Tathra Wind Farm

Hydrogeological and Surface Water Desktop Assessment

Synergy Renewable Energy Development

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Document Tracking

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Project Manager:	Ellie Diggins

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Abbreviations

Abbreviation	Description
AEP	Annual exceedance probability
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid sulfate soils
BESS	Battery energy storage system
BoM	Bureau of Meteorology
DEM	Digital elevation model
DER	Department of Environment Regulation
DOW	Department of Water
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environment Regulation
EC	Electrical conductivity
EIA	Environmental Impact Assessment
EPA	Environment Protection Authority (Western Australia)
ESCP	Erosion and Sediment Control Plan
GDE	Groundwater dependent ecosystem
GMA	Groundwater management area
IBRA	Interim Biogeographic Regionalisation for Australia
LiDAR	Light detection and ranging data
NEPC	National Environment Protection Council
mAHD	Metres relative Australian Height Datum
mbgl	Metres below ground level
PDWSA	Public Drinking Water Source Area
RIWI	Rights in Water and Irrigation Act 1914
SWL	Standing water level
SynergyRED	Synergy Renewable Energy Development
TEC	Threatened ecological communities
TTWF	Tathra Wind Farm
WA	Western Australia
WTG	Wind Turbine Generator

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Synergy Renewable Energy Development (SynergyRED, the 'Proponent') to undertake a Hydrogeological and Surface Water (Hydrological) Desktop Assessment for a proposed greenfield renewable energy project, referred to as the Tathra Wind Farm (the 'Project'), to support environmental approvals in accordance with relevant legislation and guidelines.

The Hydrogeological and Hydrological Desktop Assessment was undertaken to characterise and assess the baseline groundwater and surface water environment at the Project Site.

The hydrogeology at the Site comprises the Surficial (Upper) unconfined aquifer, underlain by the Leederville-Parmelia aquifer in the eastern portion of the Site and the Yarragadee aquifer in the western portion of the Site, divided by the Eneabba fault. Groundwater quality is fresh to brackish and is likely moderately impacted by historical agricultural activities.

The hydrology at the Site comprises first to third order drainage features identified as Warradarge Creek, which flows from north to south along the central western Site boundary, and tributaries, which generally from east to west through the Site.

The desktop assessment indicated presence of potential terrestrial and aquatic groundwater dependent ecosystems (GDEs), including one Geomorphic wetland located along the primary drainage line of Warradarge Creek. Potential presence of Subterranean GDEs remains unknown.

Project activities may directly affect both groundwater and surface water environments at and surrounding the Site and should be independently reviewed in impact assessment at the detailed design phase of the Project.

Design and general recommendations based on outcomes of the current assessment include:

- Establishment of buffer zones, particularly along Warradarge Creek.
- Micrositing of proposed wind turbine generator crane pads to assess potential for interaction with shallow groundwater systems.
- Appropriate groundwater licensing.
- Low impact construction techniques, including stormwater, sediment and erosion controls.
- Contamination and spill prevention controls.
- Development of a fit for purpose groundwater and surface water monitoring program, including baseline data collection.

Recommendations should be revisited and refined at subsequent Project stages and incorporated into a Site Environmental Management Plan.

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1. Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Synergy Renewable Energy Development (SynergyRED, the 'Proponent') to undertake a Hydrogeological and Surface Water (Hydrological) Desktop Assessment for a proposed greenfield renewable energy project, referred to as the Tathra Wind Farm (the 'Project'), to support environmental approvals in accordance with:

- Environmental Factor Guideline – Inland Waters (WA EPA, 2018).
- Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016).
- Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER, 2015) - Specifically Section 3.3.1 (Hydrological assessment) and Section 3.3.2 (Groundwater Investigations).
- Operational Policy No. 5.12 (WA DOW, 2009).

1.1. Project description

The Project comprises of up to 140 wind turbine generators (WTGs), solar and battery storage with supporting infrastructure. The rural zoned Site area is located approximately 300 km north of Perth and 15 km east of the township of Eneabba, in the Shire of Carnamah on Yamatji Country, Western Australia (WA) as shown in Figure 1-1.

The proposed Project activities include construction and operation of the following infrastructure:

- Up to 140 WTGs with a total capacity of up to 1,000 MW across the site, including up to 500 MW capacity in solar and 500 MW in Battery Energy Storage Systems (BESS).
- Access roads, foundations and drainage system.
- Associated turbine foundations and hard stand areas.
- A turbine design comprising:
    - Blade length up to 90m.
    - Tower/hub height between 110 m and 160 m; and
    - Turbine tip height up to 250m.
- Site entrances from public roads and internal access roads between wind turbines and supporting infrastructure.
- Overhead transmission poles or towers and power lines, and underground electrical cables.
- Electrical substations and switchyards, including ancillary electrical equipment (e.g. STATCOM).
- Operations and maintenance buildings, workshops, and associated car parking.
- Temporary construction facilities, including site offices, construction compounds, laydown areas, gravel borrow pits and concrete batching plant.
- Water abstraction bore(s) for construction activities and associated infrastructure (dams/turkey's nests).
- Fire water tanks.
- Communication towers and monitoring masts (meteorological masts) up to 150 m tall.

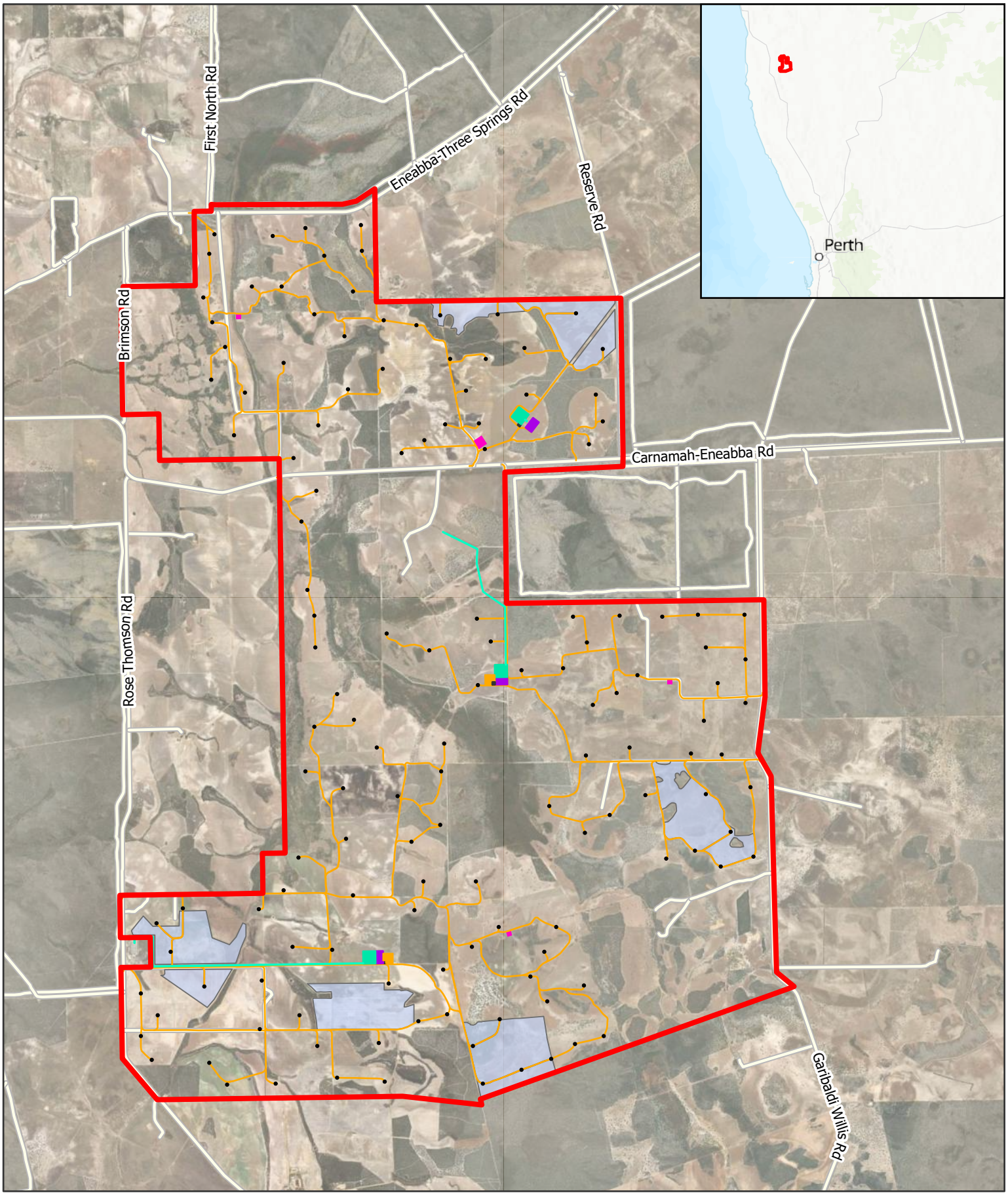

Figure 1-1 Project Site location and layout

- Project Site boundary
- Roads
- Proposed roads
- Construction laydown area

Proposed layout

- Building
- 330kV substation
- BESS
- Construction areas

- Wind Turbine
- Solar Panels
- Transmission line

0 0.75 1.5 3
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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1.2. Purpose and objectives

This Assessment aims to support the Project in achieving planning and development approvals and ensure compliance with legislative obligations and relevant guidelines. The objectives of the Assessment are to:

- Characterise the baseline hydrogeological and hydrological environment, including water quantity and quality, at and surrounding the Project site.
- Assess potential groundwater and surface water impact receptors including wetland habitat and Groundwater Dependent Ecosystems (GDEs) at and surrounding the Project site.
- Provide recommendations and general contingency measures for management of potential effects from the Project on catchment values, identify likely residual effects and specify if further management is required.

1.3. Scope of work

The scope of work undertaken to achieve the objectives comprised:

- A review of the legislative framework and background studies relevant to the assessment (Sections 2 and 3).
- Desktop assessment of the existing environment (topography, hydrology, land use, soils, geology, hydrogeology, hydrology, wetlands), including a review of previous investigations for the Site (Section 4).
- Characterisation and assessment of baseline hydrogeology and hydrology at the Site (Sections 5 and Section 6).
- Provision of recommendations and contingency measures to manage and monitor effects on catchment values (Section 7).

1.4. Overview of methodology

The approach utilised to achieve the Hydrogeological and Surface Water Assessment scope of works comprised the following desktop-based methodologies:

- Review of relevant legislation, proponent provided spatial information, previous investigation reports and publicly available databases.
- Existing environment assessment including:
    - Analysis of local climatic and environmental data including rainfall, evaporation and vegetation (including wetland) communities.
    - Assessment of local topography and hydrogeological/hydrographic characteristics, including rivers, tributaries and other surface features.
    - Review of local surface to basement geology and soil types.
- Baseline hydrogeology and hydrology characterisation comprising:
    - Analysis of available historical water quality analytical results.
    - Review of GDE information.
    - Identification of potential groundwater-surface water interactions.
    - Hydrogeology and hydrology desktop assessment including identification of potential groundwater and surface water receptors.

2. Legislative framework

The Assessment has been undertaken in accordance with relevant federal, including National Environment Protection Council (NEPC) and Australian and New Zealand (ANZG) Governments, and state, including WA Environmental Protection Authority (EPA) and WA Department for Environment Regulation (DER), legislation and guidance as summarised in Table 2-1.

The legislation and guidance documents considered in this Assessment provide relevant requirements for Hydrogeological and Surface Water Assessments in WA which aim to minimise impacts on key environmental values including sensitive areas, conservation significant species, inland waters and GDEs associated with groundwater and surface water systems at and surrounding the Project Site.

Table 2-1 Summary of relevant legislative framework

Legislation/guideline	Description and relevance
Rights in Water and Irrigation Act 1914 (WA Government, 2020)	Provides regulatory framework for access and use of groundwater and surface water resources in WA
Operational Policy No. 5.12 – Hydrogeological Reporting Associated with a Groundwater Well License (WA DOW, 2009)	Describes how groundwater license applications are assessed and provides groundwater compliance monitoring requirements
Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (WA DER, 2015)	Provides technical and procedural measures to prevent and mitigate environmental harm in areas underlain by acid sulfate soils (ASS)
Biodiversity Conservation Act 2016 (WA, 2023)	Provides biodiversity protection requirements including for threatened species and threatened ecological communities (TEC)
Environmental Factor Guideline – Terrestrial Environmental Quality (WA EPA, 2016a)	Describes how potential impacts to terrestrial environmental quality is considered by EPA in the EIA submission and defines potential impact pathways for land and soils environmental values
Environmental Factor Guideline – Terrestrial Fauna (WA EPA, 2016b)	Describes how potential impacts to terrestrial fauna are considered by EPA in the EIA submission, including definition of potential impact pathways for terrestrial fauna environmental values
Environmental Factor Guideline – Terrestrial Flora and Vegetation (WA EPA, 2016c)	Describes how potential impacts to flora and vegetation are considered by EPA in the EIA submission and defines potential impact pathways for terrestrial flora environmental values
Environmental Factor Guideline – Inland Waters (WA EPA, 2018)	Describes how inland waters are considered by EPA in the EIA submission and defines potential impact pathways and environmental value receptors including conservation significant wetlands, waterways, rivers, springs/pools, GDEs and ecosystems supporting conservation significant species
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2018)	Provides a Water Quality Management Framework including toxicant default guideline values and water quality assessment methods with reference to the ANZG (2000) Guidelines (ANZECC/ARMCANZ, 2000)
Environmental Protection Act 1986 and *Environmental Protection Amendment Act 2020* (Western Australia, 2020)	Provides requirements for environmental impact assessments, prevention and control of pollution and environmental harm to conserve, preserve, protect, enhance and manage the environment
Guideline: Assessment and management of contaminated sites (WA DER, 2021)	Provides requirements for assessment and management of soil and/or water contamination with reference to the *Contaminated Sites Act 2003* (WA, 2023), *Contaminated Sites Regulations 2006* (WA, 2022) and the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPC, 2013)
Statement of environmental principles, factors, objectives and aims of EIA (WA EPA, 2021)	Outlines how the EPA considers Environmental Impact Assessment (EIA) submissions for projects in WA

3. Background studies

Vegetation mapping (Umwelt, 2025)

Umwelt undertook three botanical surveys and associated vegetation mapping of the Site between June and November 2024. Spatial files of results and a summary of vegetation unit descriptions was provided by SynergyRED.

Further discussion and visual presentation of vegetation mapping are presented in Section 4.9.

Geotechnical and Environmental Desktop Study Proposed Tathra Wind Farm (WSP, 2024)

WSP undertook a geotechnical and environmental desktop study for the Project in September 2024. The study was considered a Stage 1 approach to inform a Stage 2 on-site preliminary geotechnical and baseline contamination investigation.

The Stage 1 desktop assessment identified site-specific lithology, geomorphology, topography and environmental constraints through a review of historical aerials, potentially contaminating historical activities, unexploded ordinance records, WA contaminated sites and heritage databases.

The study noted a general lack of available subsurface information to inform design and optimise infrastructure locations. The desktop information indicated potential Project constraints due to weak soils, potential to encounter weak soils and/or laterite while excavating, potential erosion/loose soils, geohazards and flood hazards.

The information provided in the WSP assessment is presented in each relevant respective subsection under Section 4 of this report.

Geotechnical Desktop Study and Site Visit Report Warradarge Wind Farm (Coffey, 2013)

A geotechnical study was undertaken by Coffey in 2013 for Warradarge Wind Farm, located immediately south adjacent the Site, comprising drilling of ten boreholes up to 20 mbgl, ten boreholes up to 2 mbgl and installation of vibrating wire piezometers in three boreholes at 10 mbgl to monitor groundwater levels.

The study noted regional geology as Yarragadee, Laterite (ferruginous laterite), colluvium (quartz sand), residual deposits comprising sand, clay, duricrust overlying Victoria Plateau Sandstone in Perth Basin, Lateritic gravel (gravel, sand and minor clays), alluvial and colluvial deposits (transported clay, sand lithic fragments, indurated (hardened) clay), Parmelia (felspathic sandstone, siltstone and shale), and swamp and lacustrine deposits (clay, silt and diatomite).

Subsurface lithology on site was fine grained white quartz sand, lateritic gravel, clayey sand as transitional material between upper laterite and underlying formation, and Parmelia observed as weathered silty sand/sandy silt. Fine grained alluvial sediments in low lying areas in north-east (near the Project Site).

No groundwater was observed and it was assumed deeper aquifers are present with potential to have temporary perched shallow groundwater between lateritic gravel and underlying lithology.

Uneven erosion was present due to some steep localised topography, requiring consideration of slope stability at and near turbine pads.

4. Existing environment

The existing environment characterisation was undertaken utilising all available information from the desktop assessment to inform the overall hydrogeological and surface water assessment for the Project Site.

4.1. Project Site details

The key Project Site details at the time of this Assessment are summarised in Table 4-1.

Table 4-1 Site details

Item	Description
Project name	Tathra Wind Farm (TTWF)
Site area[1] (ha)	15,833 (1,590 disturbance footprint)
Shire	Shire of Carnamah
Zoning	Rural
Summary of proposal	Up to 140 WTGs (1,000 MW), solar (500 MW), battery storage (500M W) and associated infrastructure

1 Area based on Project Site spatial files provided by SynergyRED dated 19 June 2025.

4.2. Land use

The Project Site is located in the Shire of Carnamah and classified by the WA Department of Primary Industries and Regional Development (DPIRD) as a generalised agricultural land use of 'cropping cereals and legumes', with a portion in the west/southwest of the site classified as 'livestock grazing'.

It is noted that a previous preliminary site investigation desktop study identified presence of a compressor station for the Dampier to Bunbury Natural Gas Pipeline (CS08) located approximately 3 km south-west of the Site that has been operational since 1991. The compressor station is classified under the WA Department of Water and Environmental Regulation (DWER) Contaminated Sites Database as *Contaminated – Restricted Use* due to concentrations of hydrocarbons in soil above *National Environment Protection (Assessment of Site Contamination Measure 1999* commercial/industrial management limits, likely originating from historical leaks in the underground waste oil storage tank (WSP, 2024).

Vegetation mapping undertaken at the Site confirmed presence of both natural native vegetation landscapes and modified areas including dams (artificial water bodies), cleared pasture, cleared land and cropped areas, planted and revegetated areas and developments (roads and infrastructure) (Umwelt, 2025).

Notable surrounding land use, including the recorded compressor station site, is considered in the context of potential regional cumulative impacts as summarised in Table 4-2. Land use at and surrounding the Project Site is shown in Figure 4-1.

Table 4-2 Surrounding land use

Direction	Proximity	Description
West	Immediate	Scrub and modified pastural and cropland
	9.5 km	Iluka Eneabba Rare Earth Minerals stockpile, storage and processing facility
	12 km	Eneabba Township
South-west	Immediate	Western Power Eneabba Terminal
	3 km	Compressor station CS08 (owned and operated by AGIG)
South	Immediate	Warradarge Wind Farm comprising 51 turbines (180 MW), in preliminary expansion stage
	14.5 km	Alexander Morrison National Park
	40 km	Waslee Down Wind Farm
East	Immediate	Tathra National Park
	7.7 km	Indian Ocean Farms Chatfield Rd Almond Farm (commercial scale agricultural production)
	<50 km	Cleared agricultural land, mostly used for cereal cropping
North-east	23 km	Yarra Yarra Lakes
North	Immediate	Wotto Nature Reserve
	<50 km	Modified pastoral and cropland

4.3. Biogeographical context and land systems

The Project Site is located within the regional Perth Basin, Geraldton Sandplains bioregion and the Lesueur Sandplain subregion of WA as defined by the Interim Biogeographic Regionalisation for Australia (IBRA) classification system (Thackway & Cresswall, 1995). The latest version (IBRA7) classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information (DCCEEW, 2023).

Land systems are defined as an area or areas throughout which there is a recurring pattern of topography, soils and vegetation (Tille, 2006). The majority (central and eastern) portion of the Site lies within the Coalara System (222Co) in the northern central portion of the Dandaragan Plateau Soil landscape Zone, with the Boothendarra Soil-landscape system (224Bh) of the Arrowsmith Soil-landscape Zone present in the western portion of the Site.

The two mapped landscape systems are summarised in Table 4-3 and shown in Figure 4-2. Warradarge Creek runs north-south in the western portion of the Site forming the approximate boundary between the two primary landscape systems (Griffin, Stuart-Street, van Wyk, & Tille, 2019), as shown in Figure 4-2. Site vegetation mapping undertaken in 2024 further characterised 12 distinct native vegetation landscapes at the Site, discussed further in Section 4.8.3 (Umwelt, 2025).

Table 4-3 Summary of mapped land and vegetation systems

Land system	Landscape zone	Description
Coalara	Dandaragan Plateau	Partially dissected plateau with crests, slopes and sandy valley plains on weathered Cretaceous sandstones in the western margin of the Dandaragan Plateau. Soils are mainly Pale and Yellow deep sands, sandy gravels and sand over gravel. Vegetation is mainly heath and scrub heath with banksia and Eucalyptus todtiana open low woodland.
Boothendarra	Arrowsmith	Subdued, stripped lateritic plateau with undulating rises to gently undulating plains on laterite, siltstone and sandstone in the west Midlands area. Sandy duplexes, Pale deep sand, sandy and loamy gravels and minor clays. Vegetation is wandoo woodland, Eucalyptus todtiana and banksia low open woodland, scrub heath and some mallee.

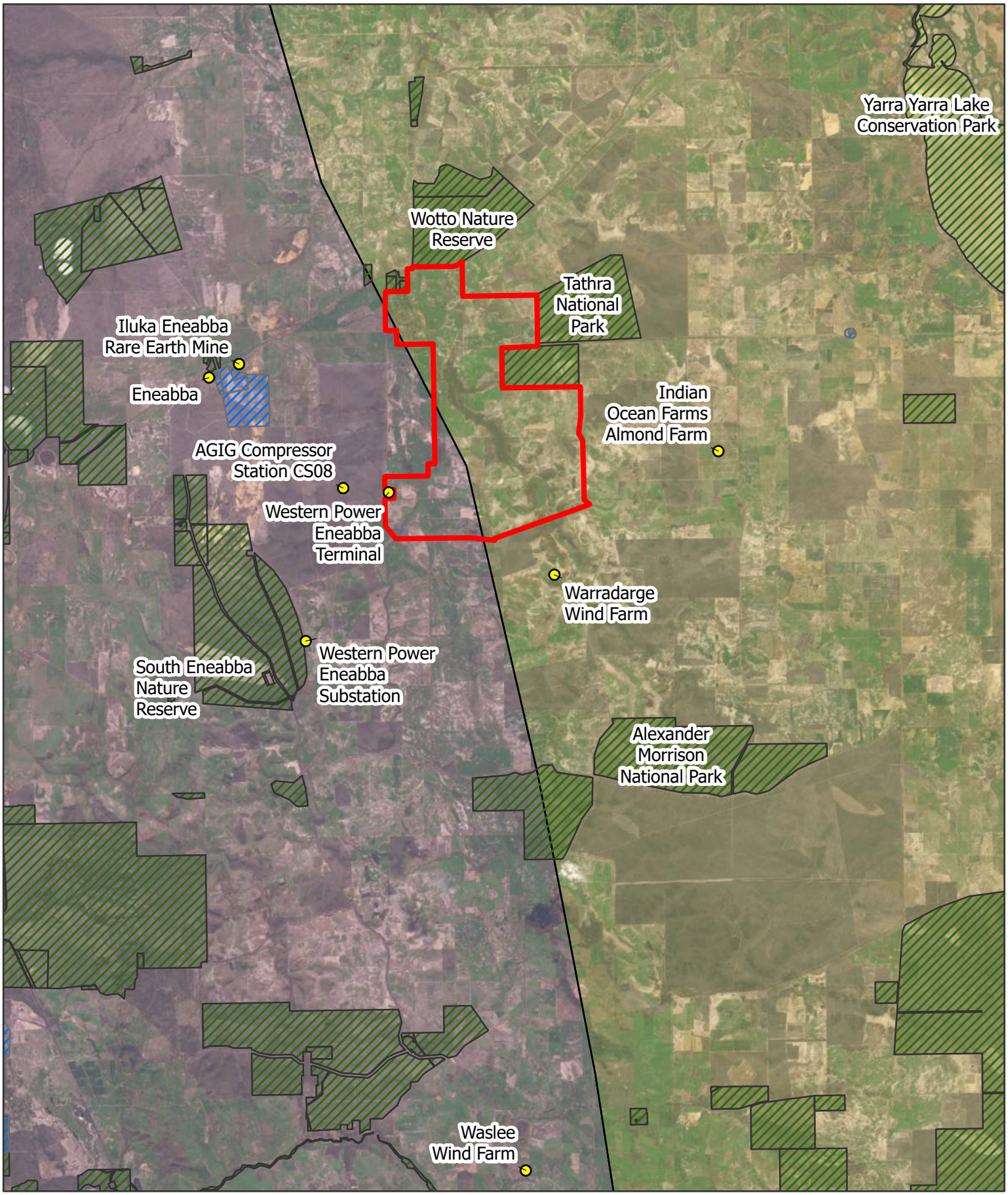

Figure 4-1 Land Use

Project Site boundary

Land Use

- Cropping Cereals/Legumes
- Livestock Grazing
- Conservation area
- Water resource plan area
- Surrounding key features

0 3 6 12

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 2/27/2025

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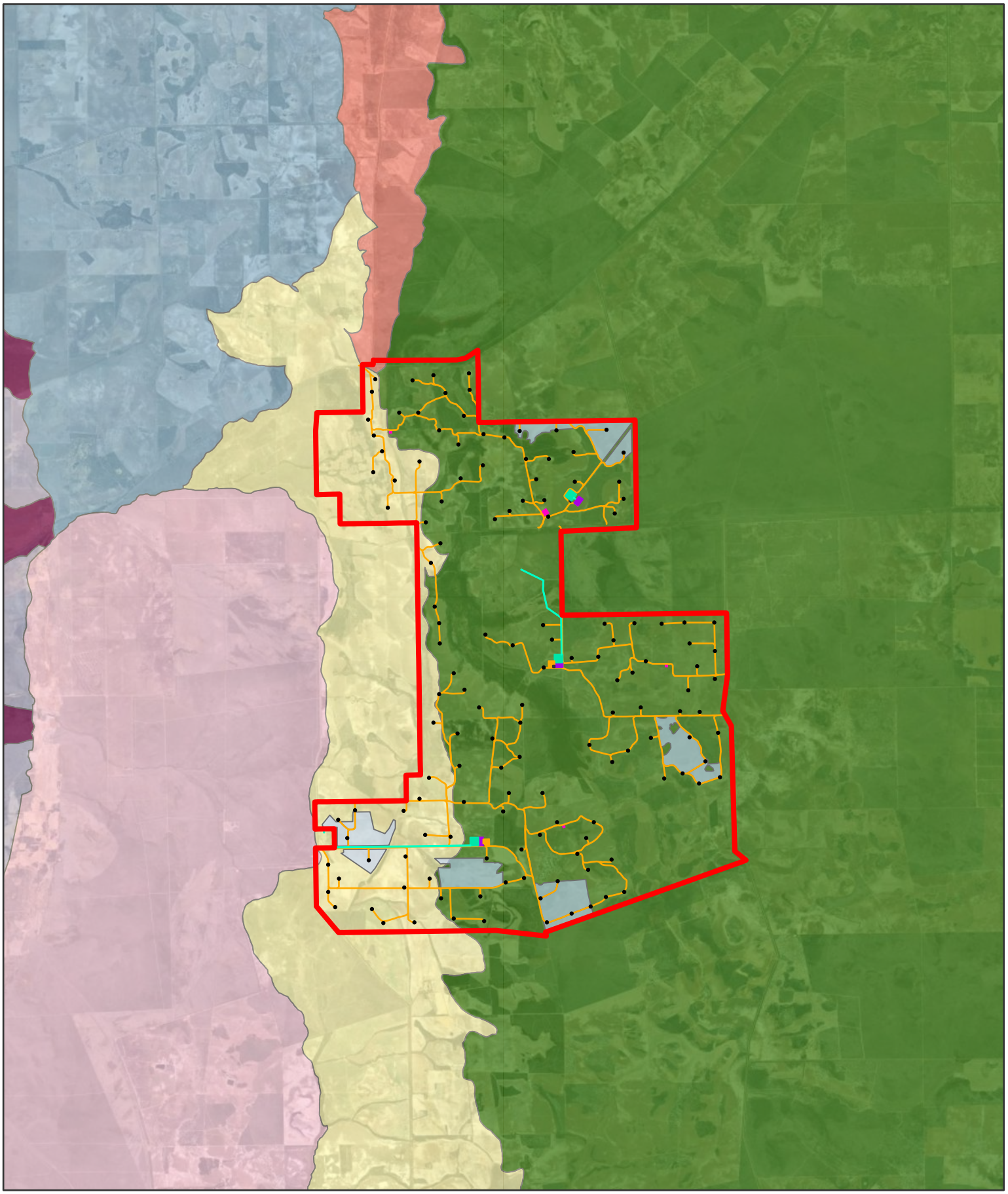

Figure 4-2 Land systems

Project Site boundary

Proposed layout

Building

330kV substation

BESS

Construction areas

Construction laydown area

Wind Turbine

Solar Panels

Proposed roads

Transmission line

Landscape system

Boothendarra System

Coalara System

Correy System

Eneabba Plain System

Mount Adams System

Otorowiri System

Yerramullah System

0 1.5 3 6

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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4.4. Soils and geology

4.4.1. Soils

A review of DPIRD soil-landscape mapping (WA DPIRD-076, 2019) indicates the dominant soil types at the Site comprise:

- Deep sandy gravel of the Coalara 3 subsystem characterised as plateau remnants, hillcrests and very gently to moderately inclined hillslopes across much of the central portion of the Site from north to south.
- Yellow deep sand, sandy gravel and sandy duplexes of the Boothendarra 11 subsystem located along gently to very gently inclined hillslopes and footslopes in the western portion of the Site near the primary Warradarge Creek drainage line and south-eastern portion of the Site along upper reaches of the tributary to Warradarge Creek.
- Red shallow sands and loams over bog iron ore accumulations of the Coalara 4 subsystem bisecting the central portion of the Site along the tributaries to Warradarge Creek.
- Loamy gravel, loamy duplexes and some clays associated with the Boothendarra 2 subsystem characterised by incised gullies and lateritic outcrops in the north-western portion of the Site.

The identified soil types at the Site are typically formed in colluvium and weathered rock, and are moderate to well-draining, particularly in areas outside of drainage lines.

Surficial soils comprise laterite over weathered rock, transported sediments including wind-blown aeolian sand, sand dominated colluvium, slope wash, and alluvial deposits (floodplain, lacustrine and swamp clays, silt and sand). Deeper soils at the Site comprise sandy clay, clayey sand and duricrusts of calcrete and ferricrete underlying adjacent alluvial valleys and watercourses, lateritic soils and ferruginous outcrops with potential silcrete (WSP, 2024).

Based on a review of the Australian National Soil Information System (ANSIS) ASS mapping, the soils at the Site are classified as ASS Cn(p4) representing an extremely low probability of ASS occurrence.

Project Site soils are shown in Figure 4-3.

4.4.2. Regional geology

The Site lies within the Perth Basin, a large north-north-west trending on and offshore sedimentary basin that extends along the south-western margin of the continent that formed as the product of periods of rifting during the Permian, late Triassic to Early Jurassic and Middle Jurassic to Early Cretaceous periods. The sedimentary layers of the Perth Basin are typically underlain by pre-existing sedimentary basin terrains (Geoscience Australia, 2023).

A review of the *1:500 000 State interpreted bedrock geology of Western Australia* (Geological Survey Western Australia) indicates the regional bedrock and structural geology underlying the Site as:

- Primarily early Cretaceous Parmelia Group, characterised as predominantly sandstone with most formations recognized only in subsurface.
- The Parmelia Group is conformably underlain by the Otorowiri Formation, a micaceous siltstone, shale and minor glauconitic sandstone.
- The Otorowiri Formation is bisected and displaced by two major fault/shear zones passing through the Site:
    - The Eneabba Fault, a normal fault running approximately south to north from the north-western corner through the middle of the Site.

    - The Abrolhos Fault intersecting the Eneabba Fault, causing displacement in a south-east to north-west direction across the Site.

- To the west of the conformably overlying eroded Otorowiri Formation and underlying the majority of the south-western corner of the Site's surface geology is the mid to late Jurassic Yarragadee Formation, a fine to coarse grained sandstone with thin shale interbeds.

The *1:100,000 Geological series map – Arrowsmith – Beagle Island* indicates that the surface geology at the Site comprises:

- Early Cainozoic ferruginous laterite (Czl) and associated leached quartz sands.
- Small areas of exposed upper Parmelia Formation rocks (Kp) typically associated with topographic features.
- Quaternary alluvial sediments (Qa) and mixed colluvial/residual/diluvial deposits (sand, silt and clay – Q) associated with drainage lines and associated floodplains (such as Warradarge Creek and its tributaries), particularly in the western portion of the Site.
- Some Quaternary swamp/lacustrine deposits in tributary confluence zones in the south-east portion of the Site.

The summary above agrees with previous assessment results which identified regional bedrock as feldspathic sandstone and siltstone, shale of coastal marine and fluvial origin. Dandaragan Plateau is residual top of Parmelia Formation with distinctly weathered bedrock >5 mbgl underlying surficial soils at the Site. Otorowiri Member forms the base of the Parmelia and is a lacustrine deposit (fine grained siltstone and mudstone. The Parmelia Formation is underlain by the Yarragadee which outcrops in the southwestern portion of the Site and along the Dandaragan Scarp. The Yarragadee is similar to Parmelian lithology but originates from a deeper marine setting (WSP, 2024).

The regional geology underlying the Site and surrounds is shown in Figure 4-4.

4.4.3. Observed lithology

A review of the BoM Groundwater Explorer (http://www.bom.gov.au/water/groundwater/explorer/) database identified 47 groundwater bores drilled between 1955 and 2010 to depths between 7 and 500 mbgl within a 2km radius of the Site, with 35 of these located within the Project Site boundary. Drilling borehole logs were available for five bores (two on-Site and three off-Site) with key lithological observations summarised in Table 4-4 and locations indicated in Figure 4-4.

A previous investigation undertaken at Eneabba Terminal, located west of the Site, with 20 test pits indicated surficial sand, gravelly sand, lateritic gravel, duricrust of laterite/ferricrete grading into clayey sand/sandy clay overlying residual soils comprising interbedded layers of silty sand, clayey sand, sandy clay and silty clays from sandstone/siltstone bedrock. No groundwater encountered but some moisture at one location 15 mbgl (WSP, 2024).

Overall, lithology observed at and immediately surrounding the Site comprised recovered clay, sandy shale, sand and gravel to approximately 400 mbgl, consistent with expected characteristics of regional quaternary deposit surface geology and subsurface geology dominated by weathered shale and sedimentary sandstones.

Table 4-4 Available lithological observations for bores within 2 km of Site

Bore ID	Proximity to Site	Total depth (mbgl)	Lithology	Description
61711390	Near centre	10.97	Ironstone, Sand	Ironstone (likely laterite) and sand to silt
61712835	Near eastern boundary	115.8	Clay, Sand	Hard yellow clay to sandy clay/clayey sand
61711383	~2 km north	51.21	Clay, Sand, Gravel	Surface sand into clay, kaolinite and fine sandy clays
61711361	~1.5 km north-west	34.75	Kaolin, Clay	Sand into grey, brown to white clay, black and brown kaolinite
61711378	~1.5 km west	169.47	Ironstone, Gravel, Clay, Shale	Ironstone (likely laterite), gravel and clay, hard to soft sandy clay and sandstone

This was further confirmed by preliminary geotechnical Site investigation which recorded lithology comprising sandy clay, clayey sand and duricrusts of calcrete and ferricrete, lateritic soils and ferruginous outcrops with potential silcrete (WSP, 2024).

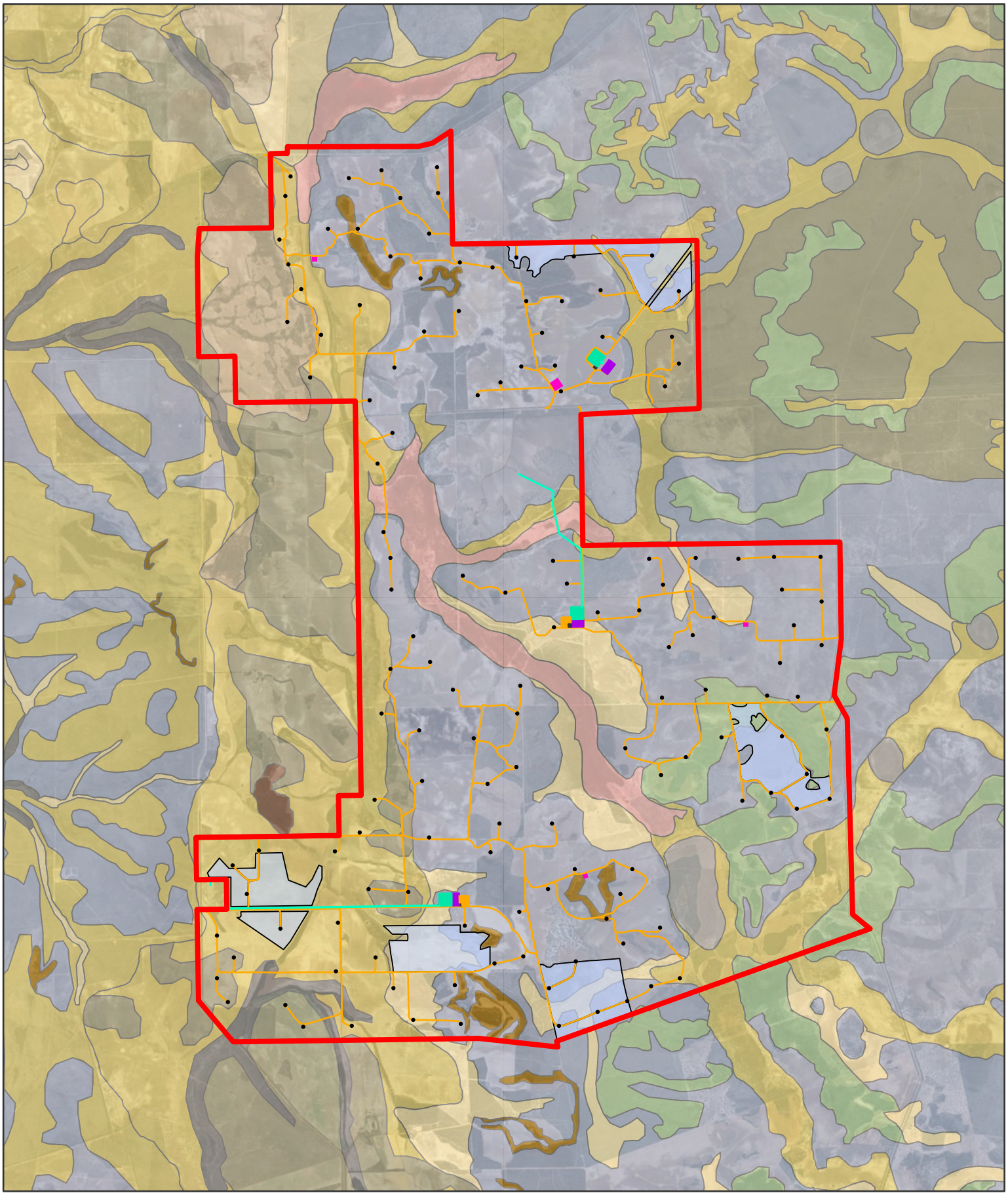

Figure 4-3 Soils

Project Site boundary
Proposed layout
Building
330kV substation
BESS
Construction areas
Construction laydown area
Wind Turbine

Solar Panels
Proposed roads
Transmission line

Soil group
Brown deep loamy duplex
Deep sandy gravel
Duplex sandy gravel
Gravelly pale deep sand
Grey deep sandy duplex
Grey shallow sandy duplex
Loamy gravel
Pale deep sand
Red shallow loam
Shallow gravel
Yellow deep sand

0 0.75 1.5 3
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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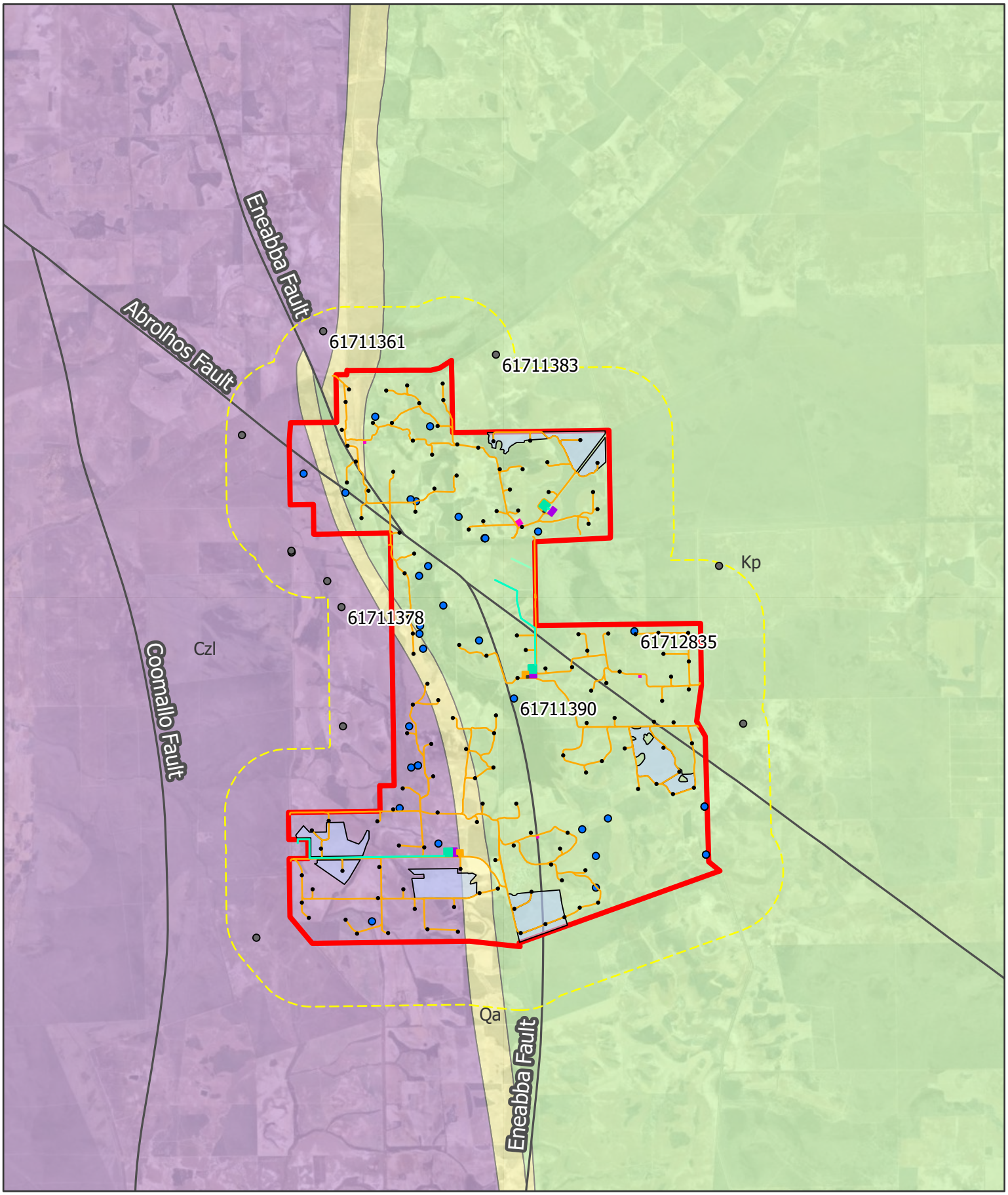

Figure 4-4 Geology

- Project Site boundary
- 2 km Site buffer
- Proposed layout
- Building
- 330kV substation
- BESS
- Construction areas
- Construction laydown area
- Wind Turbine
- Solar Panels
- Proposed roads
- Transmission line
- Geological group
- Otorowiri Formation
- Parmelia Group
- Yarragadee Formation
- Fault
- Drilled groundwater bores
- On-Site
- Off-Site

0 1.5 3 6
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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4.5. Climate and rainfall

Climate patterns such as temperature, precipitation, humidity, evaporation and other atmospheric conditions play a key role in driving regional hydrogeological and hydrological processes affecting the water environments (hydrology and hydrogeology) at the Site.

The Site is located in Climate Zone 4 (of 6), characterised by hot dry summers and cold winters. Temperature measurements taken from BoM Carnamah weather station (gauge 008025), located approximately 45 km east (inland) from the Site (-29.69°S,115.89°E), shows average maximum temperatures ranging from 36.2°C in January to 18.1°C in July, with mean minimum temperatures ranging from lows of 18.5°C in January and 7.3°C in July and August (see Figure 4-6).

Observed rainfall information from BoM Twin Hills (gauge 8289), located 15 km north of site (-29.67°S, 115.36°E), and Warradarge (gauge 8278), located 18 km southwest of the Site (-30.07°S,115.31°E) indicate an annual mean rainfall of approximately 504 mm for the Project Site. Based on a review of monthly historical rainfall data from 1972 – 2020, the wettest months in the Hill River catchment area are June and July and the driest months are typically December and January as indicated in Table 4-5.

Table 4-5 Mean monthly rainfall for BoM stations 8289 (Twin Hills) and 8278 (Warradarge)

Rainfall (mm)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
Twin Hills	6.0	9.2	13.5	22.8	67.2	83.2	87.6	73.0	44.9	22.5	11.4	7.5	**476.2**
Warradarge	9.7	16.4	18.7	22.7	72.8	101.3	88.3	51.1	51.1	22.7	15.4	7.5	**532.9**

A review of the observed daily rainfall for both weather stations from 1 January 1980 to 31 August 2020 generally indicated regional rainfall events, with some isolated localised rainfall as exemplified in the daily rainfall difference between gauges on certain days (Figure 4-5). The maximum daily rainfall between either weather station was 92 mm, observed at the BoM Warradarge (8278) station on 3 July 2018. The corresponding rainfall at the Twin Hills (8289) weather station was 51 mm. Conversely, the maximum recorded 24-hour rainfall in the upper at Twin Hills was 78 mm on 14 May 1999, with a corresponding rainfall of 34 mm at Warradarge.

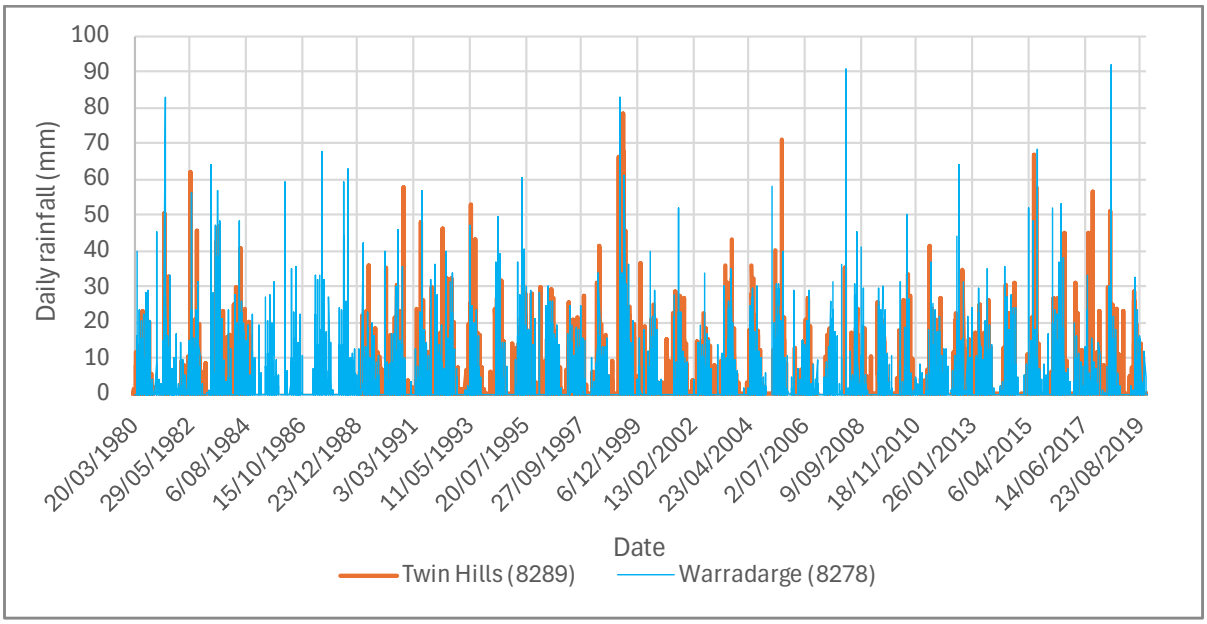

Figure 4-5 Daily rainfall

Observed evapotranspiration data sourced from the Australian Terrestrial Ecosystem Research Network (TERN) Landsat online map portal from February 2000 to June 2024 indicates a mean annual evaporation of approximately 406 mm/year, approximately 81% of mean annual rainfall, but typically exceeds rainfall in 7 months of the year; mean monthly evaporation is typically highest in September and lowest in April, as shown in Figure 4-6 (Australia's Terrestrial Ecosystem Research Network, 2025).

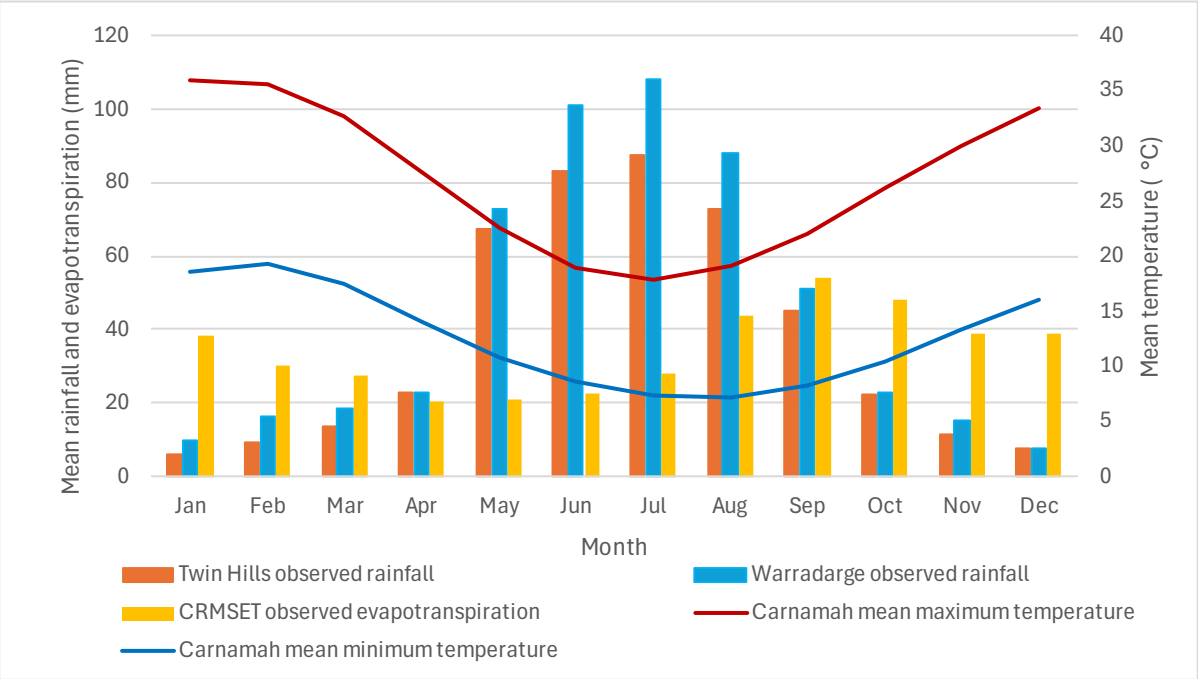

Figure 4-6 Mean monthly temperature, rainfall and evapotranspiration

4.6. Topography and drainage

Based on a review of the 2 m topographic dataset provided by SynergyRED, the elevation of the Site ranges from approximately 174 m relative Australian Height Datum (mAHD) in the north-eastern portion of the Site to 322 mAHD in the south-eastern portion of the Site (DPIRD-072). A regional Shuttle Radar Topography Mission digital elevation model (DEM) was also sourced from the Australian Government's Intergovernmental Committee on Surveying and Mapping Elevation and Depth – Foundation Spatial Data website to determine runoff catchments for waterways that drain to or through the Project Site.

The Project Site is located within the Hill River catchment, between the Nambung River system to the south, and the Arrowsmith River to the North. The primary drainage features include:

- Warradarge Creek and tributaries, flowing from east to west through the central and south-eastern portions of the Site then south through the western portion of the Site.
- Upper reaches of Eneabba Creek flowing west from the north-western portion of the Site.

Surface water features generally drain from north-east to south-west, consistent with regional topography. Warradarge Creek flows from north to south through the western portion of the Site before converging with Coomallo Creek approximately 35 km south and discharging to the Hill River approximately 40 km south of the Site. The Hill River subsequently discharges to the Indian Ocean at the Hill River Estuary, approximately 60 km south-west of the Site (Healthy Rivers South-West, 2025).

The generally topography, delineated catchment boundaries and key drainage features are shown in Figure 4-7.

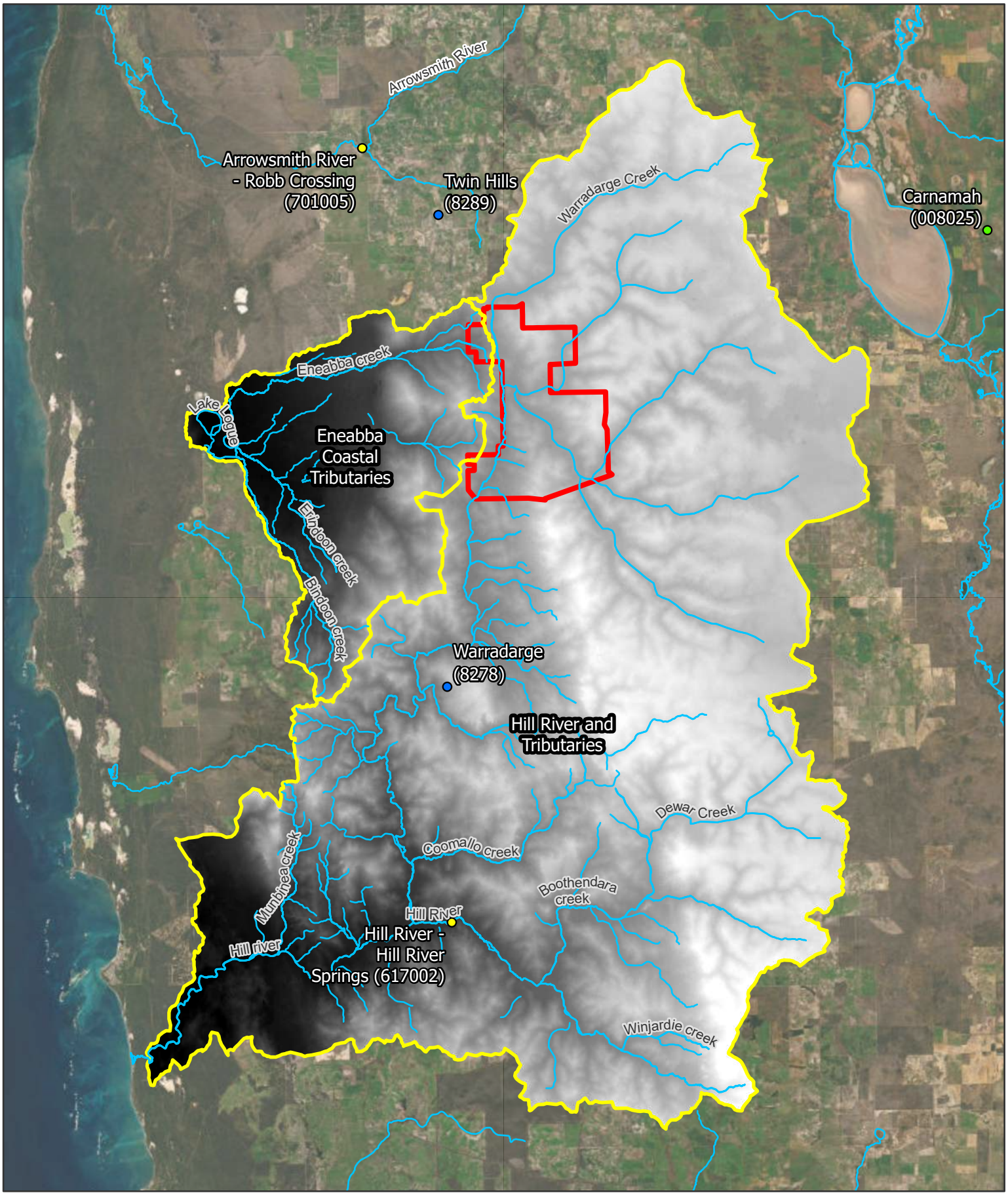

Figure 4-7 Topography and drainage

- Project Site boundary
- Drainage lines
- Catchment boundary
- Rainfall gauge
- Temperature gauge
- Streamflow gauge

Elevation (mAHD)

389.832

6.5068

0 3.75 7.5 15

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 3/5/2025

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4.7. Hydrology

4.7.1. Hydrological zones

Hydrological zones are broad spatial framework grouping areas with similar hydrology. Zone boundaries are derived from hydrological attributes associated with the best available soil-landscape mapping (WA DPIRD, 2013).

The central and eastern portions of the Site are dominated by the Dandaragan Plateau, characterised as gently undulating plateau with areas of sandplain and some laterite on Cretaceous sediments, with broad u-shaped valleys 80-150 m deep and smaller v-shaped valleys east of the Gingin Scarp in the south. The north-western and south-western corners of the Site and portions of the central western boundary are within the Arrowsmith hydrological zone, characterised as gently undulating, dissected sandplain and dunes on sandstone and other sedimentary rocks. This zone is bounded in the east by the Dandaragan Scarp and in the west by the Indian Ocean.

4.7.2. Catchment delineation

The Project Site extends across two distinct catchment areas(see Figure 4-7):

- Hill River catchment, including Warradarge Creek which runs through the western portion of the Project Site from north to south.
- Eneabba Creek catchment, with upper reaches of Eneabba Creek located in the north-western portion of the Project Site.

Total catchment areas for Hill River and Eneabba Creek are 3,702 km^2 and 564 km^2, respectively. However, the contributing catchment area upstream of the primary Warradarge Creek drainage that flows through the site is limited to approximately 1,400 km^2.

4.7.3. Surface water quantity

There are two streamflow gauges within a 50 km radius of the Site, Arrowsmith River – Robb Crossing (Gauge 701005) and Hill River – Hill River Springs (Gauge 617002), indicated in Figure 4-7. Available hydrographic data from 1972 to date was reviewed, with maximum observed daily flows noted as 35 m^3/s and 31 m^3/s at the Arrowsmith and Hill River sites, respectively, as shown in Figure 4-8.

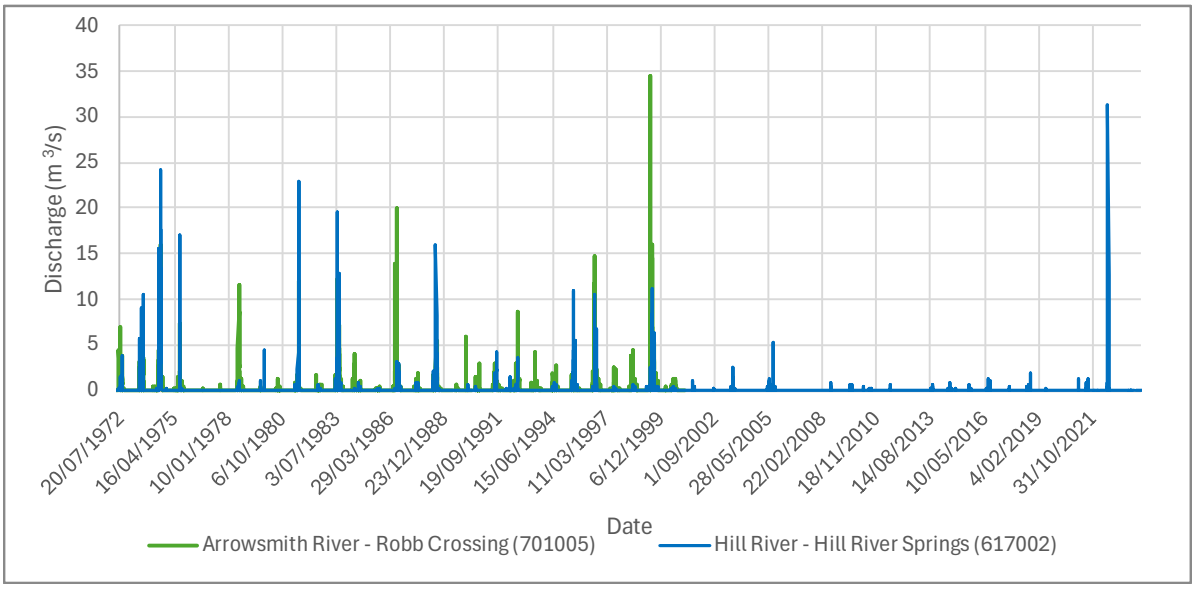

Figure 4-8 Historical surface water flow at Arrowsmith and Hill River gauges 1972 – 2022

The maximum flows recorded typically correspond to significant regional rainfall events, as expected (see Figure 4-5). However, recorded annual surface water flows span a large range, as summarised in Table 4-6, suggesting hydrologic response is dependent on climatic trends (i.e. wet and dry periods across multiple years) rather than weather events alone.

Table 4-6 Summary of historical gauged surface water flow

Site name	Gauge ID	Proximity to Site	Catchment area (km²)	Annual flow (ML)		
				Average	Minimum	Maximum
Arrowsmith River - Robb Crossing	701005	30 km north-west	848	5,537	123 (1976)	24,410 (1999)
Hill River - Hill River Springs	617002	45 km south-west	902	1,930	0 (1974)	14,671 (1977)

As both the Arrowsmith River and Hill River are classified as second order Strahler streams and have comparable contributing catchment areas to Warradarge Creek at the downstream Project Site boundary, it is expected that surface water flows may be similar to recorded streamflow observations (up to 35 m^3/s and 25,000 ML per year) at the Site following rainfall events and/or wet periods where base soil saturation is increased from average year conditions. While there may be differences in peak flow rates within the Site catchment relative to nearby catchments, it is widely accepted that peak flows recorded in nearby catchments with similar hydrologic properties can be used to estimate peak flows in catchments with no available recorded peak flow data.

4.7.4. Surface water quality

Limited relevant surface water quality data was available for review, with no historical water quality monitoring sites or publicly available water quality data identified within the immediate vicinity of the Project Site. The only water quality data available for review was electrical conductivity (EC) monitoring data for the Hill River – Hill River Springs (Gauge 617002) site.

Daily water quality monitoring records for gauge 617002 from 2010 to 2024 (Figure 4-9) indicated an average annual EC ranging from 2.65 mS/cm (2024) to 6.06 mS/cm (2017) with an overall average of 4.54 uS/cm, indicative of freshwater. EC records above 5 mS/cm are potentially due to elevated sediment loads likely associated with rainfall events and/or relatively wet periods.

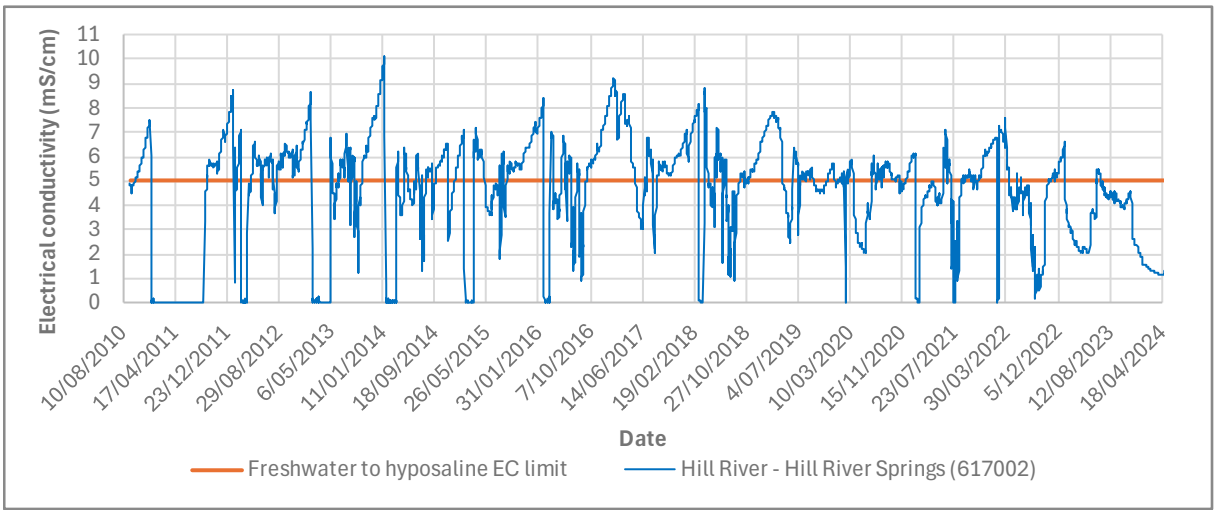

Figure 4-9 Historical EC at Hill River gauge 2010 – 2024

No water quality parameter data was available for the Arrowsmith River – Robb Crossing (gauge 701005) site. This site is located outside of the Warradarge Creek/Hill River and Eneabba Creek catchments and is therefore not representative of surface water quality at the Site.

4.8. Hydrogeology

4.8.1. Hydrostratigraphy

The Site is located within the Northern Perth sedimentary Basin and overlaps the boundary of the Dandaragan Plateau and the Arrowsmith Region zones as noted in Section 4.3. The primary aquifers of the Northern Perth Basin comprise:

- The Surficial (Upper) aquifer, forming part of the extensive palaeodrainage systems of the Dandaragan Plateau, regionally consisting of mid to late-Quaternary sediments up to 65 m thick (WA DOW, 2017). Where this Upper aquifer is found it typically overlies the Parmelia and Yarragadee formation aquifers with regionally variable hydro-connectivity to the underlying formations.
- Leederville-Parmelia aquifers in the Dandaragan Plateau landscape zone covering the majority of the Project Site including eastern and central portions.
- Yarragadee aquifer in the Arrowsmith landscape zone covering the south-western and north-western portions of the Site roughly west of the Eneabba fault, and underlying the Parmelia aquifer in the central and eastern portions of the Site.

The upper paleochannel aquifers, typically formed in surficial Quaternary sediments, receive direct recharge from rainfall, and are highly variable in presence and reliability. There is evidence of perched and semi-continuous shallow upper paleochannel aquifers at and surrounding the Site based on regional mapping and the presence of soaks (discussed further in Section 5.3) and bore drilling records where total depth is less than 20 mbgl.

The shallow paleochannel and Leederville-Parmelia aquifers, located within the Parmelia Group formations, in the eastern portion of the Site are underlain by the Yarragadee aquifer. The Otorowiri formation, a fine-grained aquitard, separates the Leederville-Parmelia aquifer in the east from the Yarragadee aquifer below and in the western portion of the Site where the Yarragadee formation outcrops.

A summary of the hydrogeological characteristics of key aquifers is provided in Table 4-7, which is based on previously referenced data and data from the Department of Water bulletin “Northern Perth Basin - Geology, Hydrogeology and Groundwater Resources”, 2017.

Table 4-7 Aquifer hydrogeological characteristics

Aquifer	Hydrogeological characteristics
Surficial (Upper) aquifer Channel deposits	The channel deposits comprise an extensive palaeodrainage system on the Dandaragan Plateau consisting of mid to late-Quaternary sediments. Recharge is from rainfall and local runoff. Groundwater flow is likely to be towards the west, discharging as small springs where the surficial deposits pinch out. Water quality is likely to be highly variable.
Leederville-Parmelia aquifer	Major aquifer below the coastal plain south of Cataby (combined with Parmelia Group beneath Dandaragan Plateau to form the Leederville–Parmelia aquifer). Upper aquifer units include early Cretaceous sandstones siltstones-shales and late Jurassic sandstone and siltstones, often hydrogeologically connected with the Yarragadee aquifer, though below the Dandaragan Plateau separated from the Yarragadee by the extensive Otorowiri aquitard. Regionally consisting primarily of late Jurassic-early cretaceous Parmelia Group Sandstone, siltstone and shale, becoming more shaley to the north. Water Quality: Fresh
Yarragadee aquifer	Mid to late Jurassic shale, siltstone, sandstone and clayey sandstone, major regional aquifer. Water Quality: Fresh to brackish

4.8.2. Groundwater levels

Site-specific groundwater level information was available for 15 of the 35 identified groundwater bores drilled within the Project Site boundary. Available details were reviewed for 10 additional bores located within a 5 km radius of the Site, as summarised in Table 4-8. Construction details such as screen depths are presented where available to better understand potential aquifer connectivity and hydrostatic pressure.

The available standing water levels (SWLs), bore locations and topographic surface elevation were used to determine potentiometric groundwater elevations for each identified aquifer, with Parmelia bores typically showing shallower groundwater than the deeper Yarragadee, as shown in the hydrogeological cross section presented in Figure 4-10 as adopted from previous investigations of the Northern Perth Basin (WA DOW, 2017).

Note, the data quality for the SWL information used is unknown, and limitations exist in that not all SWL measurements were recorded at the same time. Resulting groundwater level contours/depth to groundwater are shown in Figure 4-11.

Table 4-8 Summary of available bore details within 5 km of Site

Well Number	Proximity to Site	Purpose	Drill depth (mbgl)	Screen depth (mbgl)	Aquifer	SWL (mbgl)
61710428	North central	Unknown	-	-	Upper	11.5
61711387	North-west	Stock	15.24	-	Upper	3.35
61711388	North-west	Unknown	13.11	-	Upper	3.96
61711389	Near western boundary	Unknown	17.07	10.97-17.07	Upper	9.14
61711390	Near centre	Unknown	10.97	-	Upper	<10
61714963	West central	Stock	10.36	-	Upper	2.44
61714964	West central	Unknown	7.32	-	Upper	4.06
61714974	South-west	Unknown	20	-	Upper	6.3
61700395	Near south-eastern boundary	Unknown	204	194-200	Parmelia	19.19
61711381	North central	Stock	36.58	30.6-36.6	Parmelia	25.91
61711382	North-east	Stock	28.65	-	Parmelia	16.76
61711384	North	Unknown	46.02	-	Parmelia	27.43
61711383	~2 km north	Stock	51.21	45.2-51.2	Parmelia	32.92
61712827	~2 km east	Stock/domestic	62.18	-	Parmelia	47.24
61712835	East central	Irrigation	115.8	99-105 108.3-114.3	Parmelia	85.3
61718127	North central	Monitoring	487	459-465	Yarragadee	171.47
61711379	~1.5 km west	Unknown	152.1	-	Yarragadee	137.16
61718128	~1.5 km west	Monitoring	718	543-549	Yarragadee	117.7
61718129	~1.5 km west	Monitoring	216	171-177	Yarragadee	109.68
61718130	~1.5 km west	Monitoring	402	387-393	Yarragadee	106.24
61714965	~1.5 km south-west	Unknown	-	-	Yarragadee	99.06
61718122	~3.5 km east	Monitoring	762	662-674	Yarragadee	67.65
61711451	~3.5 km west	Water Supply	202	103.7-115.9 134.2-195.2	Yarragadee	97.36
61700558	~5 km south-west	Unknown	150	144-500	Yarragadee	127.3
61700559	~5 km south-west	Unknown	305	288-300	Yarragadee	127.6

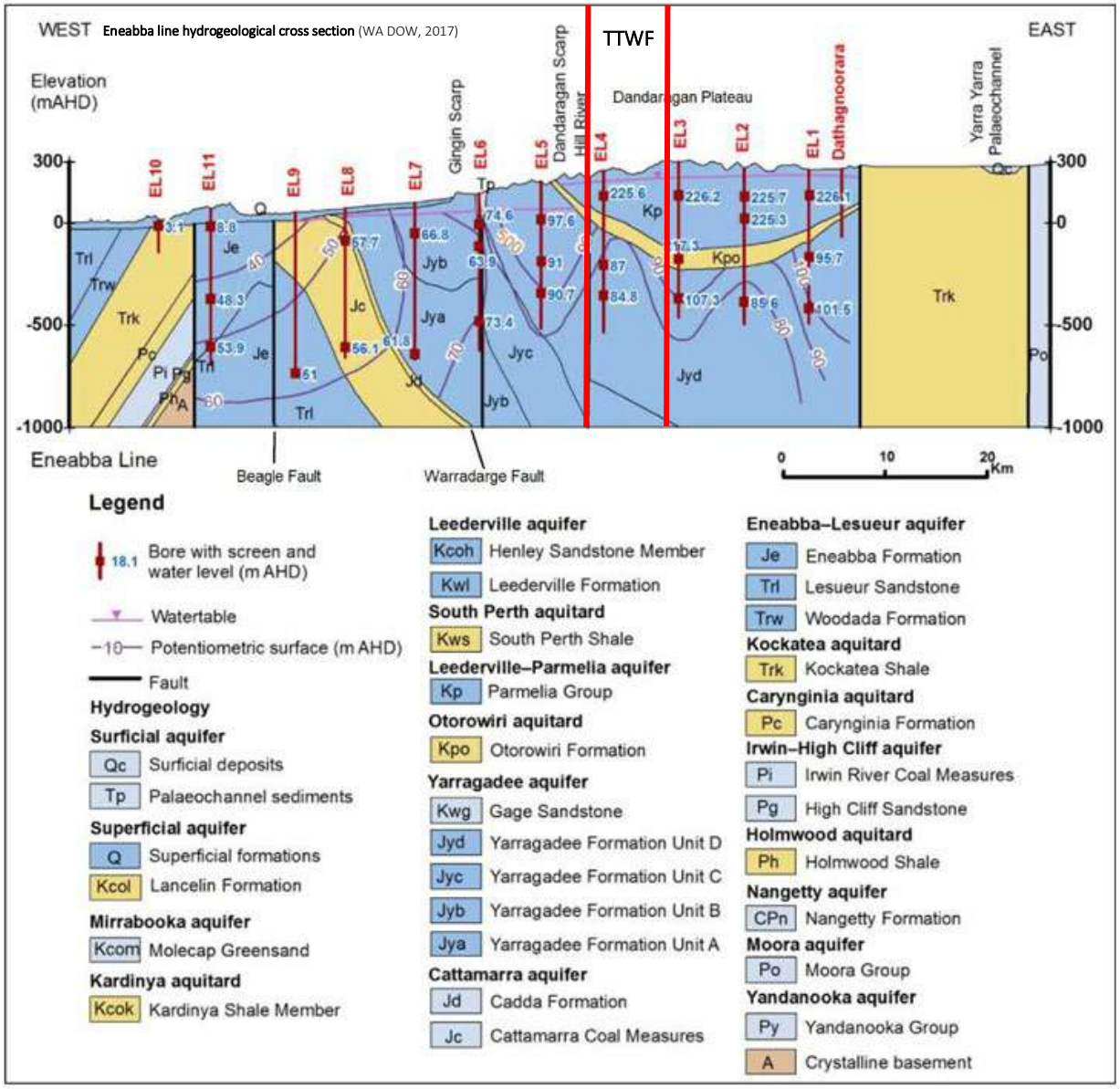

Figure 4-10 Eneabba Line cross section (WA DOW, 2017)

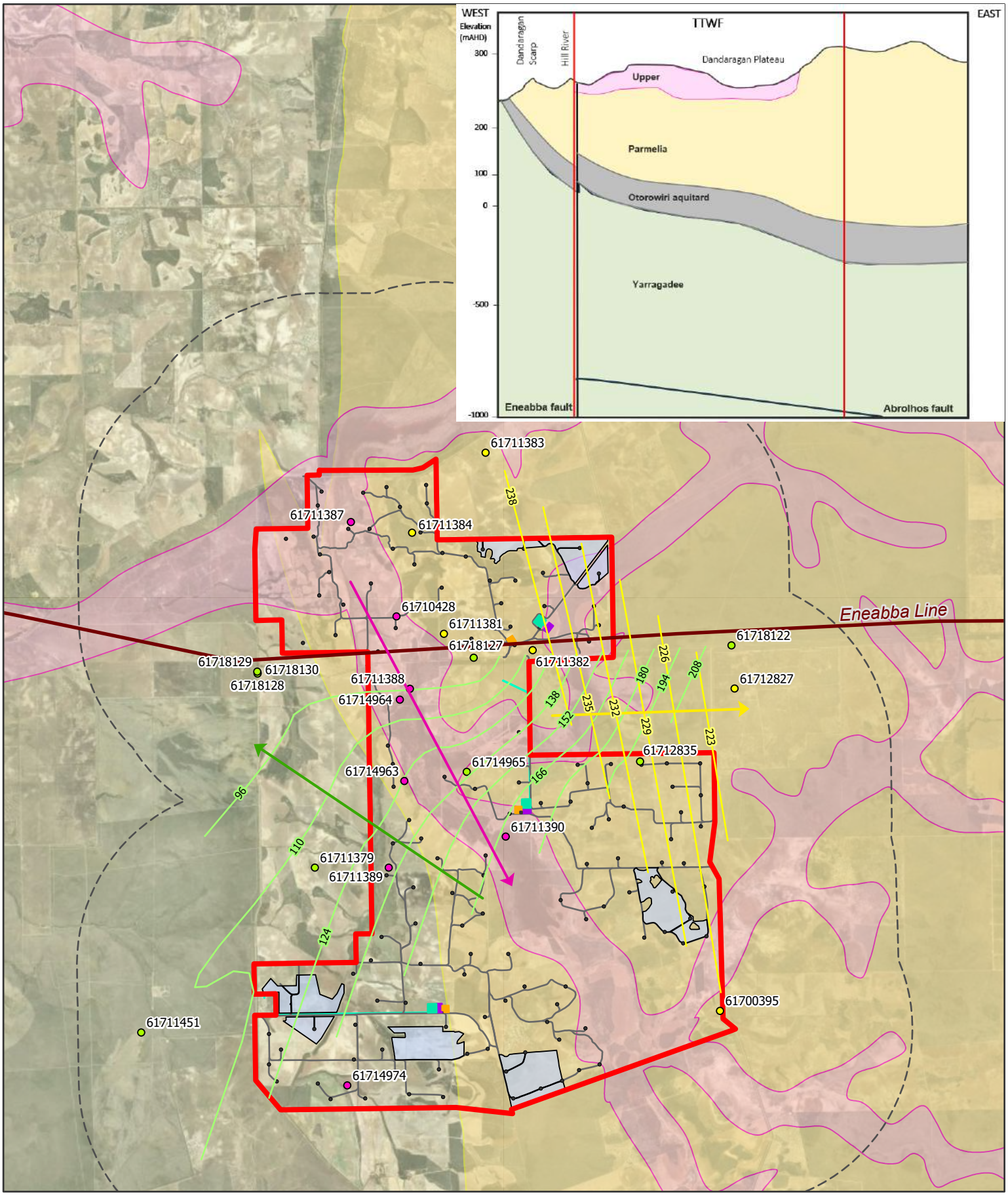

Figure 4-11 Groundwater level and flow direction

- Project Site boundary
- 5km Site buffer

Proposed layout
- Building
- 330kV substation
- BESS
- Construction areas
- Transmission line
- Proposed roads
- Wind Turbine
- Solar Panels

Aquifer
- Palaeovalley (Upper)
- Leederville-Parmelia
- Yarragadee
- Groundwater bore - Upper
- Groundwater bore - Parmelia
- Groundwater bore - Yarragadee
- Potentiometric groundwater elevation - Parmelia
- Potentiometric groundwater elevation - Yarragadee

Groundwater flow direction
- Upper
- Parmelia
- Yarragadee

0 1.25 2.5 5
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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4.8.3. Groundwater quality

The salinity of a groundwater resource is a broad measure of the beneficial use or value of the resource. Fresh water has a wide range of uses and high community value and can be used for drinking purposes. Groundwater of increasing salinity has limited uses. Very saline water can generally only be used for industrial or mining purposes. The groundwater quality parameters for determining whether groundwater is considered fresh, marginal, brackish, saline or hypersaline is from Operational Policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence (WA DOW, 2009), and is tabulated below.

Table 4-9 Water quality labels

Quality	Salinity (TDS mg/L)
Fresh	<500 mg/L
Marginal	501–1500 mg/L
Brackish	501–1500 mg/L
Saline	5001–50 000 mg/L
Hypersaline	>50 000 mg/L

Regionally, the Upper and Parmelia Aquifers have a salinity, which is fresh to generally fresh, with the Groundwater Salinity Statewide DWER-026 (WA DWER, 2018) mapping indicating a regional salinity (Total Dissolved Solids) for the Site of 500-1000 mg/L. A summary of available groundwater quality monitoring data from all available dates within 5 km from the Site is presented in Table 4-10.

Table 4-10 Summary of available groundwater quality data within 5 km of Site

Bore ID	Screen depth (mbgl)	Temp (°C)	pH	EC (µS/cm)	TDS (mg/L)
61711453	144 - 533	-	6.2	-	650
61711452	208 - 533	-	6.6	-	690
61714571	-	20	6.4	3626.37	2,300
61714825	Eneabba Springs	20	6.3	1514.67	960
61714965	-	20	5.8	1017.15	640
61710429	-	-	-	-	790
61711431	(drilled depth 18.29m)	-	-	-	4,630
61711397	113.08 – 119.18	-	-	-	471
61710430	-	-	-	-	790
61710452	-	-	-	-	1,080
61711386	(drilled depth 14.02m)	20	6.7	3184.13	2,010
61711377	166.12-170.69	-	-	-	900
61711372	Sample depth 91.4-107.6	20	6.2	1160.88	740
61712832	(drilled depth 46.5m)	-	-	-	176
61718124	71.3-77.2	20	7	1149.8	730
61718125	607.6-613.6	20	7.9	2100.6	1,230
61710428	Sample taken 11.5m bTOC	21.6	5.7	1122	-
61710450	Sample taken 0.5m bTOC	21.7	5.3	2580	-
61711376	12.9-18.29	-	-	-	2,488
61711383	32.9-51.2	20	5.8	1127.71	720
61714964	4.1-7.3	20	6.3	1791.1	1,140
61718126	(drilled depth 7.32m)	-	-	-	465
61711363	35-61	20	6.9	1271.44	800

Bore ID	Screen depth (mbgl)	Temp (°C)	pH	EC (µS/cm)	TDS (mg/L)
61711379	(drilled depth 152.1m)	-	-	-	629
61714974	6.3-20	20	5.4	3537.92	2,240
61718122	662-674	20	7.5	5096.7	3,230
61711380	(drilled depth 18.59)	-	-	-	140
61711385	Sample depth 0.61m	20	7.2	12161.6	7,700
61711388	(drilled depth 13.11)	-	-	-	600
61711432	(drilled depth 18.29)	-	-	-	877
61718130	386.96-392.96	24	10.4	696.5	460
61711381	25.9-26.6	20	6.3	583.86	291
61711382	(drilled depth 28.65)	-	-	-	200
61711389	10.97-17.07	-	-	-	486
61712827	Sample depth 47.2m	20	6.9	995.04	630
61712835	99-105, 108.3-114.3	-	-	-	543
61711378	166.42-169.47	-	-	-	729
61711387	3.3-15.2	20	6.1	784.97	490
61714963	2.4-10.4	20	6.8	895.54	570
61718123	472.3-478.3	20	7.5	1481.4	940
61718128	543-549	-	-	-	805
61718127	459-465	24.5	11.7	1930	-
61718129	171-177	20	7.2	718.6	460
61710451	Sample depth 5.5m btoc	-	-	-	600
61714973	-	20	5.8	1160.88	740

4.8.4. Key groundwater environment characteristics

The key characteristics of the groundwater environment (summarised primarily from Department of Water, 2017) at the Site are summarised in Table 4-11.

Table 4-11 Groundwater environment characteristics

Aquifer	Depth/thickness	Confinement	Salinity	Recharge
Upper	<65m	Unconfined	Fresh	Rainfall and streamflow driven. Higher percentage of rainfall contributing to upper aquifer recharge than the deeper aquifers.
Parmelia (Leederville – Parmelia)	Surface (at outcrops) or below surficial deposits, typically 500m regional thickness	Unconfined where there is formation outcropping	Marginal to Fresh	Primarily from rainfall at outcropping areas (approx. 8mm per year). Local aquifer recharge from surface drainage along paleochannels.
Yarragadee	Generally <1000m, maximum regional thickness 4000m	Confined to semi-confined under the Dandaragan Scarp, unconfined where the Yarragadee formation outcrops east of the Dandaragan Scarp. Likely unconfined under the Site.	Marginal to Fresh	Likely from rainfall at outcrops (approx. 16-30mm per year) and through hydroconnectivity to the Leederville-Parmelia via channel deposits and where the Otorowiri Aquitard is displaced by Eneabba Fault.

4.9. Ecology

As noted in previous preliminary investigations (WSP, 2024), the ecological setting at the Project Site hosts populations and/or suitable habitat for 31 threatened and priority flora and fauna species protected under the Environment Protection and Biodiversity Conservation Act (EPBC Act 1999), including migratory avian species. Of these, 6 are listed as critically endangered:

- Curlew Sandpiper
- Eastern Curlew
- Northern Serrate Dryandra (banksia)
- Eremophila subangusifolia (flowering figwort)
- Styphelia longissimi (flowering erica)
- Tetratheca nephelioides (quandong).

Of the remaining listed species, 17 are endangered and 11 vulnerable.

Although habitat for priority species has been identified in the region, the majority of the Site has been historically cleared and it is considered unlikely for significant populations of the above species to be present at the Site. A Flora and Fauna Assessment should be undertaken to confirm risk of impact to priority species and other Biodiversity values.

4.9.1. Vegetation mapping

Vegetation mapping undertaken at the Site in 2024 confirmed presence of 12 native vegetation landscapes including heathlands, low woodlands, shrubland and mixed mallee types of good or better condition, although only a small proportion was mapped as Excellent. No areas of the site were mapped Pristine. The majority of the Site (71%) comprised highly modified areas where remnant vegetation has been removed with only isolated remnant trees and shrubs remaining in either Completely Degraded Condition or Cleared. In addition to vegetation, other observed landscape types within the Site included dams (artificial water bodies), cleared pasture, cleared land and cropped areas, planted and revegetated areas and developments (roads and infrastructure) (Umwelt, 2025). Mapping is shown in Figure 4-12.

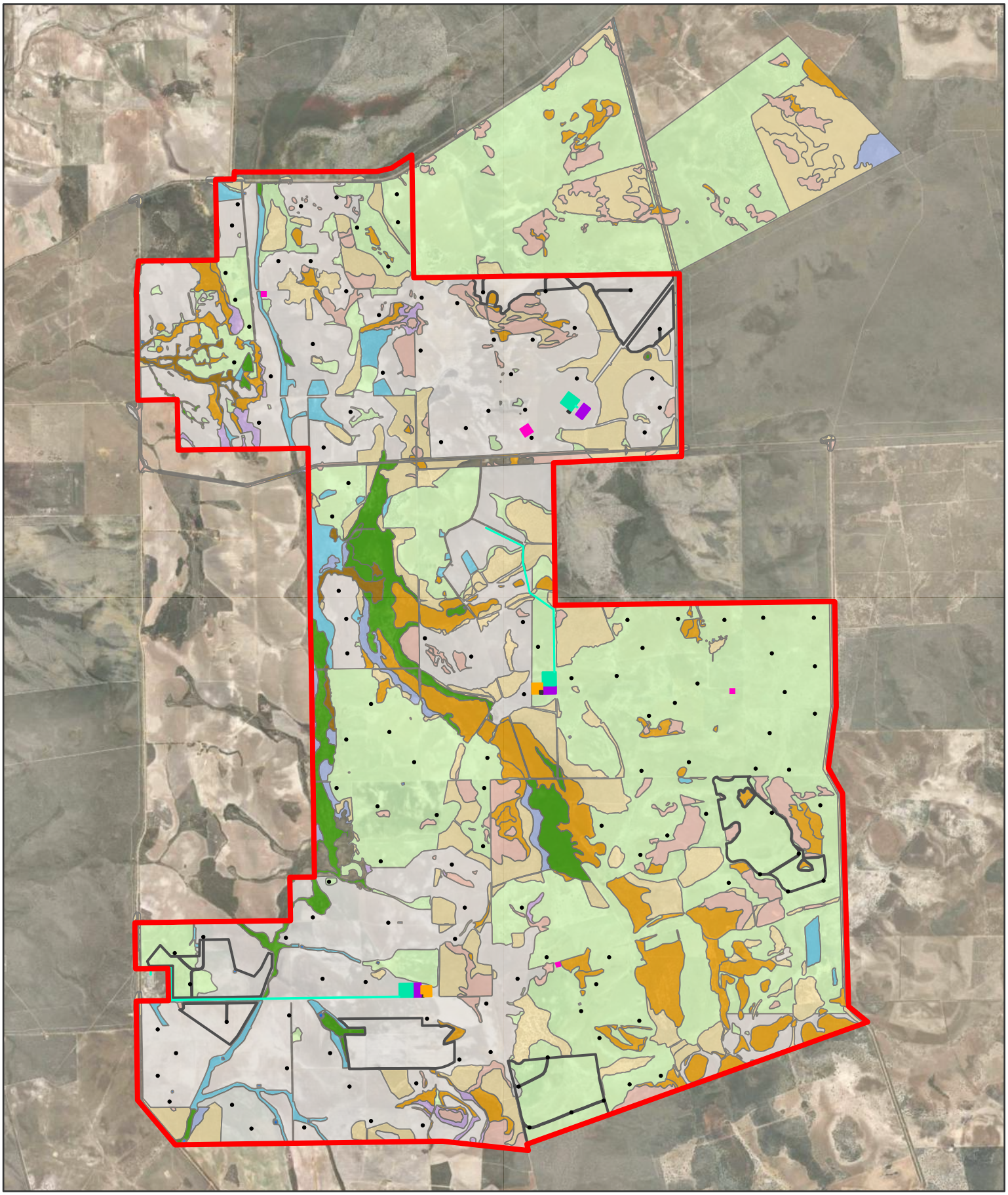

Figure 4-12 Vegetation mapping (Umwelt, 2025)

Project Site boundary
Proposed layout
Building
330kV substation
BESS
Construction areas
Construction laydown area
Transmission line
Wind Turbine
Solar Panels

Vegetation mapping type (Umwelt, 2025)
Artificial waterbodies (including dams)
Planted area
Mostly cleared pasture
Cleared land
Cleared land (including roads and infrastructure)
Low woodland
Low open woodland
Low sparse woodland
Tall shrubland
Low woodland/mixed mallee
Closed shrubland
Sparse mid heathland

0 0.75 1.5 3
Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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4.10. Water resource management

Water use in WA falls under the *Rights in Water and Irrigation Act 1914* (RIWI Act) as discussed in Section 2 and is regulated by WA Department of Water and Environmental Regulation (DWER) to manage water allocation planning and water supply licensing.

4.10.1. Surface water management

For surface water management purposes, the Project is located within the Mid West – Gascoyne Region and predominantly in the Hill River and Tributaries Surface Water Management Area, with a small portion of the site to the west of Warradarge Creek and overlying the upper reaches of Eneabba Creek falling into the Eneabba Coastal Tributaries Surface Water Management Area. Rivers in the Mid West region flow intermittently, with fresh surface water for reliable use limited.

There are no Public Drinking Water Source Areas (PDWSA) located within 5 km of the Site, with the closest being the Eneabba Water Reserve, proclaimed in 1992 under the *Country Areas Water Supply Act 1947* (WA Government, 2017), located 10 km to the west. The Site is approximately 20 km from the closest PDWSA; Dathagnoorara Water Reserve to the east, though this is a groundwater resource (see Section 4.10.2). Other surface water resource PDWSAs are >40 km from the Study Area. The PDWSA locations relative to the Site are shown in Figure 4-13.

4.10.2. Groundwater management

For groundwater management purposes, the Project is located across the Tathra and Twin Hill Groundwater Management Subareas within the greater regional Arrowsmith Groundwater Management Area (GMA), proclaimed in 1975 under the RIWI Act through the Eneabba Water Reserve drinking water source protection plan (WA DOW, 2008). The management strategies outlined in the plan also apply to the Dathagoorara Water Reserve, including requirements to obtain a licence for construction of boreholes and extraction within the proclaimed GMA.

The DWER Contaminated Sites Database does not indicate there to be classified contaminated land or groundwaters in or immediately adjacent to the Site, with the closest registered contaminated site identified as a compressor station (CS08) located approximately 3 km south-west of the Site. Although preliminary investigation has not identified contaminated soil or groundwater at the Site (WSP, 2024), it is important to note that this does not guarantee the Site is free from contamination and that further investigation is recommended, particularly if there is going to be sensitive uses of groundwater on site, such as abstraction for human consumption (WA DWER, 2025).

Due to the variability of recharge in the Surficial aquifers at the Site, they are likely to be low yielding with a typically small supply of <100 kL/day. In contrast, the Parmelia aquifer and deeper Yarragadee aquifer can supply >500 kL/day and >1,000 kL/day. Considering both the Project water supply requirements of approximately 500,000 KL/annum for 18-24 months per each potential stage or asset (2-3 years) at a target pump rate of 15 L/s and the water quality, the Parmelia aquifer may be the most suitable source for construction and operations. However, the DWER has noted that groundwater in the Parmelia formation at the Project Site is fully allocated. Therefore, the Yarragadee aquifer may be considered as a potential groundwater resource for the Project noting variable water quality ranging from fresh to brackish (Carse, 2024). A summary of the key groundwater resources and availability based on DWER advice provided to SynergyRED in September 2024 is provided in Table 4-12. The GMAs are shown in Figure 4-13.

Table 4-12 Groundwater availability

Aquifer	GMA	Availability	DWER comment
Surficial (Upper)	Various	Available	Small supply, low yield (<100 kL/day)
Parmelia	Tathra	Fully allocated	Suitable yield (>500 kL/day), requires alternative trade or agreement
Yarragadee	Twin Hills	Available	Suitable yield (>1,000 kL/day) and quantity (up to 700,000 kL/annum under allocation and additional alternative agreement)

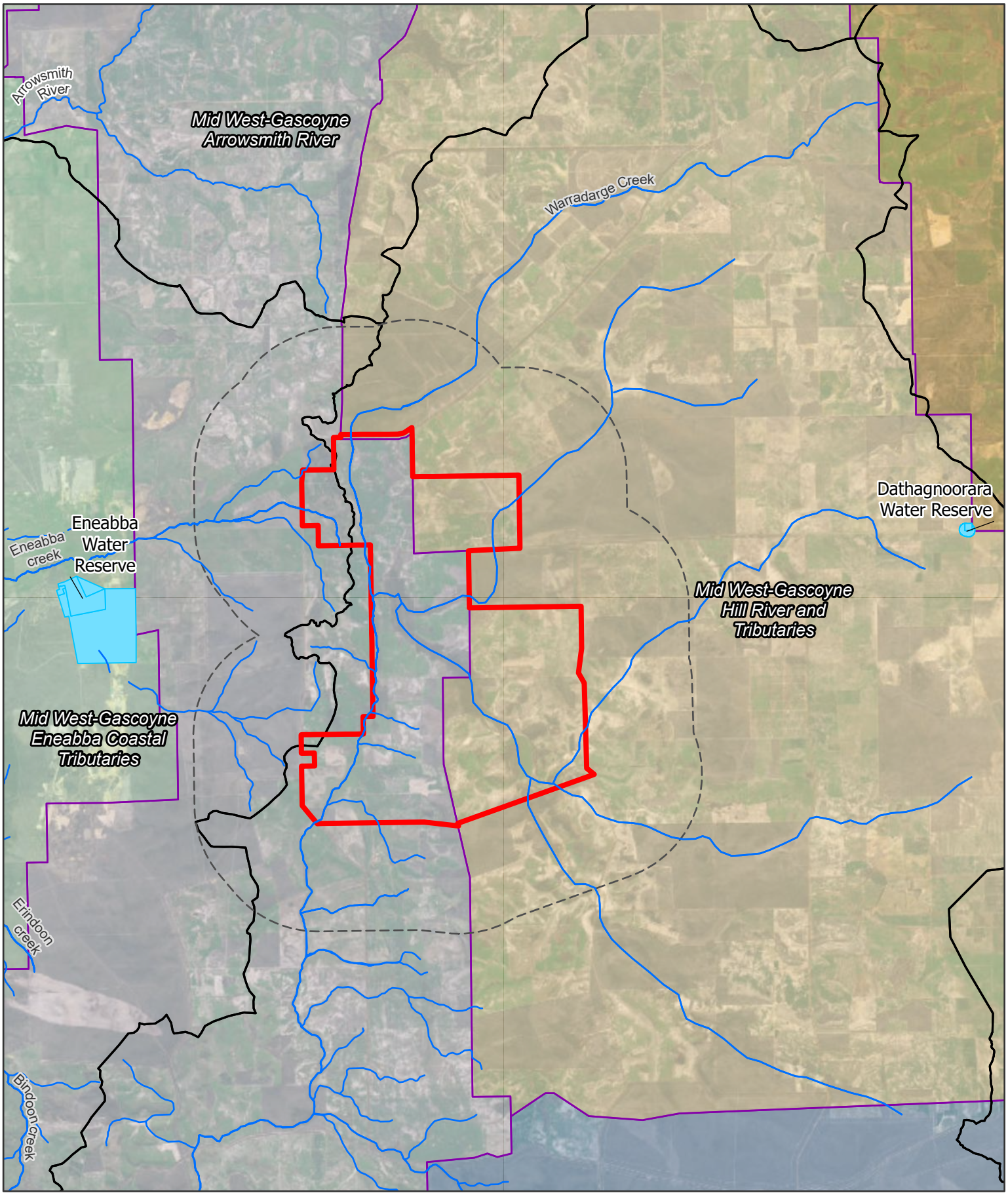

Figure 4-13 Public Drinking Water Source Areas and Groundwater Management Areas

- Project Site boundary
- 5km Site buffer
- Drainage lines
- Surface Water Management Area
- Public Drinking Water Source Area

Groundwater Management Area

- Tathra
- Twin Hills
- Eneabba Plains
- Morrison
- Darling

0 2 4 8
Kilometers

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5. Hydrogeology assessment

5.1. Registered groundwater bores and other users

There are 47 registered groundwater bores within 2 km of the Site (see Figure 4-4). Of these, 10 are registered as being for stock watering purposes/domestic use, 1 for irrigation and 7 for monitoring purposes. The 29 remaining bores are registered as Unknown. Many of these bores are likely to be associated with domestic/stock usage or similar, though on-Site inspections and monitoring to observe the condition, usage status and well details (structure, SWL, water quality) is recommended as part of the overall Site investigations.

Due to known groundwater use for livestock watering, irrigation and domestic purposes it is deemed appropriate to consider the end users of groundwater as potential receptors for the purposes of impact assessment.

5.2. Cultural heritage places

According to the mapping provided by the Department of Planning, Lands and Heritage (DPLH, 2025) registered and lodged Aboriginal cultural heritage places are not present within or immediately adjacent to the Project Site. The closest aboriginal heritage record to the Site is greater than 9 km away based on an Aboriginal Cultural Heritage Inquiry System database search conducted in late 2024; two European Heritage site records were indicated at Eneabba Township approximately 15 km west of the Site (WSP, 2024).

Based on the proximity of both aboriginal and European cultural heritage records, it is considered unlikely that cultural heritage places will be impacted from Project activities. However, contingency measures to manage potential impacts broadly considers cultural heritage within recommended impact management strategies (see Section 7).

Note, this report is not designed to provide a comprehensive Aboriginal cultural heritage assessment beyond what pertains to the site and potential environmental (particularly surface and groundwater associated) sites registered as Aboriginal cultural heritage.

5.3. Groundwater Dependent Ecosystems

GDEs can be broadly classified into three major classes (Eamus, Fu, Springer, & Stevens, 2016):

I. GDEs that reside within groundwater (such as stygofauna and karst systems).
II. GDEs requiring the expression of groundwater at the surface (such as springs and wetlands).
III. GDEs dependent upon sub-surface availability of groundwater accessible to vegetation (such as woodlands and riparian forests).

The GDE Atlas (Australian Bureau of Meteorology, 2025) is a national dataset of Australian GDEs sourced from the 2009-12 national assessment and updated with recent regional studies. The Atlas contains information about three types of ecosystems:

- Aquatic - ecosystems that rely on the surface expression of groundwater e.g. springs, wetlands and rivers.
- Terrestrial - ecosystems that rely on the subsurface presence of groundwater e.g. vegetation.
- Subterranean ecosystems - caves and aquifer ecosystems.

Note, there was no data on the GDE atlas regarding subterranean GDEs for the Site. ELA recommends a localised Subterranean GDE investigation should be undertaken if groundwater or subterranean structures are deemed likely be impacted through potential abstraction of groundwater (requirement to be determined).

Information from the GDE atlas indicates the presence of many potential terrestrial GDEs within the Site Area, with GDE probability (likelihood of groundwater dependency from national assessment) ranging from high to low potential GDEs as shown in Figure 5-1 (Australian Bureau of Meteorology, 2025).

Onsite GDEs have been mapped as the following:

- Low Potential terrestrial GDEs – typically shrub lands of scrub-heath on lateritic sandplain in the central Geraldton Sandplain Region or mixed heath, on a geomorphology of 'Dissected ferruginous plateaus and hills on sedimentary rocks with areas of sandplain'. These are distributed over large portions of the Site Area on the plateaus, slopes and low-lying areas within the Site Area.
- Moderate Potential terrestrial GDEs - predominantly found in the low-lying areas and slopes within the Site Area, typically shrublands, particularly Melaeuca uncinata thicket and scrub-heath on lateritic sandplains.
- High Potential terrestrial GDEs – Found in the low-lying areas of the Site Area, mapped as Shrublands; Melaeuca uncinata thicket. This vegetation community is highly likely to exhibit groundwater dependency within the Site and surrounds.
- Aquatic GDEs – The mapped onsite aquatic GDEs mostly range from moderate to high probability of groundwater dependency. The previously identified wetland portion of Warradarge creek that flows north south in the western portion of the Site is considered to support aquatic GDEs in the form of a watercourse with an associated floodplain.

In addition to the Warradarge Creek wetland and aquatic GDE at the Site, there are two locations where expression of groundwater at or near surface as soaks or springs are recorded as Aquatic GDEs.

- Eneabba Springs: Permanent, near permanent, unconfined Parmelia Formation, consolidated sedimentary, < 1500 mg/L TDS, dominantly groundwater reliant. Spatially associated with Eneabba fault and displacement of the Otorowiri Aquitard. May be associated with onsite groundwater bore 61714825, this is likely not a bore installation but a record of the existence and possible development of the spring – though this would require onsite inspection to confirm.
- White Horse Soak: Permanent, near permanent, unclassified potential GDE - from regional studies. Likely a surface expression of the mapped onsite Surficial (Upper) aquifers.

Overlapping the GDE assessment with the Native Vegetation Extent DPIRD-005 (WA DPIRD, 2023), a data set containing native vegetation extent polygons from the mapping of remnant vegetation in Western Australia, shows a high correlation between potential GDEs and mapped native vegetation extents. The Lesueur area/subregion contains shrub heaths rich in endemics with over 250 species of sandplain flora endemic to the subregion (Desmond & Chant, 2001). These communities can host both rare flora and fauna such as:

- Rare Vertebrates including: Peregrine Falcon (Falco peregrinus), Malleefowl (Leipoa ocellata), Carnaby's Cockatoo (Calyptorhynchus latirostris), Boullanger Island Dunnart (Sminthopsis griseoventer boullangerensis), Southern Dibbler (Parantechinus apicalis), Carpet Python (Morelia spilota imbricata), Simoselaps calonotos, Western Spiny-tailed Skink (Egernia stokesii badia).

- Rare Flora: A large number of rare flora are recorded from the area.

Five vegetation types including host communities to the above (such as Melaleuca uncinata thicket and scrub-heath on lateritic sandplain) have been mapped on Site (see Section 4.9.1), often with moderate to high probability of groundwater dependence, particularly in the low-lying areas associated with watercourses and/or wetlands (Umwelt, 2025).

ELA assumes that detailed vegetation mapping and comprehensive ecological investigation of the terrestrial and aquatic communities of the Site will inform development of management controls to limit disturbance of the native vegetation or disruption of the groundwater conditions, thus ensuring sensitive floral and faunal communities are not impacted by Project construction and operational activities.

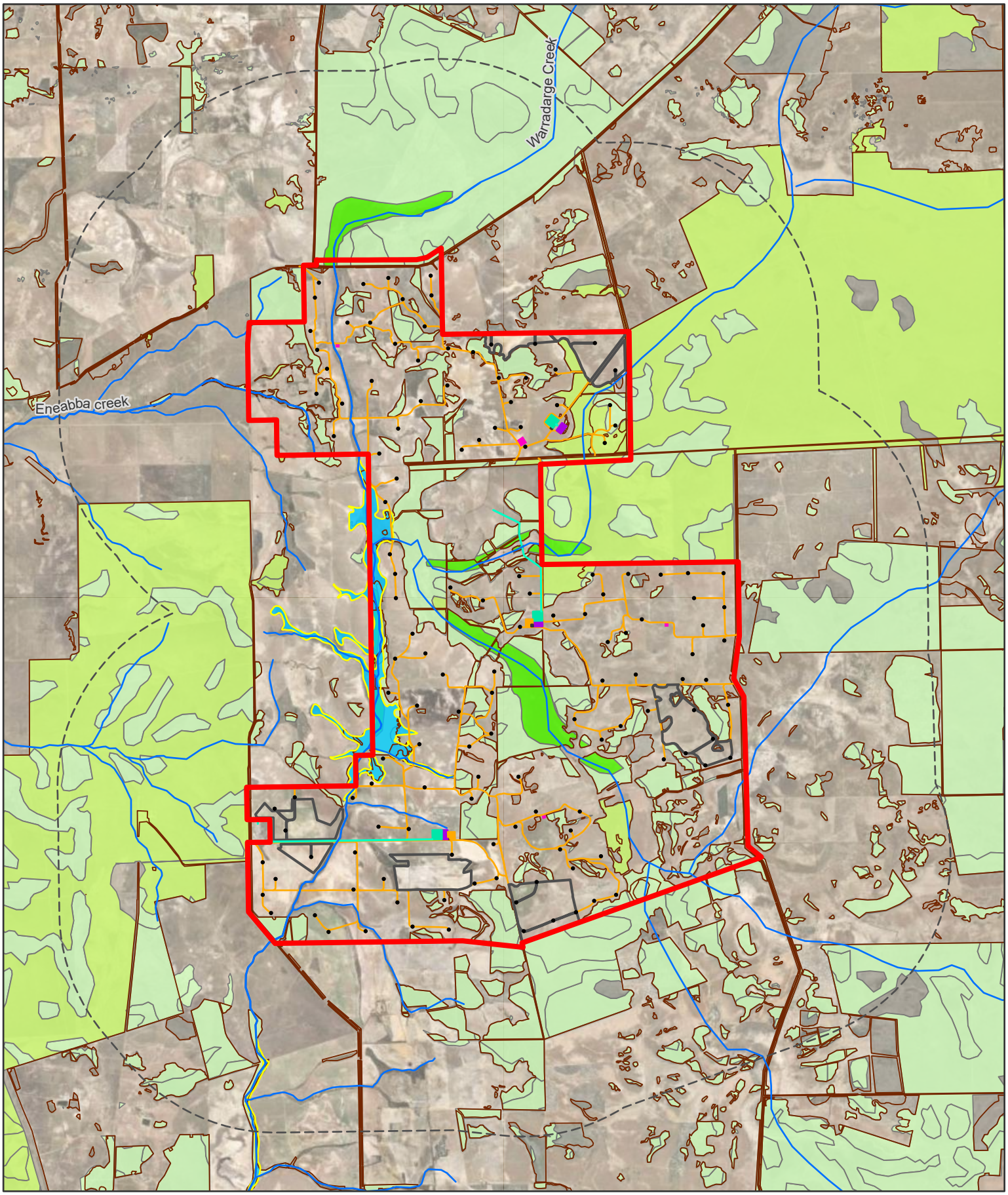

Figure 5-1 Wetlands and GDEs

- Project Site boundary
- 5km Site buffer
- Drainage lines
- Geographic Wetland Extent (DBCA)
- Native Vegetation extent (DPIRD, 2005)

Proposed layout

- Building
- 330kV substation
- BESS
- Construction areas
- Construction laydown area

Aquatic

- Known GDE - from regional studies
- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment
- Unclassified potential GDE - from regional studies
- Unclassified potential GDE - from national assessment
- Transmission line
- Wind Turbine
- Proposed roads
- Solar Panels

Terrestrial

- Known GDE - from regional studies
- High potential GDE - from national assessment
- Moderate potential GDE - from national assessment
- Low potential GDE - from national assessment
- Unclassified potential GDE - from regional studies
- Unclassified potential GDE - from national assessment

0 0.75 1.5 3
Kilometers

Datum/Projection: GDA2020 MGA Zone 50

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6. Surface water assessment

6.1. Wetlands

Based on a review of the Geomorphic Wetlands Cervantes Eneabba (DBCA-015 spatial file sourced from Data WA), there is one Geomorphic Wetland within 5 km of the Site, located along the central western boundary of the Site along Warradarge Creek (WA DBCA, 2017), which flows through the Site generally from north to south as shown in Figure 5-1. Although the likelihood and potential distribution of ASS in this wetland is low and restricted, it is noted that ASS potentially forms in wetland (with dependent vegetation such as Melaleuca spp.) conditions (WA DER, 2015).

A search of the DCCEEW Directory of Important Wetlands indicates that the closest classified wetland to the Site is Lake Logue/Indoon, located approximately 33 km west of the Site. The Lake Logue/Indoon system is intermittently connected by shallow groundwater systems of the Surficial (Upper) aquifer to smaller ephemeral wetlands to the north and south (WSP, 2024). There are no classified Ramsar or Important Wetlands located within a 5 km radius of the Site.

Characterisation of hydrogeology, hydrostratigraphy and depth to groundwater information for the Site indicates likelihood that there is some limited groundwater-surface water interaction, particularly within paleochannels of the Surficial (Upper) aquifer and along the primary Warradarge Creek line.

The potential interaction between surface water and groundwater suggests potential presence of GDEs at the Site, which may include sections of creek lines, wetlands or other natural depressions in terrain.

6.2. Drainage features

A review of the existing hydrological environment identified the following key drainage features relevant to the site:

- Warradarge Creek and tributaries, flowing from east to west through the central and south-eastern portions of the Site then south through the western portion of the Site.
- Upper reaches of Eneabba Creek flowing west from the north-western portion of the Site.

The major streamlines as mapped by DWER (2025) indicate four tributaries from the east meet within the site forming a broad central wetland chain, which ultimately flows into Warradarge Creek that runs from north to south along the western site boundary.

Due to the presence of permanent first to third order drainages within the Site and which flow adjacent proposed wind turbine and infrastructure locations, surface water features are considered a potential receptor of impacts from the Project.

6.3. Flood risk

Information provided from the Soil landscape land quality - Flood Risk Map (WA DPIRD, 2005) suggests that the majority of the Site is classified as L1 (<3% of map unit has a moderate to high flood risk), equivalent to a low to moderate risk under the 1% annual exceedance probability event, while the north-west corner of Site between the Warradarge Creek and upper Eneabba Creek has a slightly higher flood risk of L2 (3-10% of map unit has a moderate to high flood risk). The area around Warradarge Creek tributaries in the central and south-eastern portions of Site are classified as either M2 (30-50% of map unit has a moderate to high flood risk) or H2 (>70% of map unit has a moderate to

high flood risk). A portion of the primary Warradarge Creek drainage line in the south-western corner of the Site are classified as H1 (50-70% of map unit has a moderate to high flood risk).

Although hydrologic modelling and flood hazard assessment was not undertaken for the Site as part of this assessment, the available desktop information reviewed corroborates general flood risk rating for the Site as low to high, as shown in Figure 6-1.

Notably, the proposed Project infrastructure, including solar, is generally located within areas classified as low to moderate flood risk, with only one turbine located in the north-western portion of the Site within an area classified as L2 (3-10% of map unit has a moderate to high flood risk).

It is noted that changes to hydrological regime and associated flood risk are possible as a result of proposed Project activities, particularly in locations where proposed access tracks intersect existing drainage features (minimum of nine locations, three of which are consistent with existing road waterway crossings and where it is assumed infrastructure is already in place but should be reviewed).

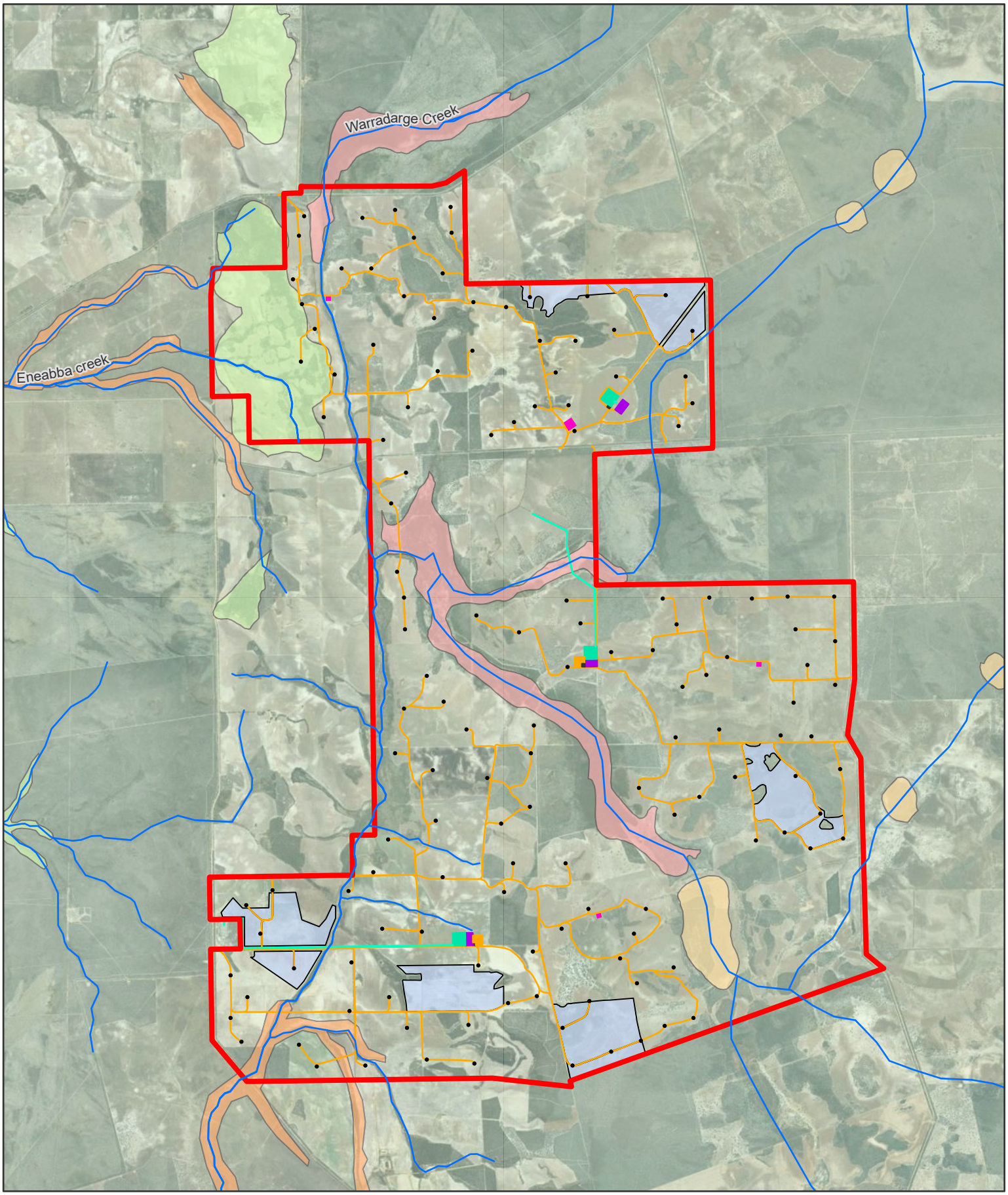

Figure 6-1 General flood risk (DPIRD, 2005)

Project Site boundary

Proposed layout

Building

330kV substation

BESS

Construction areas

Construction laydown area

Wind Turbine

Solar Panels

Proposed roads

Transmission line

Drainage lines

Flood risk classification

L1 - <3% moderate to high flood risk

L2 - 3-10% moderate to high flood risk

M1 - 10-30% moderate to high flood risk (none present)

M2 - 30-50% moderate to high flood risk

H1 - 50-70% moderate to high flood risk

H2 - >70% moderate to high flood risk

0 0.75 1.5 3

Kilometers

Datum/Projection:
GDA2020 MGA Zone 50

Project: 24ADL10052 Date: 7/11/2025

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7. Recommendations

Application of appropriate impact mitigation and control measures should be considered in all stages of the Project including design and construction, operational and decommissioning phases.

The following design measures relevant to mitigation of potential impacts to groundwater at the Site are recommended:

- Establishment and maintenance of buffer zones around natural surface water flow paths, high probability GDEs and wetlands, particularly along Warradarge Creek in the central western portion of the Site, to minimise potential construction and operational impacts. Turbine-free buffer zones should be, at a minimum, 30 m from ephemeral waterways, 50 m from designated waterways and 100 m from wetlands and major waterways, such as Warradarge Creek.
- Prior to construction, micrositing and review by proponent of proposed layout design excavation locations and depth to identify site-specific controls for construction of each turbine crane pad with respect to shallow groundwater systems.
- Consultation with DWER should be undertaken where works require a groundwater licence.

Recommended general construction phase management measures include:

- Utilisation of low impact construction techniques, such as limiting works to the immediate construction area and using designated laydown areas, to minimise soil disturbance.
- Appropriate stockpile management and earthworks, including designation of laydown areas, utilisation of bunding, silt fences and/or erosion control blankets to minimise sediment transport in event of rainfall and surface water runoff.
- Sediment and erosion control measures, such as silt fences, bunding and/or sediment traps, upstream and downstream of structure construction locations to intercept external flows, prevent siltation of shallow groundwater and prevent sedimentation in designated downstream waterways. These controls should be clearly outlined in a site Erosion and Sediment Control Plan (ESCP) and implemented in accordance with the ESCP.
- Stormwater and wastewater management measurements including separation of clean and dirty surface water areas to avoid and minimise potential downstream impacts from discharges within the development Site:
    - implementation of drainage systems to reduce potentially impacted stormwater infiltration into groundwater
    - use of permeable surfaces where possible (i.e. access tracks, substation) to promote natural infiltration of clean surface water.
- Spill prevention measures for hazardous materials including fuels and lubricants used during construction activities to prevent contamination.
- Management of temporary sewage systems in accordance with Industry Standard to prevent and respond to potential spills or overflows.

Additional operations phase impact mitigation measures may include:

- Re-vegetation of disturbed areas to stabilise soil and minimise potential erosion and sedimentation.

- Implementation of a comprehensive Stormwater Management Plan for the Site based on final detailed and operational design to adequately control runoff and reduce sediment loads that may affect potential receptors within and hydraulically downgradient of the Site.
- Utilisation of retention ponds, bioswales or other stormwater management infrastructure to manage peak flows and mitigate potential impacts to water quality.
- Ongoing monitoring to identify and address potential impacts (see Section 7.3).

7.1. Design considerations

Due to the potential for Project activities to effect hydrological regime, it is recommended to consider design of appropriately sized drainage infrastructure, such as culverts, at locations where proposed access tracks intersect existing drainage features.

In order to appropriately size drainage infrastructure, it is recommended that numerical surface water modelling is undertaken to inform design and impact assessment at the detailed design phase of the Project.

7.2. Water supply considerations

The Site lies within the Arrowsmith groundwater management area and hence falls under the Arrowsmith groundwater allocation plan (WA DOW, 2010), with the Site being split roughly evenly between the Tathra subarea in the east and the Twin Hills subarea in the west.

Table 7-1 shows the groundwater allocation and general regional water quality for each aquifer accessed in the two groundwater management subareas, from (WA DOW, 2010). Note that aquifers that lie below the Parmelia and Yarragadee formations (such as the Cattamara) have not been covered with any depth in this report, as for the planned development and operations at the Site Area, they are highly unlikely to be encountered or impacted during site works, including for construction, extraction or dewatering purposes.

Table 7-1 Groundwater allocation limits and water available for licensing

Resource		Allocation (kL/yr)	Unlicensed (kL/yr)		Licensable (kL/yr)	Status	Estimated yield	Quality
Subarea	Aquifer		Public Supply	Exempt unlicensed	General licensing			
Tathra	Parmelia	33 400 000	200,0000	810,000	30,590,000	available	>500 kL/day	Commonly fresh–marginal
	Surficial	(0)	0	0	(0)	unknown	<100 kL/ day/ variable in paleochannels	Marginal–brackish
	Yarragadee	700,000	0	0	700,000	available	>1000 kL/ day	Commonly fresh-brackish
Twin Hills	Cattamarra	500,000	0	0	500,000	available	>500 kL/day	Brackish–saline at depth
	Otorowiri	(100,000)	0	0	(100,000)	unknown	-	-
	Parmelia	3,400,000	0	0	3,400,000	available	-	-

Resource		Allocation (kL/yr)	Unlicensed (kL/yr)		Licensable (kL/yr)	Status	Estimated yield	Quality
Subarea	Aquifer		Public Supply	Exempt unlicensed	General licensing			
	Yarragadee	48,800,000	5,000,000	970,000	42,830,000	available	>1000 kL/ day	Commonly fresh-brackish
	Surficial	600,000	0	110,000	490,000	water available	<100 kL/ day variable In paleochannels	Marginal–brackish

Note that the above bore yield estimates are estimates over the Subareas, and for the Site yield and water quality assessments including a more detailed onsite investigation will be required. For reliable quality and quantity of groundwater that is unlikely to impact terrestrial and aquatic GDEs, the recommended aquifers to be sourced for abstraction are the Parmelia and Yarragadee aquifers, depending on location and requirements.

7.3. Groundwater and surface water monitoring

Groundwater and surface water monitoring is recommended prior to commencement of Project activities to better characterise and understand the hydrogeological and hydrological environment and establish a suitable baseline dataset for the Site.

A Groundwater and Surface Water Monitoring Plan should be developed based on final design and if water abstraction is planned. If water abstraction is required, the following recommendations should be considered and fit for purpose:

- The monitoring plan should be adapted to site-specific considerations based on final Project design and proposed construction/operational activities.
- Reconnaissance should be undertaken for groundwater monitoring bores located within the Project Site boundary mapped as part of this assessment to evaluate accessibility and viability for inclusion in a longer-term monitoring plan.
- Any bores found to be accessible that do not have headworks or are not actively pumped should be regularly gauged to monitor groundwater levels.
    - Groundwater and surface water monitoring locations should achieve a suitable spatial distribution to monitor potential impacts in each portion of the Site. Monitoring frequency , analytes and trigger thresholds will be developed following detailed project design, and will be of an appropriate level to reflect potential impacts identified.

7.4. Contingency measures

The following general contingency measures are recommended:

- Development of an Emergency Response Plan based on detailed design.
- Strategic placement of spill containment kits, including absorbent materials and/or barriers, throughout the Site.
- Groundwater bore headworks protection including installation of temporary barriers to prevent potential impacts to groundwater systems.

- Development and implementation of communications protocol to inform environmental regulators, landholders and local communities of potential impacts.
- Ongoing review and adaptation of mitigation measures and management actions to prevent, minimise and resolve potential impacts.

Contingency measures should comply with environmental regulations including incident reporting and documentation of response actions.

8. Conclusion

The Hydrogeological and Surface Water Desktop Assessment was undertaken to characterise and assess the baseline groundwater and surface water environments at the Project Site.

The hydrogeology at the Site comprises the Surficial (Upper) unconfined aquifer, underlain by the Leederville-Parmelia aquifer in the eastern portion of the Site and the Yarragadee aquifer in the western portion of the Site, divided by the Eneabba fault. Groundwater quality is fresh to brackish and is likely moderately impacted by historical agricultural activities.

The hydrology at the Site comprises first to third order drainage features identified as Warradarge Creek, which flows from north to south along the central western Site boundary, and tributaries, which generally from east to west through the Site.

The desktop assessment indicated presence of potential Terrestrial and Aquatic GDEs, including one Geomorphic wetland located along the primary drainage line of Warradarge Creek. Potential presence of Subterranean GDEs remains unknown. GDEs are therefore considered a potential receptor of groundwater impacts that may arise from the Project. In addition to GDEs, third-party bore users including for domestic and livestock watering purposes are considered potential receptors of indirect impacts. Project activities may also directly affect both groundwater and surface water quantity and quality at the Site and should be independently reviewed in impact assessment at the detailed design phase of the Project.

Design and general recommendations based on outcomes of the hydrogeological and surface water desktop assessment include:

- Establishment a of buffer zones, particularly along Warradarge Creek.
- Micrositing of proposed WTG crane pads to assess potential for interaction with shallow groundwater systems.
- Appropriate groundwater licensing.
- Utilisation of appropriately sized drainage infrastructure (i.e. culverts).
- Low impact construction techniques, including stormwater, sediment and erosion controls.
- Contamination and spill prevention controls and implementation of an ESCP.
- Development of a fit for purpose groundwater monitoring program, including baseline data collection.

Recommendations should be revisited and refined at subsequent Project stages and incorporated into a Site Environmental Management Plan.

9. References

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