Ground Doctor Pty Ltd

Groundwater Impact Assessment

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Braidwood Sand and Gravel
552 Larbert Road
Larbert, NSW

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On Behalf Of:
Lentro Group Australia Pty Ltd

27 October 2025
2025-GD027-RP1-FINAL

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DOCUMENT CONTROLS

Project Details	
Project Number:	2025-GD027
Project /Document Title:	Groundwater Impact Assessment Braidwood Sand and Gravel 552 Larbert Road Larbert, NSW

Report Details	
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Review Date:	20 October 2025 – Electronic PDF - Draft Report 27 October 2025 – Electronic PDF – Final Report
File Name:	2025-GD027-RP1-FINAL
Report Status:	FINAL
Reports Issued:	Electronic PDF

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 General Project Description 1
1.2 Assessment Objectives 2
1.3 Scope of Work 3
1.4 Limitations of this Report and Authorisation 3

2 EXISTING ENVIRONMENT 4

2.1 Site Details 4
2.2 Existing Site Features and Use 4
2.3 Surrounding Land-uses 4
2.4 Topography and Drainage 5
2.5 Geology 6
2.6 Rainfall and Evaporation 7
2.7 Hydrogeology 7
2.7.1 Registered Groundwater Works 7
2.7.2 On-site Groundwater Monitoring Bores 7
2.7.3 Relevant Groundwater Management Units 8
2.8 Groundwater Dependant Ecosystems 8
2.9 Culturally Significant Groundwater Sites 8
2.10 Contamination Sources 9
2.11 Acid Sulphate Soils 9

3 GROUNDWATER CHARACTERISATION WORKS 10

3.1 Monitoring Bore Locations 10
3.2 Monitoring Bore Installation Methodology 10
3.3 Field Observations 11
3.4 Groundwater Gauging and Groundwater Elevation 11
3.5 Groundwater Sampling Method 12
3.6 Groundwater Sample Analysis 13
3.7 Field Water Quality Parameters 13
3.8 Analytical Results 13

4 CONCEPTUAL GROUNDWATER MODEL 15

4.1 Pre-Development Conditions 15
4.2 Groundwater Take of the Proposed Development 16
4.3 Potential Groundwater Impacts Associated with the Development 16
4.4 Post Development 18

5 GROUNDWATER IMPACT ASSESSMENT 19

5.1 Aquifer Interference 19
5.2 Aquifer Interference Tests 19
5.3 Aquifer Type 19
5.3.1 Groundwater Dependent Ecosystems and Cultural Sites 20
5.3.2 Drawdown Impacts 20
5.3.3 Water Quality 21
5.4 Groundwater Use and Evaporative Losses 22
5.5 Summary of Aquifer Impact Assessment 23

6 CONCLUSIONS 23

7 REFERENCES 24

LIST OF ANNEXURES

ANNEX A: **FIGURES**
ANNEX B: **ANALYTICAL RESULTS SUMMARY TABLES**
ANNEX C: **LABORATORY CERTIFICATE OF ANALYSIS**
ANNEX D: **GROUNDWATER WORKS SUMMARY FORMS**
ANNEX E: **BOREHOLE AND MONITORING BORE CONSTRUCTION LOGS**
ANNEX F: **GROUNDWATER SAMPLING RECORDS**

1 Introduction

This report presents the findings of a Groundwater Impact Assessment of the proposed continuation and expansion of an existing approved sand extraction operation (sand quarry) over Lots 331, 332 and 333 in Deposited Plan (DP) 755915, No. 552 Larbert Road, Larbert NSW (Project Site, Project, Braidwood Sand & Gravel Project).

The site location is shown at a regional and local scale in *Figure 1* and *Figure 2* of *Annex A*.

1.1 General Project Description

At the time of this assessment The Proponent (Braidwood Sand and Gravel [BSG]) operated a sand quarry at the site. The existing sand quarry is approved as non-designated development under Queanbeyan Palerang Regional Council (QPRC) Development Consent DA.2022.1181 for sand and gravel extraction, and wet screening (washing) of these materials.

The proponent seeks consent for the staged expansion of sand extraction from the currently approved sand extraction area, the component parts including the following:

- The staged, progressive expansion of the existing sand extraction area by an additional 18.1 ha approximately, with an estimated resource of approximately 1.23 million tonnes.
- An increase in the rate of sand extraction, from the currently approved 25,000 tonnes per annum, to increase to 200,000 tonnes per annum.
- Reliance on existing approved access to and from the existing sand pit back to Larbert Road.
- A minor increase in the currently approved hours of operation of sand extraction and processing.
- A proposed increase in truck volumes associated with the increased rate of sand extraction proposed on site, equivalent to an average of 20 loaded trucks per day, or a maximum of up to 50 loaded trucks per day.
- Avoiding extraction of sand from significant trees on site and from a drainage depression located to the north of the currently approved extraction area.
- Avoiding extraction over identified Aboriginal sites.
- The project would initially rely on the existing sand processing and washing plant on the Project Site.
- Rehabilitation of each extraction stage once sand extraction is completed in each stage.

Activity occurring at the site would remain largely unchanged with the exception that the extent of the extraction area will be increased. The proposed development includes expansion of the approved disturbance area to the west and north of the existing extraction area.

Sand extraction is proposed in five stages. The approximate extents of sand extraction associated with each stage are shown in *Figure 3* of *Annex A*. The proposed size of each extraction cell is as follows.

- Stage 1a: 48,933m^2 (this includes 19,200m^2 occupied by the existing approved extraction area).
- Stage 1b: 28,446m^2.

- Stage 2: 32,470m^2.
- Stage 3: 34,425m^2.
- Stage 4: 40,415m^2.
- Stage 5: 15,520m^2.

The total area of the Project Site (excluding the existing approved extraction area) is approximately 18.1ha.

In general, the progressive steps in rehabilitation will entail:

- The stripping of topsoil and overburden (approximately 0.3 m) for later use in rehabilitation. Stockpile management will involve the revegetation of topsoil and overburden until required for rehabilitation purposes. These stockpiles will be established for progressive rehabilitation works and checked regularly for weeds.
- Back-filling of excavated sand pits with a dozer using stockpiled topsoil and overburden from soil stockpiles or bunding, supplemented by imported fill, once extraction is completed in each sand pit stage/cell. Once each stage of sand extraction is completed the decommissioned area will be rehabilitated and shaped to stable, post-extraction landforms, using excavated natural material (ENM) and/or virgin excavated natural material (VENM) fill when available. The sand extraction cells will be filled to a level higher than the typical groundwater elevation so that there are no ongoing losses of groundwater to evaporation.
- All supplementary imported fill delivered to the site will be either VENM or ENM within the meaning of the *Protection of the Environment Operations Act 1997* and free of weeds and weed seeds.
- The final walls of each extraction stage/cell leading down to a water source would be shaped to achieve a maximum slope of 1:3 (V:H) to ensure that the walls are stable and will not erode. The shaping of the final walls would be undertaken by a front-end loader and/or excavator to achieve effective water drainage towards each batter. It is also proposed to construct drainage swales around each completed stage

1.2 Assessment Objectives

The Groundwater Impact Assessment has been prepared to accompany a Development Application to NSW Department of Planning, Housing and Infrastructure (DPHI).

NSW DPHI Secretary's Environmental Assessment Requirements (SEARs) for the proposal development specify that the development application include an assessment of potential impacts to quantity and quality of groundwater resources that may be impacted by the proposed development. The SEARs also require The Proponent to present the proposed water management system, water monitoring system and an outline of measures proposed to minimise potential groundwater impacts.

The objectives of this assessment were to establish whether the proposed development would adversely impact groundwater quantity and groundwater quality and to outline the proposed measures that will be adopted by the Proponent to minimise any potential impacts to groundwater quality and quantity.

1.3 Scope of Work

Ground Doctor completed the following work.

- Assessed of the site setting by reviewing relevant mapping and conducting a site inspection.
- Reviewed available groundwater bore data and geological information to assess the location and characteristics of groundwater aquifers located within the site and surrounding areas.
- Identified and described available groundwater works data to assess existing groundwater users in the vicinity of the proposed development.
- Installed and developed four monitoring bores (MB01-MB04) around the proposed extraction areas to characterise subsurface conditions and the occurrence of groundwater.
- Surveyed and gauged groundwater levels in the installed monitoring bores (MB01-MB04) to establish the groundwater elevation and assess the groundwater flow direction.
- Purged and sampled the monitoring bores. Water samples collected from each monitoring bore were analysed for major cations, major anions, nutrients and metals to establish baseline groundwater quality and conceptual understanding of the hydrogeology.
- Conducted a review of potential groundwater quality and quantity impacts based on the characterisation of the groundwater environment and activities proposed. Minimum impact considerations outlined in the NSW Department of Primary Industries, Office of Water (2012) NSW Aquifer Interference Policy were used to assess the significance of potential groundwater impacts.
- Outlined measures that will be adopted to mitigate or manage potential groundwater impacts associated with the proposed development.

1.4 Limitations of this Report and Authorisation

The findings of this report are based on the Scope of Work outlined in *Section 1.3,* which is described in more detail in the following sections of this Report. Ground Doctor performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental consulting profession. No warranties, express or implied are made.

The results of this assessment are based upon the information documented and presented in this report. All conclusions and recommendations regarding the site are the professional opinions of Ground Doctor personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, Ground Doctor assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of Ground Doctor, or developments resulting from situations outside the scope of work detailed in this report.

The results of this assessment are based on the conditions identified at the time the works were undertaken. Ground Doctor will not be liable to revise the report to account for any changes in site characteristics, regulatory requirements, assessment criteria or the availability of additional information, subsequent to the issue date of this report.

2 Existing Environment

2.1 Site Details

The proposed development is located within part of Lots 331, 332 and 333 of DP 755915, 552 Larbert Road, Larbert, NSW (Project Site, Project, Braidwood Sand & Gravel Project). The Project Site is situated within the Queanbeyan- Palerang Regional Council local government area.

The Project Site is approximately 14 kilometres (km) north west of Braidwood, 5.5km north of the Kings Highway intersection and 85km east of Canberra. The regional setting of the Project Site is shown in *Figure 1* of *Annex A*. The boundary of the site is shown in *Figure 2* of *Annex A*.

The extent of the existing disturbance area (associated with the existing approved sand quarry) and the proposed extent of the disturbance area (within which sand is proposed to be extracted in the future) are shown in *Figure 3* of *Annex A*.

2.2 Existing Site Features and Use

At the time of this assessment the site featured an existing sand quarry with an approved disturbance footprint of approximately 1.9ha. The total area of the Project Site (excluding the existing approved extraction area) is approximately 18.1ha.

The site was accessed via an internal access route that links the existing sand extraction operation to Larbert Road.

An open excavation was located in the south eastern portion of the Project Site. The existing excavation was approximately 150m long and approximately 120m wide. The deepest parts of the excavation occurred within the centre of the excavation and were estimated to be approximately 5m below pre-disturbance surface elevation. Standing water was present in the deepest parts of the excavation as a result of groundwater inflow.

The area to the west of the existing excavation was cleared and graded and was used for material handling and temporary stockpiling of raw and finished sand products, and truck loading. A sand washing and screening plant, a demountable site office, storage shed and a generator were located adjacent to the southern Project Site boundary.

A series of sediment ponds were located in the south west corner of the Project Site. Ponds were used to settle suspended fines from the sand processing water.

The remainder of the Project Site was predominantly grassed open space used for livestock grazing. Three mature eucalypt trees were situated close to the centre of the Project Site.

2.3 Surrounding Land-uses

Adjoining land use was mixed farming including livestock grazing and fodder cropping. Other nearby land uses were as follows.

- Durran Durra Creek was situated approximately 100-200m from the western Project Site boundary.
- A sand and gravel quarry (Canberra Sand and Gravel) was situated approximately 1000m west of the Project Site.
- A sand and gravel quarry (Schmidt Quarries) was situated approximately 850m north west of the Project Site.

- A hard rock quarry was situated approximately 1900m to the north north east of the Project Site.

- Nadgigomar Nature Reserve was located approximately 1800m north east of the Project Site.

2.4 Topography and Drainage

Regional topography is illustrated in the topographic map presented as *Figure 4* of *Annex A*. A detailed topographic map of the Project Site and surrounds is presented as *Figure 5* of *Annex A*.

The surface elevation contours presented in *Figure 5* were extrapolated from a 1m digital elevation model (DEM) published by the Australia and New Zealand Intergovernmental Committee on Survey and Mapping "ELVIS" website (https://elevation.fsdf.org.au/, 28 August 2025). The DEM is based on LIDAR survey data collected in 2015.

The Project Site surface elevation ranges from approximately 587m along parts of the eastern boundary to approximately 580m AHD along parts of the western boundary. The Project Site has a general fall toward the north west at an average gradient of approximately 1%. The south eastern corner of the Project Site may have drained in a generally southerly direction toward Durran Durra Creek prior to the existing ground disturbance associated with the approved quarry.

The ground surface gradient increases to the east of the Project Site boundary. Hills located approximately 1000m east of the Project Site reach an elevation of approximately 626m AHD.

The Project Site is situated approximately 100-200m east of Durran Durra Creek. Typical surface water elevation within Durran Durra Creek is approximately 579m AHD in the area approximately 100m to the west of the Project Site. The Durran Durra Creek floodplain is approximately 150m wide in the vicinity of the Project Site. Immediately upstream (to the south east) of the Project Site Durran Durra Creek is better defined and surrounded by steeper sides. There is no obvious floodplain, indicating the Creek is likely bound by incised bedrock.

Durran Durra Creek is fed from a catchment that extends approximately 14km to the south east of the Project Site, where surface elevation rises to an elevation over 700m AHD.

Land to the west of Durran Durra Creek rises relatively steeply indicating the presence of Braidwood Granodiorite close to the ground surface. Hills reach an elevation of approximately 620m AHD approximately 800m to the south east of the Project Site boundary.

Durran Durra Creek flows in a general north westerly direction and meets the Shoalhaven River approximately 1200m north east of the site.

The Shoalhaven River is the regional drainage feature. It flows in a general south west to north easterly direction in the Larbert area. Typical surface water elevation within Shoalhaven River at the junction with Durran Durra Creek is approximately 574m AHD. There is approximately 5m of fall along Durran Durra Creek between parts of the Creek closest to the Project Site and Shoalhaven River.

Areas between Shoalhaven River and the north west corner of the Project Site are lower lying and relatively flat and are inferred to be alluvial plains associated with Durran Durra Creek and Shoalhaven River. These plains are relatively level with surface elevation close to 579m AHD. At the time of the site inspection, standing water was observed in lower lying parts of the alluvial plain, in what appeared to be historical meanders of previous alignments of Durran Durra Creek.

2.5 Geology

The "Braidwood *1:100,000 Geological Series Sheet 8827 Second Edition*" indicates that the Project Site is situated on quaternary alluvium associated with the Shoalhaven River and/or Durran Durra Creek. The quaternary alluvium is described as "*unconsolidated alluvial gravel, sand, silt and clay, with variable humic content*",

The map sheet indicates that the surface geology is "*Braidwood Granodiorite*" in the area immediately east of the Project Site. Braidwood Granodiorite is described as "*grey, white to pink, medium grained hornblende-phyric, hornblende pyroxene granodiorite*".

Granodiorite outcrop was visible approximately 50m south of the Project Site. The Proponent indicated that white clay had been encountered close to the base of the existing excavation. It is likely that the white clay is the extremely weathered top of Braidwood Granodiorite. It is inferred that granodiorite bedrock is located close to the ground surface close to the eastern site boundary and beneath elevated areas to the east of the Project Site.

Tertiary or pre-quaternary alluvium has been documented to exist as a terrace above the more recent quaternary alluvium along the Shoalhaven Rover in the Larbert area, due to historic changes in flow regimes of the Shoalhaven River. The Shoalhaven River has historically had a wider and higher floodplain than at present. This tertiary floodplain has been incised by the Shoalhaven River and Durran Durra Creek, such that it remains above the existing extent of the present day floodplains of both surface water features. These processes are detailed by Jonathon Nott (1990) in his thesis on "*Cainozoic landform evolution of the Shoalhaven Plain, NSW*". It is possible that alluvium beneath the more elevated eastern parts of the Project Site are pre-quaternary alluvium as they are situated several metres above the present day level of the Durran Durra Creek floodplain.

Areas between the north west corner of the Project Site and Shoalhaven River are low lying and relatively flat. They are inferred to be quaternary alluvium plains associated with Durran Durra Creek and Shoalhaven River.

Granite bedrock was identified close to Shoalhaven River level in the area approximately 1500m west of the Project Site by Ground Doctor (2023) during assessment of a nearby quarry site. This suggests quaternary alluvium to the north west of the Project site is likely to be less than 10m deep over granodiorite bedrock.

Four groundwater monitoring bores were installed at the Project Site as part of this assessment. Monitoring bore locations are shown in *Figure 6* of *Annex A*.

Monitoring bore MB02 was drilled along the southern boundary of the Project Site. Bedrock was encountered at a depth of approximately 4.9m below ground level at this location (bedrock elevation inferred to be approximately 579.5m AHD). Outcropping grandiorite was visible approximately 50m to the south west in this location where the surface elevation was approximately 584m AHD. At MB02 groundwater was encountered in the sandy and gravely alluvium encountered over bedrock.

Monitoring bores MB01, MB03 and MB04 were drilled to depths ranging 6.2m to 7.8m below ground level and were terminated within alluvium. Observations indicate that alluvium extends to an elevation of less than 576m AHD beneath the western portion of the Project Site.

Alluvium encountered in boreholes drilled at MB01, MB03 and MB04 was predominantly fine to coarse grained sand with layers of clayey sand and relatively thin layers of gravel and cobbles. Saturated flowing sand was encountered at each of these locations below a depth of 4m suggesting the presence of groundwater.

2.6 Rainfall and Evaporation

Rainfall and evaporation data was obtained from the Australian Bureau of Meteorology (BOM) website (www.bom.gov.au, 15 October 2025).

The nearest Bureau of Meteorology (BOM) rainfall gauging stations to the site were situated at Braidwood, approximately 15 km south of the site. The Braidwood (Wallace Street) station had collected rainfall data for the period 1907 to 1975. Over this period the average annual rainfall amount was 721mm/year. The Braidwood Racecourse AWS had collected rainfall data for the period 1985 to 2025. Over this period the average annual rainfall amount was 691.5mm/yr.

The nearest BOM gauging sites that measured evaporation were at Goulburn Tafe (approximately 65km north of the site) and Canberra Airport (approximately 50km west of the site). The mean daily rate of evaporation at the Goulburn Station was 3.4mm/day (or 1241mm/yr). The mean daily rate of evaporation at the Canberra Airport was 3.6mm/day (or 1314mm/yr).

The available BOM rainfall and evaporation data at gauging stations most representative of the site indicate that the average net rate of annual evaporation at the Project Site ranges between 520mm/yr to 622mm/yr.

2.7 Hydrogeology

2.7.1 Registered Groundwater Works

Ground Doctor conducted a search of the NSW Water groundwater works database (https://realtimedata.waternsw.com.au, 16 October 2025) for registered groundwater works located within an approximate 5km radius of the Project Site.

Figure 7 of *Annex A* shows the locations of registered groundwater works relative to the Project Site boundary. The search identified 4 registered groundwater works within 5km search radius.

A summary of the registered bore details is presented as *Table D1* of *Annex D*. Groundwater Work Summary Forms for the identified registered works are also presented in *Annex D*.

The closest registered groundwater work to the Project Site was GW100322, which was located approximately 1100m to the south.

Where information was provided, registered groundwater works were bores used for stock and domestic purposes.

Bore depths ranged from 1.8m to 144m below ground level. No drillers log or water bearing zones were recorded on the work summary form for GW102354. At other bore locations groundwater was encountered in fractured rock described as basalt and granite at depths of more than 10m below ground level.

Recorded bore yields ranged from 0.4L/s to 1.0L/s. Recorded standing water levels ranged from 1.8 to 15m below ground level. Water quality was described as “good” where recorded.

2.7.2 On-site Groundwater Monitoring Bores

Ground Doctor installed four monitoring bores (MB01-MB04) in September 2025. Monitoring bore locations are shown in *Figure 6* of *Annex A*. Borelogs for the monitoring bores are presented as *Annex C*. The monitoring bore installation works and monitoring results are detailed in *Section 3*.

Groundwater was identified in alluvium at each monitoring bore location. Standing water levels ranged from 2.3m to 4.4m below ground level.

Bedrock was encountered at 4.9m below ground level in MB02. Alluvium encountered within MB02 was clayey and of limited thickness. Groundwater yield at MB02 was relatively low with the bore able to be bailed dry after which it took several hours to return to the static level.

Alluvium was encountered throughout MB01, MB03 and MB04. At each of these locations alluvium typically had some clay content in the upper 4m but was predominantly sand and gravel below a depth of 4m that was unstable. These boreholes had to be stabilised during drilling with temporary casing. Bore yields were not measured but no change in water level was noted during development using a bailer indicating the sand and gravel had relatively high hydraulic conductivity.

2.7.3 Relevant Groundwater Management Units

The *Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023* indicates that the site is situated above the "*Lachlan Fold Belt – Greater Metropolitan Groundwater Source*" groundwater management unit.

In the previous (2011) version of the Water Sharing Plan this groundwater management unit was referred to as "*Goulburn Fractured Rock*". The background document for the 2011 version of the water sharing plan states the following regarding the "*Goulburn Fractured Rock*" groundwater management unit.

"The Goulburn Fractured Rock Groundwater Source is bounded to the north by the Murruin Range, the Pacific Ocean and rocks of the Sydney Basin to the east, and Great Dividing Range in the south and west. The groundwater source covers an area of 8,175.31 square kilometres, and rock types are a mixture of Palaeozoic rocks which are mainly volcanic in origin. Most of the groundwater found within these rocks is suitable for some domestic, agricultural and limited industrial uses. High salinity groundwater does underlie some areas near Goulburn. Although groundwater may be in supply, the water quality may limit potential uses. Bore distribution is well spread out, but there is some concentration around major townships like Goulburn."

As outlined in earlier sections of the report, groundwater appears to exist in two distinct aquifers beneath the Project Site and within the surrounding areas. Groundwater is present in quaternary and pre-quaternary alluvium situated in low lying areas along Durran Durra Creek and Shoalhaven River. Alluvium is inferred to be less than 10m thick and is underlain by igneous bedrock (granodiorite). Groundwater would exist in weathered zones and fractures within bedrock.

Given the limited extent of alluvial groundwater systems in the vicinity of the Project Site, groundwater within alluvium is managed as part of the "*Lachlan Fold Belt – Greater Metropolitan Groundwater Source*" groundwater management unit.

2.8 Groundwater Dependant Ecosystems

The "*Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources 2023"* maps high priority Groundwater Dependant Ecosystems (GDEs). Based on the GDE mapping at the time of reporting the nearest high priority GDE was situated approximately 3.4km to the north of the Project Site. The mapped high priority GDE was vegetation in close proximity to Shoalhaven River downstream of the junction with Sandy Creek. Topographic mapping indicates that the typical Shoalhaven River height at this location is less than 570m AHD.

2.9 Culturally Significant Groundwater Sites

An assessment of potential impacts on Aboriginal cultural heritage assessment report has been undertaken for the Project. The Aboriginal cultural heritage assessment report (Past Traces, 2025) found a number of Aboriginal relics and potential sites in and around the proposed sand extraction footprint. Based on the identification of Aboriginal sites close to Durran Durra Creek it is inferred that the Creek has some cultural importance to Aboriginal people. Similar sites are likely to exist along the Shoalhaven River in the Larbert area.

Durran Durra Creek is inferred to be fed partially by groundwater inflow from adjoining fractured rock in areas upslope of the Project Site and from alluvium in areas close to and downslope of the Project Site. However, Durran Durra Creek is primarily a surface water system fed from surface runoff from a catchment which extends approximately 14km south east of the Project Site. Therefore, it is not considered to be a groundwater dependant cultural site.

2.10 Contamination Sources

Ground Doctor conducted a search of the NSW EPA list of sites notified under Section 60 of the Contaminated Land Management (CLM) Act 1997. The search was conducted on 15 October 2025. There were no notifications listed for the site or within a 5km radius of the site.

A preliminary site investigation undertaken to support the development application (Ballpark Environmental, 2025) found that the risk of land contamination at the site is low and acceptable.

Ground Doctor reviewed publicly available NSW Government mapping of Naturally Occurring Asbestos in the vicinity of the site (NSW Resources and Geoscience, 2025). The site is not mapped as being within an elevated risk area for naturally occurring asbestos. The nearest elevated risk area occurs approximately 25km west of the site and is classed as having low potential for containing asbestos.

2.11 Acid Sulphate Soils

Acid sulphate soil risk mapping presented on the NSW Department of Planning and Environment eSpade website (https://www.environment.nsw.gov.au/eSpade2Webapp#, 15 October 2025) indicates that the site is not located within an acid sulphate soil risk zone.

3 Groundwater Characterisation Works

3.1 Monitoring Bore Locations

Ground Doctor installed monitoring bores at four locations (MB01-MB04) in September 2025. Monitoring bore locations were selected to assess subsurface conditions including groundwater conditions around the periphery of the existing and proposed disturbance areas.

Monitoring bore locations are shown in *Figure 6* of *Annex A*. *Table 1* presents a summary of monitoring bore locations and depths.

Table 1: Monitoring Bore Locations, Elevation and Depth

Bore ID	Easting GDA2020 Zone 55	Northing GDA 2020 Zone 55	Top of Casing RL (m AHD)	Casing Depth (m bgl)
MB01	753158	6087702	587.45	7.8
MB02	752867	6087556	584.80	4.9
MB03	752711	6087869	582.58	6.2
MB04	752875	6088121	582.69	6.2

Coordinates and elevation data provided by ACT Civil Surveys.

3.2 Monitoring Bore Installation Methodology

The monitoring bores were installed by Sea to Summitt Drilling on 15 and 16 September 2025.

Boreholes were drilled using a track mounted rotary drill. The borehole at MB02 was installed using solid augers. Alluvium at MB02 contained clay and stayed open after drilling allowing installation of bore casing.

Boreholes at MB01, MB03 and MB04 were drilled with a combination of solid auger drilling and wash-boring with HQ casing. Solid augers were utilised to drill the borehole until the formation became unstable, which typically occurred 4m below ground level where saturated flowing sand and gravel was encountered. At this point the drilling method switched to wash-bore. A retractable bit was run through HQ drill rods. The boreholes were advanced by circulating water through the HQ casing and drill bit. When the borehole reached the desired depth the drill bit was retracted from the hole. Bore casing and gravel pack was installed into the HQ casing. HQ casing was later retrieved from the borehole.

Water used to wash-bore drill MB01, MB03 and MB04 was sourced on-site and had been pumped from the existing extraction excavation.

Boreholes were drilled to refusal on bedrock (MB02 only) or at least 2-3m below the uppermost water bearing zone to ensure adequate connection to the aquifer.

Monitoring bores were constructed of 50mm ID screw-fit Class 18 PVC blank casing and machine slotted screen. The screened interval was positioned adjacent to the primary water bearing zone. The borehole annulus was backfilled with 2-4mm washed river gravel to a height at least 0.2m above the top of the screened interval. The remainder of the borehole annulus was backfilled with bentonite. The PVC casing was left approximately 0.6m above adjacent ground surface. A steel stick-up well monument was installed over the PVC casing and was concreted at ground level.

Monitoring bores were developed on the day of installation by bailing. A steel bailer was used to remove sediment from the base of the PVC casing and to surge the bore. MB02 was low yielding and was bailed dry. At all other locations approximately 50L of water was removed during development.

3.3 Field Observations

Borelogs for the monitoring bores are presented as *Annex E*.

MB01, MB03 and MB04 were situated in alluvium throughout. The subsurface at these locations was predominantly fine to medium grained sand with varying silt and clay content. Thin layers of cobbles and/or gravel were encountered in some boreholes. Sand typically became unstable at a depth of more than 4m below ground level, which typically corresponded with the depth of the water table and reduced clay content in soil.

MB02 is inferred to be located close to the south eastern boundary of alluvium. Alluvium encountered within MB02 typically contained clay and was stable relative to the other boreholes. Bedrock was encountered at a depth of approximately 4.9m below ground level.

3.4 Groundwater Gauging and Groundwater Elevation

Ground Doctor gauged the monitoring wells on the morning of 7 October 2025, approximately 3 weeks after the monitoring bores had been installed. Bores were gauged in quick succession to establish relative groundwater elevation over the monitoring network at a point in time, minimising temporal changes due to natural processes.

The depth to water was measured from a reference location on the top of the PVC casing using an electronic water level meter.

The relative elevation of the top of PVC casing at each monitoring bore were measured by a land surveyor (Kerry Surveys Pty Ltd). A copy of the survey plan is presented within *Annex E*. The measured casing elevation and gauging data was used to calculate the relative groundwater elevation in each bore.

Survey data and measured standing water levels at the time of gauging are summarised in *Table 2*.

Table 2: Summary of Groundwater Elevation Data – 7 October 2025

Bore ID	Depth to Water (m btoc)	Relative Elevation Top of Casing (m AHD)	Relative Elevation of Groundwater (m AHD)
MB01	4.37	587.45	583.08
MB02	2.28	584.80	582.52
MB03	3.29	582.58	579.29
MB04	3.18	582.69	579.51

mbtoc – metres below top of casing.

Measured relative groundwater elevation was lowest at MB03 (579.29m AHD) and highest at MB01 (583.08m AHD). The groundwater elevation at MB02 was similar to the water level at MB01 and were approximately 3m higher than the water level measured at MB03 and MB04.

Inferred groundwater elevation contours within and surrounding the Project Site are shown in *Figure 8* of *Annex A*.

The inferred groundwater elevation contours are based on the following information.

- Groundwater elevation data for four monitoring bores installed around the perimeter of the Project Site.
- Ground surface topography.
- There was standing water visible at the ground surface in low lying alluvial flats to the west / north west of the site. The occurrence of standing water corresponded with a ground surface

elevation of approximately 579m AHD, which corresponds to measured groundwater elevation at MB03 and MB04.

- The measured groundwater elevation at MB01 and MB02 is higher than the adjacent Durran Durra Creek suggesting recharge from elevated land to the east and north east with flow toward Durran Durra Creek to the south, west and north west towards the nearest low point in surface topography.

- Typical surface water elevation in Durran Durra Creek falls from approximately 579m AHD close to the south western corner of the Project Site to approximately 574m AHD at the junction with Shoalhaven River. Therefore, Durran Durra Creek acts as a groundwater sink during typical flow conditions and would be expected to drain water from alluvium beneath the Project Site and alluvial plans between the Project Site and Shoalhaven River.

- Bedrock was encountered at the base of MB02 and similar white clay (inferred to be weathered basement) has been encountered close to the base of the existing extraction area. These observations combined with the observation of bedrock outcrop to the east of the Project Site and geological mapping indicates that granodiorite bedrock is likely to be located close to the ground surface in the elevated areas south east and east of the Project Site. Presence of low permeability weathered bedrock and bedrock beneath elevated areas close to the eastern and southern Project Site boundaries are likely to inhibit downward vertical migration of groundwater and therefore a flow gradient exists in a general westerly direction from elevated areas east of the Project Site toward Durran Durra Creek.

- Inferences based on ground surface elevation and visible surface drainage features.

Measured groundwater elevation in all monitoring bores appear to be higher than the typical elevation of surface water in Durran Durra Creek and well above typical elevation of Shoalhaven River. This suggests that Durran Durra Creek and Shoalhaven River are gaining streams in the vicinity of the Project Site. That is, there is groundwater flow from alluvium and granite beneath the site toward Durran Durra Creek and ultimately toward Shoalhaven River.

3.5 Groundwater Sampling Method

Ground Doctor gauged and sampled all monitoring bores on 7 October 2025, approximately 3 weeks after the bores had been installed.

Monitoring bores were sampled using a low flow (micro-purge) sampling method. A peristaltic pump was used to purge and sample the bores. At each bore disposable single use tubing was lowered into the bore and positioned with the end of the tube adjacent to the documented water bearing zone.

Bores were pumped at a low flow rate (approximately 0.15L/min) to minimise drawdown and ensure effective micro-purge of the well prior to sample collection.

Groundwater discharge was directed into a flow cell which housed a water quality meter. Water quality parameters (temperature, dissolved oxygen (DO), electrical conductivity (EC), pH and oxygen reduction potential (ORP)) were recorded at regular intervals during purging to assess representativeness of purge water. Well drawdown was also monitored during purging and flow rate adjusted accordingly to minimise drawdown.

The wells were pumped at a low flow rate for a period of 40-60 minutes. Wells were sampled once water quality parameters had become stable.

Groundwater samples were collected into appropriately labelled and preserved sampling containers. Samples for dissolved metals analysis were field filtered using disposable 45µm filters.

Water samples were placed on ice inside an esky immediately after collection.

Water samples were transported to the analytical laboratory (SGS, Sydney) by Ground Doctor personnel. The samples arrived at the laboratory on the day of sampling, less than 9 hours after collection.

3.6 Groundwater Sample Analysis

Groundwater samples collected from each monitoring bore were analysed for major cations, major anions, nutrients and a range of dissolved metals.

3.7 Field Water Quality Parameters

Groundwater sampling records are presented as *Annex F*. Stabilised water quality parameter data for each monitoring bore are presented in *Table 3*.

Table 3: Measured Water Quality Parameters – 7 October 2022

Bore ID	Temperature (°C)	Dissolved Oxygen (mg/L)	Electrical Conductivity (uS/cm)	pH	Field Oxidation Reduction Potential (mV)
MB01	15.9	6.40	50	6.3	114
MB02	13.3	1.02	209	6.0	77
MB03	14.4	5.35	93	6.4	104
MB04	15.3	6.76	86	6.3	129

The measured EC values for water sampled from all bores range 50-209µS/cm. Measured pH ranged 6.0 to 6.4. Groundwater sampled from MB02, which was installed to the top of bedrock and possible in clay representative of weathered bedrock, had higher EC and lower pH that water sampled from MB01, MB03 and MB04, which were installed and screened in alluvium in areas where bedrock was inferred to be situated further below the surface.

The measured EC and pH of groundwater in all monitoring bores indicates the water has low dissolved salt concentrations and would be suitable for all typical beneficial uses within the site setting. These could include for potable water supply, stock water, irrigation, recreation and commercial uses.

3.8 Analytical Results

Analytical results are summarised and compared to generic water quality guidelines in *Table B1* of *Annex B*. The laboratory certificate of analysis is presented as *Annex C*.

Water quality guidelines referenced in *Table B1* include:

- National Health and Medical Research Council (NHMRC) (2011 – updated 2025) **Australian Drinking Water Guidelines**. These guidelines apply to assessment of potential impacts to water resources that may be used for potable water supply.

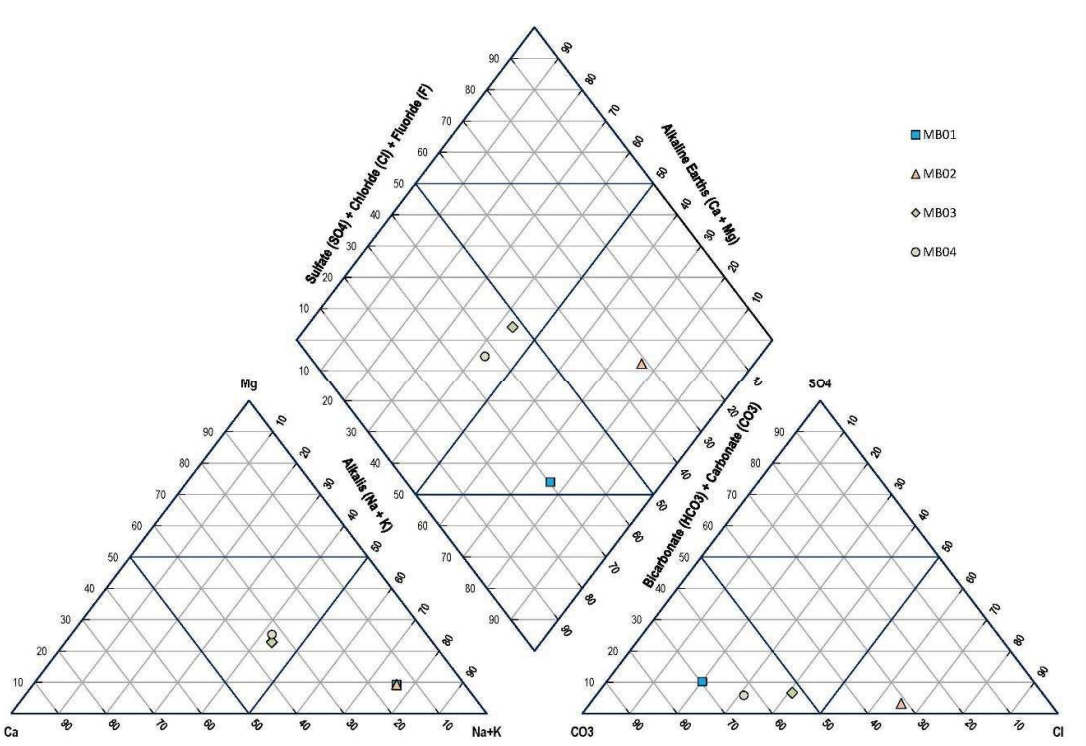
- Default guideline values (DGVs) specified in the Australian and New Zealand **Guidelines for Fresh and Marine Water Quality** (August 2018). Ground Doctor adopted threshold relevant to moderately disturbed freshwater ecosystems (95% protection) as this is most appropriate for the nearest freshwater aquatic ecosystem (Durran Durra Creek), which is moderately disturbed.

Where dissolved metals were detected above the practical quantification limits (PQLs) the reported metals concentrations were less than the generic thresholds for the protection of drinking water and freshwater aquatic ecosystems.

Nutrients were detected in all groundwater samples. The concentrations of nutrients were less than the referenced guideline concentrations for drinking water and freshwater aquatic ecosystems, with the exception of nitrate in water sampled from MB03. The reported nitrate (as N) concentration in water sampled from MB03 exceeded the DGV for 95% protection of freshwater aquatic ecosystems.

The reported concentrations of cations and anions in all samples were relatively low, consistent with low electrical conductivity measured in the field. The proportion of major anions and cations in each sample are presented in a piper trilinear plot in *Plot 1*.

The plotted anion and cation data indicates no clear grouping of groundwater based on basic chemistry. Trends are difficult to discern based on the relatively low concentrations of dissolved cations and anions in all samples.



Plot 1: Piper Trilinear Diagram Showing the Proportions of Major Anions and Cations

4 Conceptual Groundwater Model

4.1 Pre-Development Conditions

The following conceptual understanding of the hydrogeological setting of the Project Site is based on observations and data collected as part of this assessment.

- The alluvial plains adjacent to Durran Durra Creek and Shoalhaven River are comprised of quaternary and pre-quaternary alluvium. The pre-quaternary alluvium has been incised by the Duran Durra Creek and Shoalhaven River such that alluvium is situated above the present day flood range of Durran Durra Creek and Shoalhaven River. The Project Site is situated over alluvium that is above typical flood levels of Durran Durra Creek and Shoalhaven River.

- Bedrock outcrop is visible approximately 50m to the south east of the Project Site. White clay has been encountered near the base of the existing quarry excavation and is inferred to be to top of underlying bedrock. It is inferred that granodiorite bedrock is located close to the ground surface close to the eastern site boundary and beneath elevated areas to the east of the Project Site. That is, the upgradient boundary of the alluvial aquifer unlikely to extend very far to the east of the Project Site.

- Ground Doctor (2023) observed bedrock visible on the bed of Shoalhaven River approximately 1500m to the east of the Project Site. This indicates that alluvium situated beneath the Project Site and in the area between the Project Site and Shoalhaven River is likely to be less than 10m thick.

- Groundwater elevation data shows groundwater beneath the Project Site is marginally higher than typical surface water elevation within Durran Durra Creek. There is groundwater flow toward Durran Durra Creek in a general westerly direction beneath most of the Project Site. There is likely groundwater flow in a south westerly direction close to the southern boundary of the Project Site. Observed groundwater elevation data suggests that groundwater in alluvium beneath the Project Site is recharged from rainfall falling on the Project Site and more elevated areas to the east of the Project Site. Groundwater may also flow into the alluvium from underlying granodiorite bedrock, which would be recharged from rainfall occurring to the south east of the Project Site. Groundwater beneath the Project Site discharges to the surface into Durran Durra Creek and/or Shoalhaven River to the north west.

- The groundwater elevation in alluvium beneath the Project Site is at least 5m above typical surface water elevation in Shoalhaven River downslope of the site. Therefore, Shoalhaven River does not act as a source of recharge of groundwater beneath the Project Site. Groundwater elevation data indicates there is groundwater discharge into Durran Durra Creek during typical conditions. It is possible that Durran Durra Creek acts is a source of recharge of groundwater in alluvium beneath the site during periods of flooding, where surface water elevation could potentially rise above the groundwater elevation in the adjacent alluvium.

- Measured electrical conductivity of groundwater in four groundwater monitoring bores indicates groundwater is excellent quality with respect to dissolved salt concentrations. The low EC supports the inference that groundwater beneath the Project Site is related to recharge occurring within or relatively close to the Project Site.

- Observations of groundwater behaviour in the existing approved extraction excavation indicates that alluvium has relatively high hydraulic conductivity. The Proponent indicated that it is possible to lower the water level in the excavation with pumping but that water levels within the excavation recover quickly when pumping ceases.

- Observations during monitoring bore installation and development also indicates alluvium beneath the Project Site has relatively high hydraulic conductivity.

- Standing water was observed to be present across alluvial plains immediately northwest of the Project Site at the time of the site inspection. A review of historical aerial photography spanning 2003 to 2023 indicates that areas where standing water was observed at the time of assessment were dry in the period 2003 to 2018. This indicates that groundwater levels at the time of assessment were above average corresponding to a relatively wet interval between 2020 and 2025.

4.2 Groundwater Take of the Proposed Development

Groundwater take associated with the development will be comprised of:

- Indirect losses to evaporation associated with exposure of the water table to the atmosphere. These can be approximated by applying the net evaporation rate to the area of exposed water table.

- Use of water to process sand. Water consumption will occur as a result of evaporation of water from settling ponds, evaporation of water in stockpiled sand and export of water in sold product.

- Use of water for dust suppression. This use can be metered.

Long term indirect losses of groundwater will be managed by systematically backfilling the former extraction areas with imported ENM or VENM fill to a level above the water table.

4.3 Potential Groundwater Impacts Associated with the Development

The direct and indirect take of water from the extraction areas will result in local lowering of the water table close to the extent of the active extraction area. The following assumptions can be drawn from the conceptual understanding of the Project Site hydrogeological setting.

- Excavation will be limited to less than 3m below the water table due to operation constraints associated groundwater inflows. Therefore the maximum possible drawdown is 3m within the footprint of the extraction areas. Observations of groundwater behaviour in the existing approved extraction area indicate that it is difficult to significantly lower the water table, therefore it is likely that actual drawdown induced by the Project will be less than 3m. No discharge of water is proposed from the Project Site so the maximum depth of excavation and drawdown will be limited to that which is possible from direct and indirect take of groundwater associated with the proposal.

- Pre-development groundwater elevation beneath the eastern portion of the Project Site is proximately 3m higher than the lower lying western portion of the Project Site. Therefore drawdown induced by the take of groundwater by the proposed development will propagate upslope of the Project Site only whilst ever the extraction depth remains above 579m AHD (which is the groundwater elevation at the at the down gradient Project Site boundary.

- If/when dewatering of the extraction area occurs below a depth of 579m AHD there will be potential for drawdown to propagate on the down gradient (western) side of the Project Site, toward Durran Durra Creek. Durran Durra Creek is fed primarily from surface water flows from further up the catchment and as such would be expected to act as a recharge boundary if drawdown impacts did reach the Creek. That is, surface water recharge to alluvium would be sufficient to balance any draw of water from alluvium beneath the Creek meaning that no drawdown would occur at or beyond Durran Durra Creek.

- The maximum potential drawdown beneath the proposed extraction areas will remain 2-3m above the typical water level within the Shoalhaven River downslope of the Project Site. At the catchment scale groundwater will continue to flow through the alluvium from south east to north west toward Shoalhaven River, irrespective of localised drawdown at the Project Site.

The volume of groundwater discharging into Durran Durra Creek downslope of the Project Site will exceed the amount of groundwater use/loss associated with the Project.

- Standing water visible on the surface of alluvial plains immediately northwest of the Project Site serve as a physical model of aquifer behaviour. The standing water is an expression of the alluvial aquifer water table above the ground surface. These ponds are subject to evaporative losses at the same rate as exposed surface water within the extraction area. Aerial photography published on google earth suggests these surface water features have been present for several years. This indicates that groundwater flow through the surrounding alluvium enters the surface ponds at a rate which exceeds evaporative loss from the surface water features.

- Once each extraction area is exhausted it will be progressively backfilled above the pre-development water table elevation to minimise the extent of exposed water table and associated evaporative losses.

- The proposed development does not pose any direct discharge of water from the Project Site. All process water will be circulated within the boundary of the Project Site. The alluvium underlying the Project Site has relatively high hydraulic conductivity. It is anticipated that any accumulation of water within the Project Site would soak into underlying and surrounding permeable sand.

- The proposed development involves mechanical excavation of sandy soil and washing with groundwater on site. Addition of contaminants is not proposed. Potential chemical contaminants are limited to diesel fuel and oils used to operation the generator and plant at the site. Risks associated with the use of petroleum hydrocarbon based products can be managed by adopting appropriate environmental controls.

- There are no registered groundwater works situated within the alluvial aquifers in the vicinity of the Project Site or in the area between the Project Site and Shoalhaven River.

- The nearest registered groundwater supply work to the Project Site (GW100332) is situated approximately 1100m south of the Project Site. This bore is situated on the opposite side of Durran Durra Creek and is up gradient of the Project Site and therefore is not expected to experience any drawdown impacts. The bore is also constructed in granite bedrock so is unlikely to have significant hydraulic connection to alluvium that would be disturbed by the proposed development.

- The only other registered groundwater works identified within the 5km search radius were situated more than 4km from the Project Site and were accessing groundwater in fractured rock.

- The only identified potential high priority GDE located within 5km of the Project Site is situated approximately 3.4km to the north of the Project Site. The mapped high priority GDE was vegetation in close proximity to Shoalhaven River downstream of the junction with Sandy Creek. Topographic mapping indicates that the typical Shoalhaven River height at this location is less than 570m AHD. This GDE will not be impacted by local drawdown impacts in alluvium situated approximately 5-10m higher up the catchment.

- When a quarry excavation acts as a groundwater sink dissolved salt concentrations can increase over time due to evaporation of fresh water. This is not expected to be an issue at the Project Site. Baseline dissolved salt concentrations are very low. Whilst there is potential for localised changes to the hydraulic gradient around the Project Site, at the regional scale groundwater will continue to flow through the alluvium from south east to northwest ensuring there will be no significant magnification of dissolved slat within exposed groundwater. Furthermore, the life of each stage of the quarry will be relatively short. Completed excavations will be backfilled progressively to minimise ongoing evaporative losses.

4.4 Post Development

Extraction excavations will be progressively rehabilitated by filling with imported ENM and/or VENM. Excavations will be filled above the pre-development water table elevation. The water table should reestablish a new equilibrium condition close to the pre-development level as there will be no ongoing direct or indirect take of groundwater from the post development landscape. Groundwater will continue to flow through and around the Project Site toward Shoalhaven River.

5 Groundwater Impact Assessment

5.1 Aquifer Interference

The *Water Management Act 2000* defines an aquifer interference activity as that which involves any of the following:

- the penetration of an aquifer,
- the interference with water in an aquifer,
- the obstruction of the flow of water in an aquifer,
- the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations, and/or
- the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.

Based on the observed occurrence of groundwater in the existing quarry extraction area and measured groundwater elevation in four groundwater monitoring bores installed at the Project Site, groundwater will be encountered in the proposed extraction areas. Groundwater will be used on-site to process sand and for dust suppression. Therefore, the proposed development is an aquifer interference activity.

5.2 Aquifer Interference Tests

The NSW Aquifer Interference Policy (NSW DPI, 2012) outlines "*minimum impact considerations*" for various aquifer types. If the predicted impacts are less than the "*minimal impact considerations*", then these impacts are considered acceptable.

5.3 Aquifer Type

The proposed development will intersect an alluvial aquifer that forms part of the "*Lachlan Fold Belt – Greater Metropolitan Groundwater Source*" groundwater management unit.

The alluvium in the vicinity of the Project Site is managed as part of the underlying fractured rock water source. There are very few registered groundwater works in the vicinity of the site. As such, the alluvial aquifer at the site is classed as a "less productive" alluvial aquifer.

The NSW Aquifer Interference Policy 2012 discusses impacts within "highly connected" groundwater units, referring to aquifers with high connectivity to adjacent surface water features. The Aquifer Interference Policy 2012 indicates that "highly connected" systems are defined by the relevant regulations.

The NSW Department of Planning and Environment (2022) Groundwater Resource Description - Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources states the following with regard to connectivity of surface and ground water.

"While the surface water and groundwater connectivity to a varying degree is acknowledged in most water sources, the groundwater pumping impact on the river flow is considered 'subdued and/or delayed'. Most of the groundwater systems are considered to be "less highly connected" as described in the groundwater macro-planning method report. Therefore, the groundwater sources in the water sharing plan area are managed independently from surface water except for the Hawkesbury Alluvium which is considered as a connected system."

On this basis the alluvial aquifer subject to interference is not a "highly connected" system as defined by the regulations.

The minimum impact thresholds "*less productive alluvial aquifers*" are discussed in the following subsections.

5.3.1 Groundwater Dependent Ecosystems and Cultural Sites

"1. Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any:

(a) high priority groundwater dependent ecosystem; or

(b) high priority culturally significant site – listed in the schedule of the relevant water sharing plan.

A maximum of 2m decline cumulatively at any water supply work.

2. If more than 10% cumulative variation in the water table, allowing for typical climatic "post-water sharing plan" variations, 40m from any:

(a) high priority groundwater dependent ecosystem; or

(b) high priority culturally significant site; listed in the schedule of the relevant water sharing plan.

Then appropriate studies will need to demonstrate to the Minister's satisfaction that the variation will not prevent the long-term viability of the dependent ecosystem or significant site.

If more than 2m decline cumulatively at any water supply work then make good provisions should apply."

The only identified high priority GDE is sited approximately 3.4km north of the Project Site. It is in a location with no hydraulic connection to alluvium that will be impacted by the proposed development as it is situated at an elevation well below the maximum potential drawdown impacts associated with the project.

As outlined in *Section 2.9*, Durran Durra Creek has potential to be a significant cultural site that is partially reliant on groundwater inflow. The Creek is situated approximately 100-200m from the Project Site where the typical surface water elevation is approximately 579m AHD. Drawdown impacts are possible adjacent to the Creek if/when drawdown occurs below 579m AHD. However, Durran Durra Creek is inferred to be fed primarily from inflow of surface water and/or groundwater from its upper catchment, which extends approximately 14km to the south east of the Project Site. As such, the Creek itself is likely to act as a recharge boundary for the nearby alluvium, with surface water able to recharge groundwater in adjoining alluvium should a hydraulic gradient develop away from the Creek. Therefore, drawdown impacts would not be expected to impact availability of water within Durran Durra Creek.

5.3.2 Drawdown Impacts

"1. A cumulative pressure head decline of not more than 40% of the post water sharing plan pressure head above the base of the water source to a maximum of 2m decline at any water supply work.

2. If the predicted pressure head decline is greater than the requirement above, then appropriate studies are required to demonstrate to the Minister's satisfaction that the decline will not prevent the long-term viability of the affected water supply works unless make good provisions apply.

The physical boundaries of the alluvial aquifer that will be impacted by the Project are well defined by surface topography. There were no registered groundwater works identified within the alluvium. The nearest registered groundwater supply work to the Project Site (GW100332) is situated approximately 1100m south of the Project Site. This bore is situated on the opposite side of Durran

Durra Creek to the Project Site and therefore is not expected to experience any drawdown impacts. The bore is also constructed in granite bedrock so is likely to have minimal hydraulic connection to alluvium that would be disturbed by the proposed development.

It is possible that drawdown impacts could propagate uphill to the east of the Project Site. The boundary of any impacts in this direction with be the elevated ridgeline situated approximately 1km east of the Project Site. There were no registered groundwater works within the maximum potential extent of drawdown impacts.

5.3.3 Water Quality

"1. (a) Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40m from the activity.

1. (b) No increase of more than 1% per activity in long-term average salinity in a highly connected surface water source at the nearest point to the activity.

Redesign of a highly connected(3) surface water source that is defined as a "reliable water supply"(4) is not an appropriate mitigation measure to meet considerations 1.(a) and 1.(b) above.

1. (c) No mining activity to be below the natural ground surface within 200m laterally from the top of high bank or 100m vertically beneath (or the three dimensional extent of the alluvial material - whichever is the lesser distance) of a highly connected surface water source that is defined as a "reliable water supply".

2. If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works."

As outlined in *Section 5.2*, Durran Durra Creek and Shoalhaven River are not considered "highly connected" surface water sources in the context of applying the aquifer interference minimum impact tests. Therefore conditions 1 (b) and 1(c) are not relevant to this assessment. Notwithstanding, available data shows that even if some drawdown occurs within the proposed extraction areas, a hydraulic gradient will remain between the Project Site and Shoalhaven River. Significant water quality impacts would not be expected as groundwater will continue to flow through and around the proposed development, albeit with some local and temporary changes in the immediate vicinity of the Project Site.

With regard to impact test 1. (c) the proposed development is not "mining" as defined by State Environmental Planning Policy (Resources and Energy) 2021, therefore this test is not relevant to the assessment.

The existing and proposed quarry process involves excavation, haulage, sorting and screening of excavated alluvium. Potential contaminants are not used in any stage of the process. The proposed activities have little if any potential to add contaminants that could adversely change groundwater quality.

The development requires operation of plant at the ground surface. Spillage of fuel, lubricants and hydraulic fluids poses a risk to underlying groundwater quality. This risk would be adequately managed by the establishment of dedicated vehicle servicing and refuelling areas and appropriate management controls, which would include fast containment of spills and fast removal and containment of impacted soil using on-site earth moving equipment.

Hazardous and non-hazardous chemicals to be used within the site would be managed in accordance with the specifications of the Material and Safety Data Sheets (MSDS) and relevant management plans.

The following measures would be implemented to further minimise adverse environmental impacts associated with storage and use of reagents and chemicals within the Project Site.

- All chemicals would be stored and used in accordance with the manufacturer's instructions and the relevant MSDS.

- All liquid chemicals would be stored within an impermeable bunded area with a capacity of at least 110% of the capacity of the largest container.

- Chemicals with the potential to react with each other would not be stored in the same area to prevent any reactions between them in the event of a spill.

- Only the minimum volume of chemicals required for the ongoing operation of the quarry would be stored on-site.

- MSDS and appropriate spill management equipment would be available in the vicinity of all chemical storage areas.

- Personnel who will use chemicals would be provided with the appropriate training in the proper handling techniques.

Flow of water from the existing and proposed excavations will occur through alluvium (clay, silt, sand and gravel) situated beneath or at the side of the excavations. The natural aquifer material will act as a filter to eliminate discharge of sediment laiden water to Durran Durra Creek.

Acid sulphate soil risk mapping indicates the quarry has low risk of encountering iron pyrite rich material that would be acid generating if exposed to oxygen. The mapping is supported by water quality monitoring data for the site, which indicated groundwater had pH that was only mildly acidic close to the existing quarry excavation.

When a quarry excavation acts as a groundwater sink dissolved salt concentrations can increase over time due to evaporation of fresh water, which magnifies residual salt. This is not expected to be an issue at the Project Site. Baseline dissolved salt concentrations are very low. Whilst a hydraulic gradient exists across the site there will be groundwater flow through any open excavations via the adjoining permeable sand and gravel, meaning the excavation will not act as a sink. The maximum proposed vertical extent of extraction will remain above the typical surface water level of Shoalhaven River (the regional scale groundwater sink) so at the catchment scale groundwater flow will remain toward Shoalhaven River.

Some magnification of dissolved salt will be possible if/when drawdown is created below 579m AHD. Significant groundwater quality impacts are not expected as the life of each stage of the quarry will be relatively short and exhausted extraction areas will be backfilled progressively to minimise ongoing evaporative losses and associated drawdown impacts.

5.4 Groundwater Use and Evaporative Losses

The proposed development will utilise water from the existing and proposed excavations for water supply. Water accumulating within the existing and proposed excavations is likely to be comprised primarily of groundwater.

The proposed quarry excavations will need to be registered as a groundwater supply work. BSG will need to obtain a Water Access License (WAL) for groundwater taken from the "*Lachlan Fold Belt – Greater Metropolitan Groundwater Source*" groundwater management unit for commercial use.

The volume of groundwater used will be difficult to measure given that the existing and proposed development involves recycling of wash water within the Project Site. Direct and indirect take of groundwater is summarised in *Section 4.2*.

The post development landform will be rehabilitated so that the final landform is above the pre-development water table elevation. Therefore, there will be no ongoing groundwater losses once the development is completed.

5.5 Summary of Aquifer Impact Assessment

Potential groundwater impacts associated with the proposed development would not exceed the Level 1 "*minimum impact considerations*" outlined in the NSW Aquifer Interference Policy (NSW DPI, 2012). Therefore, groundwater impacts associated with the proposed development are acceptable.

6 Conclusions

Information gathered and reviewed as part of this assessment indicates that the proposed development will intersect water within an alluvial aquifer, so the proposed development would be an aquifer interference activity.

Potential impacts associated with the proposed development would not exceed the "*minimum impact considerations*" outlined in the NSW Aquifer Interference Policy (NSW DPI, 2012). Therefore, groundwater impacts associated with the project are acceptable.

The existing and proposed development will utilise groundwater as water supply for washing and screening sand product. Indirect take of groundwater will also occur in the form of evaporative losses from exposed groundwater within the open excavations. The proposed quarry excavations will need to be registered as a groundwater supply work. The Proponent will need to obtain a commercial use water access licence for any direct or indirect take of groundwater from the "*Lachlan Fold Belt – Greater Metropolitan Groundwater Source*" groundwater management unit.

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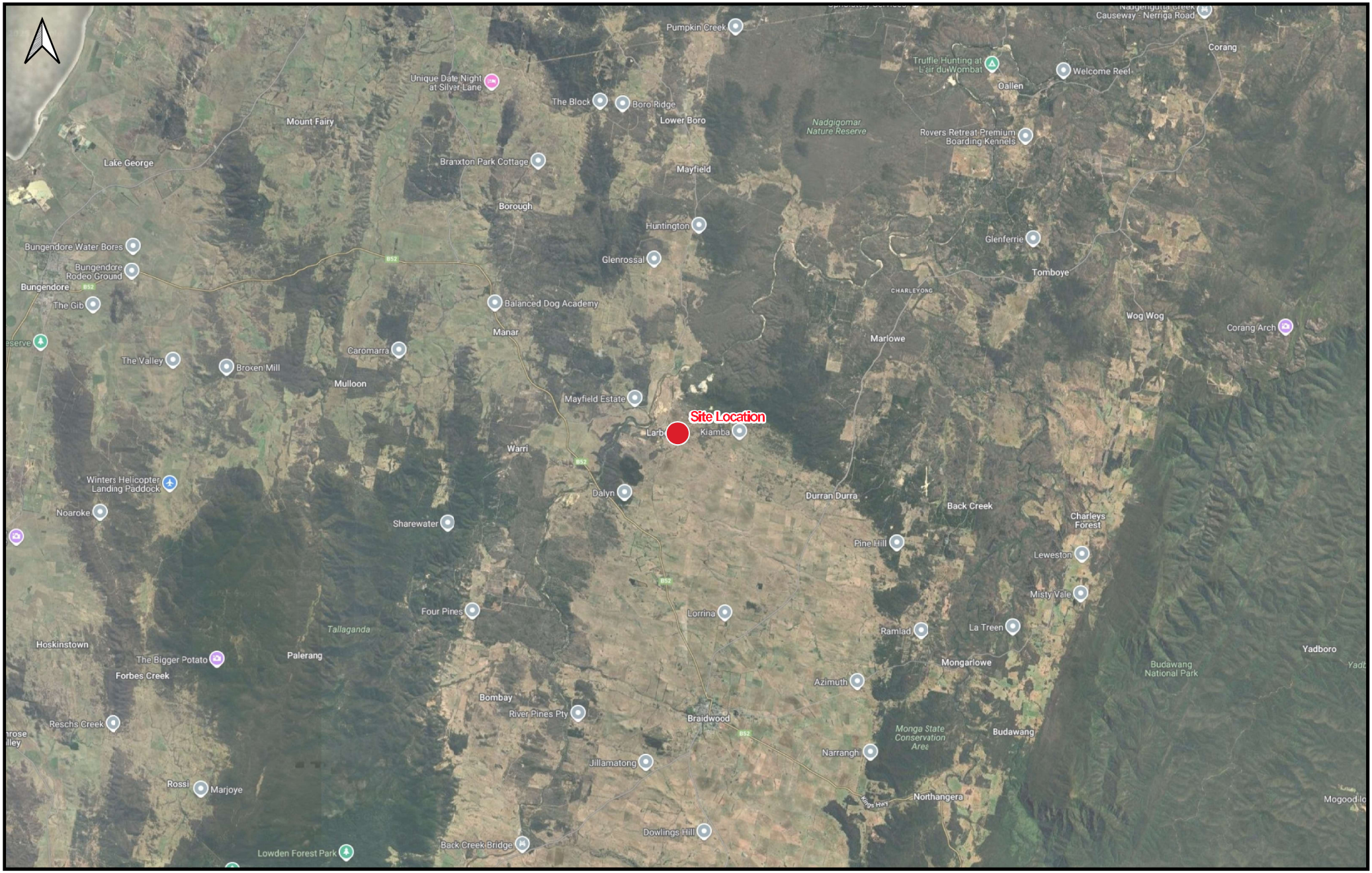
Annex A

Figures



Ground Doctor

22 Tamworth Street
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0 5 10 km

Figure 1: Site Location and Regional Setting

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027

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Legend:
Project Site Boundary

0 100 200 300 400 m

Figure 2: Site Location and Locall Setting

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027

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Project Site Boundary
Proposed Quarry Stage Area
Existing Approval Area

0 50 100 150 200 m

Figure 3: Project Site Showing Proposed Development Stages

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027

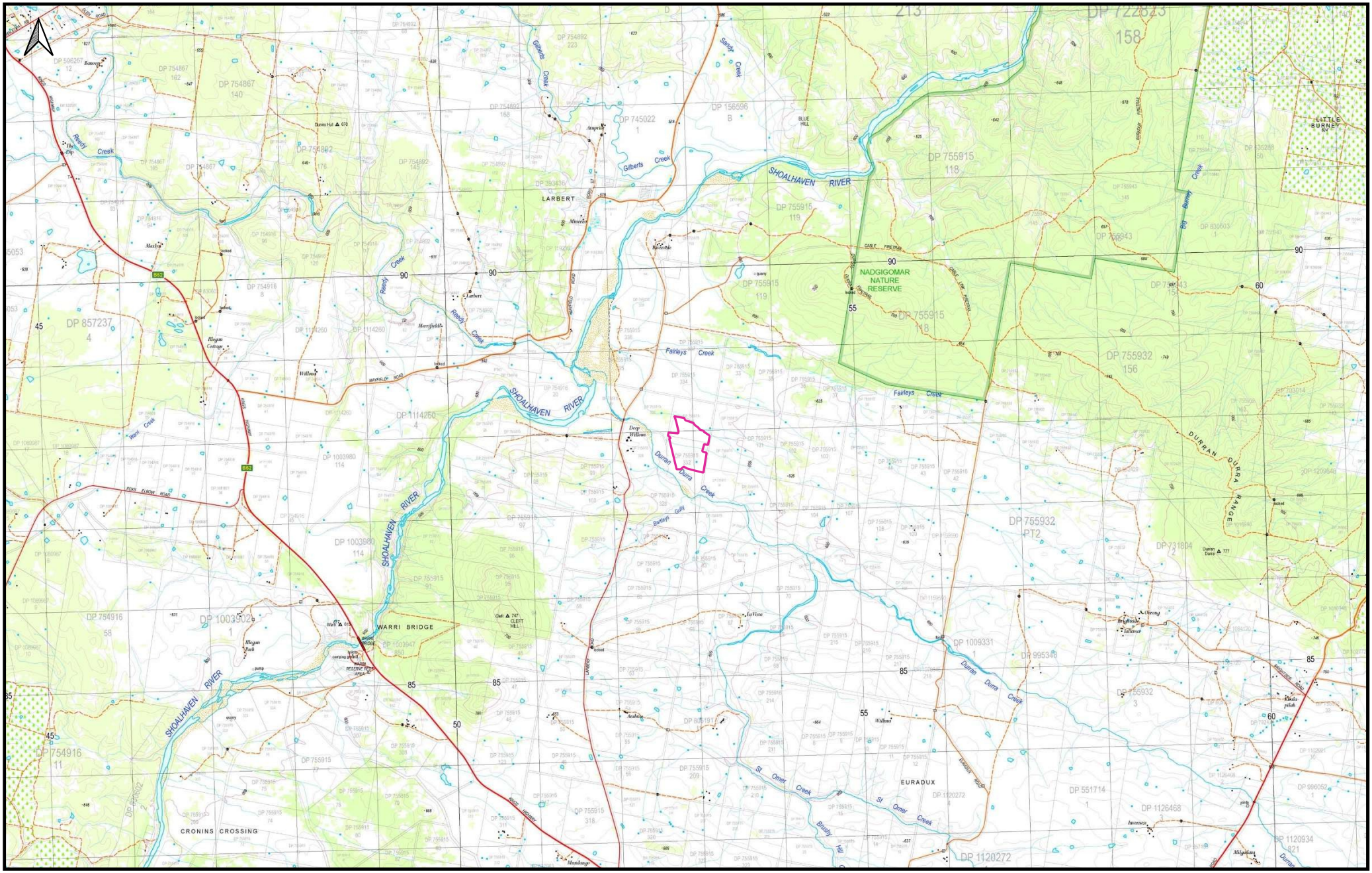

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Figure 4: Regionall Topography

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027

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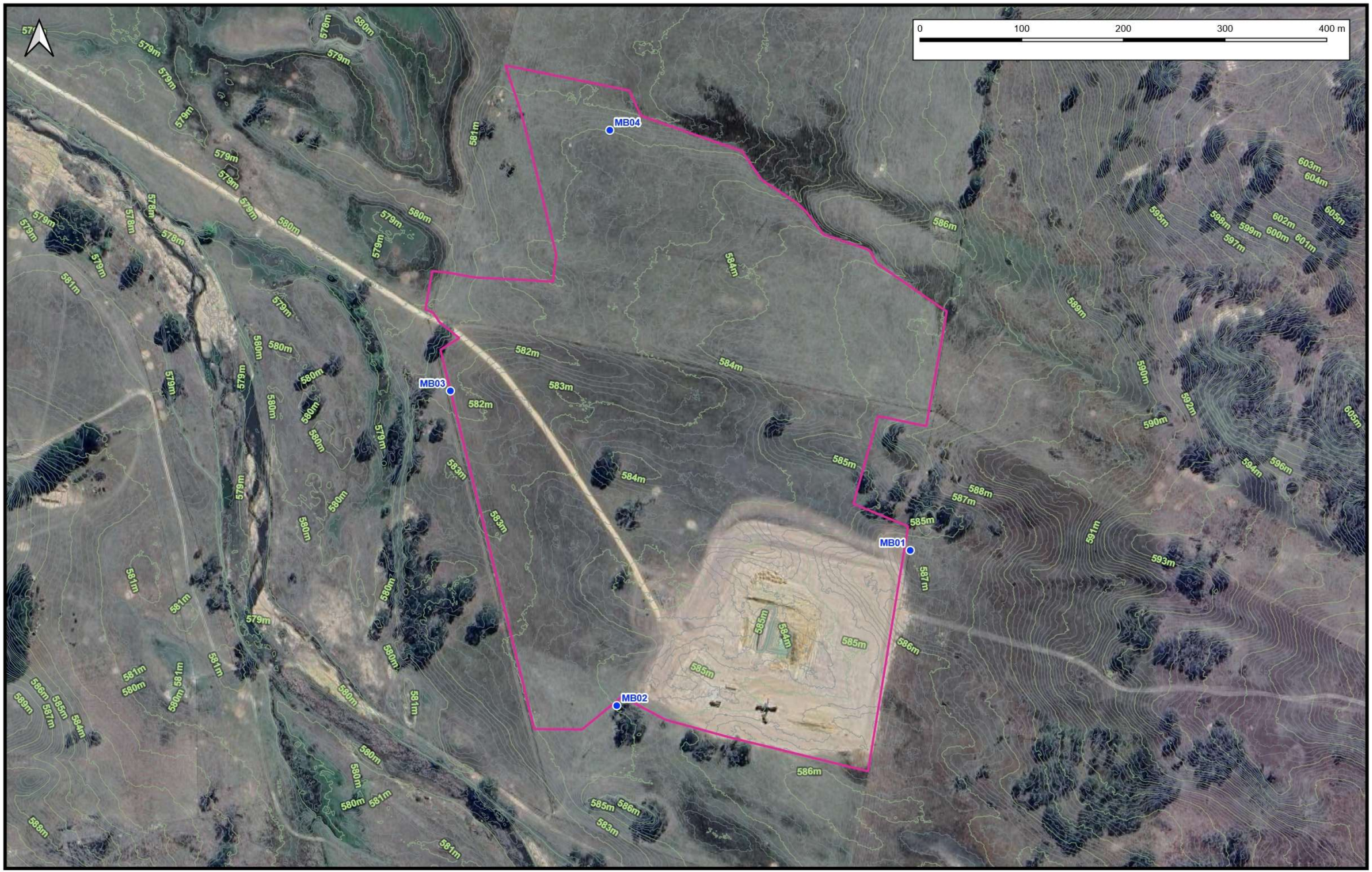
Figure 5: Detailed Surface Topography

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027



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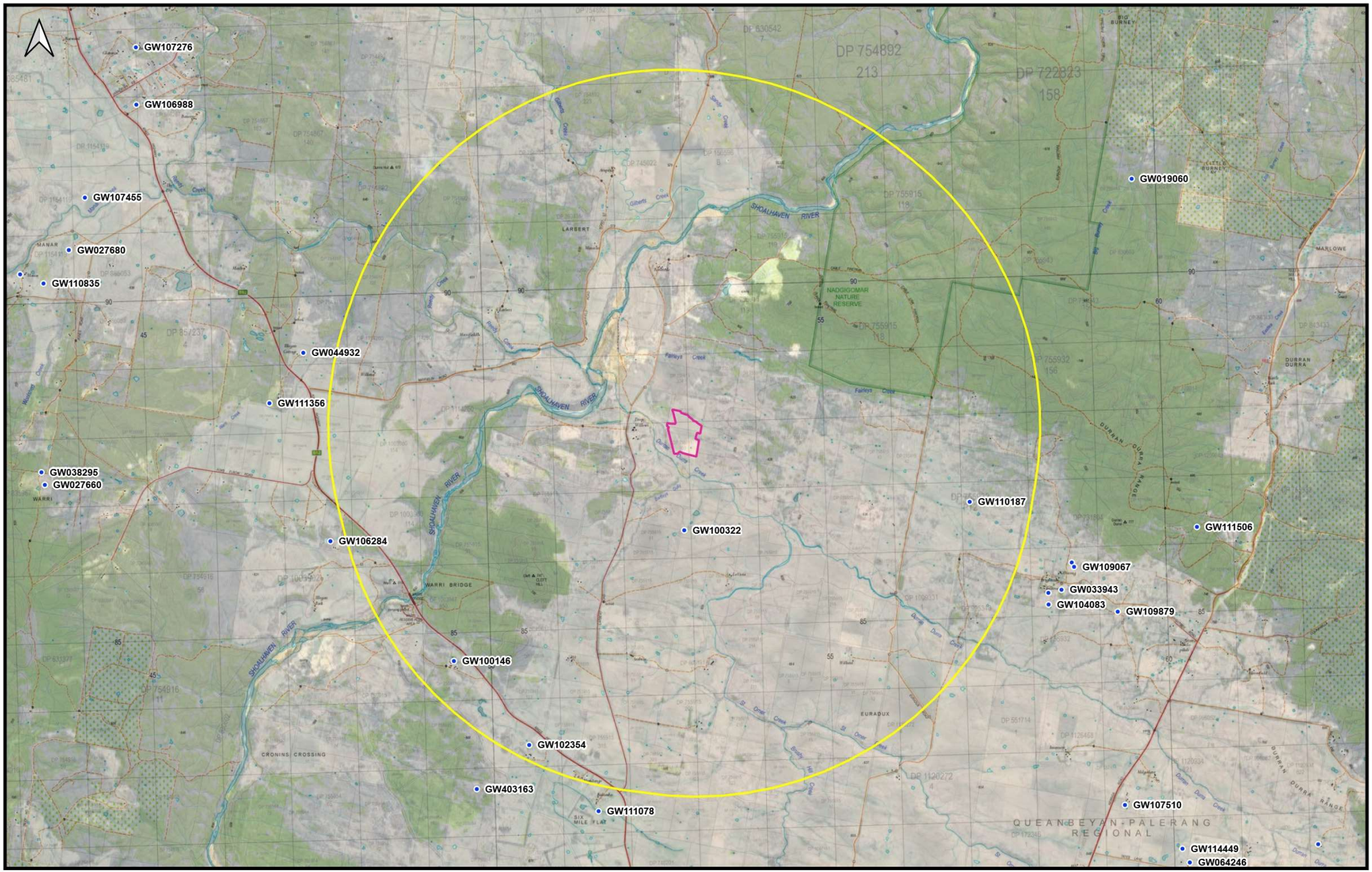
Project Site Boundary
Monitoring Bore Location
1m Surface Elevation Contours (m AHD)
0.2m Surface Elevation Contours (m AHD)

Figure 6: Groundwater Monitoring Bore Locations

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027



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Project Site Boundary

5km Buffer Around Project Site

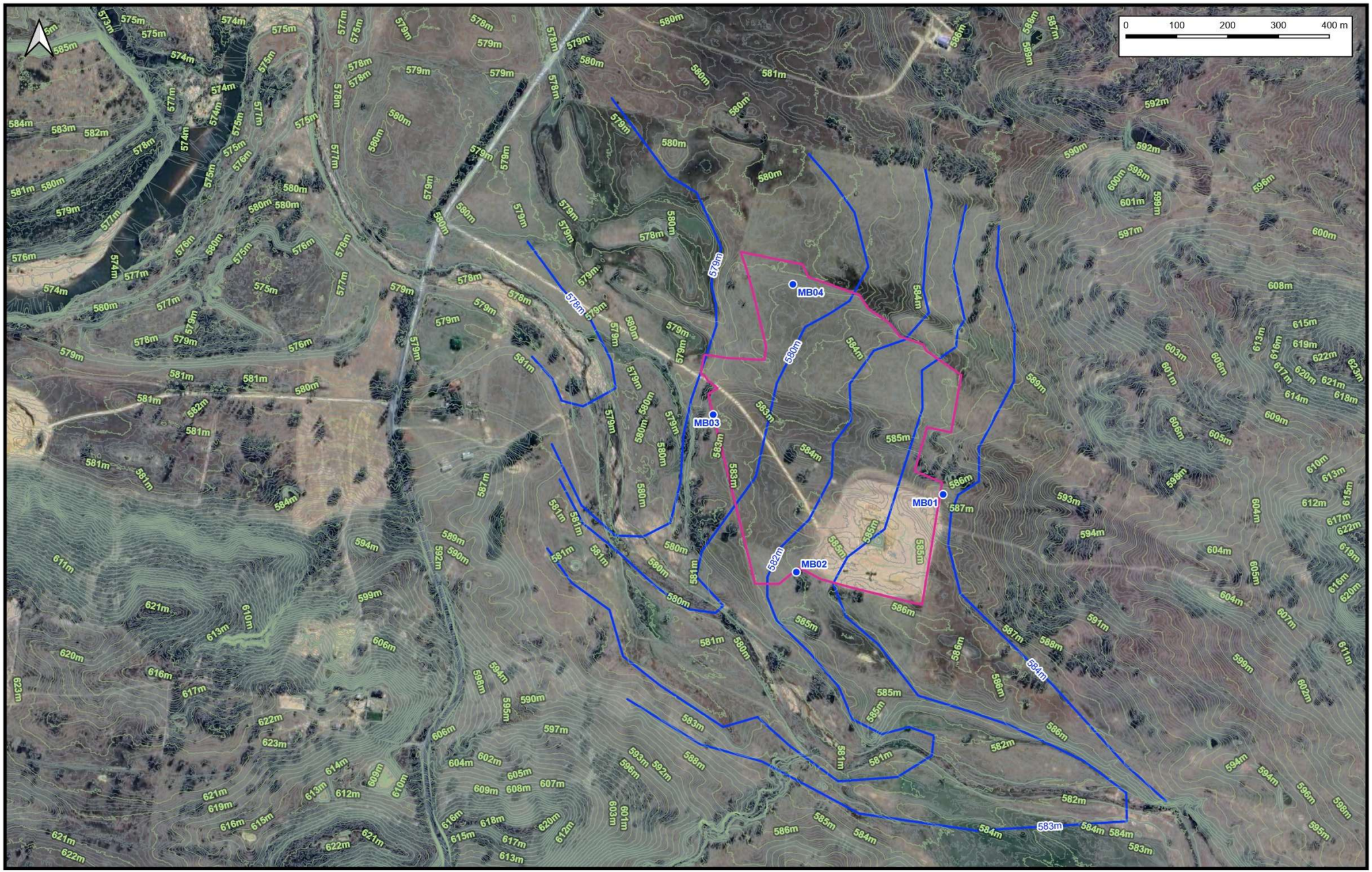
Registered Groundwater Works

0 1 2 km

Figure 7: Inferred Groundwater Elevation Contrours

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel Quarry

Job Number: 2025-GD027



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Project Site Boundary
Monitoring Bore Location
Inferred Groundwater Elevation Controur (m AHD)
1m Surface Elevation Contours (m AHD)
0.2m Surface Elevation Contours (m AHD)

Figure 8: Inferred Groundwater Elevation Contours

Job Name: Groundwater Impact Assessment - Braidwood Sand and Gravel - Larbert Quary

Job Number: 2025-GD027

Annex B

Analytical Results Summary Table

Table B1: Summary of Groundwater Analytical Results and Comparison to Relevant Water Quality Thresholds
Groundwater Impact Assessment - Braidwood Sand and Gravel - 552 Larbert Road, Larbert, NSW

Sample ID		Units	ANZECC	Aust. Drinking Water	MB01	MB02	MB03	MB04
Sampling Date			DGV 2018 (Fresh)	2011	7/10/2025	7/10/2025	7/10/2025	7/10/2025
Major Cations	Calcium, Ca	mg/L	-	-	**2.6**	**4.3**	**6.1**	**5.3**
	Magnesium, Mg	mg/L	-	-	**1.0**	**1.7**	**2.5**	**2.5**
	Sodium, Na	mg/L	-	-	**4.6**	**26**	**8.5**	**6.6**
	Potassium, K	mg/L	-	-	**2.0**	**0.5**	**0.8**	**2.2**
	Hardness	mg CaCO3/L	-	-	**11.0**	**18.0**	**26.0**	**24.0**
Major Anions	Sulfate, SO4	mg/L	-	-	**2.2**	**2.4**	**2.7**	**2.2**
	Chloride	mg/L	-	-	**3.0**	**35**	**12**	**8.4**
	Fluoride	mg/L	1.7	1.5	<0.1	<0.1	<0.1	<0.1
	Bicarbonate Alkalinity as CaCO3	mg/L	-	-	**17**	**27**	**25**	**28**
	Carbonate Alkalinity as CaCO3	mg/L	-	-	<1	<1	<1	<1
	Hydroxide Alkalinity as CaCO3	mg/L	-	-	<5	<5	<5	<5
	Total Alkalinity as CaCO3	mg/L	-	-	**17**	**27**	**25**	**28**
Metals (Dissolved)	Aluminium	µg/L	55	-	<5	**13**	<5	<5
	Arsenic	µg/L	13	10	<1	<1	<1	<1
	Barium	µg/L	-	200	**7**	**42**	**24**	**20**
	Beryllium	µg/L	-	60	<1	<1	<1	<1
	Boron	µg/L	370	4000	**8**	**6**	**7**	**9**
	Cadmium	µg/L	0.2	2	<0.1	<0.1	<0.1	<0.1
	Chromium	µg/L	1	50	<1	<1	<1	<1
	Cobalt	µg/L	-	-	<1	**5**	**5**	<1
	Copper	µg/L	1.4	2000	<1	<1	<1	<1
	Lead	µg/L	3.4	10	<1	<1	<1	<1
	Manganese	µg/L	1900	500	**4**	**32**	**330**	**2**
	Mercury, Hg	mg/L	600	1	<0.0001	<0.0001	<0.0001	<0.0001
	Molybdenum	µg/L	-	50	<1	<1	**1**	<1
	Nickel	µg/L	11	20	<1	<1	**2**	<1
	Selenium	µg/L	5	10	<1	<1	<1	<1
	Uranium	µg/L	0.5	17	<1	<1	<1	<1
	Zinc	µg/L	8	3000	<5	**7**	**6**	<5
Nutrients	Total Nitrogen (calc)	mg/L	-	-	**0.17**	**0.19**	**1.4**	**0.10**
	Nitrate Nitrogen, NO3-N	mg/L	1.1	50	**0.098**	<0.005	**1.4**	**0.047**
	Nitrite Nitrogen, NO2 as N	mg/L	-	3	<0.005	<0.005	**0.011**	<0.005
	Ammonia Nitrogen, NH_3 as N	mg/L	0.9	-	**0.008**	**0.009**	**0.023**	**0.005**
	Total Kjeldahl Nitrogen	mg/L			**0.07**	**0.19**	<0.05	**0.05**
	Organic Nitrogen (calc)	mg/L			**0.06**	**0.18**	<0.05	<0.05
	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	-	-	**0.05**	<0.02	<0.02	<0.02
	Filterable Reactive Phosphorus as P	mg/L	-	-	<0.005	<0.005	<0.005	**0.011**

Annex C

Laboratory Certificate of Analysis

SAMPLE RECEIPT ADVICE

SE290630

CLIENT DETAILS

Contact	[redacted]
Client	GROUND DOCTOR PTY LTD
Address	22 TAMWORTH STREET DUBBO NSW 2830
Telephone	[redacted]
Facsimile	(Not specified)
Email	[redacted]
Project	**Labret GIA / 2025-GD027-1**
Order Number	**2025-GD027-1**
Samples	5

LABORATORY DETAILS

Manager	[redacted]
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
Samples Received	Tue 7/10/2025
Report Due	Tue 14/10/2025
SGS Reference	**SE290630**

SUBMISSION DETAILS

This is to confirm that 5 samples were received on Tuesday 7/10/2025. Results are expected to be ready by COB Tuesday 14/10/2025. Please quote SGS reference SE290630 when making enquiries. Refer below for details relating to sample integrity upon receipt.

Sample counts by matrix	5 Water	Type of documentation received	COC
Date documentation received	7/10/2025	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	9.3°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice	Samples clearly labelled	Yes
Complete documentation received	Yes		

Unless otherwise instructed, water and bulk samples will be held for one month from date of report, and soil samples will be held for two months.

COMMENTS

This document is issued by the Company under its General Conditions of Service accessible at www.sgs.com/en/Terms-and-Conditions.aspx. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

SAMPLE RECEIPT ADVICE

SE290630

CLIENT DETAILS

Client GROUND DOCTOR PTY LTD

Project Labret GIA / 2025-GD027-1

SUMMARY OF ANALYSIS

No.	Sample ID	Alkalinity	Ammonia Nitrogen by Discrete Analyser	Anions by Ion Chromatography in Water	Filterable Reactive Phosphorus (FRP)	Mercury (dissolved) in Water	Metals in Water (Dissolved) by ICPOES	Nitrite in Water	TKN Kjeldahl Digestion by Discrete Analyser	Total Phosphorus by Kjeldahl Digestion DA in	Trace Metals (Dissolved) in Water by ICPMS
001	MB01	1	1	4	1	1	4	1	3	1	16
002	MB02	1	1	4	1	1	4	1	3	1	16
003	MB03	1	1	4	1	1	4	1	3	1	16
004	MB04	1	1	4	1	1	4	1	3	1	16
005	MB05	1	1	4	1	1	4	1	3	1	16

The above table represents SGS' interpretation of the client-supplied Chain Of Custody document.
The numbers shown in the table indicate the number of results requested in each package.
Please indicate as soon as possible should your request differ from these details .
Testing as per this table shall commence immediately unless the client intervenes with a correction .

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	[redacted]
Client	GROUND DOCTOR PTY LTD
Address	22 TAMWORTH STREET DUBBO NSW 2830
Telephone	[redacted]
Facsimile	(Not specified)
Email	[redacted]
Project	**Labret GIA / 2025-GD027-1**
Order Number	**2025-GD027-1**
Samples	5

LABORATORY DETAILS

Manager	[redacted]
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE290630 R0**
Date Received	7/10/2025
Date Reported	13/10/2025

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

[redacted]
Metals/Inorganics Team Leader

[redacted]
Laboratory Technician

Anions by Ion Chromatography in Water [AN245] Tested: 8/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.098**	<0.005	**1.4**	**0.047**	**0.041**
Fluoride	mg/L	0.1	<0.10	<0.10	<0.10	<0.10	<0.10
Chloride	mg/L	1	**3.0**	**35**	**12**	**8.4**	**6.2**
Sulfate, SO4	mg/L	1	**2.2**	**2.4**	**2.7**	**2.2**	**2.2**

Nitrite in Water [AN277] Tested: 8/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	**0.011**	<0.005	<0.005

TKN Kjeldahl Digestion by Discrete Analyser [AN281/292] Tested: 10/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Total Kjeldahl Nitrogen	mg/L	0.05	**0.07**	**0.19**	<0.05	**0.05**	**0.19**
Total Nitrogen (calc)	mg/L	0.05	**0.17**	**0.19**	**1.4**	**0.10**	**0.23**
Organic Nitrogen (calc)	mg/L	0.05	**0.06**	**0.18**	<0.05	<0.05	**0.18**

Total Phosphorus by Kjeldahl Digestion DA in Water [AN279/AN293] Tested: 10/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.05**	<0.02	<0.02	<0.02	<0.02

Filterable Reactive Phosphorus (FRP) [AN278] Tested: 8/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Filterable Reactive Phosphorus as P	mg/L	0.005	<0.005	<0.005	<0.005	**0.011**	**0.007**

Ammonia Nitrogen by Discrete Analyser [AN291] Tested: 8/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Ammonia Nitrogen, NH_3 as N	mg/L	0.005	**0.008**	**0.009**	**0.023**	**0.005**	**0.007**

Alkalinity [AN135] Tested: 10/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Total Alkalinity as CaCO3	mg/L	5	17	27	25	28	28

Metals in Water (Dissolved) by ICPOES [AN320] Tested: 9/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Calcium, Ca	mg/L	0.2	2.6	4.3	6.1	5.3	5.3
Magnesium, Mg	mg/L	0.1	1.0	1.7	2.5	2.5	2.5
Sodium, Na	mg/L	0.5	4.6	26	8.5	6.6	6.7
Potassium, K	mg/L	0.1	2.0	0.5	0.8	2.2	2.3

Trace Metals (Dissolved) in Water by ICPMS [AN318] Tested: 10/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Aluminium	µg/L	5	<5	13	<5	<5	<5
Arsenic	µg/L	1	<1	<1	<1	<1	<1
Barium	µg/L	1	7	42	24	20	20
Beryllium	µg/L	1	<1	<1	<1	<1	<1
Boron	µg/L	5	8	6	7	9	10
Cadmium	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt	µg/L	1	<1	5	5	<1	<1
Chromium	µg/L	1	<1	<1	<1	<1	<1
Copper	µg/L	1	<1	<1	<1	<1	<1
Lead	µg/L	1	<1	<1	<1	<1	<1
Manganese	µg/L	1	4	32	330	2	2
Molybdenum	µg/L	1	<1	<1	1	<1	<1
Nickel	µg/L	1	<1	<1	2	<1	<1
Selenium	µg/L	1	<1	<1	<1	<1	<1
Uranium	µg/L	1	<1	<1	<1	<1	<1
Zinc	µg/L	5	<5	7	6	<5	<5

Mercury (dissolved) in Water [AN311(Perth)/AN312] Tested: 13/10/2025

PARAMETER	UOM	LOR	MB01 WATER - 7/10/2025 SE290630.001	MB02 WATER - 7/10/2025 SE290630.002	MB03 WATER - 7/10/2025 SE290630.003	MB04 WATER - 7/10/2025 SE290630.004	MB05 WATER - 7/10/2025 SE290630.005
Mercury, Hg	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN278	Filterable Reactive Phosphorus by DA (determined on filtered sample): Orthophosphate reacts with ammonium molybdate (Mo VI) and potassium antimonyl tartrate (Sb III) in acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue colour and the absorbance is read at 880 nm. The sensitivity of the automated method is 10-20 times that of the macro method. Reference APHA 4500-P F
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 660 nm by Discrete Analyser.
AN311(Perth)/AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN318	Determination of elements at trace level in waters by ICP-MS technique,, referenced to USEPA 6020B and USEPA 200.8 (5.4).
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components .
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements . Reference APHA 3120 B.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO2 D.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
		NVL	Not validated.	LOR	Limit of Reporting.
**	Indicative data, theoretical holding time exceeded.	IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR			
***	Indicates that both * and ** apply.		Sample listed, but not received.		
NAD	No Asbestos Detected.	NA	Not Applicable.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: https://www.sgs.com/en-au/industry/environmental-health-and-safety.

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STATEMENT OF QA/QC PERFORMANCE

SE290630 R0

CLIENT DETAILS

Contact	[redacted]
Client	GROUND DOCTOR PTY LTD
Address	22 TAMWORTH STREET DUBBO NSW 2830
Telephone	[redacted]
Facsimile	(Not specified)
Email	[redacted]
Project	**Labret GIA / 2025-GD027-1**
Order Number	**2025-GD027-1**
Samples	5

LABORATORY DETAILS

Manager	[redacted]
Laboratory	SGS Alexandria Environmental
Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	+61 2 8594 0400
Facsimile	+61 2 8594 0499
Email	au.environmental.sydney@sgs.com
SGS Reference	**SE290630 R0**
Date Received	07 Oct 2025
Date Reported	13 Oct 2025

COMMENTS

All the laboratory data for each environmental matrix was compared to SGS' stated Data Quality Objectives (DQO). Comments arising from the comparison were made and are reported below.

The data relating to sampling was taken from the Chain of Custody document.
This QA/QC Statement must be read in conjunction with the referenced Analytical Report.
The Statement and the Analytical Report must not be reproduced except in full.

All Data Quality Objectives were met (within the SGS Alexandria Environmental laboratory).

SAMPLE SUMMARY

Sample counts by matrix	5 Water	Type of documentation received	COC
Date documentation received	7/10/2025	Samples received in good order	Yes
Samples received without headspace	Yes	Sample temperature upon receipt	9.3°C
Sample container provider	SGS	Turnaround time requested	Standard
Samples received in correct containers	Yes	Sufficient sample for analysis	Yes
Sample cooling method	Ice	Samples clearly labelled	Yes
Complete documentation received	Yes		

HOLDING TIME SUMMARY

SE290630 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364265	07 Oct 2025	07 Oct 2025	21 Oct 2025	10 Oct 2025	21 Oct 2025	10 Oct 2025
MB02	SE290630.002	LB364265	07 Oct 2025	07 Oct 2025	21 Oct 2025	10 Oct 2025	21 Oct 2025	10 Oct 2025
MB03	SE290630.003	LB364265	07 Oct 2025	07 Oct 2025	21 Oct 2025	10 Oct 2025	21 Oct 2025	10 Oct 2025
MB04	SE290630.004	LB364265	07 Oct 2025	07 Oct 2025	21 Oct 2025	10 Oct 2025	21 Oct 2025	10 Oct 2025
MB05	SE290630.005	LB364265	07 Oct 2025	07 Oct 2025	21 Oct 2025	10 Oct 2025	21 Oct 2025	10 Oct 2025

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB02	SE290630.002	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB03	SE290630.003	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB04	SE290630.004	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB05	SE290630.005	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB363869	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	09 Oct 2025
MB02	SE290630.002	LB363869	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	09 Oct 2025
MB03	SE290630.003	LB363869	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	09 Oct 2025
MB04	SE290630.004	LB363869	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	09 Oct 2025
MB05	SE290630.005	LB363869	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	09 Oct 2025

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB02	SE290630.002	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB03	SE290630.003	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB04	SE290630.004	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025
MB05	SE290630.005	LB363953	07 Oct 2025	07 Oct 2025	04 Nov 2025	08 Oct 2025	04 Nov 2025	08 Oct 2025

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364419	07 Oct 2025	07 Oct 2025	04 Nov 2025	13 Oct 2025	04 Nov 2025	13 Oct 2025
MB02	SE290630.002	LB364419	07 Oct 2025	07 Oct 2025	04 Nov 2025	13 Oct 2025	04 Nov 2025	13 Oct 2025
MB03	SE290630.003	LB364419	07 Oct 2025	07 Oct 2025	04 Nov 2025	13 Oct 2025	04 Nov 2025	13 Oct 2025
MB04	SE290630.004	LB364419	07 Oct 2025	07 Oct 2025	04 Nov 2025	13 Oct 2025	04 Nov 2025	13 Oct 2025
MB05	SE290630.005	LB364419	07 Oct 2025	07 Oct 2025	04 Nov 2025	13 Oct 2025	04 Nov 2025	13 Oct 2025

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364098	07 Oct 2025	07 Oct 2025	05 Apr 2026	09 Oct 2025	05 Apr 2026	13 Oct 2025
MB02	SE290630.002	LB364098	07 Oct 2025	07 Oct 2025	05 Apr 2026	09 Oct 2025	05 Apr 2026	13 Oct 2025
MB03	SE290630.003	LB364098	07 Oct 2025	07 Oct 2025	05 Apr 2026	09 Oct 2025	05 Apr 2026	13 Oct 2025
MB04	SE290630.004	LB364098	07 Oct 2025	07 Oct 2025	05 Apr 2026	09 Oct 2025	05 Apr 2026	13 Oct 2025
MB05	SE290630.005	LB364098	07 Oct 2025	07 Oct 2025	05 Apr 2026	09 Oct 2025	05 Apr 2026	13 Oct 2025

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB363953	07 Oct 2025	07 Oct 2025	11 Oct 2025	08 Oct 2025	11 Oct 2025	08 Oct 2025
MB02	SE290630.002	LB363953	07 Oct 2025	07 Oct 2025	11 Oct 2025	08 Oct 2025	11 Oct 2025	08 Oct 2025
MB03	SE290630.003	LB363953	07 Oct 2025	07 Oct 2025	11 Oct 2025	08 Oct 2025	11 Oct 2025	08 Oct 2025
MB04	SE290630.004	LB363953	07 Oct 2025	07 Oct 2025	11 Oct 2025	08 Oct 2025	11 Oct 2025	08 Oct 2025
MB05	SE290630.005	LB363953	07 Oct 2025	07 Oct 2025	11 Oct 2025	08 Oct 2025	11 Oct 2025	08 Oct 2025

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/292

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB02	SE290630.002	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB03	SE290630.003	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB04	SE290630.004	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB05	SE290630.005	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

Sample Name	Sample No.	QC Ref

HOLDING TIME SUMMARY

SE290630 R0

SGS holding time criteria are drawn from current regulations and are highly dependent on sample container preservation as specified in the SGS "Field Sampling Guide for Containers and Holding Time" (ref: GU-(AU)-ENV.001). Soil samples guidelines are derived from NEPM "Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils". Water sample guidelines are derived from "AS/NZS 5667.1 : 1998 Water Quality - sampling part 1" and APHA "Standard Methods for the Examination of Water and Wastewater" 21st edition 2005.

Extraction and analysis holding time due dates listed are calculated from the date sampled, although holding times may be extended after laboratory extraction for some analytes. The due dates are the suggested dates that samples may be held before extraction or analysis and still be considered valid.

Extraction and analysis dates are shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria. If the

Total Phosphorus by Kjeldahl Digestion DA in Water (continued) — **Method: ME-(AU)-[ENV]AN279/AN293**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB02	SE290630.002	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB03	SE290630.003	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB04	SE290630.004	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025
MB05	SE290630.005	LB364244	07 Oct 2025	07 Oct 2025	04 Nov 2025	10 Oct 2025	04 Nov 2025	13 Oct 2025

Trace Metals (Dissolved) in Water by ICPMS — **Method: ME-(AU)-[ENV]AN318**

Sample Name	Sample No.	QC Ref	Sampled	Received	Extraction Due	Extracted	Analysis Due	Analysed
MB01	SE290630.001	LB364224	07 Oct 2025	07 Oct 2025	05 Apr 2026	10 Oct 2025	05 Apr 2026	13 Oct 2025
MB02	SE290630.002	LB364224	07 Oct 2025	07 Oct 2025	05 Apr 2026	10 Oct 2025	05 Apr 2026	13 Oct 2025
MB03	SE290630.003	LB364224	07 Oct 2025	07 Oct 2025	05 Apr 2026	10 Oct 2025	05 Apr 2026	13 Oct 2025
MB04	SE290630.004	LB364224	07 Oct 2025	07 Oct 2025	05 Apr 2026	10 Oct 2025	05 Apr 2026	13 Oct 2025
MB05	SE290630.005	LB364224	07 Oct 2025	07 Oct 2025	05 Apr 2026	10 Oct 2025	05 Apr 2026	13 Oct 2025

Surrogate results are evaluated against upper and lower limit criteria established in the SGS QA/QC plan (Ref: MP-(AU)-[ENV]QU-022). At least two of three routine level soil sample surrogate spike recoveries for BTEX/VOC are to be within 70-130% where control charts have not been developed and within the established control limits for charted surrogates. Matrix effects may void this as an acceptance criterion. Water sample surrogate spike recoveries are to be within 40-130%. The presence of emulsions, surfactants and particulates may void this as an acceptance criterion.

Result is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

No surrogates were required for this job.

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Alkalinity

Method: ME-(AU)-[ENV]AN135

Sample Number	Parameter	Units	LOR	Result
LB364265.001	Total Alkalinity as CaCO3	mg/L	5	<5

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result
LB363953.001	Ammonia Nitrogen, NH_3 as N	mg/L	0.005	0.009

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result
LB363869.001	Fluoride	mg/L	0.1	<0.10
	Chloride	mg/L	1	<0.05
	Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.005
	Sulfate, SO4	mg/L	1	<1.0

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Number	Parameter	Units	LOR	Result
LB363953.001	Filterable Reactive Phosphorus as P	mg/L	0.005	<0.005

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Sample Number	Parameter	Units	LOR	Result
LB364419.001	Mercury, Hg	mg/L	0.0001	<0.0001

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result
LB364098.001	Calcium, Ca	mg/L	0.2	<0.2
	Magnesium, Mg	mg/L	0.1	<0.1
	Potassium, K	mg/L	0.1	<0.1
	Sodium, Na	mg/L	0.5	<0.5

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Number	Parameter	Units	LOR	Result
LB363953.001	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

Sample Number	Parameter	Units	LOR	Result
LB364244.001	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	<0.02

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result
LB364224.001	Aluminium	µg/L	5	<5
	Arsenic	µg/L	1	<1
	Barium	µg/L	1	<1
	Beryllium	µg/L	1	<1
	Boron	µg/L	5	<5
	Cadmium	µg/L	0.1	<0.1
	Chromium	µg/L	1	<1
	Cobalt	µg/L	1	<1
	Copper	µg/L	1	<1
	Lead	µg/L	1	<1
	Manganese	µg/L	1	<1
	Molybdenum	µg/L	1	<1
	Nickel	µg/L	1	<1
	Selenium	µg/L	1	<1
	Uranium	µg/L	1	<1

Blank results are evaluated against the limit of reporting (LOR), for the chosen method and its associated instrumentation, typically 2.5 times the statistically determined method detection limit (MDL).

Result is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Trace Metals (Dissolved) in Water by ICPMS (continued) — **Method: ME-(AU)-[ENV]AN318**

Sample Number	Parameter	Units	LOR	Result
LB364224.001	Zinc	µg/L	5	<5

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Alkalinity

Method: ME-(AU)-[ENV]AN135

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290665.003	LB364265.013	Total Alkalinity as CaCO3	mg/L	5	41.821166666	27.246166666	16	2
SE290665.010	LB364265.021	Total Alkalinity as CaCO3	mg/L	5	1089.468	1112.3375	15	2

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290615.003	LB363953.014	Ammonia Nitrogen, NH_3 as N	mg/L	0.005	<0.01	<0.01	200	0
SE290630.005	LB363953.022	Ammonia Nitrogen, NH_3 as N	mg/L	0.005	0.007	0.010	136	0

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290576.002	LB363869.025	Nitrate Nitrogen, NO3-N	mg/L	0.005	4.9	5.0	15	0
SE290589.001	LB363869.014	Sulfate, SO4	mg/L	1	180	170	16	1

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290630.005	LB363953.022	Filterable Reactive Phosphorus as P	mg/L	0.005	0.007	0.007	83	2

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290630.004	LB364419.014	Mercury, Hg	µg/L	0.0001	<0.0001	<0.0001	200	0

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290615.001	LB364098.014	Calcium, Ca	mg/L	0.2	0.53473	0.48702	54	9
		Magnesium, Mg	mg/L	0.1	2.154	2.1169	20	2
		Potassium, K	mg/L	0.1	0.95465	0.91471	26	4
		Sodium, Na	mg/L	0.5	31.741	31.115	17	2

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290615.003	LB363953.014	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0
SE290630.005	LB363953.022	Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	200	0

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/292

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290772.001	LB364244.014	Total Kjeldahl Nitrogen	mg/L	0.05	1.3	1.5	19	15
SE290774.005	LB364244.027	Total Kjeldahl Nitrogen	mg/L	0.05	0.16	0.16	46	5

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290615.004	LB364224.014	Arsenic	µg/L	1	0.134	0.147	200	0
		Cadmium	µg/L	0.1	0.017	0.016	200	0
		Chromium	µg/L	1	0.102	0.092	200	0
		Copper	µg/L	1	18.225	19.545	20	7
		Lead	µg/L	1	0.267	0.428	200	0
		Nickel	µg/L	1	3.619	3.673	42	1
		Zinc	µg/L	5	6.676	6.321	92	5
SE290622.007	LB364224.021	Arsenic	µg/L	1	-0.006	-0.009	200	0
		Cadmium	µg/L	0.1	0.001	0.002	200	0
		Chromium	µg/L	1	0.105	0.088	200	0
		Copper	µg/L	1	0.039	0.036	200	0
		Lead	µg/L	1	-0.007	-0.012	200	0
		Nickel	µg/L	1	-0.023	-0.004	200	0

Duplicates are calculated as Relative Percentage Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

NOTE: The RPD reported is calculated from the unrounded data for the original and replicate result. Manual calculation of the RPD from the rounded data reported may

Trace Metals (Dissolved) in Water by ICPMS (continued) **Method: ME-(AU)-[ENV]AN318**

Original	Duplicate	Parameter	Units	LOR	Original	Duplicate	Criteria %	RPD %
SE290622.007	LB364224.021	Zinc	µg/L	5	0.136	0.178	200	0

Laboratory Control Standard (LCS) results are evaluated against an expected result, typically the concentration of analyte spiked into the control during the sample preparation stage, producing a percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA /QC plan (Ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended dagger symbol (†) when outside suggested criteria.

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB363953.002	Ammonia Nitrogen, NH_3 as N	mg/L	0.005	2.6	2.5	80 - 120	105

Anions by Ion Chromatography in Water

Method: ME-(AU)-[ENV]AN245

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB363869.002	Fluoride	mg/L	0.1	1.9	2	80 - 120	96
	Chloride	mg/L	1	18	20	80 - 120	92
	Nitrate Nitrogen, NO3-N	mg/L	0.005	1.8	2	80 - 120	90
	Sulfate, SO4	mg/L	1	18	20	80 - 120	91

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB363953.002	Filterable Reactive Phosphorus as P	mg/L	0.005	0.094	0.1	80 - 120	94

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB364098.002	Calcium, Ca	mg/L	0.2	51	50.5	80 - 120	101
	Magnesium, Mg	mg/L	0.1	52	50.5	80 - 120	103
	Potassium, K	mg/L	0.1	57	55	80 - 120	104
	Sodium, Na	mg/L	0.5	52	50.5	80 - 120	103

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB363953.002	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.097	0.1	80 - 120	97

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB364244.002	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	1.1	1	80 - 120	113

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

Sample Number	Parameter	Units	LOR	Result	Expected	Criteria %	Recovery %
LB364224.002	Aluminium	µg/L	5	21	20	80 - 120	103
	Arsenic	µg/L	1	19	20	80 - 120	97
	Barium	µg/L	1	22	20	80 - 120	109
	Beryllium	µg/L	1	21	20	80 - 120	103
	Boron	µg/L	5	22	20	80 - 120	110
	Cadmium	µg/L	0.1	21	20	80 - 120	104
	Chromium	µg/L	1	20	20	80 - 120	101
	Cobalt	µg/L	1	21	20	80 - 120	104
	Copper	µg/L	1	21	20	80 - 120	106
	Lead	µg/L	1	21	20	80 - 120	107
	Manganese	µg/L	1	21	20	80 - 120	103
	Molybdenum	µg/L	1	20	20	80 - 120	101
	Nickel	µg/L	1	21	20	80 - 120	103
	Selenium	µg/L	1	20	20	80 - 120	102
	Uranium	µg/L	1	22	20	80 - 120	109
	Zinc	µg/L	5	21	20	80 - 120	106

Matrix Spike (MS) results are evaluated as the percentage recovery of an expected result, typically the concentration of analyte spiked into a field sub -sample during the sample preparation stage. The original sample's result is subtracted from the sub-sample result before determining the percentage recovery. The criteria applied to the percentage recovery is established in the SGS QA/QC plan (ref: MP-(AU)-[ENV]QU-022). For more information refer to the footnotes in the concluding page of this report.

Recovery is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the end of this report for failure reasons.

Ammonia Nitrogen by Discrete Analyser

Method: ME-(AU)-[ENV]AN291

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290615.001	LB363953.024	Ammonia Nitrogen, NH_3 as N	mg/L	0.005	2.5	0.01111	2.5	98

Filterable Reactive Phosphorus (FRP)

Method: ME-(AU)-[ENV]AN278

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290615.001	LB363953.024	Filterable Reactive Phosphorus as P	mg/L	0.005	0.094	-0.00567	0.1	100

Mercury (dissolved) in Water

Method: ME-(AU)-[ENV]AN311(Perth)/AN312

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290622.001	LB364419.004	Mercury, Hg	mg/L	0.0001	0.0018	-0.038	0.008	90

Metals in Water (Dissolved) by ICPOES

Method: ME-(AU)-[ENV]AN320

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290630.001	LB364098.004	Calcium, Ca	mg/L	0.2	56	2.6	50.5	106
		Magnesium, Mg	mg/L	0.1	56	1.0	50.5	108
		Potassium, K	mg/L	0.1	64	2.0	55	112
		Sodium, Na	mg/L	0.5	60	4.6	50.5	109

Nitrite in Water

Method: ME-(AU)-[ENV]AN277

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290615.001	LB363953.024	Nitrite Nitrogen, NO2 as N	mg/L	0.005	0.094	0.00036	0.1	93

TKN Kjeldahl Digestion by Discrete Analyser

Method: ME-(AU)-[ENV]AN281/292

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290630.001	LB364244.028	Total Kjeldahl Nitrogen	mg/L	0.05	2.6	0.07	2.5	100

Total Phosphorus by Kjeldahl Digestion DA in Water

Method: ME-(AU)-[ENV]AN279/AN293

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290630.001	LB364244.028	Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	1.0	0.05	1	99

Trace Metals (Dissolved) in Water by ICPMS

Method: ME-(AU)-[ENV]AN318

QC Sample	Sample Number	Parameter	Units	LOR	Result	Original	Spike	Recovery%
SE290630.001	LB364224.004	Aluminium	µg/L	5	22	<5	20	103
		Arsenic	µg/L	1	19	<1	20	97
		Barium	µg/L	1	28	7	20	107
		Beryllium	µg/L	1	20	<1	20	102
		Boron	µg/L	5	29	8	20	105
		Cadmium	µg/L	0.1	20	<0.1	20	102
		Chromium	µg/L	1	21	<1	20	102
		Cobalt	µg/L	1	21	<1	20	103
		Copper	µg/L	1	21	<1	20	105
		Lead	µg/L	1	21	<1	20	106
		Manganese	µg/L	1	25	4	20	105
		Molybdenum	µg/L	1	20	<1	20	96
		Nickel	µg/L	1	21	<1	20	103
		Selenium	µg/L	1	20	<1	20	100
		Uranium	µg/L	1	22	<1	20	108
		Zinc	µg/L	5	23	<5	20	105

MATRIX SPIKE DUPLICATES

SE290630 R0

Matrix spike duplicates are calculated as Relative Percent Difference (RPD) using the formula: RPD = | OriginalResult - ReplicateResult | x 100 / Mean

The original result is the analyte concentration of the matrix spike. The Duplicate result is the analyte concentration of the matrix spike duplicate.

The RPD is evaluated against the Maximum Allowable Difference (MAD) criteria and can be graphically represented by a curve calculated from the Statistical Detection Limit (SDL) and Limiting Repeatability (LR) using the formula: MAD = 100 x SDL / Mean + LR

Where the Maximum Allowable Difference evaluates to a number larger than 200 it is displayed as 200.

RPD is shown in **Green** when within suggested criteria or **Red** with an appended reason identifer when outside suggested criteria. Refer to the footnotes section at the

No matrix spike duplicates were required for this job.

Samples analysed as received.

Solid samples expressed on a dry weight basis.

QC criteria are subject to internal review according to the SGS QA/QC plan and may be provided on request or alternatively can be found here: https://www.sgs.com/en-au/industry/environmental-health-and-safety

*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.
***	Indicates that both * and ** apply.
-	Sample not analysed for this analyte.
IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
LOR	Limit of reporting.
QFH	QC result is above the upper tolerance.
QFL	QC result is below the lower tolerance.
NA	Not Applicable
①	At least 2 of 3 surrogates are within acceptance criteria.
②	RPD failed acceptance criteria due to sample heterogeneity.
③	Results less than 5 times LOR preclude acceptance criteria for RPD.
④	Recovery failed acceptance criteria due to matrix interference.
⑤	Recovery failed acceptance criteria due to the presence of significant concentration of analyte (i.e. the concentration of analyte exceeds the spike level).
⑥	LOR was raised due to sample matrix interference.
⑦	LOR was raised due to dilution of significantly high concentration of analyte in sample.
⑧	Reanalysis of sample in duplicate confirmed sample heterogeneity and inconsistency of results.
⑨	Recovery failed acceptance criteria due to sample heterogeneity.
⑩	LOR was raised due to high conductivity of the sample (required dilution).
†	Refer to relevant report comments for further information.

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SGS

Unit 16, 33 Maddox Street
Alexandria NSW 2015
Telephone No: (02) 85940400
Facsimile No: (02) 85940499
Email: au.samplereceipt.sydney@sgs.com

CHAIN OF CUSTODY & ANALYSIS REQUEST

Company Name:	Ground Doctor Pty Ltd	Project Name/No:	Labret GIA / 2025-GD027-1
Address:	22 Tamworth Street, Dubbo, NSW 2830	Purchase Order No:	2025-GD027-1
		Results Required By:	Standard Turn Around
Contact Name:	[redacted]	Telephone:	[redacted]
		Facsimile:	
		Email Results:	[redacted]

Client Sample ID	Depth	Date Sampled	Lab Sample ID	WATER	SOIL	PRESERVATIVE	NO OF CONTAINERS	17 Dissolved Metals (Al, As, Ba, Be, B, Cd, Co, Cr, Cu, Pb, Mn, Mo, Hg, Ni, Se, U, Zn)	CL5 - TRH / BTEXN	CA1 - Major Cations (Ca, Mg, NA, K)	AN2 - Major Anions (alkalinity, SO4, Cl, F)	AN10 - Forms of Nitrogen and Phosphorous
MB01	-	7/10/2025	1	x				x		x	x	x
MB02	-	7/10/2025	2	x				x		x	x	x
MB03	-	7/10/2025	3	x				x		x	x	x
MB04	-	7/10/2025	4	x				x		x	x	x
MB05	-	7/10/2025	5	x				x		x	x	x

Relinquished By: James Morrow on 7/10/25 at 1820		Received By: XW	Date/Time 7/10/2025 6:10
Relinquished By:		Received By:	Date/Time
Samples Intact: Yes/No	9.3C. ICE	Sample Cooler Sealed: (Yes)/No	Laboratory Quotation No:

SGS EHS Sydney COC

SE290630

source: Sydney_coc_251007_173301.pdf page:1 SGS Ref: SE290630_COC

Annex D

Groundwater Works Summary Forms

Table D1 - Groundwater Works Summary Form Information

Work ID	Work Type	Status	Owner Type	Purpose	Complete Year	Final Depth	Drilled Depth	Salinity	SWL (m bgl)	Water Bearing Zones (WBZ)	Inferred Ground Level mAHD	SWL (mAHD)	Upper WBZ (mAHD)	Yield (L/s)	Distance from Disturbance Area	Direction	Geology Summary
GW100322	Bore	Current	Private	Stock and Domestic	1993	17.4	17.4	Good	-	10.4-10.7m (Weathered Granite) 14.0-14.3m (Granite)	600	-	-	0.44	1100	South	0-3m Topsoil and Clay 3-17.4m Granite
GW110187	Bore	Current	Private	Stock and Domestic	2009	144	144	-	11	94-95m (Granite) 114-115m (Granite) 124-125m (Granite) 134-135m (Granite)	630	620	536	1	4100	East	0-3m Sand and Sandy Clay 3-10m Sandstone 10-144m Granite
GW100146	Bore	Current	Private	Stock and Domestic	1991	32	32	Good	15	21.0-23.0m (Basalt) 26.0-28.0m (Basalt)	630	615	625	0.41	4400	South West	0-5m Topsoil and Clay 5-32m Basalt
GW102354	Bore	-	-	-	-	1.83	1.83	-	1.8	-	625	623	623	0.42	4800	South West	-

WaterNSW
Work Summary

GW100146

Licence: 10WA115084 **Licence Status:** CURRENT

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 27/04/1991
Final Depth: 32.00 m
Drilled Depth: 32.00 m

Contractor Name: Watermin Drillers Pty Ltd
Driller:
Assistant Driller:

Property: N/A NSW
GWMA: -
GW Zone: -
Standing Water Level (m): 15.000
Salinity Description: Good
Yield (L/s): 0.410

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	ST VINCENT	BRUCE	LT1 DP748059
Licensed:	ST VINCENT	BRUCE	Whole Lot 1//748059

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6084579.000
Easting: 749451.000
Latitude: 35°21'03.4"S
Longitude: 149°44'42.3"E

GS Map: -
MGA Zone: 55
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.00	165			Rotary Air
1		Hole	Hole	5.00	32.00	165			Rotary Air
1	1	Casing	Steel	-0.40	6.10	165			Driven into Hole

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
21.00	23.00	2.00	Unknown	15.00		0.30	23.00		
26.00	28.00	2.00	Unknown	15.00		0.11	28.00		

Drillers Log

From	To	Thickness	Drillers Description	Geological Material	Comments

(m)	(m)	(m)			
0.00	2.00	2.00	TOP SOIL	Topsoil	
2.00	5.00	3.00	CLAY	Clay	
5.00	32.00	27.00	BLUE BASALT	Basalt	

Remarks

22/01/2013: Nat Carling, 22-Jan-2013; Added rock type codes to driller's log & added missing information (based on existing data).

***** End of GW100146 *****

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WaterNSW
Work Summary

GW100322

Licence: 10WA115106 **Licence Status:** CURRENT

Authorised Purpose(s): STOCK,DOMESTIC
Intended Purpose(s): STOCK, DOMESTIC

Work Type: Bore
Work Status: Supply Obtained
Construct.Method: Rotary
Owner Type: Private

Commenced Date:
Completion Date: 09/02/1993
Final Depth: 17.40 m
Drilled Depth: 17.40 m

Contractor Name: Watermin Drillers Pty Ltd
Driller: [redacted]
Assistant Driller:

Property: N/A NSW
GWMA: -
GW Zone: -
Standing Water Level (m):
Salinity Description: Good
Yield (L/s): 0.440

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	ST VINCENT	BRUCE	63//755915
Licensed:	ST VINCENT	BRUCE	Whole Lot //

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6086406.000
Easting: 752904.000
Latitude: 35°20'01.0"S
Longitude: 149°46'56.9"E

GS Map: -
MGA Zone: 55
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	11.00	190			Rotary Air
1		Hole	Hole	11.00	17.40	165			Rotary Air
1	1	Casing	Steel	-0.50	11.40	165	160		Driven into Hole, Welded
1	1	Opening	Slots - Vertical	10.40	10.70	165		1	Steel, SL: 457.0mm, A: 2.00mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
10.40	10.70	0.30	Unknown			0.22	10.70		
14.00	14.30	0.30	Unknown			0.22	14.30		

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.90	0.90	LOAM SAND	Sand	
0.90	3.00	2.10	CLAY	Clay	
3.00	11.00	8.00	DECOMPOSED GRANITE	Granite	
11.00	17.40	6.40	GRANITE	Granite	

Remarks

10/10/2011: Adjusted Inside, Outside Diameter and Thickness due to data entry errors with advice from Madhwan Keshwan. GDS Data Cleanup project 2011.
12/03/2013: Nat Carling, 12-Mar-2013; Added rock type codes to driller's log & added missing information (based on existing data).

***** End of GW100322 *****

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WaterNSW
Work Summary

GW102354

Licence:		**Licence Status:**	
		Authorised Purpose(s):	
		Intended Purpose(s):	
Work Type:	Bore		
Work Status:			
Construct.Method:			
Owner Type:			
Commenced Date:		**Final Depth:**	1.83 m
Completion Date:		**Drilled Depth:**	
Contractor Name:	(None)		
Driller:			
Assistant Driller:			
Property:		**Standing Water Level (m):**	1.828
GWMA:		**Salinity Description:**	
GW Zone:		**Yield (L/s):**	0.420

Site Details

Site Chosen By:

		County	Parish	Cadastre
	Form A:		UNKNOWN	
	Licensed:			
Region:	10 - Sydney South Coast	**CMA Map:**		
River Basin:	- Unknown	**Grid Zone:**		**Scale:**
Area/District:				
Elevation:	0.00 m (A.H.D.)	**Northing:**	6083316.000	**Latitude:** 35°21'43.4"S
Elevation Source:	Unknown	**Easting:**	750528.000	**Longitude:** 149°45'26.3"E
GS Map:	-	**MGA Zone:**	55	**Coordinate Source:** GIS - Geogra

Remarks

03/08/1999: Form A Remarks:
INFORMATION FROM AG APPLICATION ONLY

***** End of GW102354 *****

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WaterNSW
Work Summary

GW110187

Licence: 10BL602200 **Licence Status:** CONVERTED

Authorised Purpose(s): DOMESTIC,STOCK
Intended Purpose(s): DOMESTIC, STOCK

Work Type: Bore
Work Status:
Construct.Method: Rotary Air
Owner Type: Private

Commenced Date:
Completion Date: 03/06/2009
Final Depth: 144.00 m
Drilled Depth: 144.00 m

Contractor Name: INTERTEC DRILLING SERVICES
Driller: [redacted]
Assistant Driller:

Property: DIMARCO Lot 2 Euradux Rd BRAIDWOOD 2622 NSW
GWMA:
GW Zone:
Standing Water Level (m): 11.000
Salinity Description:
Yield (L/s): 0.200

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	ST VINCENT	DURRAN DU	2//755932
Licensed:	STVINCEN	DURRANDU	Whole Lot 2//755932

Region: 10 - Sydney South Coast
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6086705.000
Easting: 757127.000
Latitude: 35°19'47.4"S
Longitude: 149°49'43.7"E

GS Map: -
MGA Zone: 55
Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	10.00	159			Rotary Air
1		Hole	Hole	10.00	14.40	210			Down Hole Hammer
1		Hole	Hole	14.40	144.00	157			Down Hole Hammer
1	1	Casing	Steel	-0.60	14.40	168			Driven into Hole
1	1	Casing	Pvc Class 9	0.60	29.40	140			Suspended in Clamps, Screwed and Glued

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
94.50	95.00	0.50	Unknown			0.05		00:15:00	266.00
114.50	114.70	0.20	Unknown			0.25		00:15:00	216.00
124.00	124.30	0.30	Unknown			0.50		00:15:00	197.00
134.00	134.40	0.40	Unknown	11.00		0.20		00:15:00	192.00

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	1.00	1.00	SAND,LIGHT BROWN	Sand	
1.00	2.50	1.50	CLAY SANDY	Clay Loam	
2.50	10.00	7.50	SANDSTONE/QUARTZ WEATHERED	Sandstone	
10.00	23.00	13.00	GRANITE YELLOW	Granite	
23.00	94.50	71.50	GRANITE GREY	Granite	
94.50	95.00	0.50	GRANITE SOFT BANDS	Granite	
95.00	114.50	19.50	GRANITE GREY	Granite	
114.50	114.70	0.20	GRANITE FRACTURED	Granite	
114.70	124.00	9.30	GRANITE GREY	Granite	
124.00	124.30	0.30	GRANITE FRACTURED	Granite	
124.30	134.00	9.70	GRANITE GREY	Granite	
134.00	134.40	0.40	GRANITE FRACTURED	Granite	
134.40	144.00	9.60	GRANITE GREY	Granite	

***** End of GW110187 *****

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Annex E

Borehole and Monitoring Bore Construction Logs

Name	Easting	Northing	RL
MB01	753157.795	6087701.546	587.448
MB02	752867.467	6087555.984	584.795
MB03	752711.122	6087868.803	582.581
MB04	752875.038	6088121.245	582.687

REV	DATE	REVISION DESCRIPTION	DRN	TECH	VER	APP
1	21/10/25	ISSUED FOR INFORMATION	TB	TB	DG	DG

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PURPOSE OF ISSUE - PRELIMINARY UNLESS INDICATED

CLIENT APPROVAL ☐ PLANNING ☐ TENDER ☐ CONSTRUCTION ☐ AS BUILT ☐

CLIENT: Ground Doctor Pty Ltd

PROJECT: Willow View Sand Quarry
551 Larbert Road, Larbert, NSW

CONTRACT: Braidwood Sand and Gravel

DRAWING TITLE: Monitoring Wells
Coordinate System GDA2020
Height Datum AHD71

PRODUCTION UNIT: SURVEY

KERRY SURVEYS

DRAWN	PROJECTED	VERIFIED	APPROVED	APPROVAL DATE
TD	TD	DG	DG	21/10/2025
CLIENT REF		NO. OF SHTS	SIZE	SCALE
		1	A1	NTS

DRAWING NUMBER | SHEET | REV
1 | 1

Borehole ID: MB01

Project No.: 2025-GD027

Project Name: BSG Larbert Sand Quarry GIA

Client: Lentro Australia Pty Ltd

Site Address: 552 Larbert Road, Larbert, NSW

Ground Doctor Pty Ltd

22 Tamworth Steet
PO Box 6278
DUBBO NSW 2830

[redacted]
fx: (02) 8607 8122
admin@grounddoc.com.au

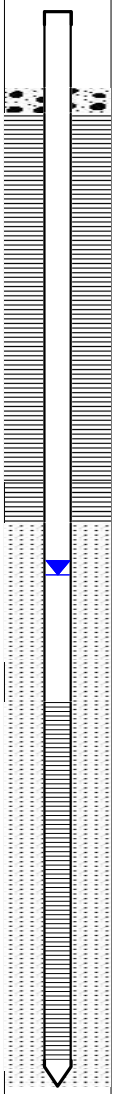
SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Depth/Elev.
		Ground Surface	0.0
0		**SAND:** Grey-brown, fine to medium grained, dry. Light brown below 1.2m.	
			2.0
2		**Clayey Silty SAND:** Light brown, fine to medium grained with some clay and silt, moist.	
			3.7
4		**Gravelly SAND:** Light brown, fine to coarse grained sand with cobbles (sub-rounded), moist.	4.0
		SAND: Light brown, fine to coarse grained, saturated. Flowing sand - unable to keep hole open with auger drilling. Gravel and cobble layer 6.0-6.2m.	
			7.8
8		**End of Hole at 7.8m in Sand.**	

SAMPLE

Sample ID	PID / Odour

CONSTRUCTION



Well Diagram	Materials Used
	Steel Stickpup Well Monument Concreted over Well Casing
	Annulus backfilled with bentonite (0.2-3.4m)
	50mm ID Class 18 PVC Thread Joined Blank (-0.6-4.8m)
	Annulus backfilled with 2-4mm gravel (3.4-7.8m)
	50mm ID Class 18 PVC Thread Joined and Machine Slotted Screen (4.8-7.8m)

Drilled By: Sea to Summitt Drilling

Drill Method: Solid Auger / Washbore (HQ casing)

Drill Date: 15 September 2025

Hole Size: 100mm

Datum:

Sheet: 1 of 1

Borehole ID: MB02

Project No.: 2025-GD027

Project Name: BSG Larbert Sand Quarry GIA

Client: Lentro Australia Pty Ltd

Site Address: 552 Larbert Road, Larbert, NSW

Ground Doctor Pty Ltd

22 Tamworth Steet
PO Box 6278
DUBBO NSW 2830

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admin@grounddoc.com.au

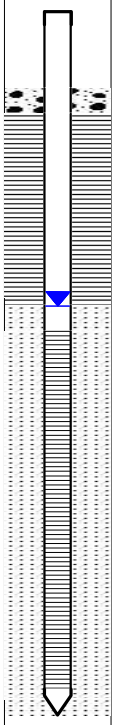
SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Depth/Elev.
		Ground Surface	0.0
0		**SAND:** Light brown, fine to medium grained, moist.	0.7
		Sandy GRAVEL: Light brown, coarse gravel and cobbles with some fine to coarse sand, moist.	0.8
1		**Gravelly SAND:** Light brown, fine to coarse grained sand and fine gravel, wet.	1.6
		Sandy CLAY: Orange t light brown, fine to coarse sand, wet.	2.2
2		**Clayey Silty SAND:** Mottled light brown, orange and white, fine to coarse grained sand and some fine gravel, wet.	3.1
3		**Silty Sandy CLAY:** Mottled light brown, orange and white, with fine to coarse grained sand and some fine gravel, wet.	3.8
4		**Clayey Sand and Gravel:** Light brown, white and grey, fine to coarse grained sand and fine to coarse grained gravel, saturated.	4.7
		Sandy Gravelly CLAY: Light brown and white, fine to coarse grained sand and some fine to course grained gravel and cobbles.	4.9
5		**End of Hole at 4.9m. Refusal on Bedrock.**	
6			
7			
8			
9			

SAMPLE

Sample ID	PID / Odour

CONSTRUCTION



Well Diagram	Materials Used
	Steel Stickpup Well Monument Concreted over Well Casing
	Annulus backfilled with bentonite (0.2-1.7m)
	50mm ID Class 18 PVC Thread Joined Blank (-0.6-1.9m)
	Annulus backfilled with 2-4mm gravel (1.7-4.9m)
	50mm ID Class 18 PVC Thread Joined and Machine Slotted Screen (1.9-4.9m)

Drilled By: Sea to Summitt Drilling

Drill Method: Solid Auger

Drill Date: 15 September 2025

Hole Size: 100mm

Datum:

Sheet: 1 of 1

Borehole ID: MB03

Project No.: 2025-GD027

Project Name: BSG Larbert Sand Quarry GIA

Client: Lentro Australia Pty Ltd

Site Address: 552 Larbert Road, Larbert, NSW

Ground Doctor Pty Ltd

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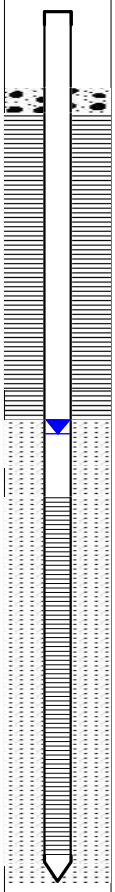
SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Depth/Elev.
		Ground Surface	0.0
0		**SAND:** Dark brown, fine to medium grained, some silt, moist.	0.2
		SAND: Brown, fine to medium grained, some silt, moist.	0.7
		Sandy CLAY: Light brown, fine to medium grained, moist, low plasticity.	0.9
1		**Clayey SAND:** Light brown, fine to coarse grained sand, wet.	1.6
		Clayey Gravelly SAND: Light brown, fine to coarse sand and fine gravel, moist.	2.2
2		**Clayey Sandy GRAVEL:** Light brown, fine gravel with fine to coarse sand, some clay, moist.	2.6
		SAND: Light brown, fine to coarse grained, saturated. Flowing sand below 3.5m - unable to keep hole open with auger drilling.	
3			
4			
5			
6			6.2
		End of Hole at 6.2m in Sand.	
7			
8			
9			

SAMPLE

Sample ID	PID / Odour

CONSTRUCTION



Well Diagram	Materials Used
	Steel Stickpup Well Monument Concreted over Well Casing
	Annulus backfilled with bentonite (0.2-2.6m)
	50mm ID Class 18 PVC Thread Joined Blank (-0.6-3.2m)
	Annulus backfilled with 2-4mm gravel (2.6-6.2m)
	50mm ID Class 18 PVC Thread Joined and Machine Slotted Screen (3.2-6.2m)

Drilled By: Sea to Summitt Drilling

Drill Method: Solid Auger / Washbore (HQ casing)

Drill Date: 16 September 2025

Hole Size: 100mm

Datum:

Sheet: 1 of 1

Borehole ID: MB04

Project No.: 2025-GD027

Project Name: BSG Larbert Sand Quarry GIA

Client: Lentro Australia Pty Ltd

Site Address: 552 Larbert Road, Larbert, NSW

Ground Doctor Pty Ltd

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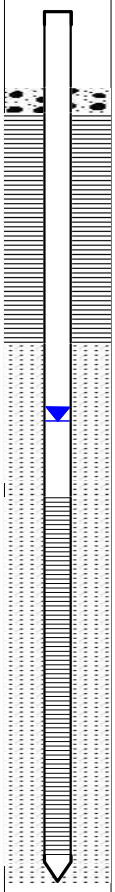
SUBSURFACE PROFILE

Depth (m)	Symbol	Description	Depth/Elev.
		Ground Surface	0.0
0		**SAND:** Dark brown, fine to medium grained, some silt, moist.	0.2
1		**SAND:** Light brown, fine to medium grained, moist.	1.8
2		**Clayey SAND:** Light brown, fine to medium grained, moist.	2.2
		Silty CLAY: Light brown, moist, some fine to medium sand, low plasticity, saturated below 2.5m.	2.6
3		**Clayey SAND:** Light brown, fine to coarse grained, saturated.	3.2
4		**Sandy CLAY:** Light brown, fine to coarse grained sand, low plasticity, saturated.	4.5
5		**Gravelly SAND:** Light brown, fine to coarse grained sand and fine gravel, saturated. Sand was unstable below 4.5m.	
6		**End of Hole at 6.2m in Gravelly Sand.**	6.2
7			
8			
9			

SAMPLE

Sample ID	PID / Odour

CONSTRUCTION



Well Diagram	Materials Used
	Steel Stickpup Well Monument Concreted over Well Casing
	Annulus backfilled with bentonite (0.2-2.0m)
	50mm ID Class 18 PVC Thread Joined Blank (-0.6-3.2m)
	Annulus backfilled with 2-4mm gravel (2.0-6.2m)
	50mm ID Class 18 PVC Thread Joined and Machine Slotted Screen (3.2-6.2m)

Drilled By: Sea to Summitt Drilling

Drill Method: Solid Auger / Washbore (HQ casing)

Drill Date: 15 September 2025

Hole Size: 100mm

Datum:

Sheet: 1 of 1

Annex F

Groundwater Sampling Records

Site Name:	**Braidwood Sand and Gravel - Groundwater Impact Assessment**
Project Number:	**2025-GD027**
Sampling Dates:	**07-Oct-25**

MB01

Purge Volume (L)	Time	DTW (mbtoc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	Redox (mV)
0.8	1253	4.37	15.8	6.50	51	6.33	126
1.6	1258	4.37	16.0	6.57	50	6.33	125
2.4	1303	4.37	16.0	6.58	50	6.40	124
3.2	1308	4.37	16.1	6.67	49	6.31	120
4.0	1313	4.37	16.1	6.58	51	6.37	113
4.8	1318	4.37	16.1	6.52	51	6.38	105
6.4	1328	4.37	15.9	6.38	51	6.38	104
7.2	1333	4.37	16.2	6.36	49	6.32	108
8.0	1338	4.37	16.1	6.39	49	6.29	113
8.8	1343	4.37	15.9	6.40	50	6.29	114
							.

Comments / Observations:
Clear and colourless.
No odour.

MB02

Purge Volume (L)	Time	DTW (mbtoc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	Redox (mV)
0.8	911	2.52	13.3	1.02	209	5.97	77
1.6	916	2.67	13.2	0.35	164	5.67	63
2.4	921	2.67	13.0	0.33	146	5.63	32
3.2	926	2.74	13.0	0.31	113	5.63	16
4.0	931	2.88	13.0	0.28	152	5.60	-31
4.8	936	2.89	13.0	0.28	161	5.64	-43
5.6	941	2.94	13.0	0.27	163	5.65	-72
6.4	946	2.98	13.0	0.34	166	5.63	-94
7.2	951	3.01	12.9	0.30	171	5.64	-101
8.0	956	3.03	13.0	0.30	165	5.60	-108
8.8	1001	3.06	13.0	0.31	176	5.61	-108
							.

Comments / Observations:
Clear and colourless.
No odour.

MB03

Purge Volume (L)	Time	DTW (mbtoc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	Redox (mV)
0.8	1023	3.30	13.9	4.93	106	6.19	84
1.6	1028	3.30	14.0	4.83	82	6.28	96
2.4	1033	3.30	139.0	4.98	82	6.27	100
3.2	1038	3.30	14.0	5.20	82	6.23	106
4.0	1043	3.30	13.8	5.17	82	6.22	110
5.6	1053	3.30	14.1	5.31	82	6.19	114
6.4	1058	3.30	14.3	5.75	82	6.26	113
7.2	1103	3.30	14.2	5.19	84	6.41	107
8.0	1108	3.30	14.4	5.48	82	6.37	103
8.8	1113	3.30	14.4	5.35	93	6.38	104
							.

Comments / Observations:
Clear and colourless.
No odour.

MB04

Purge Volume (L)	Time	DTW (mbtoc)	Temp (oC)	DO (ppm)	EC (uS/cm)	pH	Redox (mV)
0.8	1135	3.17	15.1	7.06	86	6.34	110
1.6	1140	3.17	15.0	6.59	85	6.34	116
2.4	1145	3.17	15.0	7.30	86	6.35	119
3.2	1150	3.17	15.0	6.63	86	6.34	122
4.0	1155	3.17	15.0	6.64	86	6.33	124
4.8	1200	3.17	15.2	6.90	85	6.32	126
5.6	1205	3.17	15.0	6.70	86	6.34	128
6.4	1210	3.17	15.0	6.57	86	6.34	129
7.2	1215	3.17	15.3	6.76	86	6.33	129
							.

Comments / Observations:
Clear and colourless.
No odour.