS 1726 may be adopted, with geological characteristics typically noted within accompanying text.

Grain Size (mm)	Sedimentary				Metamorphic		Igneous		
	Clastic or Detrital	Carbonate		Pyroclastic	Foliated	Non-Foliated	Felsic	↔	Mafic
		Low Porosity	Porous						
>2.0	CONGLOMERATE (rounded grains in a finer matrix) BRECCIA (angular or irregular fragments in a finer matrix)	LIMESTONE (Predominantly CaCO ₃) or	CALCIRUDITE	AGGLOMERATE (rounded grains in a finer matrix) VOLCANIC BRECCIA (angular fragments in a finer matrix)	GNEISS	MARBLE (carbonate) QUARTZITE	GRANITE	DIORITE	GABBRO
2.0-0.06	SANDSTONE	DOLOMITE (Predominantly CaMgCO ₃)	CALCARENITE	TUFF	SCHIST	SERPENTINITE	MICRO-GRANITE	MICRO-DIORITE	DOLERITE
0.06-0.002	MUDSTONE	SILTSTONE (mostly silt)	CALCISILTITE	Fine grained TUFF	PHYLLITE or SLATE	HORNFELS	RHYOLITE	ANDESITE	BASALT
<0.002	CLAYSTONE (mostly clay)		CALCILUTITE						

Reproduced with modification from Tables 15, 16 and 17, Clause 6.2.3.1, AS 1726-2017, Geotechnical site investigations.

Grain size: For rocks with predominantly sand sized grains the dominant or average grain size is described as follows:

Rock type	Coarse grained	Medium grained	Fine grained
Sedimentary rocks	Mainly 0.6 mm to 2 mm	Mainly 0.2 mm to 0.6 mm	Mainly 0.06 mm (just visible) to 0.2 mm
Igneous and metamorphic rocks	Mainly >2 mm	Mainly 0.06 mm to 2 mm	Mainly <0.6 mm (just visible)

Colour assists in rock identification and interpolation. Rock colour is generally described in a “moist” condition, using simple terms (e.g. grey, brown, etc.) and modified as necessary by “pale”, “dark”, or “mottled”. Borderline colours may be described as a combination of these colours (e.g. red-brown).

Texture refers to the arrangement of, or the relationship between, the component grains or crystals (e.g. porphyritic, crystalline or amorphous).

Fabric refers to visible grain arrangement along a preferential orientation or a layering. Fabric may be noted as “indistinct” (little effect on strength) or “distinct” (rock breaks more easily parallel to the fabric). Common terms include “massive” or “flow banding” (igneous), “foliation” or “cleavage” (metamorphic). Sedimentary layering is described as “bedding” or (where thickness < 20 mm) “lamination”. The typical orientation, spacing or thickness of these structural features can be described directly in millimetres and metres. Further quantification of bedding thickness applied by GHD is as follows:

Bedding Term	Thickness
Very thickly bedded	>2 m
Thickly bedded	0.6 to 2 m
Medium bedded	0.2 to 0.6 m
Thinly bedded	60 to 200 mm
Very thinly bedded	20 to 60 mm
Laminated	6 to 20 mm
Thinly laminated	<6 mm

Features, Inclusions and Minor Components are typically only described when those features could influence the engineering behaviour of the rock. Described features may include: gas bubbles in igneous rocks; veins of quartz, calcite or other minerals; pyrite crystals and nodules or bands of ironstone or carbonate; cross bedding in sandstone; clast or matrix support in conglomerates and breccia.

Moisture content may be described by the feel and appearance of the rock, as follows: “dry” (looks and feels dry), “moist” (feels cool, darkened in colour, but no water is visible on the surface), or “wet” (feels cool, darkened in colour, water film or droplets visible on the surface). The moisture content of rock cored with water may not represent in situ conditions.

Durability of rock samples is noted where there is an observed tendency of samples to crack, breakdown in water or otherwise deteriorate with exposure.

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b) Classification of the rock material condition (strength, weathering and/or alteration)

Estimated Strength refers to the rock material and not the rock mass. The strength is defined in terms of uniaxial compressive strength (UCS), though is typically estimated by either tactile assessment or Point Load Strength Index ($Is_{(50)}$) (measured perpendicular to planar anisotropy). A correlation between $Is_{(50)}$ and UCS is adopted for classification, though is not intended for design purposes without appropriate supporting assessment. A field guide follows:

Term and (Symbol)		UCS (MPa)	$Is_{(50)}$ (MPa)	Field Guide
Very Low	(VL)	0.6 – 2	0.03 - 0.1	Material crumbles under firm blows with sharp end of geological pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm thick can be broken by finger pressure.
Low	(L)	2 - 6	0.1 - 0.3	Easily scored with knife; indentations 1 to 3 mm show in the specimen with firm blows of a geological pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	(M)	6 - 20	0.3 - 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	(H)	20 - 60	1 - 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a geological pick with a single firm blow; rock rings under hammer.
Very High	(VH)	60 - 200	3 - 10	Hand specimen breaks with geological pick after more than one blow; rock rings under hammer.
Extremely High	(EH)	>200	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Based on Table 19, Clause 6.2.4.1, AS 1726-2017, Geotechnical site investigations. Refer to source document for further detail.

Material with strength less than “very low” is described using soil characteristics, with the presence of an original rock texture or fabric noted if relevant.

Weathering and Alteration: The process of weathering involves physical and chemical changes to the rock resulting from exposure near the earth’s surface. A subjective scale for weathering is applied as follows:

Weathering Term and (Symbol)		Description
Residual Soil	(RS)	Material has weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered	(XW)	Material has weathered to such an extent that it has soil properties. Mass structure, material texture and fabric of original rock are still visible.
Highly Weathered	(HW)	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered	(MW)	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly Weathered	(SW)	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	(Fr)	Rock shows no sign of decomposition of individual minerals or colour changes.

Modified based on Table 20, Clause 6.2.4.2, AS 1726-2017, Geotechnical site investigations. Refer to source document for further detail.

Where physical and chemical changes to the rock are caused by hot gases or liquids at depth, the process is called alteration. Unlike weathering, the distribution of altered material may occur at any depth and show no relationship to topography. Where alteration minerals are identified the terms “*extremely altered*” (XA), “*highly altered*” (HA), “*moderately altered*” (MA) and “*slightly altered*” (SA) can be used to describe the physical and chemical changes described above.

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c) Description of defects (defect type, orientation, roughness and shape, coatings and composition of seams, spacing, length, openness and thickness, block shape)

Defects often control the overall engineering behaviour of a rock mass. AS 1726 defines a defect as “a discontinuity, fracture, break or void in the material or materials across which there is little or no tensile strength”. Describing the type, character and distribution of natural defects is an essential part of the description of many rock masses.

Commonly described characteristics of defects within a rock mass include type, orientation, roughness and shape, coatings and composition of seams, aperture, persistence, spacing and block shape.

The degree of detail required for defect descriptions depends on project requirements. All defects judged of engineering significance for the site and project are described individually. Where appropriate, generalised descriptions for less significant, or multiple similar, defects can be provided for delineated parts of rock core or exposures. A general description of delineated defect sets is provided when sufficient orientation data is available.

Defect Type is described using the terms summarised below. On core logs, only natural defects across which the core is discontinuous are described (i.e. inferred artificial fractures such as drill breaks are excluded). Incipient defects are described using the relevant texture or fabric terms. Healed defects (those that have been re-cemented by minerals such as chlorite or calcite) are described using the prefix “healed” (e.g. healed joint).

Type and (Symbol)		Description	Diagram
Parting	(Pt)	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering (e.g. bedding) or a planar anisotropy in the rock material (e.g. cleavage). May be open or closed.	
Joint	(Jt)	A surface or crack with no apparent shear displacement and across which the rock has little or no tensile strength, but which is not parallel or subparallel to layering or to planar anisotropy in the rock material. May be open or closed.	
Sheared Surface	(SS)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided and which shows evidence of shear displacement.	
Sheared Zone	(SZ)	Zone of rock material with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.	
Sheared Seam	(SSm)	Seam of soil material with roughly parallel almost planar boundaries, composed of soil materials with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge-shaped blocks.	
Crushed Seam	(CSm)	Seam of soil material with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock material which may be more weathered than the host rock. The seam has soil properties.	
Infilled Seam	(ISm)	Seam of soil material usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1 mm thick may be described as a veneer or coating on a joint surface.	
Extremely Weathered Seam	(WSm)	Seam of soil material, often with gradational boundaries. Formed by weathering of the rock material in place.	

Modified based on Table 22, Clause 6.2.5.2, AS 1726-2017, Geotechnical site investigations. Refer to source document for further detail.

Defect Orientation is recorded as the “dip” (maximum angle of the mean plane, measured from horizontal) and the “dip direction” (azimuth of the dip, measured clockwise from true north). Dip and dip direction is expressed in degrees, with two-digit and three-digit numbers respectively, separated by a slash (e.g. 45/090). For vertical boreholes, the defect dip is measured as the acute angle from horizontal. Rock core extracted from vertical boreholes is generally not oriented, so the dip direction cannot be directly measured. For non-oriented inclined boreholes, a defect “alpha” (α) angle is measured as the acute angle from the core axis. For vertical and non-oriented inclined boreholes, the dip direction can sometimes be estimated from the relationship of the defect to a well-defined site structure such as fabric. For oriented inclined boreholes, the measurement of the defect orientation is carried out and recorded in a form suited to the particular device being used and later processed to report true dip and dip direction.

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Roughness and Shape of the defect surface combine to have significant influence on shear strength. Standard descriptions and abbreviations include:

Roughness and (Symbol)		Description
Very Rough	(VR)	Many large surface irregularities (amplitude generally more than 1 mm). Feels like, or coarser than very coarse sand paper.
Rough	(Rf)	Many small surface irregularities (amplitude generally less than 1 mm). Feels like fine to coarse sand paper.
Smooth	(So)	Smooth to touch. Few or no surface irregularities.
Polished	(Pol)	Shiny smooth surface.
Slickensided	(Slk)	Grooved or striated surface, usually polished.

Shape and (Symbol)		Description
Planar	(Pln)	The defect does not vary in orientation.
Curved	(Cu)	The defect has a gradual change in orientation.
Undulating	(Un)	The defect has a wavy surface.
Stepped	(St)	The defect has one or more well defined steps.
Irregular	(Ir)	The defect has many sharp changes of orientation.

Although the surface roughness of defects can be described at small (10-100 mm) scales of observation, the overall shape of the defect surface can usually be observed only at medium (0.1-1 m) and large (>1 m) scale.

Where it is necessary to assess the shear strength of a defect, observations are generally made at multiple scales. Surface roughness may also be characterised by using the joint roughness coefficient (JRC) profiles established by Barton and Choubey (1977). Where large-scale observations are possible, further measurement of defect “waviness” (angle of the asperities relative to the overall dip angle of the plane) is made.

Coatings and Composition of Seams: Many defects have surface coatings, which can affect their shear strength. Standard descriptions include:

Coating and (Symbol)		Description
Clean	(Cn)	No visible coating.
Stained	(Sn)	No visible coating but surfaces are discoloured.
Veneer	(Ve)	A visible coating of soil or mineral substance, but too thin to be measured may be patchy.
Coating	(Co)	A visible coating up to 1 mm thick. Soil material greater than 1 mm thick is described using defect terms (e.g. infilled seam). Rock material greater than 1 mm thick is described as a vein (Vn).

Common Minerals and (Symbol)	
Clay	(CLAY)
Calcite	(Ca)
Carbonaceous	(X)
Chlorite	(Kt)
Iron Oxide	(Fe)
Micaceous	(Mi)
Manganese	(Mn)
Pyrite	(Py)
Quartz	(Qz)

The composition of seams are described using soil description terms as given on the SOIL DESCRIPTION AND CLASSIFICATION Standard Sheet. Where possible the mineralogy of coatings is identified. Common mineral coatings include:

Aperture: Defects across which there is little or no tensile strength can be either “open” (Op) or “closed” (Cl). For rock core, the width of the “open” defect is measured whilst still in the core barrel splits. The descriptor “tight” (Ti) can only apply to healed or incipient defects (i.e. veins, foliation, etc.).

Persistence and Spacing of defects is described directly in millimetres and metres. If the measurement of defect persistence is limited by the extent of the exposure, the end conditions are noted (i.e. 0, 1 or 2 defect ends observed). The spacing between defects of similar orientation (i.e. within a specific defect set) is recorded when possible.

The frequency of defects within rock core can be measured as either: the spacing between successive defects; or the “Fracture Index”, which is the number of defects per metre of core.

Spacing Term	Thickness
Very wide	>2 m
Wide	0.6 to 2 m
Medium	0.2 to 0.6 m
Closely	60 to 200 mm
Very closely	20 to 60 mm
Extremely closely	6 to 20 mm

Block Shape: Where it is considered significant, block shape can be described using the subjective terms as follows:

Block Shape	Description
Polyhedral	Irregular discontinuities without arrangement into distinct sets, and of small persistence.
Tabular	One dominant set of parallel discontinuities, for example bedding planes, with other non-continuous joints; thickness of blocks much less than length or width.
Prismatic	Two dominant sets of discontinuities, approximately orthogonal and parallel, with a third irregular set; thickness of blocks much less than length or width.
Equidimensional	Three dominant sets of discontinuities, approximately orthogonal, with occasional irregular joints, giving equidimensional blocks.
Rhomboidal	Three (or more) dominant, mutually oblique, sets of joints giving oblique-shaped, equidimensional blocks.
Columnar	Several, usually more than three sets of continuous, parallel joints usually crossed by irregular joints; lengths much greater than other dimensions.

Modified based on Table 23, Clause 6.2.5.7, AS 1726-2017, Geotechnical site investigations. Refer to source document for further detail.

ROCK DESCRIPTION AND CLASSIFICATION



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d) Interpreted stratigraphic unit

Stratigraphic units may be interpreted and reported, in accordance with The Australian Stratigraphic Units Database (ASUD). The terms “possibly” or “probably” indicate increased uncertainty in this interpretation.

e) Geological structure

After describing the rock material and defects, an interpretation of the nature and configuration of rock mass defects may be presented in logs, charts, 2D sections and 3D models (e.g. dipping strata, folds, unconformities, weathering profiles, defect sets, geological faults, etc.).

PARAMETERS RELATED TO CORE DRILLING

Drill Depth and Core Loss: Drilling intervals are shown on GHD Core Log Sheets by depth increments and horizontal marker lines.

“Core loss”, or its inverse “total core recovery” (TCR), is measured as a percentage of the core run. If the location of the core loss is known, or strongly suspected, it is shown in a region of the column bounded by dashed horizontal lines. If unknown, core loss is assigned to the bottom of a core run.

Rock Quality Designation (RQD), described by Deere et al. (1989), may be recorded on GHD Core Log Sheets.

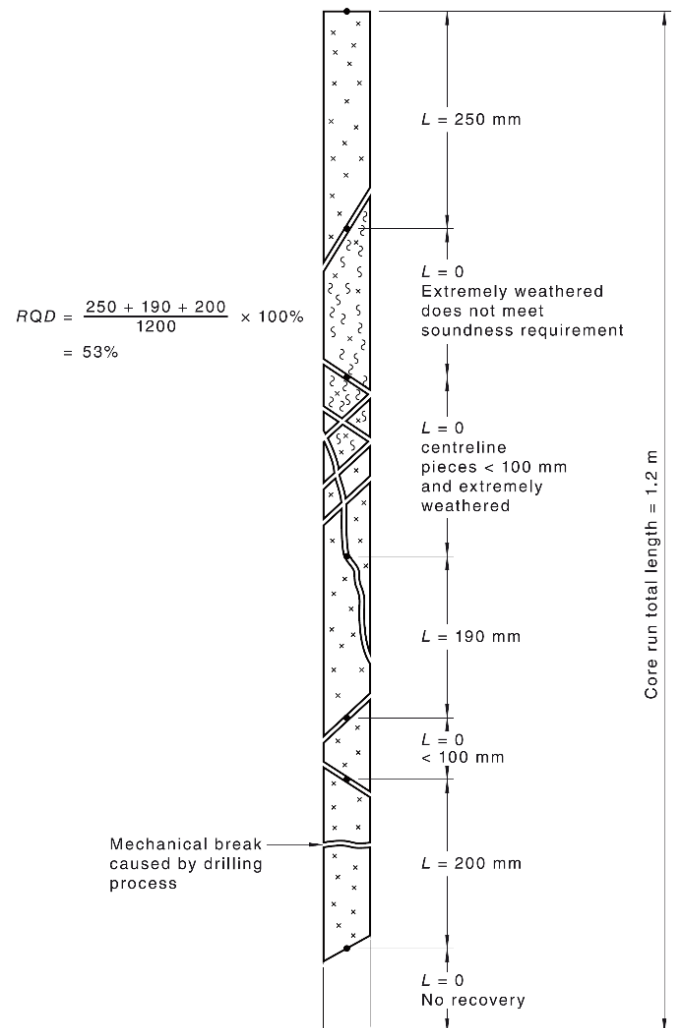
For certain projects, such as tunnelling or underground mining investigations, rock mass ratings or classifications can be required as part of the design process. The RQD forms a component of these rock mass ratings and provides a quantitative estimate of rock mass quality from rock core logs.

The rock core must be “N” sized (nominally 50 mm) or greater for derivation of RQD. The RQD is expressed as a percentage of intact rock core (excluding residual soil and extremely weathered rock) greater than 100 mm in length over the total selected core length.

Deere et al. (1989) recommends measuring lengths of core along the centreline, as shown right.

RQD is expressed as:

$$RQD = \frac{\sum \text{Length of sound core pieces} > 100 \text{ mm in length}}{\text{Length of core run}} \times 100\%$$



RQD measurement procedure

(reproduced from Figure 13, Clause 6.2.9.4, AS 1726-2017, Geotechnical site investigations)

ROCK MASS CLASSIFICATION

Rock mass classification schemes may be used to represent the engineering characteristics of a rock mass. A large variety of classification schemes have been developed by various authors, ranging from simple to complex. All of the schemes are limited in their application and many rock mass classification systems assume that the rock mass is isotropic, which is rarely the case.

References

STANDARDS AUSTRALIA (2017). AS 1726-2017. GEOTECHNICAL SITE INVESTIGATIONS.
BARTON, N. AND CHOUBEY, V. (1977). THE SHEAR STRENGTH OF ROCK JOINTS IN THEORY AND PRACTICE. ROCK MECHANICS 10, 1-54. SPRINGER.
DEERE, D.U. AND DEERE, D.W. (1989). ROCK QUALITY DESIGNATION (RQD) AFTER TWENTY YEARS. CONTRACT REPORT GL-89-1. ARMY CORPS OF ENGINEERS. WASHINGTON DC, 1989.

BOREHOLE LOG SHEET

Client : Manildra Group

Project : Starches Expansion Project - Gas Pipeline Mod 2

HOLE No. GBH01

Location : Lot 2 DP538289, Bolong Road Bomaderry NSW, (western side of Abernathy's Creek)

SHEET 1 OF 3

Position : 281863.0 E 6140447.0 N GDA2020/ 56

Surface RL: Not measured

Angle from Horiz. : 90°

Processed : AJET

Rig Type : Hanjin 88D

Mounting: Track

Contractor : South Coast Drilling

Driller : CM

Checked : MW/CQ

Date Started : 4/2/2022

Date Completed : 4/2/2022

Logged by : MW

Date: 11/2/2022

Note: * indicates signatures on original issue of log or last revision of log

DRILLING					MATERIAL					Comments/ Observations	
SCALE (m)	Drilling Method	Hole Support Casing	Water	Samples & Tests	Depth metres	Graphic Log	USC Symbol	Description	Moisture Condition	Consistency / Density Index	
1 											

See standard sheets for details of abbreviations & basis of descriptions



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Job No.

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BOREHOLE LOG SHEET

Client : Manildra Group

Project : Starches Expansion Project - Gas Pipeline Mod 2

HOLE No. GBH01

SHEET 2 OF 3

Location : Lot 2 DP538289, Bolong Road Bomaderry NSW, (western side of Abernathy's Creek)

Position : 281863.0 E 6140447.0 N GDA2020/ 56

Surface RL: Not Measured

Angle from Horiz. : 90°

Processed : AJET

Rig Type : Hanjin 88D

Mounting: Track

Contractor : South Coast Drilling

Driller : CM

Checked : MW/CQ

Date Started : 4/2/2022

Date Completed : 4/2/2022

Logged by : MW

Date: 11/2/2022

Note: * indicates signatures on original issue of log or last revision of log

DRILLING					MATERIAL					Note: * indicates signatures on original issue of log or last revision of log	
SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth metres	Graphic Log	USC Symbol	Description	Moisture Condition	Consistency / Density Index	Comments/ Observations
6 											

See standard sheets for
details of abbreviations
& basis of descriptions

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Job No.

12567208

BOREHOLE LOG SHEET

Client : Manildra Group

Project : Starches Expansion Project - Gas Pipeline Mod 2

Location : Lot 2 DP538289, Bolong Road Bomaderry NSW, (western side of Abernathy's Creek)

HOLE No. GBH01

SHEET 3 OF 3

Position : 281863.0 E 6140447.0 N GDA2020/ 56

Surface RL: Not Measured

Angle from Horiz. : 90°

Processed : AJET

Rig Type : Hanjin 88D

Mounting: Track

Contractor : South Coast Drilling

Driller : CM

Checked : MW/CQ

Date Started : 4/2/2022

Date Completed : 4/2/2022

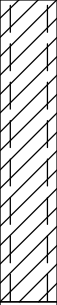
Logged by : MW

Date: 11/2/2022

Note: * indicates signatures on original issue of log or last revision of log

DRILLING

MATERIAL

SCALE (m)	Drilling Method	Hole Support \ Casing	Water	Samples & Tests	Depth metres	Graphic Log	USC Symbol	Description	Moisture Condition	Consistency / Density Index	Comments/ Observations
11	Solid Flight Auger	Nil			11.00		Cl-CH	Silty CLAY: as previous.	w < PL	VSI/ H	
12								End of borehole at 11.00 metres.			
13											
14											
15											

See standard sheets for details of abbreviations & basis of descriptions



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Job No.

12567208

Geological & Engineering Log

Project
Client
Site
Job Number

Packing Plant
Manildra
Bolong Road Bomaderry
3001550

East
North
Elevation
Datum

281865.0 m
6140465.0 m
2.53 m
MGA94 Zone 56/AHD

Start Date
End Date
Contractor
Rig Type
Mounting

27/06/2019
27/06/2019

Total Drilling
Hanjin 8D
Track

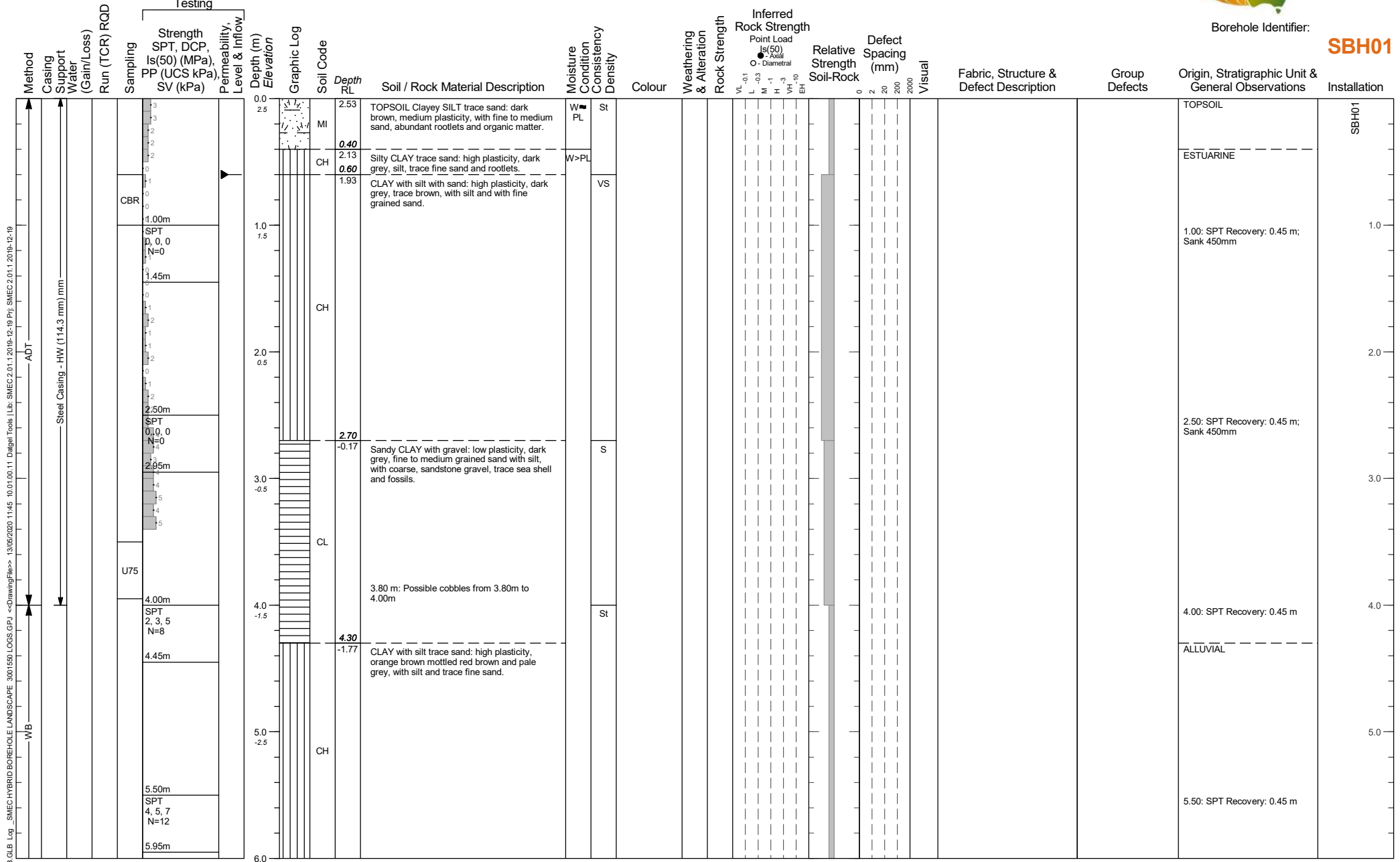
Inclination
Azimuth
North
Survey

90°



Borehole Identifier:

SBH01



Observations and Comments
Backfilled on Completion

Penetrometer Notes
Type: DCP9
Blows per 100 mm

Notes

Classifications compliant with AS1726-2017: Geotechnical Site Investigations unless otherwise noted.
Defect Log Abridged. Additional detail in digital dataset. Lugeon: BS5930:1999
For Inclined Holes: Angles reported in defects are apparent dip from core horizontal unless as α or β .
Refer to explanatory notes for SMEC logs for details of abbreviations or basis of description.

Logged By GRR Date 27/06/2019
Approved By SM Date 30/08/2019
Status Final Page 1 of 3



SBH01

Notes

Logged By	GRR	Date	27/06/2019
Approved By	SM	Date	30/08/2019
Status	Final	Page	2 of 3

Geological & Engineering Log

Project
Client
Site
Job Number

Packing Plant
Manildra
Bolong Road Bomaderry
3001550

East
North
Elevation
Datum

281865.0 m
6140465.0 m
2.53 m
MGA94 Zone 56/AHD

Start Date
End Date

27/06/2019
27/06/2019

Contractor
Rig Type
Mounting

Total Drilling
Hanjin 8D
Track



Borehole Identifier:

SBH01

Method	Casing Support Water (Gain/Loss)	Run (TCR) RQD	Sampling	Strength SPT, DCP, Is(50) (MPa), PP (UCS kPa), SV (kPa)	Permeability, Level & Inflow	Depth (m) Elevation	Graphic Log	Soil Code	Depth RL	Soil / Rock Material Description	Moisture Condition	Consistency Density	Colour	Weathering & Alteration	Rock Strength	Inferred Rock Strength Point Load (s(50)) - Axial Diametral	Relative Strength Soil-Rock	Defect Spacing (mm)	Visual	Fabric, Structure & Defect Description	Group Defects	Origin, Stratigraphic Unit & General Observations	Installation
WB						12.0 -9.5		CH		CLAY trace sand trace gravel: high plasticity, red brown, orange, with fine to medium grained sand, trace fine to medium, highly weathered gravel. (continued)	W PL	VSt										RESIDUAL SOIL	
				13.20m SPT 17, 10/20 mm HB N=R 13.37m		13.0 -10.5			13.20	SANDSTONE (100%): medium grained, low strength, highly weathered, pale grey, red brown, medium grained sandstone.	M	H										WEATHERED ROCK (SANDSTONE) 13.20: SPT Recovery: 0.17 m	13.5
						13.45				Hole Terminated at 13.45 m Target depth													
						14.0 -11.5																	
						15.0 -12.5																	
						16.0 -13.5																	
						17.0 -14.5																	
						18.0																	

Observations and Comments
Backfilled on Completion

Penetrometer Notes
Type: DCP9
Blows per 100 mm

Notes

Classifications compliant with AS1726-2017: Geotechnical Site Investigations unless otherwise noted.
Defect Log Abridged. Additional detail in digital dataset. Lugeon: BS5930:1999
For Inclined Holes: Angles reported in defects are apparent dip from core horizontal unless as α or β .
Refer to explanatory notes for SMEC logs for details of abbreviations or basis of description.

Logged By GRR Date 27/06/2019
Approved By SM Date 30/08/2019
Status Final Page 3 of 3

Appendix I

DCP test results

DYNAMIC CONE PENETROMETER (DCP) TESTING



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SCOPE

The Dynamic Cone Penetrometer (DCP) test comprises the measurement of the soil resistance to a steel rod driven into the ground by a dropped weight.

The DCP test is a simple manual test used in both sandy and clayey soils. The test is a measure of the shear strength of the soil at relatively shallow depth.

EQUIPMENT AND METHOD

A general description of the dynamic penetrometer apparatus used by our firm is presented in Australian Standard AS 1289.6.3.2. The equipment utilises a 9 kg sliding weight with a drop height of 510 mm. It is fitted with a conical tip. The equipment can be adjusted for a fall of 600 mm and use of a blunt tip in accordance with AS 1289.6.3.3.

The test data are generally recorded as the number of blows (n) per 50 mm of penetration. For specific applications (such as pavement investigations), the data may be collected in the reverse form, i.e. as mm per blow. The results are presented either in tabular or graphic form for reporting purposes.

INTERPRETATION

The interpretation of the DCP results is generally based on the assumption that the measured resistance is a function of soil strength. A profile of soil strength (cohesive soils) or density index (cohesionless soils) can thus be established. The test often can be used to qualitatively indicate the presence of soft or loose zones within a soil profile.

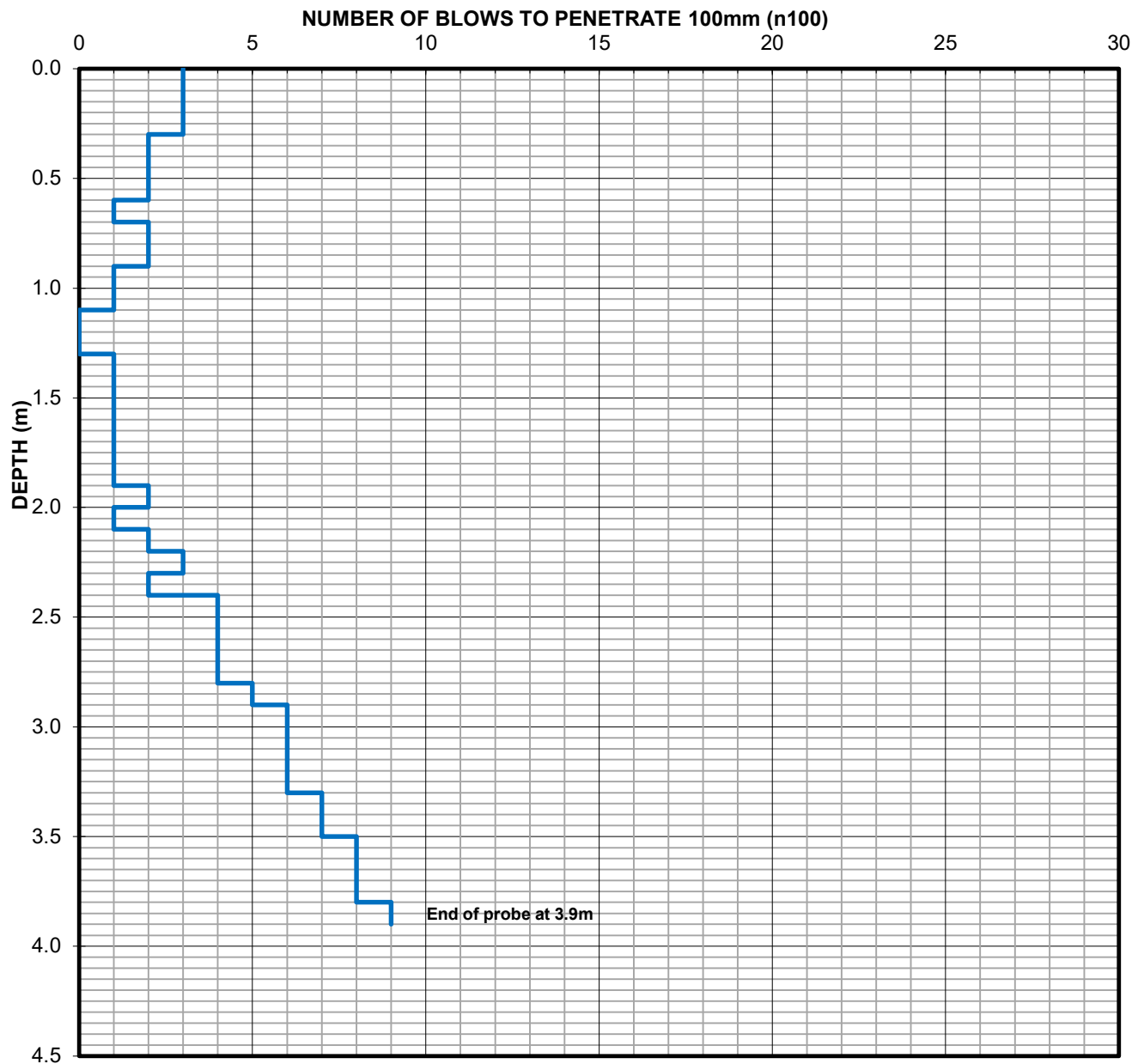
The energy of the system per unit area is similar to that of the larger Standard Penetration Test (SPT). Thus, the common relationships of SPT and other parameters can be used as a means of estimating soil properties, after appropriate site specific consideration. The interpretations from the test are approximate only, and this is particularly pertinent to sand profiles where the magnitude of confinement stress is important in the assessment of the results.

Interpretation of the DCP penetration rate at depth must be conducted with due regard to rod friction effects. In particular, care must be exercised with soft clay profiles where rod resistance may have an unconservative impact on the results. Care must also be exercised with soil profiles containing larger particles such as gravels and cobbles where penetration rate can be affected if the DCP tip strikes or glances off such particles.

In-situ California Bearing Ratio (CBR) values of clay soil subgrades are sometimes interpreted directly from DCP test results for use in road pavement design. In this case, the correlation between DCP and CBR based on that published in AUSTROADS Pavement Structural Design guide (AGPT02-17 Part 2) may be applied. This correlation should be verified by site specific laboratory testing, where appropriate. In addition, the effects of moisture content variations (in-situ versus design conditions) must be considered, as the DCP test only reflects the shear strength of the soil at the time of testing. Further information can be found in AUSTROADS Geotechnical Investigation and Design guide (AGRD07-08 Part 7).

DYNAMIC CONE PENETROMETER LOG SHEET

Client: Manildra Group	PROBE: DCP01	
Project: Shoalhaven Starches Expansion Project	AS 1289.6.3.2-1997 (Cone Tip) 510 mm drop height.	
Location: Abernathy's Creek, Bolong Road, Bomaderry		
Position: 281894 E; 6140452 N	Chainage: N/A	Operator: M. Wright
Elevation: Not measured	Offset: N/A	Date: 11/02/2022
Adjacent Test Hole / Pit: N/A		Checked: C. Quayle
Position Relative to Test Hole / Pit: N/A		Date: 14/02/2022



Comments:



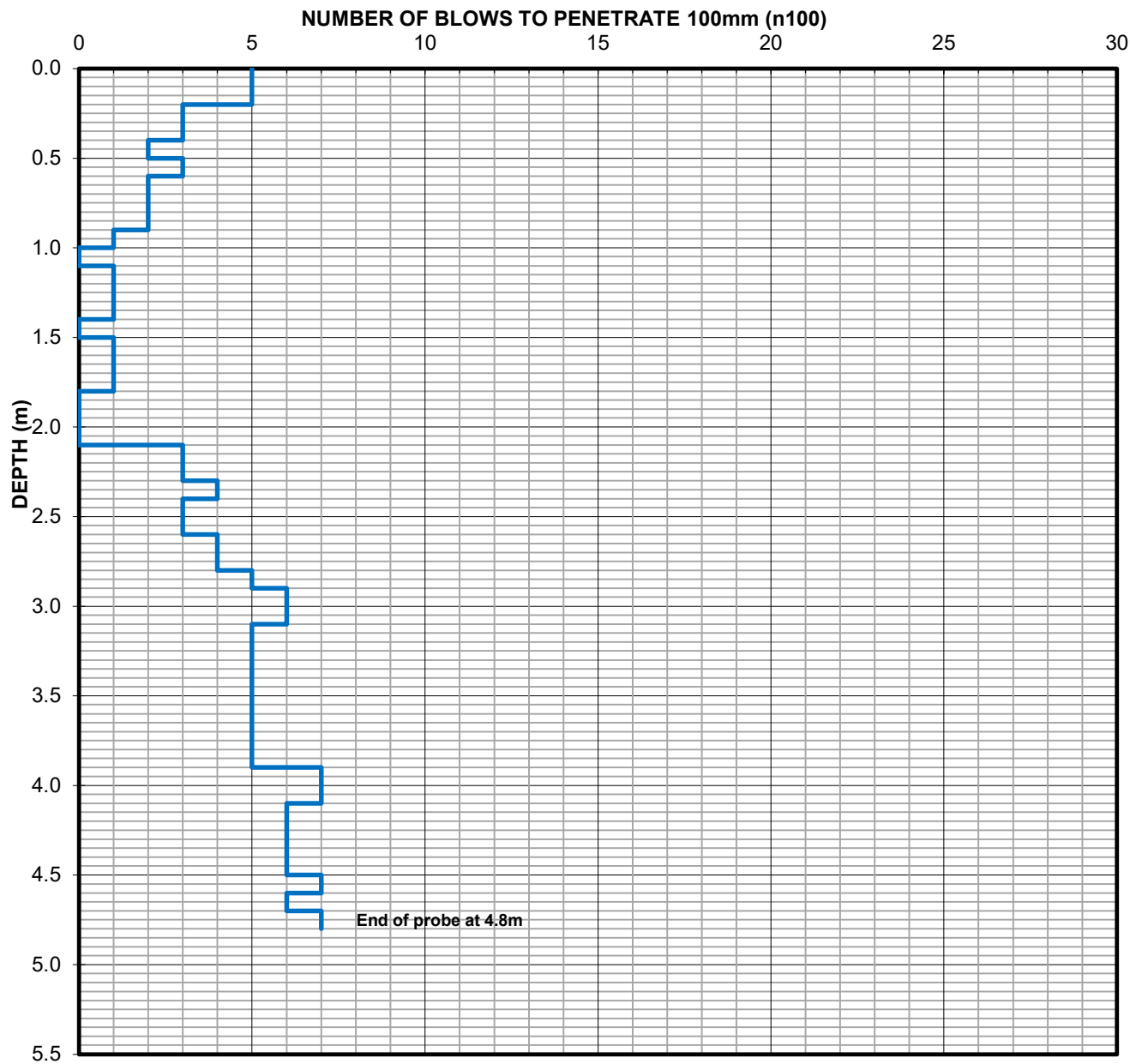
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Job No.

12548413

DYNAMIC CONE PENETROMETER LOG SHEET

Client: Manildra Group	PROBE: DCP02	
Project: Shoalhaven Starches Expansion Project	AS 1289.6.3.2-1997 (Cone Tip) 510 mm drop height.	
Location: Abernathy's Creek, Bolong Road, Bomaderry		
Position: 281900 E; 6140464 N	Chainage: N/A	Operator: M. Wright
Elevation: Not measured	Offset: N/A	Date: 11/02/2022
Adjacent Test Hole / Pit: N/A		Checked: C. Quayle
Position Relative to Test Hole / Pit: N/A		Date: 14/02/2022



Comments:
At 1.8 m DCP rods sunk after one blow to 2.1 m



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