

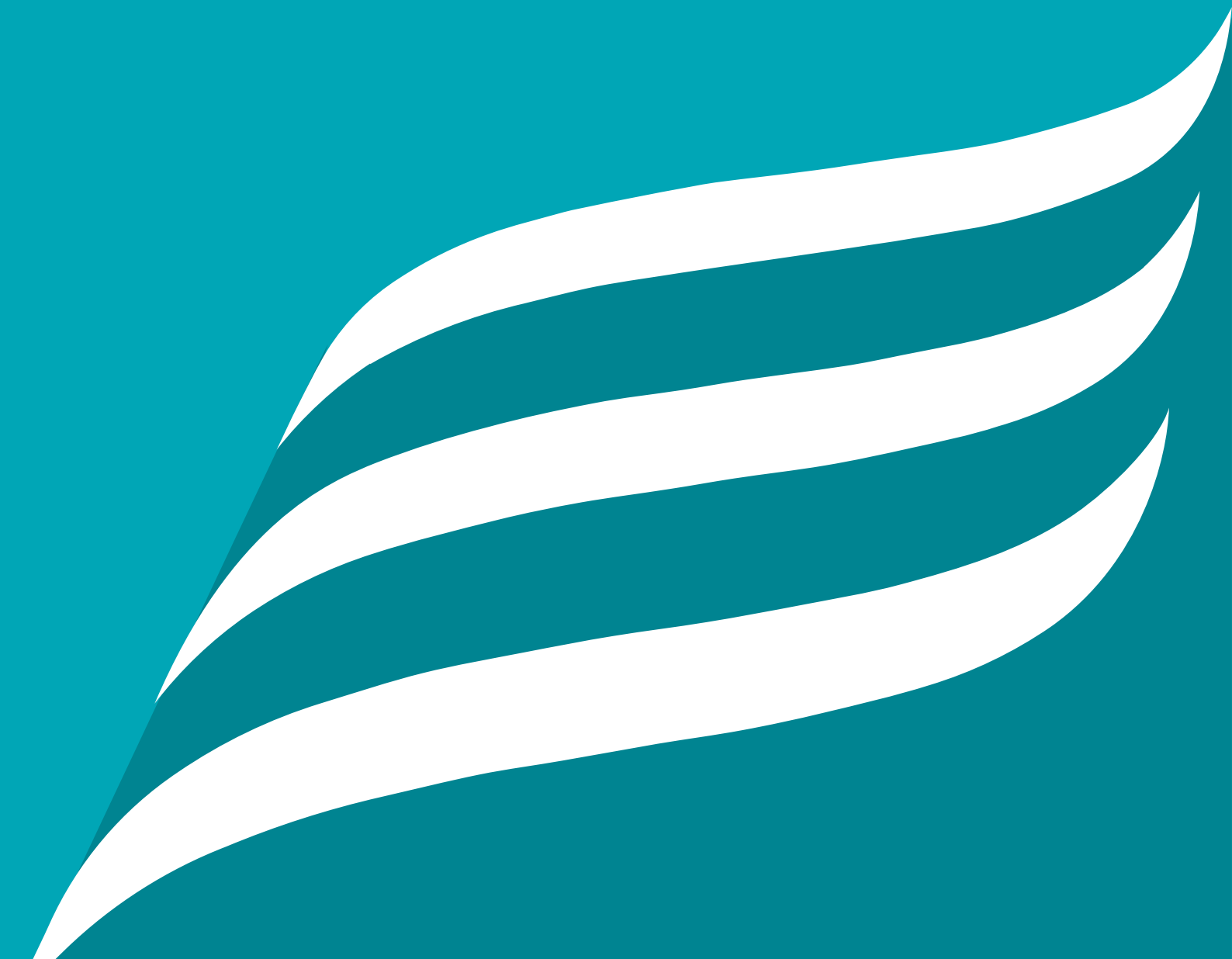


# ACENERGY

## Gara BESS Groundwater Assessment

BNTL01386\_0002-REP-001-5

16 MAY 2025



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| Rev         | Date       | Description  | Author                                                                              | Reviewer                                                                             | Project Mgr.                                                                          | Approver                                                                              |
|-------------|------------|--------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 0           | 17/09/2024 | Draft        | Ebrahim Zadeh                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| 1           | 24/10/2024 | Client Issue | Ebrahim Zadeh                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| 2           | 21/11/2024 | Client Issue | Ebrahim Zadeh                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| 3           | 20/01/2025 | Client Issue | Laura Vincent                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| 4           | 4/03/2025  | Client Issue | Laura Vincent                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| 5           | 16/05/2025 | Client Issue | Laura Vincent                                                                       | Tim Wilkinson                                                                        | Laura Vincent                                                                         | Susan Shield                                                                          |
| Signatures: |            |              |  |  |  |  |

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# 1. PROJECT BACKGROUND

## 1.1 Introduction

ACEnergy Pty Ltd is proposing to develop the Gara Battery Energy Storage System (BESS), which includes the construction, operation and decommissioning of a BESS with an estimated capacity of approximately 400MW / 1760 MWh; and associated infrastructure including transmission and connection works. The project is located at 86 Woodlands Road, approximately 8 km east of Armidale within the Armidale Local Government Area (LGA) and within the New England Renewable Energy Zone. The Site boundary lies between Buring Ground Creek to the west and Waterfall Way (Grafton Road) on south and southeast. The Gara River and dam is located 2.2 km east of the Site. The existing site access would be upgraded to provide an improved property access.

A new overhead transmission line to connect the BESS to the existing 330 kV network. The operational life of the BESS is 23 years, but the development may be upgraded to extend the operational life.

This Groundwater Impact Assessment (GIA) report is to support the Environmental Impact Statement (EIS) required by New South Wales Department of Planning, Housing and Infrastructure as part of Planning Secretary's Environmental Assessment Requirements (SEARs). The relevant SEARs and where they are addressed in this GIA are summarised in Table 1.1. Regulatory submissions to SEARs and where each is addressed in this report are listed in Table 1.2

The Site boundary is shown on Figure 1.1.

## 1.2 Project description

The project includes the following key infrastructure:

- enclosed lithium-ion batteries.
- power conversion systems including associated transformers.
- overhead power and fibre optic cabling interconnecting the equipment.
- grid connection equipment including switchgear, protection and control equipment, metering, reactive power equipment, filtering equipment, auxiliary transformers and enclosures/buildings for housing equipment.
- overhead 330kv sub-transmission lines to connect the BESS to the existing Transgrid transmission line.
- earthing and lightning protection systems.
- site office, storage area/enclosure, internal access tracks, on-site parking, security fencing, CCTV, and temporary construction laydown area.
- vegetation screening.
- provision of an upgrading existing site access from Waterfall Way to the south.

The primary components associated with the installation of the BESS are as follows:

- site investigations, vegetation clearing, levelling, access way construction, drainage system installation and installation of foundations/supports to install equipment on.
- transport to site and installation of equipment.
- testing and commissioning of the equipment.
- operation and maintenance.

**TABLE 1.1: RELEVANT SEARS AND WHERE ADDRESSED**

| SEAR  | Issue                                                                                                                                                                                                                                                                                                                                        | Section addressed in this report                                                                              |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Water | An assessment of the likely impacts of the development (including flooding and flood modelling) on surrounding watercourses (including their Strahler Stream Order), <b>groundwater resources</b> and surface water movements, and <b>measures proposed to monitor, reduce and mitigate these impacts including water management issues.</b> | Section 3.4 (Hydrogeology)<br>Section 4 (Impact Assessment)<br>Section 6 (Management and Mitigation Measures) |

**TABLE 1.2: REGULATORY SUBMISSIONS TO SEARS AND WHERE ADDRESSED**

| Regulator                         | Reference and Issue                                                                                                                                                                                                                                                                                                                                                                                           | Section addressed in this report       |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| DCCEEW – Water Take and Licensing | Description of all works/activities that may intercept, extract, use, divert or receive surface water and/or <b>groundwater</b> . This includes the description of any development, activities or structures that will intercept, interfere with or remove groundwater, both temporary and permanent.                                                                                                         | Section 4 (Impact Assessment)          |
|                                   | <b>Details of all water take for the life of the project and post closure where applicable.</b> This is to include water taken directly and indirectly, and the relevant water source where water entitlements are required to account for the water take. If the water is to be taken from an alternate source confirmation should be provided by the supplier that the appropriate volumes can be obtained. | Section 4.3.3 (Groundwater take)       |
| DCCEEW – Water Impacts            | <b>A description of groundwater conditions that provides an understanding of groundwater level across the site under a range of wet and dry conditions.</b>                                                                                                                                                                                                                                                   | Section 0 (Hydrogeology)               |
|                                   | Assessment of impacts on surface and <b>ground water sources (both quality and quantity)</b> , related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, <b>groundwater dependent ecosystems, and ground water levels; including measure proposed to reduce and mitigate these impacts.</b>                                                                | Section 4 (Impact Assessment)          |
|                                   | Proposed surface and <b>groundwater monitoring activities and methodologies.</b>                                                                                                                                                                                                                                                                                                                              | Section 6.1 (Environmental Management) |

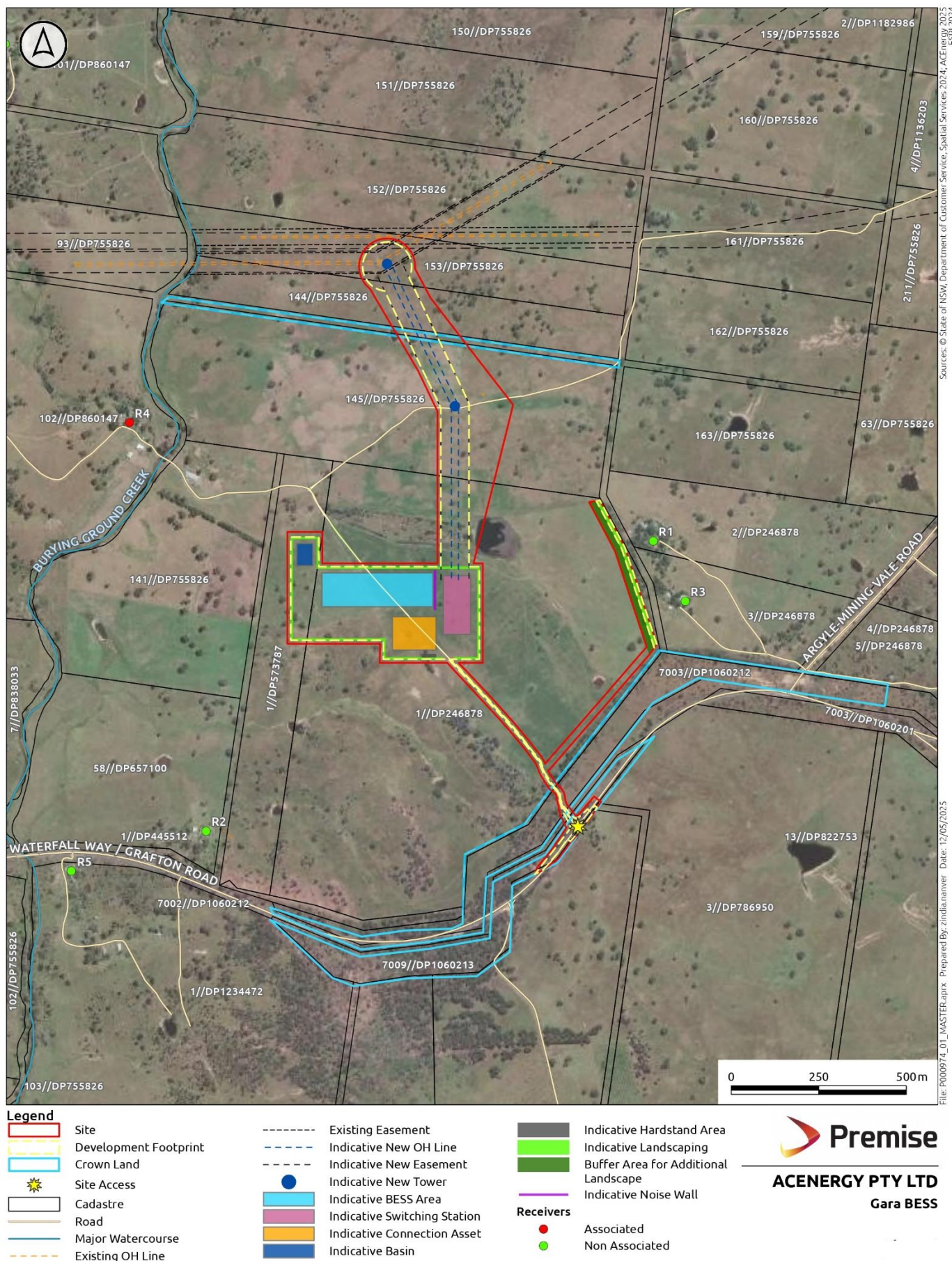


FIGURE 1.1: GARA BESS SITE LAYOUT



## 2. NSW WATER REGULATORY FRAMEWORK

### 2.1 Water Management Act 2000

The objective of the *Water Management Act 2000* is the sustainable and integrated management of the state's water sources for the benefit of present and future generations and to ensure that no more than minimal harm will be done to the aquifer, or its dependent ecosystems, as a consequence of it being interfered with during the course of the activities. The *Water Management Act 2000* governs the issue of water access licences (WALs) and approvals for water sources (rivers, lakes, estuaries and groundwater) in NSW. The *Water Management Act 2000* includes the concept of ensuring 'no more than minimal harm' for both the granting of water access licences and the granting of approvals.

#### 2.1.1 Water sharing plans

Water sharing plans have been developed across NSW to protect the health of our rivers and groundwater while also providing water users with perpetual access licences, equitable conditions, and increased opportunities to trade water through separation of land and water. Water sharing plans describe the annual groundwater recharge volumes for each identified groundwater source, the volumes of water that are available for sharing, and rules to minimise interference between water supply works. Provisions are made for environmental water allocations, basic landholder rights, and native title rights. The purpose of a water sharing plan is to:

- provide water users with a clear picture of when and how water will be available for extraction.
- protect the fundamental environmental health of the water source.
- ensure the water source is sustainable in the long-term.
- provide rules to minimise interference between water supply works.

The water sharing plan and groundwater source within the study area is provided in Table 2.1.

**TABLE 2.1: WATER SHARING PLAN AND GROUNDWATER SOURCE**

| Water sharing plan                                             | Groundwater source                       |
|----------------------------------------------------------------|------------------------------------------|
| North Coast Fractured and Porous Rock Groundwater Sources 2016 | New England Fold Belt Coast Water Source |

#### 2.1.2 NSW Aquifer Interference Policy 2012

The NSW Aquifer Interference Policy (AIP) outlines the requirements for obtaining water licences and the assessment processes for aquifer interference activities under the *Water Management Act 2000* and other relevant legislative frameworks. The AIP provides a framework for assessing the impacts of aquifer interference activities on groundwater resources and defines minimal impact considerations to ensure no more than minimal harm occurs to key water -dependent assets. Two levels of minimal impact considerations are specified. If the potential impacts are less than the Level 1 minimal impact considerations, then these impacts would be considered as acceptable.

To assess potential impacts, groundwater sources are categorised into 'highly productive' and 'less productive' (DPI 2013), with sub-categories for alluvial, coastal sands, porous rock and fractured rock aquifers. The productivity of the groundwater sources near the proposed development is outlined in Table 2.2.

**TABLE 2.2: GROUNDWATER SOURCE PRODUCTIVITY**

| Groundwater source                       | Category               | Productivity |
|------------------------------------------|------------------------|--------------|
| New England Fold Belt Coast Water Source | Fractured rock aquifer | Less         |

## 3. EXISTING ENVIRONMENT

### 3.1 Topography

The project site is located at approximately 8 km east of Armidale. Armidale is on the banks of Dumaresq Creek, in the Northern Tablelands in the New England region about midway between Sydney and Brisbane. The proposed Development Site has elevations between 951 and 1,004 mAHD.

### 3.2 Climate and rainfall

Rainfall data was obtained from the Bureau of Meteorology (BoM) Uralla (Dumaresq St) weather station (station 056034). The weather station is approximately 27 km from the Development Site. Table 3.1 summarises the average monthly rainfall observations from 1901 to present. The mean annual rainfall is 790.2 mm, and the mean annual evapotranspiration is approximately 600 mm (BoM 2023a).

**TABLE 3.1: MEAN MONTHLY RAINFALL**

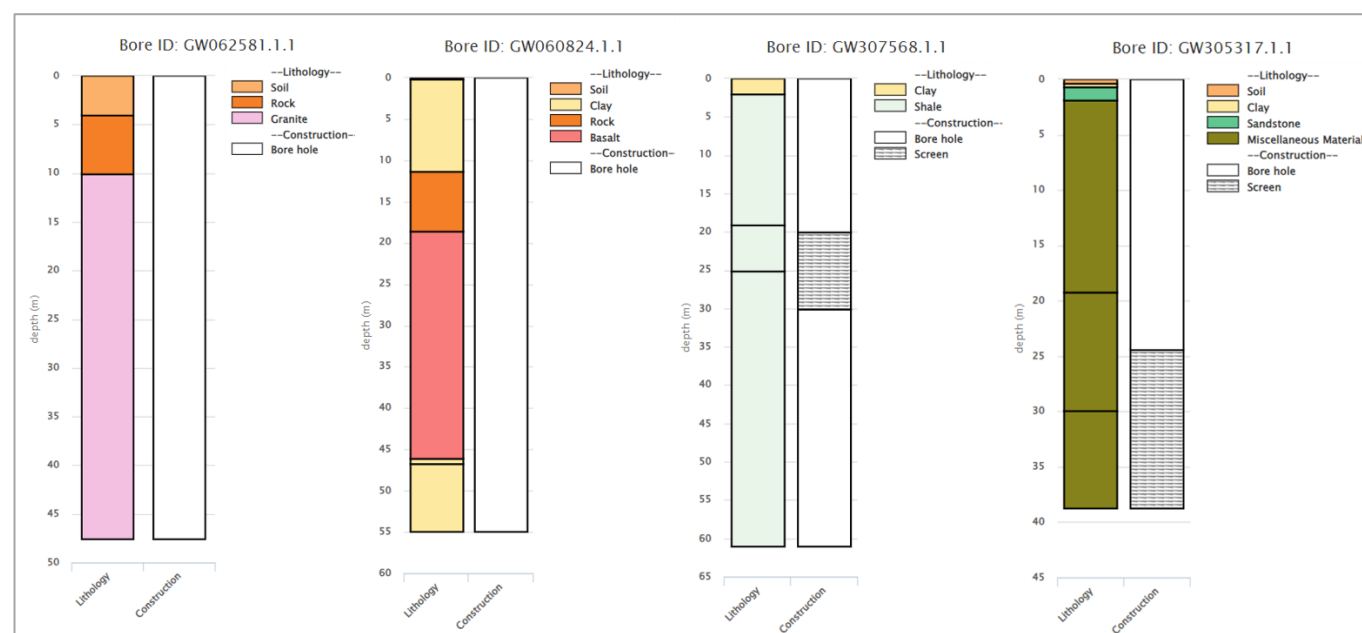
| Statistic | Jan   | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|-----------|-------|------|------|------|------|------|------|------|------|------|------|------|
| Mean      | 102.0 | 83.3 | 61.3 | 40.1 | 44.2 | 52.8 | 55.8 | 53.9 | 52.9 | 72.4 | 84.7 | 88.3 |

### 3.3 Geology

The New England fold belt in the northeast of the NSW is composed of sedimentary rocks of Carboniferous and Permian age that were extensively faulted during a period of rapid continental plate movement associated with granite intrusions in the late Carboniferous. Much of the bedrock is now overlain by Tertiary basalt flows rarely exceeding 100m in thickness that lie on river gravels and sands or on lake sediments. In the Armidale district, the oldest rocks are collectively known as the Sandon Beds. The Beds stretch at least from Mihi in the south-east to Black Mountain in the north and west towards Yarrowyck.

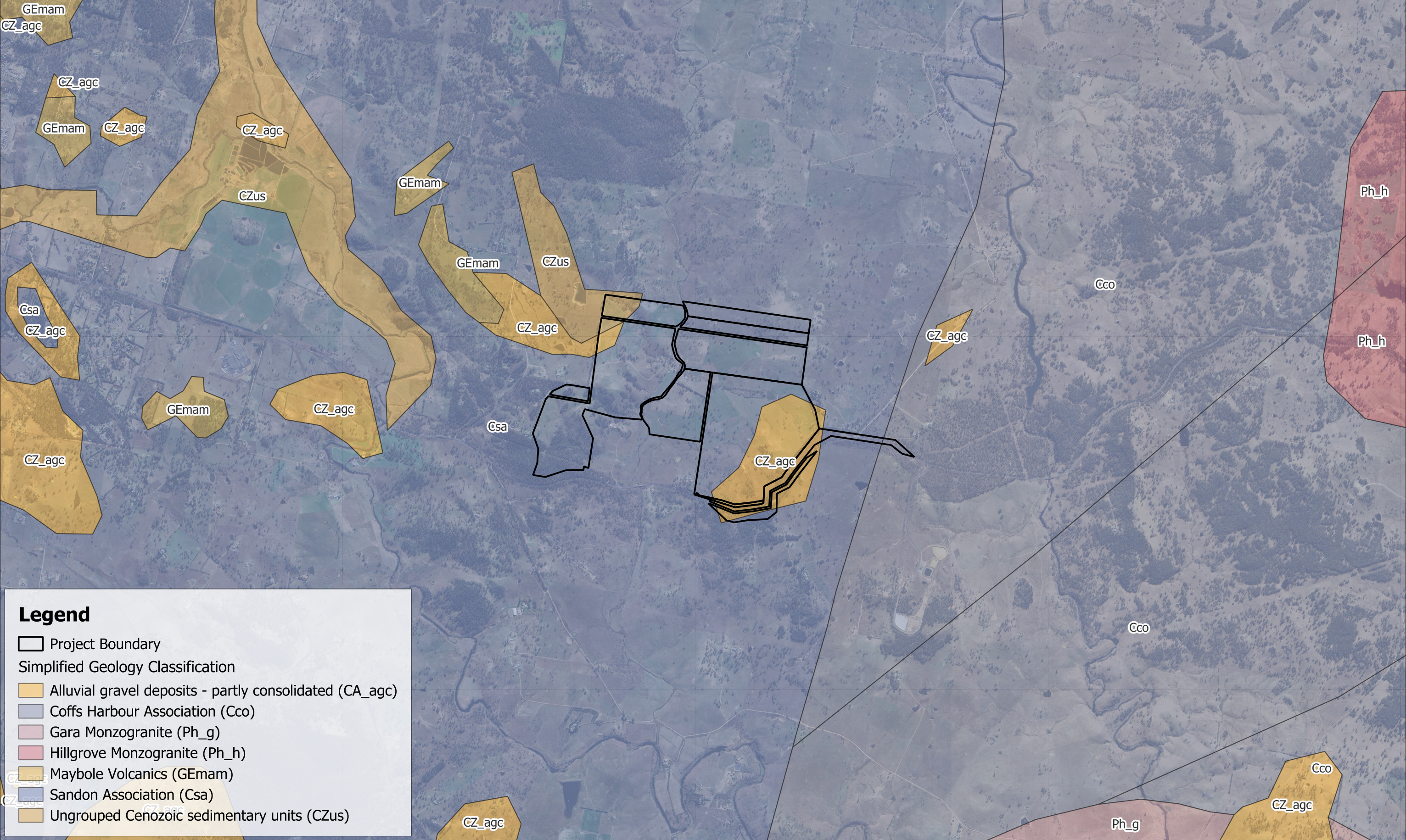
Figure 3.1 illustrates lithology variations at the bores located at vicinity of the Gara BESS site based on the bore log data from BoM (Australian Groundwater Explorer).

Figure 3.2 shows surface geology at site and surrounding area. The Development Site is largely covered by the Sandon association (Csa), with a small area of alluvial gravel (Cz\_agc) deposits at the eastern boundary.



**FIGURE 3.1: LITHOLOGY LOGS AT NEARBY BORES (BOM, 2024)**





|                                                                                                                                                                                                                          |                                                                                     |                                                                                                                                                                                                                                                                                          |                                                                                                              |                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|



## 3.4 Hydrogeology

### 3.4.1 Groundwater source

The New England Fold Belt Coast Groundwater Source is located on the mid-north coast of NSW. It is the southern coastal section of a folded and fractured aquifer known as the New England Fold Belt, which extends from Port Stephens in the south to the NSW–QLD border in the north, and east of Moree. The New England Fold Belt Coast Groundwater Source is categorised as a fractured rock, less productive groundwater source.

The New England Fold Belt Coast Groundwater Source is a fractured rock aquifer with groundwater contained within, and moving through, fractures in the rock. Yields are typically low, being around 1 L/s, however yields up to 10 L/s may be obtained from highly fractured fault systems. Groundwater is typically recharged by direct rainfall infiltration, and typically has good quality water.

### 3.4.2 Surrounding Groundwater Bores

A search of the WaterNSW real-time water data website (WaterNSW, 2023) identified six groundwater bores within 2 km of the proposed development. The identified groundwater bores are shown on Figure 3.3, and a summary and respective uses is provided in Table 3.2. These are further discussed in the following sections and Table 3.3 and Table 3.4, where:

- Table 3.3 lists all groundwater bores within a 2 km radius of the site that record Groundwater Level data.
- Table 3.4 lists all groundwater bores within a 2 km radius of the site that are associated with works approvals for Groundwater Extraction.
- Note: There is a slight intentional difference in the datasets reflected in Table 3.3 and Table 3.4. All bores listed in Table 3.4 are also listed in Table 3.3, except for one (GW103412). Bore GW103412 is included in Table 3.4 as it is associated with groundwater extraction, however, does not record groundwater level data and is therefore absent from Table 3.3.

**TABLE 3.2: SUMMARY OF GROUNDWATER BORES AND USES IN THE AREA (2KM RADIUS)**

| ID       | Eastings | Northing | Groundwater Bore Uses<br>(Relevant to the Project)     |
|----------|----------|----------|--------------------------------------------------------|
| GW306044 | 380800   | 6622935  | Groundwater Level Monitoring<br>Groundwater Extraction |
| GW305317 | 383106   | 6619331  | Groundwater Level Monitoring<br>Groundwater Extraction |
| GW103412 | 378999   | 6620739  | Groundwater Extraction                                 |
| GW307568 | 381560   | 6618326  | Groundwater Level Monitoring<br>Groundwater Extraction |
| GW062581 | 379096   | 6621676  | Groundwater Level Monitoring<br>Groundwater Extraction |
| GW060824 | 379173   | 6622015  | Groundwater Level Monitoring<br>Groundwater Extraction |

### 3.4.3 Groundwater levels and quality

A search of the WaterNSW real-time water data website (WaterNSW, 2023) identified that five of the six identified private water bores are used to monitor groundwater level and quality, recorded on driller logs. Available information from registered works approvals within 2 km of the proposed development is provided in Table 3.3, and provide an indication of the groundwater level and quality near the project area.

Depth to water is greater than 19 m and the water quality measured generally has low salinity and recorded as ‘potable’.

**TABLE 3.3: GROUNDWATER LEVELS AT BORES WITHIN 2 km**

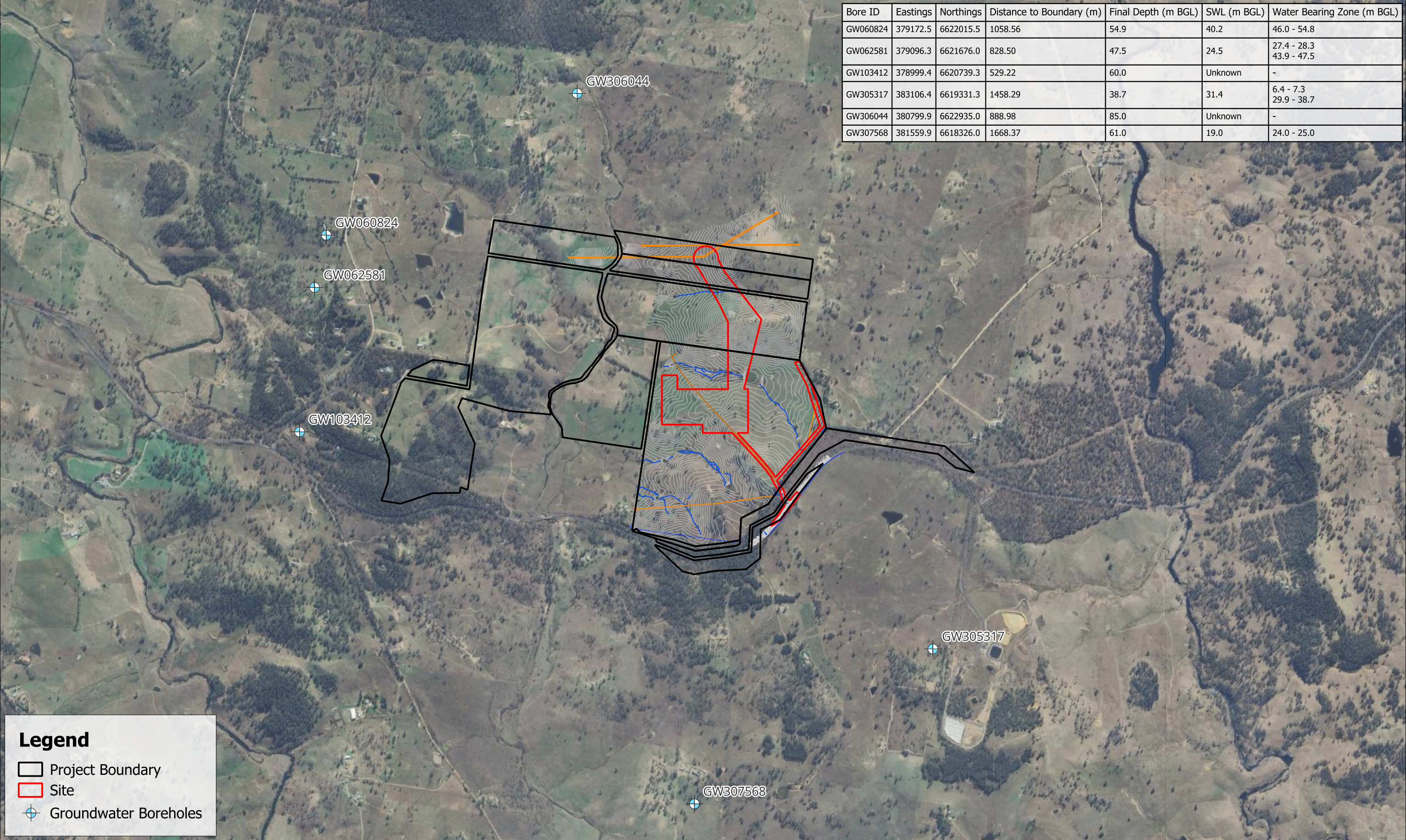
| ID       | Eastings | Northing | Final Depth<br>(m BGL) | SWL<br>(m BGL) | Groundwater<br>quality | Water Bearing<br>Zone (m BGL) |
|----------|----------|----------|------------------------|----------------|------------------------|-------------------------------|
| GW306044 | 380800   | 6622935  |                        |                | Good                   |                               |
| GW305317 | 383106   | 6619331  | 38.7                   | 31.4           | Potable                | 6.4-7.3 &<br>29.9-38.7        |
| GW307568 | 381560   | 6618326  | 61.0                   | 19.0           | Potable                | 24.0-25.0                     |
| GW062581 | 379096   | 6621676  | 47.5                   | 24.5           | 1001-3000 ppm          | 27.4-28.3 &<br>43.9-47.5      |
| GW060824 | 379173   | 6622015  | 54.9                   | 40.2           | 501 – 1000 ppm         | 46.0-54.8                     |

Note: Coordinate reference – GDA94 zone 56

### 3.4.4 Contaminated land: EPA - Planning Guidelines SEPP 55–Remediation of Land

A search of the Environmental Protection Agency (EPA) Contaminated Land record of notices was completed in September 2024 (EPA 2023). There was no contaminated land sites returned when searching in the suburb or near the Development Site.





| Bore ID  | Eastings | Northings | Distance to Boundary (m) | Final Depth (m BGL) | SWL (m BGL) | Water Bearing Zone (m BGL) |
|----------|----------|-----------|--------------------------|---------------------|-------------|----------------------------|
| GW060824 | 379172.5 | 6622015.5 | 1058.56                  | 54.9                | 40.2        | 46.0 - 54.8                |
| GW062581 | 379096.3 | 6621676.0 | 828.50                   | 47.5                | 24.5        | 27.4 - 28.3<br>43.9 - 47.5 |
| GW103412 | 378999.4 | 6620739.3 | 529.22                   | 60.0                | Unknown     | -                          |
| GW305317 | 383106.4 | 6619331.3 | 1458.29                  | 38.7                | 31.4        | 6.4 - 7.3<br>29.9 - 38.7   |
| GW306044 | 380799.9 | 6622935.0 | 888.98                   | 85.0                | Unknown     | -                          |
| GW307568 | 381559.9 | 6618326.0 | 1668.37                  | 61.0                | 19.0        | 24.0 - 25.0                |

**Legend**

Project Boundary

Site

Groundwater Boreholes

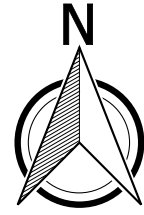
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00.751.5 km

Map Projection: Tranverse Mercator  
Horizontal Datum: Geocentric Datum of Australia  
Vertical Datum: Australia Height Datum  
Grid: Map Grid of Australia, Zone 56

Gara BESS Constraints

Figure 3.3: Surrounding Groundwater Bores and Groundwater Levels

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Checked: TW  
Date: 16/5/2025



## 3.5 Surrounding sensitive receptors

### 3.5.1 Registered groundwater users

As discussed in Section 3.4.2, registered groundwater works within 2 km of the proposed Development Site were found using WaterNSW continuous water monitoring network website (WaterNSW, 2023). Each of these bores is associated with works approvals for groundwater extraction, and are provided in Table 3.4 and shown on Figure 1.1.

Private bores in the vicinity of the Gara BESS site are being used for various purposes including water supply, irrigation or stock and domestic use. Surrounding bores are shown on Figure 3.4.

**TABLE 3.4: GROUNDWATER USERS IN THE AREA**

| ID       | Licence/<br>Work approval | Easting | Northing | Distance from<br>boundary (m) | Screened interval<br>(m BGL) | Authorised Purpose          |
|----------|---------------------------|---------|----------|-------------------------------|------------------------------|-----------------------------|
| GW306044 | 30CA314349                | 380800  | 6622935  | 1190                          | -                            | Domestic, Irrigation, stock |
| GW305317 | 30BL182812                | 383106  | 6619331  | 1458                          | 24.4 – 38.7                  | Stock and domestic          |
| GW103412 | 30WA312413                | 378999  | 6620739  | 1625                          | -                            | Stock and domestic          |
| GW307568 | 30WA30797                 | 381560  | 6618326  | 1668                          | 20 - 30                      | Stock                       |
| GW062581 | 30BL134330                | 379096  | 6621676  | 1687                          | -                            | Stock and domestic          |
| GW060824 | 30BL132172                | 379173  | 6622015  | 1827                          | 11.4 - 54.8                  | Stock and domestic          |

Note: 1. Coordinate reference system in GDA94/MGA zone 56, 2. mAHD – metres Australian Height Datum. Surface elevation estimated from Google Earth.

### 3.5.2 Groundwater dependent ecosystems

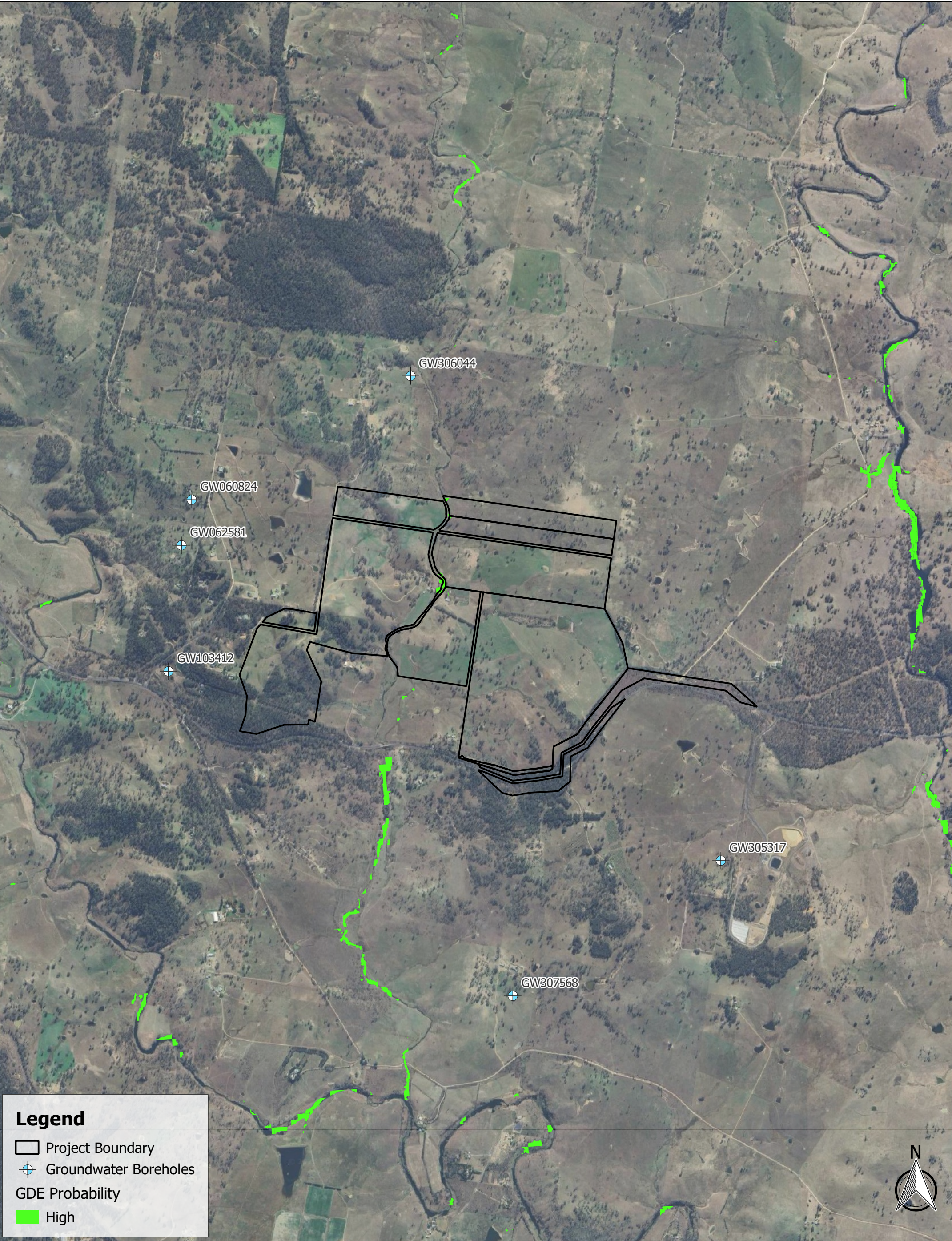
Groundwater dependent ecosystems are defined as ‘ecosystems that require access to groundwater to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services’ (DPI, 2016).

The NSW Government, GDE HEVAE (2024) was developed as a state dataset of NSW GDEs to inform groundwater planning and management. Probable HEVAE vegetation groundwater dependent ecosystems (GDEs) for NSW have been developed by NSW Department of Planning and Environment (DPE, 2022) using recorded and predicted spatial data to provide weighted scores for each attribute associated with four HEVAE criteria (distinctiveness, diversity, naturalness, and vital habitat).

A review of this data set shows there are no high priority HEVAE GDEs within 1 km of the Site boundary as shown on Figure 3.4.

There are no GDEs listed in the Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources 2016- New England Fold Belt Coast Water Source, in the area near the development.





|                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                             |                                                                                                        |                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|



## 4. IMPACT ASSESSMENT

### 4.1 Overview

The potential groundwater impacts at nearby sensitive receptors due to the proposed Gara BESS has been assessed based on the groundwater level and quality measurements from the existing bores at vicinity of the Site. The key assumption that applies to the assessment is that the Gara BESS has no requirement for significant excavation below the water table. Similarly, the project does not propose to extract groundwater during either the construction or operation stages.

### 4.2 Assessment criteria

The AIP outlines requirements for obtaining water licences for aquifer interference activities and outlines the minimal impact considerations for assessing potential groundwater impacts in NSW. The minimal impact considerations are a series of thresholds that define minimal impacts from aquifer interference activities.

The assessment criteria outlined in Table 4.1 are for acceptable level of impacts for less productive fractured rock groundwater sources of the New England Fold Belt Coast Water Source.

**TABLE 4.1: ASSESSMENT CRITERIA FOR LESS PRODUCTIVE POROUS AND FRACTURED ROCK GROUNDWATER SOURCES**

| Assessment     | Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water table    | <p>Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic 'post-water sharing plan' variations, 40 m from any high priority:</p> <ul style="list-style-type: none"> <li>• groundwater dependent ecosystem</li> <li>• culturally significant site,</li> </ul> <p>listed in the schedule of the relevant water sharing plan.</p> <p>A maximum of a 2 m decline cumulatively at any water supply work.</p> |
| Water pressure | A cumulative water pressure head decline of no more than 2 m at any water supply work.                                                                                                                                                                                                                                                                                                                                                            |
| Water quality  | Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.                                                                                                                                                                                                                                                                                                           |

### 4.3 Assessment results

The assessment has considered the potential impacts of the project with respect to groundwater quantity and quality during operation. The potential impacts during construction and operation, including on identified receptors such as registered groundwater users and GDEs. The closest registered groundwater user is 1.8 km away (see Table 3.4), and there are no high priority GDEs with 1 km of the Site.

Due to the minimal disturbance of land, the risks of altering recharge patterns or inducing drawdown in the groundwater table are considered low. Due to there being no interception of the water table no adverse impacts on the groundwater source would occur.

The below sections discuss the potential changes to groundwater availability by causing drawdown, groundwater quality changes and groundwater take volumes during the project construction and operation.

#### 4.3.1 Groundwater drawdown

Based on the project design and the surrounding groundwater level information (refer Section 3.4.2), the project would not intercept the water table. Therefore, no project activities would cause water table drawdown at nearby receivers.



### 4.3.2 Groundwater quality

Changes to groundwater quality due to contamination could occur from leaks and spills of hazardous substance, such as hydrocarbons, or leaks and spills associated with road traffic. Site specific controls are proposed to be implemented to minimise contamination risks and prevent chemicals from reaching the groundwater system in the unlikely event of leaks or spills. These include:

- Self-bunded battery and fuel storage units.
- Regular maintenance and inspection of bunded fuel, oil, and battery storage areas to ensure integrity.
- Proper storage and bunding of chemicals, along with well-designed site drainage and sedimentation basins at key locations to manage site runoff effectively.

Additional mitigation measures include the development of site management plans that detail response protocols for leaks, such as:

- Maintenance and deployment of spill kits.
- Removal of impacted soils, with appropriate testing and disposal.
- Provisions for installing groundwater monitoring bores in case of unexpected leaks.

### 4.3.3 Groundwater take

Based on the project design and the surrounding groundwater level information, the project would not intercept the water table. Additionally, the project does not propose to extract groundwater during either the construction or operation stages. Therefore, no groundwater take would occur.

### 4.3.4 Conclusion

The proposed Gara BESS project was assessed in accordance with the project's SEARs and relevant industry guidelines, to assess the potential impact on less productive fractured aquifers of the New England Fold Belt Coast Water Source in accordance with the NSW AIP.

The project would not intercept groundwater and the low likelihood of hazardous materials reaching groundwater, the assessment shows that there is no more than minimal harm done to the aquifer, or its dependent ecosystems, because of the Gara BESS.

The NSW AIP assessment criteria are addressed in Section 5. Environmental management and mitigation measures are outlined in Section 6.

# 5. AQUIFER INTERFERENCE POLICY – MINIMAL IMPACT CONSIDERATIONS

The AIP outlines requirements for obtaining water access licences for aquifer interference activities and outlines the minimal impact considerations for assessing potential groundwater impacts in NSW. This section compares the expected impacts against the requirements of the AIP and discusses compliance with the policy.

## 5.1.1 Minimal impact considerations

The minimal impact considerations are a series of thresholds that define minimal impacts from aquifer interference activities. There are two levels of minimal impact considerations specified in the AIP, being Level 1 and Level 2. If the predicted impacts are less than the threshold level specified by Level 1, then these impacts are acceptable under the AIP. Where the predicted impacts are greater than the Level 1 minimal impact considerations, then additional studies are required to fully assess and manage these predicted impacts.

Table 5.1 compares the potential project impacts with the minimal impact considerations for less productive fractured rock groundwater sources.

**TABLE 5.1: MINIMAL IMPACT CONSIDERATIONS**

| AIP Minimum impact consideration                                                                                                                                                                                                                                                                                                                                                                                                                                | Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water Sharing Plan and Groundwater source                                                                                                                                                                                                                                                                                                                                                                                                                       | North Coast Fractured and Porous Rock Groundwater Sources 2016 – New England Fold Belt Coast Water Source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Aquifer                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Fractured rock                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Less productive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Water table</b><br>Less than or equal to 10% cumulative variation in the water table, allowing for typical climatic ‘post-water sharing plan’ variations, 40 m from any high priority: <ul style="list-style-type: none"> <li>• groundwater dependent ecosystem (GDE), or</li> <li>• culturally significant site;</li> </ul> listed in the schedule of the relevant water sharing plan.<br>A maximum of a 2 m decline cumulatively at any water supply work. | <b>Water table</b><br>Table 3.4 list the registered groundwater users within 2 km of the proposed development. All groundwater levels are greater than 19 m below ground level. Considering no significant excavation, there will be no interception with water table. Figure 3.4 shows there is no HEVAE high probable GDE in the vicinity of the Site. There are no culturally significant sites present listed in the schedule of the relevant water sharing plan within the drawdown area. Therefore, no project activities will cause water table changes at nearby receivers.<br><b>Assessment: Does not exceed Level 1 impact considerations</b> |
| <b>Water pressure</b><br>A cumulative water pressure head decline of no more than 2 m at any water supply work.                                                                                                                                                                                                                                                                                                                                                 | There are no confined aquifers that would be intercepted.<br><b>Assessment: Does not exceed Level 1 impact considerations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Water quality</b><br>Any change in groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.                                                                                                                                                                                                                                                                                                 | There will be no change to the existing groundwater quality or beneficial use category.<br>Changes to groundwater quality due to contamination can occur from leaks and spills of hazardous substances. Chemicals of primary concern include hydrocarbons, or leaks and spill associated with road traffic.<br>Site specific controls, such as proper storage and bunding of chemicals, site drainage and sedimentation basins at key locations would be used around the project to control site runoff.<br><b>Assessment: Does not exceed Level 1 impact considerations</b>                                                                            |



## 6. RECOMMENDED MANAGEMENT AND MITIGATION MEASURES

### 6.1 Environmental management

This chapter describes how the project would be managed to reduce potential environmental impacts throughout detailed design, construction and operation. The approach to environmental management and mitigation of potential impacts for the project would be carried out through the development of a project specific Construction Environmental Management Plan (CEMP) for main construction works. Mitigation and management measures during operation of the project are not needed for groundwater as there is no permanent groundwater take from any of the project operational activities.

The project is anticipated to generally have no impact to groundwater and would be managed with the implementation of control measures outlined within the CEMP. Groundwater controls would be part of the CEMP and be included within the soil and water management sub-plan.

The mitigation measures would be implemented and monitored for their effectiveness during construction. Typical provisions within the CEMP would include requirements for training, inspections, corrective actions, notifications and classification of environmental incidents (such as chemical spills or leaks), record keeping and performance objectives for handover on completion of construction.

A Soil and Water Management sub-plan would also be prepared for the project and contain details of appropriate measures to minimise any groundwater contamination during construction and operation. The sub-plan would include but is not limited to:

- appropriate design of self-bunded battery and fuel and oil storage units.
- use nominated and bunded fuel and chemical storage areas.
- provision of spill kits for cleaning up chemical, oil and fuel spillages.
- training for personnel and regular maintenance and inspection of bunded fuel, oil, and battery storage areas to ensure integrity.
- procedure for managing any intercepted shallow groundwater.
- procedures for soil storage (including any potential contaminated soil) and erosion control with well-designed site drainage and sedimentation basins at key locations to manage site runoff effectively.

In addition, groundwater monitoring and testing during the geotechnical investigation phase is recommended. This may include:

- Installation of groundwater monitoring bores to detect any changes in water quality.
- Regular water sampling and testing for contaminants during and post-construction, especially in the vicinity of storage areas.
- Ongoing monitoring as part of the environmental management plan to ensure that groundwater remains unaffected over the long term.

With these controls and monitoring protocols in place, the project's risks to groundwater quality are expected to be effectively managed.

## 7. REFERENCES

- BoM. (2023a, August 14). *Climate data online*. Retrieved August 14, 2023, from <http://www.bom.gov.au/climate/data/>
- DPE. (2022, December 10). *Probable Vegetation Groundwater Dependent Ecosystems - Sydney Metro*. Retrieved December 10, 2022, from Sharing and Enabling Environmental Data in NSW: <https://datasets.seed.nsw.gov.au/dataset/probable-vegetation-gde-sydney-metro>
- DPI. (2016). *Methods for the identification of high probability groundwater dependent vegetation ecosystems*. Department of Primary Industries, a Division of NSW Department of Industry, Skills and Regional Development.
- Geological Survey of New South Wales. (2024). <https://minview-qa.geoscience.nsw.gov.au/#/?lon=148.5&lat=-32.5&z=7&l=ge0:y:100>
- NSW government. (2012). Aquifer Interference Policy. [https://www.dpie.nsw.gov.au/\\_data/assets/pdf\\_file/0005/151772/NSW-Aquifer-Interference-Policy.pdf](https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0005/151772/NSW-Aquifer-Interference-Policy.pdf)
- NSW government. (2016). Water Sharing Plan for the North Coast Fractured and Porous Rock Groundwater Sources.
- WaterNSW. (2023, September 20). *Continuous water monitoring network*. (WaterNSW, Editor) Retrieved September 20, 2023, from Continuous water monitoring network: <https://realtime.data.waternsw.com.au/>



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