

Belisama Gas Project

Inland Waters Assessment

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TABLE OF CONTENTS

1	Introduction	6
1.1	Project Description	6
1.2	Objectives	6
1.3	Scope of Work	7
1.3.1	Review of Relevant Background Information	7
1.3.2	Updates to the Conceptual Site Model (CSM) and Inland Waters Assessment	7
1.3.3	Reporting	8
1.4	Report Structure	8
2	Environmental Setting	10
2.1	Site Location	10
2.2	Climate	11
2.3	Regional Geology	11
2.4	Regional Hydrogeology	15
2.5	Surface Water Drainages	16
3	Baseline Surface Water and Groundwater Conditions	17
3.1	Studies and Sampling Informing Baseline Conditions	17
3.1.1	Available Studies and Sources of Information	17
3.1.2	Water Monitoring	17
3.2	Surface Water Baseline Conditions	19
3.2.1	Field Measurements	19
3.2.2	Laboratory Results	20
3.3	Groundwater Baseline Conditions	20
3.3.1	Field Measurements	20
3.3.2	Laboratory Results	22
3.4	Identified Environmental Values	24
3.4.1	Beneficial Use	24
3.4.2	Ecosystem Health Values	24
4	Impact Assessment	27
4.1	Activity Description	27
4.2	Potential Sources of Water Impacts	27
4.3	Pathways of Water Impacts	28
4.3.1	Surface Water Drainage	28
4.3.2	Groundwater	28
4.4	Potentially Affected Environmental Values and Receptors	31
4.4.1	Surface Water	31
4.4.2	Groundwater	31
4.5	Risk Assessment	31
4.5.1	Risk Identification, Analysis, and Evaluation	31
4.5.2	Inherent Risk Assessment	33

4.5.3	Responses to Inherent Risk Levels	33
4.5.4	Residual Risk Assessment	33
4.6	Environmental Risk Assessment	33
5	Conclusions	35
5.1	Conclusions	35
6	References	36
7	Limitations	37
Appendix A	Abbreviations	38
Appendix B	Definitions	40
Appendix C	Limitations	42
Appendix D	Feedback Presentation	44
Appendix E	Site Photos (18 - 20 November 2025)	45
Appendix F	Piper Diagram	46
Appendix G	Collated Laboratory Chemistry Results	47
Appendix H	Identified Groundwater and surface water locations	48
Appendix I	Risk Assessment	49

LIST OF TABLES

Table 1: Information required for an IWA Environmental Impact Assessment (EIA) (EPA, 2018).	8
Table 2: Breakdown of available water quality data.	19
Table 3: Summarised field results of surface water locations (MGA Z50).	20
Table 4: Summarised field results of groundwater monitoring locations (MGA Z50).	20
Table 5: Consequences categories adopted in risk assessment.	31
Table 6: Likelihood categories adopted in risk assessment.	32
Table 7: Consequence categories adopted in risk assessment adapted for site-specific factors.	32
Table 8: Risk matrix adopted in risk assessment.	33
Table 9: Risk level and mitigation response matrix.	33

LIST OF FIGURES

Figure 1: Site location and broader assessment area.	10
Figure 2: Mingenew weather station rainfall distribution (adapted from BOM [2025b]).	11
Figure 3: Regional pre-Cenozoic geology in outcrop or subcrop (DoW, 2017), with the approximate site location shown as a red square. Dongara line cross-section indicated in Figure 4.	12
Figure 4: Dongara line cross-section.	13
Figure 5: Surface geology for the site location (Mory and lasky, 1995).	14
Figure 6: Representative depth to water table (DoW, 2017). Project location shown as a red square insert.	15
Figure 7: Groundwater and surface water locations.	18
Figure 8: Groundwater elevation trends for nearby water information reporting bores.	21

Figure 9: Sample locations and exceedance results comparison.....	23
Figure 10: Identified environmental values surrounding project area.....	26
Figure 11: Interpolated groundwater elevation contours and inferred flow directions (adapted from RPS Aquaterra [2011]).....	29
Figure 12: Interpolated groundwater elevation contours and inferred flow directions.....	30

1 INTRODUCTION

Hydro Geochem Group Pty Ltd (HGG) has developed this report on an Inland Waters Assessment (IWA) for the Belisama Gas Project for Hancock Energy. This report was completed in accordance with the proposal J-H-AU0283-001-P-Rev0 (20 August 2025) provided to Hancock Energy.

1.1 Project Description

Hancock Energy (PBN) Pty Ltd (Hancock Energy) is proposing to develop the Belisama Conventional Gas Project (BCGP) in the mid-west region of Western Australia (the "Proposal"). The development will collect gas from surrounding upstream gas collection hubs (external to this Proposal and report) to a Central Processing Facility (CPF) where the gas will be treated. Product gas is planned to be routed via an export pipeline to the Dampier Bunbury Natural Gas Pipeline (DBNGP) for sale. Liquid hydrocarbons (condensate) generated as a by-product of the gas treatment process will be stored on-site prior to being transported by road for sale. The foundation project will be capable of producing up to 210 TJ/d sales gas.

The CPF will be located at 1906 Yandanooka West Rd, Milo (Lot 441 on Plan 2981) owned in freehold by Hancock Energy. The site is approximately 350 km north of Perth, 45 km east of Dongara and 35 km from Mingenew by road. Surrounding land is used for broadacre agriculture with a mixture of cropping and grazing. Rural residential homesteads are sparsely located in the surrounding area with the closest being approximately 3.5 km from the CPF and owned by Hancock Energy.

The gas will be sourced from the fields predominantly associated with the Lockyer Gas Project located in Exploration Permits EP-368 and EP-426 and other surrounding new gas discoveries. The key components of the Proposal include:

- An infield gathering system comprising underground flowlines.
- A CPF, including on-site infrastructure to support the operations phase including power generation, administration and control rooms, warehousing, workshops, switch room infrastructure, sedimentation pond, evaporation ponds and accommodation buildings.
- An underground gas export pipeline connecting the CPF to the DBNGP.
- Condensate stabilisation, storage, and offloading system to support road transport of liquid product.
- This is a conventional gas project and therefore does not require hydraulic fracturing (fracking).

1.2 Objectives

The primary objectives of this project were to provide:

- A baseline IWA of the proposed disturbance areas which satisfies both state and commonwealth regulatory assessment requirements.
- Assessment of potential impacts to Inland Waters and associated values as a result of construction and implementation of the Proposal.

1.3 Scope of Work

The scope of work, developed to meet the objectives outlined above, included the following tasks.

1.3.1 *Review of Relevant Background Information.*

HGG has leveraged the previous IWA (HGG, 2024) and aquifer characterisation work for the Lockyer site to streamline the review of the relevant background information, including any changes in site layout and infrastructure that Proposal entails.

The task included review of:

- Project specific data provided by Hancock Energy:
 - Spatial data (e.g., proposed pipeline centreline, disturbance footprints, etc.).
 - Groundwater monitoring data from monitoring bores within the Proposal area.
 - Surface water monitoring data, collected from the Sand Plain Creek, downslope of the proposed Proposal area.
- Publicly available reports and datasets as available, including:
 - Climate and river flow data.
 - Regional geology and hydrogeology reports.
 - Review of available groundwater bore information in the DWER Water Information Reporting online tool.

1.3.2 *Updates to the Conceptual Site Model (CSM) and Inland Waters Assessment*

The task included:

- Collation of relevant data identified in the background review into an updated geospatial dataset.
- Assessment of new or updated hydrological and hydrogeological data (quantity and quality) and relevant information for the development of a CSM that describes baseline conditions and identify knowledge gaps. The CSM includes a source-pathway-receptor (SPR) framework.
- Consideration of the CPF location and potential for SPR linkages between the Proposal and environmental and social receptors (and Inland Water values). This facilitated the preliminary identification of potential impacts to Inland Waters.
- Identification of mitigation strategies to avoid and minimise impacts to Inland Waters where possible, and discussion of the likely feasibility and outcomes of these measures.
- Assess the likely residual environmental impacts of the Project on the groundwater and surface water regime and associated environmental values.
- If considered necessary, make recommendations for groundwater bores and surface water monitoring such that they can inform and provide data for an on-going water quality monitoring program for the project where key risks are identified.

- Presenting the CSM and Inland Waters Assessment findings and recommendations to Hancock Energy (in PowerPoint format). The content of this presentation is available in Appendix D.

1.3.3 Reporting

This task includes provision of a report (this report, for internal Hancock Energy use) with a focus on the CSM and Inland Waters assessment, including a summary of work undertaken and assessment outcomes and conclusions.

1.4 Report Structure

The remainder of this report has been structured into the following sections:

- Section 2: Environmental setting. The environmental setting includes specifics around site location, climate, topography and surface water drainages, regional geology, and regional hydrogeology.
- Section 3: Baseline surface water and groundwater conditions. This section includes a review of the studies and available data informing the baseline conditions, a description of baseline water quality conditions, and identification of relevant environmental values for the Proposal area.
- Section 4: Impact assessment. The impact assessment outlines activities forming part of the Proposal, potential sources of water impacts associated with these activities, pathways through which water impacts may propagate, assessment of potentially affected environmental values, and evaluating risk of impact through a risk assessment.
- Section 5: Conclusions. This section summarises the conclusions of the assessment.

Table 1 provides the reader with relevant links to each topic for the information required in an IWA.

Table 1: Information required for an IWA Environmental Impact Assessment (EIA) (EPA, 2018).

INFORMATION REQUIRED FOR EIA	RELEVANT SECTION
Description of studies and surveys of surface water and/or groundwater systems and proposed buffers.	Section 3
Characterisation of the surface water and/or groundwater systems, including climatic influences on water availability and, where relevant, location, hydrology, water quality, catchment boundaries, geology, hydrogeology, and connectivity, locally and regionally.	Section 2
Description of the environmental values of the surface or groundwater systems.	Section 2
Information on the water to be used in the proposal or scheme, and other current and potential water use in the area.	Section 4
Description of how excess water is to be disposed of and how this might impact the environment.	Not Applicable - Proposal does not generate excess water.
Characterisation of the waste generated, the pathways for potential contamination, and quantification of how the proposal or scheme will impact water quality, where necessary through the use of models.	Section 4
Modelling the impact of water abstraction and use for the proposal or scheme on water regimes and other users, including the assumptions and uncertainties of the modelling and supporting data.	Not applicable - Proposal does not require additional groundwater allocation.
Predictions of the changes to surface and groundwater water regimes as a result of the proposal or scheme.	Section 4

INFORMATION REQUIRED FOR EIA	RELEVANT SECTION
The potential consequences of any hydrological or water quality changes on downstream waters such as estuaries or the marine environment.	Section 4
Predictions of the likely impacts of water use and changing water quality on water dependent ecosystems and other environmental values.	Section 4
Evaluation of the significance of the potential impacts (direct, indirect and cumulative) of the proposal or scheme on inland waters in a local and regional context.	Section 4
Description of the approach to maintaining well integrity for wells which intercept multiple aquifers.	Not Applicable - Proposal does not include additional wells (excluding for monitoring purposes).
Description of monitoring, mitigation, management, closure and rehabilitation arrangements.	Section 4
Information on the predicted outcome of the proposal or scheme against the environmental objective for inland waters and discuss whether there is likely to be a significant residual impact.	Section 4
Description of the adaptive management and/or contingency planning in the instance that predictions are incorrect.	Section 4

2 ENVIRONMENTAL SETTING

2.1 Site Location

The Proposal area is located approximately 23 km southwest of Mingenew, and 34 km southeast of Dongara, Western Australia. Pipeline infrastructure will extend approximately 30 km within the Proposal area, with conditioned gas exported 12 km west of the CPF to the DBNGP. HGG has focused this scope on the CPF (including 2,000m buffer surrounding the CPF) and the disturbance footprint location shown in Figure 1.

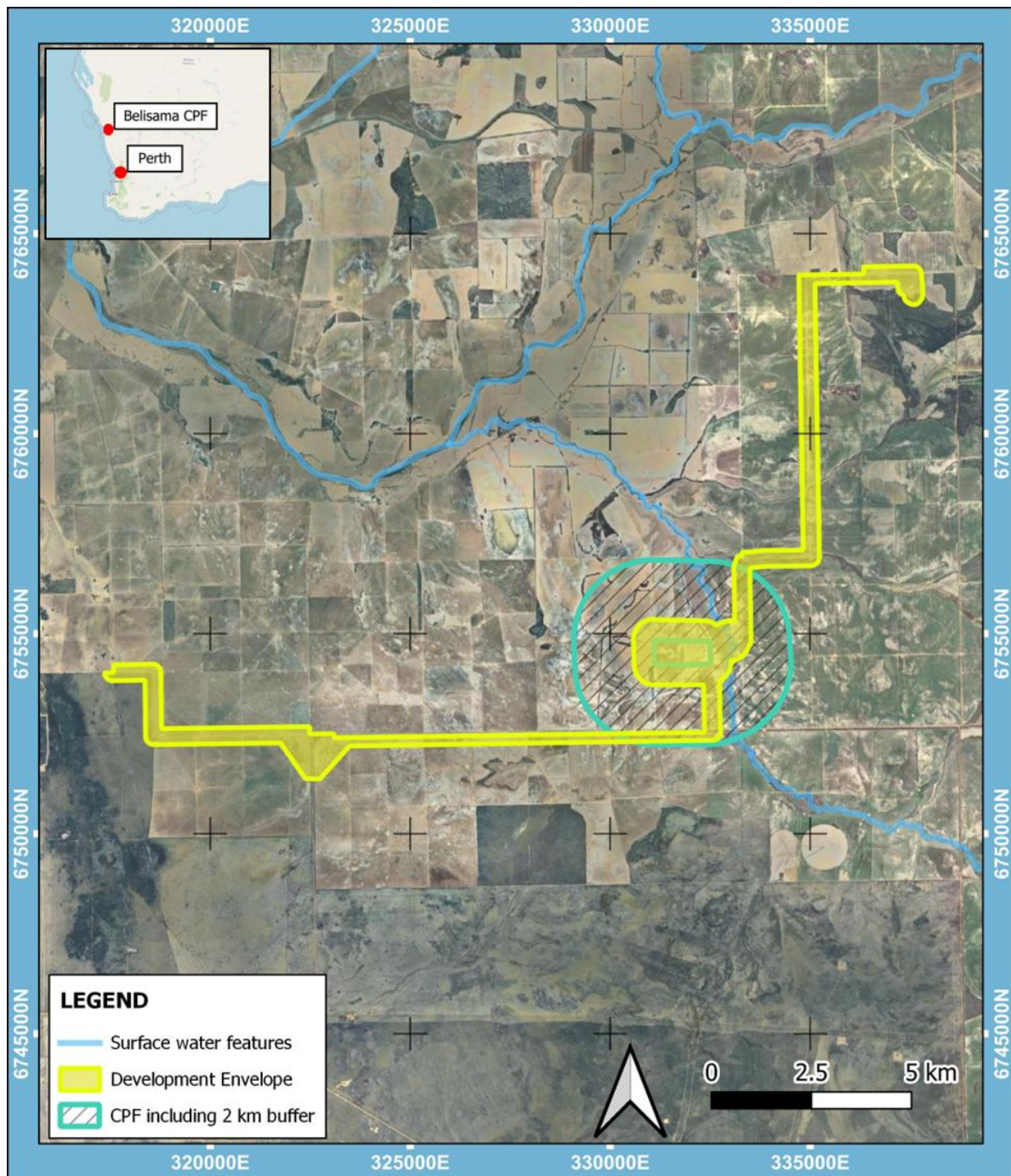


Figure 1: Site location and broader assessment area.

2.2 Climate

The regional climate in the Dongara and Mingenew area experiences a Mediterranean climate (Köppen Classification as subtropical) with mild, wet winters and hot dry summers. The mean monthly minimum temperature recorded at the Mingenew Bureau of Meteorology (BOM) station (station ID: 008088) ranges from 6.9°C in August to 19.2°C in February and the mean monthly maximum temperatures range from 19.1°C in July to 36.4°C in February. Temperature recording at this weather station occurred from 1965 to 1975. Currently, this station only records rainfall data.

Annual average rainfall reported for the Mingenew BOM station is 391.5 mm with the majority of rainfall occurring during the winter months (BOM, 2025b). Rainfall exceeds potential evaporation across the Northern Perth Basin during May to September (DoW, 2017). Figure 2 presents the monthly rainfall statistics for Mingenew weather station.

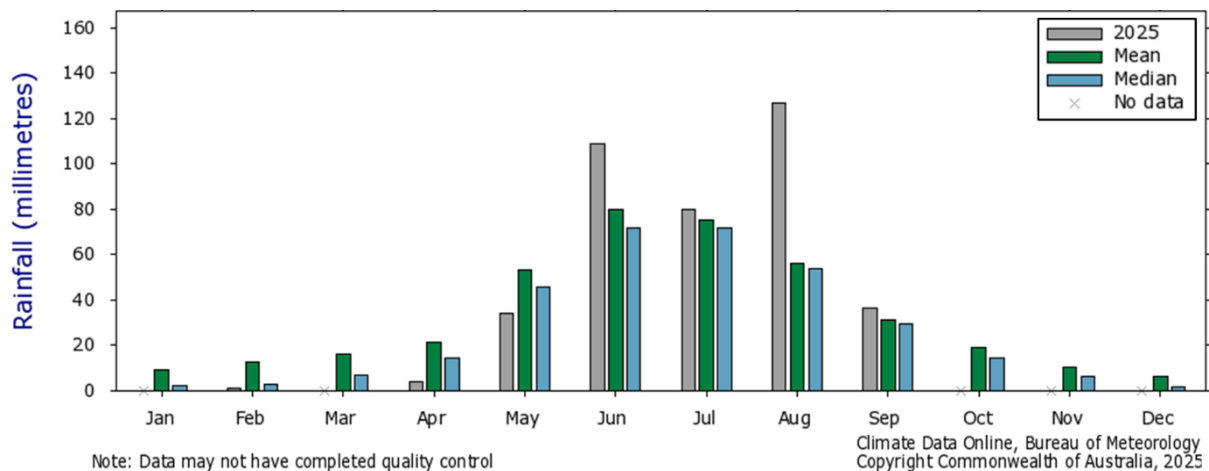


Figure 2: Mingenew weather station rainfall distribution (adapted from BOM [2025b]).

2.3 Regional Geology

The regional geology of the Project area as described in DoW (2017) is summarised below.

The CPF and associated infrastructure are situated within the Northern Perth Basin. This basin consists of a deep sequence of sedimentary units dipping in an easterly direction, bounded to the east by the north-south striking Darling Fault (Figure 3). The sequence shallows to the north, with depths to basement units approximately 3,000 m to 5,500 m below ground level.

The dominant near surface sedimentary sequence in the study area is the Jurassic Yarragadee Formation. The Formation generally dips eastwards and the regional strike is approximately north-south. The Yarragadee Formation consists of a multilayered sequence of sandstone beds with interbedded siltstone, claystone and shale. There are four units within the Yarragadee Formation, including Units A and C (consisting predominantly of unconsolidated sands) and Units B and D (consisting predominantly of siltstone, claystone and shale with interbedded sandstone). Unit D of the Yarragadee Formation outcrops in part at the surface, with thicknesses of the Unit approximately 400 m to 500 m in the study area. The Yarragadee Formation is underlain by the clay rich Cadda Formation, which has a maximum onshore thickness of 290 m.

The Kingia sandstone of Early Permian age (located > 4,000m below ground surface) presents the gas reservoir that is being targeted for development, with the Irwin River Coal Measures presenting the capping/sealing unit of the gas reservoir system.

Figure 3 shows the regional pre-Cenozoic geology of the Northern Perth Basin, with Figure 4 presenting the geological cross-sections along the Allanooka-Casuarinas and Dongarra borehole lines, north and south of the project area respectively. Figure 5 indicates the site surface geology, including cross-cutting faults through the project area.

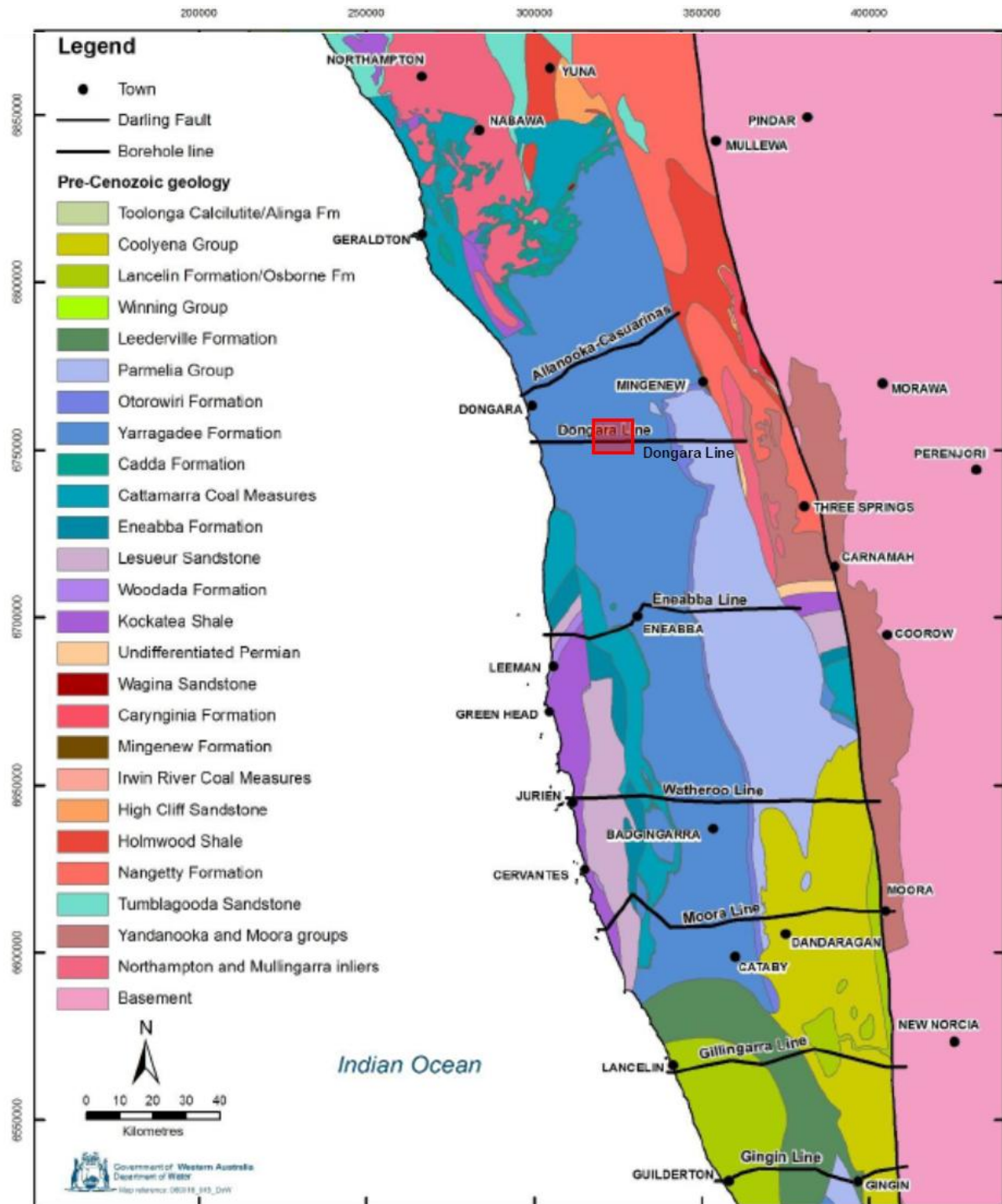


Figure 3: Regional pre-Cenozoic geology in outcrop or subcrop (DoW, 2017), with the approximate site location shown as a red square. Dongara line cross-section indicated in Figure 4.

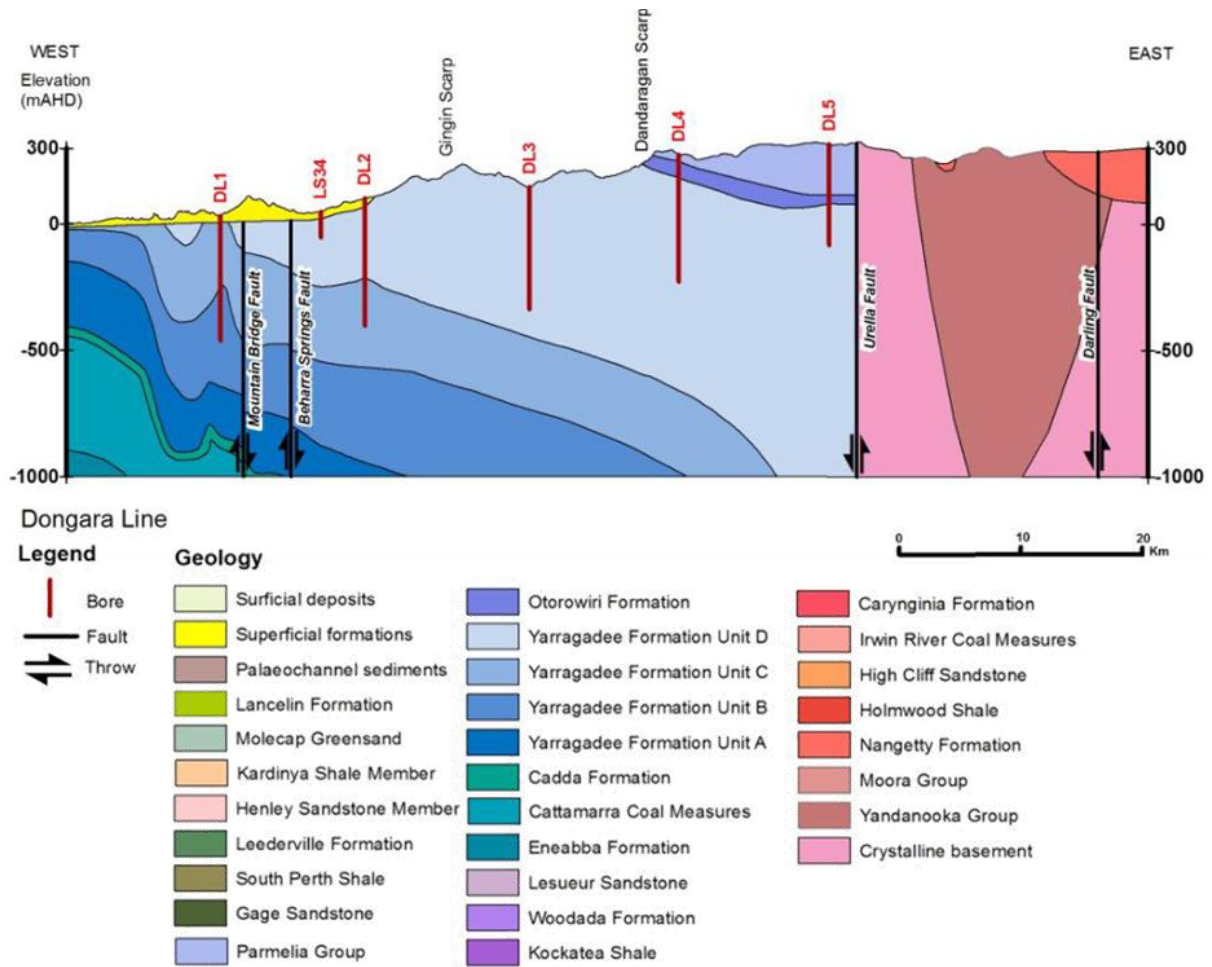


Figure 4: Dongara line cross-section.

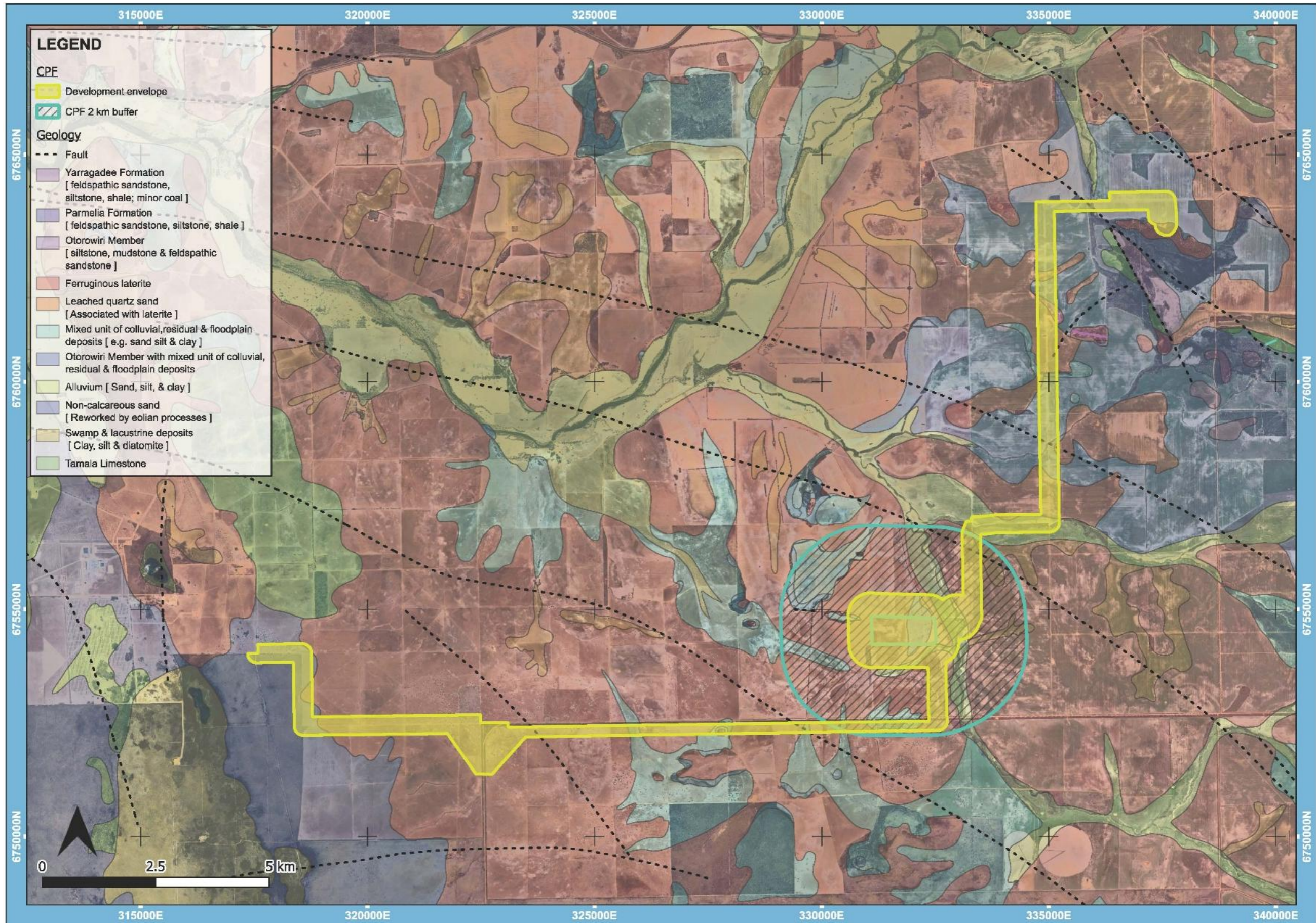


Figure 5: Surface geology for the site location (Mory and lasky, 1995).

2.4 Regional Hydrogeology

The Groundwater Survey of Western Australia has undertaken a drilling program to investigate stratigraphy and map the hydrogeology of the northern Perth Basin (DoW, 2017). As part of the drilling program, six deep east-west lines were drilled in the northern Perth Basin approximately 50 km apart up to depths of 800 m.

The Dongara Line (Figure 4), extending east from Dongara to the Dandaragan Scarp, was completed in 1995. This investigation confirmed the Yarragadee aquifer as a major groundwater resource in the area. The regional groundwater table in the area was found to vary and could be as deep as 181 m below ground level, the regional groundwater level trends westward (towards the Indian ocean), with potential localised variations in groundwater flow. Salinity in the aquifer increases with depth and towards coastal zones.

Figure 6 indicates the interpreted depths to the regional water table in 2015 (DoW, 2017). Elevated groundwater levels are seen generally near aquifer recharge points and surface water features such as rivers and tributaries, with structural geological features such as faults acting as aquifer boundaries.

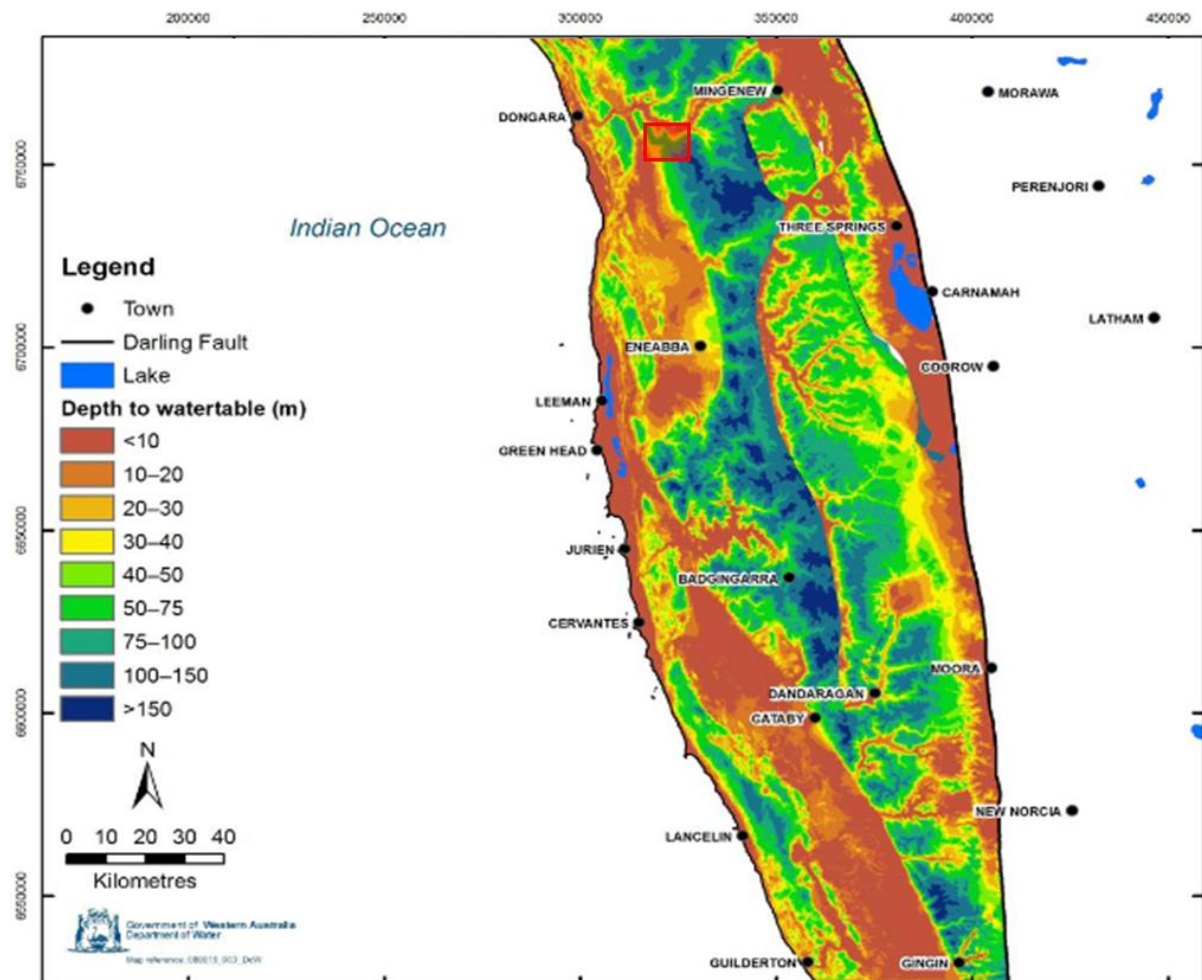


Figure 6: Representative depth to water table (DoW, 2017). Project location shown as a red square insert.

2.5 Surface Water Drainages

The Proposal area is located within the Irwin River catchment, with the catchment covering a surface area of 6,071 km². Mean annual flow at Mountain Bridge gauging station, with a catchment area of 5,264 km² was 16 gigalitres per annum (GL/a) between 2000 and 2015. Flow is generally highest during the winter months (DoW, 2017). The main surface water drainages in the project area are the Irwin River and the Sand Plain Creek (shown flowing South to North in Figure 1).

The ephemeral Sand Plain Creek acts as a minor tributary to the Irwin River, with the confluence of the surface water drainages located approximately 7 km from the northwestern boundary of the CPF. From the confluence, the Irwin River drains in a general westerly direction before entering into the Indian Ocean at Dongara. The Sand Plain Creek is seen as a localised recharge location within the Proposal area.

3 BASELINE SURFACE WATER AND GROUNDWATER CONDITIONS

3.1 Studies and Sampling Informing Baseline Conditions

3.1.1 Available Studies and Sources of Information

Studies and available source of information that were available to review for the Inland Waters assessment included:

- The Northern Perth Basin: Geology, hydrogeology and groundwater resources report (DoW, 2017).
- The Bureau of Meteorology (BoM) Australia Groundwater Explorer website (BOM, 2025a) for the identification of existing groundwater bores and use and water information reporting (DWER, 2025b).
- The BOM Groundwater Dependent Ecosystems (GDEs) Atlas (BOM, 2025c) for the identification of potential GDEs.
- A hydrology and hydrogeology baseline assessment report for a location approximately 14 km south of the Belisama Project (Eco Logical, 2021).

3.1.2 Water Monitoring

Water monitoring data available (including regionally), includes recent surface water (SW) samples collected in Sand Plain Creek (September 2025), regulatory compliance water quality sampling of nearby bores under the site water use license (DWER, 2025a; Hancock Energy, 2025b, 2025c) and historical regional investigations (Eco Logical, 2021; MDW, 2015). These locations are presented in Figure 7 and Figure 9. A summary and breakdown of available water quality data is broken down in Table 2.

Regional datasets were queried for available regional water level variations (groundwater bores). Limited data was available for the regional groundwater bore datasets, some of the results have been plotted further in Figure 8.

From the 18 to 20th November 2025, HGG conducted a short site visit for the purposes of a bore reconnaissance (also referred to as a Hydrocensus), during this period a total of 18 groundwater bores were inspected in the vicinity of the project area as well as eight surface water locations (most focused around the Sand Plain Creek). The results of this site visit are presented in this document.

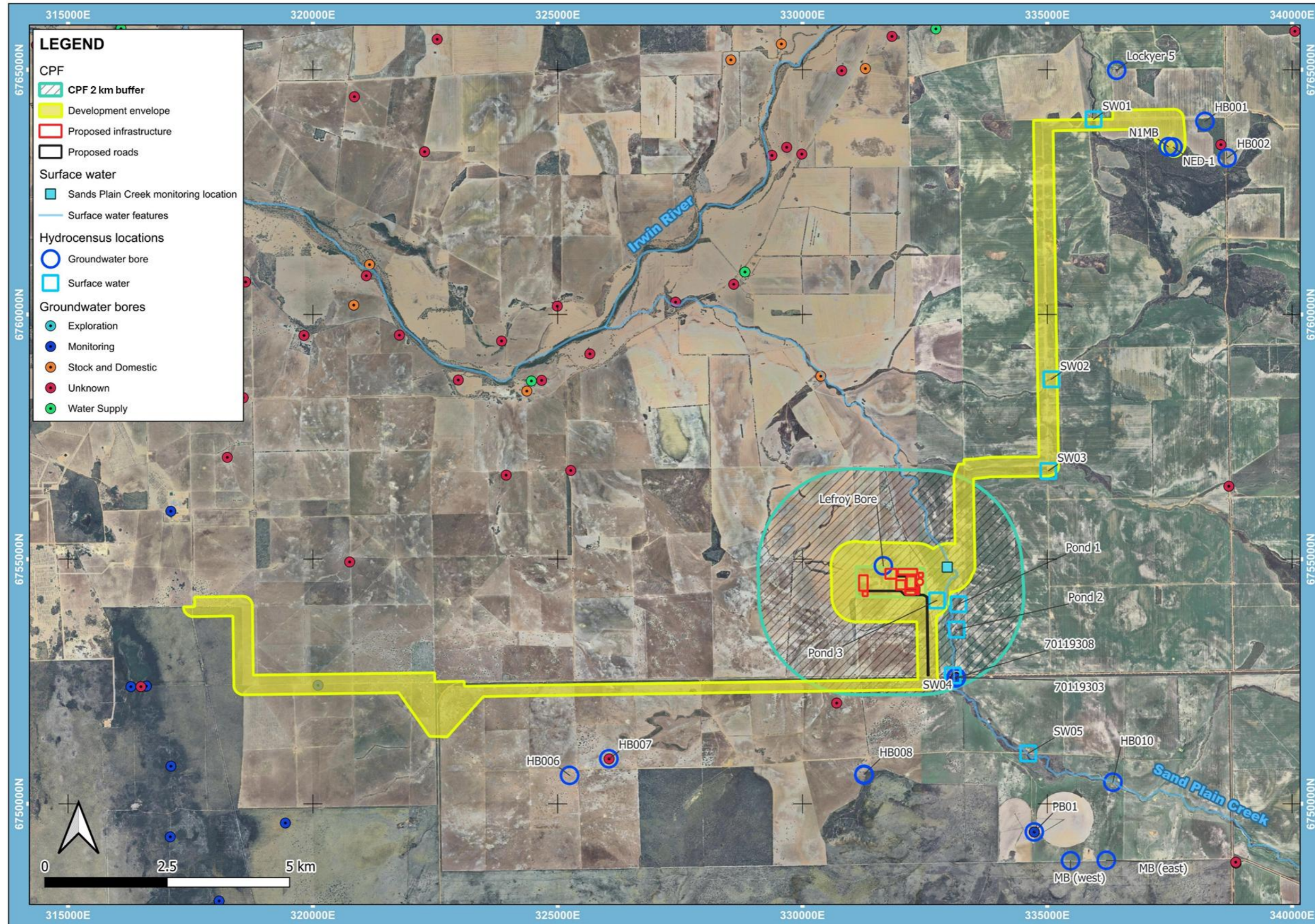


Figure 7: Groundwater and surface water locations.

Table 2: Breakdown of available water quality data.

REFERENCE	TIME PERIOD	LOCATIONS	DATA AVAILABLE
Opportunistic SW Sample	Sep 2025	Sand Plains Creek adjacent to new CPF location.	<ul style="list-style-type: none"> Physical parameters. Basic analytical suite (major and minor ions). Dissolved metals. Nutrients.
MDW (2015)	Sep 2015	Regional groundwater bores: <ul style="list-style-type: none"> Morgan. Dempster. Murion (PB1). Irwin. CO2 Australia. 	<ul style="list-style-type: none"> Physical parameters. Total and dissolved metals. Nutrients. Organochlorine and Organophosphorous Pesticides (OC/OP). Monocyclic Aromatic Hydrocarbons (MAH). Halogenated Aliphatic & Aromatic Compounds (HAC). Polynuclear Aromatic Hydrocarbons (PAH). Phenolic Compounds. Total Petroleum Hydrocarbon / Total Recoverable Hydrocarbon (TPH/TRH). Benzene, Toluene, Ethyl Benzene, Xylene and Naphthalene (BTEXN). Volatile Organic Compounds (VOC). Semi Volatile Organic Compounds (SVOC).
Eco Logical (2021)	Sep 2020	West Erregulla GW bores (Eastern monitoring bore and production bore).	<ul style="list-style-type: none"> Physical parameters. Basic analytical suite (major and minor ions). Total and dissolved metals. Nutrients (TKN, nitrate, nitrite, total nitrogen, ammonia and total phosphorus). Groundwater levels.
Hancock (2025a)	June 2025	PB1	<ul style="list-style-type: none"> Groundwater levels. Physical parameters.
PenAgri (2024)	2022	PB1	<ul style="list-style-type: none"> Basic analytical suite (major and minor ions). Dissolved metals. Nutrients.
DWER (2025b)	1988 to 2025	Regional	<ul style="list-style-type: none"> Groundwater levels.

3.2 Surface Water Baseline Conditions

3.2.1 Field Measurements

During the period of 18 to 20 November 2025, HGG completed a short site visit to the project area, the summarised results of this visit are included in Table 3 and field photos are made available in Appendix E. During the site visit, HGG was able to collect field measurements for pH and Electrical Conductivity (EC).

Table 3: Summarised field results of surface water locations (MGA Z50).

LOCATION ID	EASTING, NORTHING	ELEVATION (mAHD)	OBSERVATIONS
SW01	335945, 6763989	126	Low flow, pH = 7.18 and EC = 1,829 μ S/cm.
SW02	335082, 6758676	123	Larger water body, pH = 7.26 and EC = 2,870 μ S/cm.
SW03	335021, 6756802	119	Limited flow, pH = 7,87 and EC = 6,160 μ S/cm.
SW04	333068, 6752623	119	Could not safely access to measure field parameters.
SW05	334609, 6751032	133	Low flow, pH = 7.70 and EC = 4,270 μ S/cm.
Pond 01	333184, 6754081	131	East of creek, pH = 8.49 and EC = 445.6 μ S/cm.
Pond 02	333148, 6753562	132	East of creek, pH = 8.87 and EC = 820.7 μ S/cm.
Pond 03	332744, 6754157	129	West of creek, pH = 7.92 and EC = 441.9 μ S/cm.

The field measurements indicated generally neutral to somewhat alkaline pH conditions (ranging from 7.18 to 8.87), with very fresh to brackish salinity. The more saline surface water may have been indicative of evaporative signatures in the lower flowing streams. The surface ponds to the east of the proposed CPF had the lowest observed EC measurements of the measured locations. The locations of the surface water points are shown in Figure 7 and Figure 9.

3.2.2 Laboratory Results

Major ion composition of the water samples is shown in the Piper Diagram presented in Appendix F, with respect to regional datasets available (DoW, 2017). SW samples were of the sodium chloride type with relatively low concentrations of the other major ions calcium, magnesium, potassium, sulfate and bicarbonate. The collated SW chemistry data from the laboratory analysis were screened against the 95% species protection default guideline values (DGVs) for freshwater ecosystems that have been developed for slightly to moderately disturbed systems (ANZG, 2018).

None of the results from the two samples collected in 2025 exceeded the freshwater aquatic DGVs. The two samples were collected at the same location, to the east of the proposed CPF location. Collated laboratory results are summarised in Appendix F.

3.3 Groundwater Baseline Conditions

3.3.1 Field Measurements

Limited field measurements are available for this IWA with respect to groundwater bores. HGG completed a short site visit between 18 – 20 November 2025, the details of all bores visited during this period are listed in Table 4 and field photos are made available in Appendix E.

Table 4: Summarised field results of groundwater monitoring locations (MGA Z50).

LOCATION ID	EASTING, NORTHING	ELEVATION (mAHD)	OBSERVATIONS
61710413*	326046, 6750922	187	Damaged bore casing, with pump stuck downhole.
70111703*	330699, 6752061	-	Could not find this bore in field – suspected to be destroyed.
70111704*	332964, 6752500	-	Could not find this bore in field – suspected to be destroyed.
70119303*	333144, 6752583	129	DL3A – DWER bore, locked and data accessed online. Monitoring bore.
70119308*	333128, 6752572	129	DL3W – DWER bore, locked and data accessed online. Monitoring bore.
HB001	338219, 6763945	212	Main camp bore with headworks on top of casing. Production bore.

LOCATION ID	EASTING, NORTHING	ELEVATION (mAHD)	OBSERVATIONS
HB002	338673, 6763199	192	Water Level (WL) = 84.44 mbgl. End of bore >150m. Downhole camera log conducted. Production bore.
HB008	331257, 6750605	180	WL = 34.69 mbgl, no pump downhole, camera log conducted and suspect bore has collapsed, adjacent bore (neat tree block) <20m to south.
HB010	336339, 6750444	144	Solar panel bore adjacent to creek. Could not access for water level measurement. Stock water bore.
Lefroy's Bore	331651, 6754865	131	WL = 42.17 mbgl, pH = 6.70 and EC = 1,396 µS/cm. Bore located adjacent to proposed CPF location. Solar panel bore. Water used for stock water.
Lockyer 5	336416, 6764990	136	Production bore, WL = 23.01 mbgl, no pump installed downhole. Camera log and EC/temperature profile conducted. Production bore.
MB (East)	336204, 6748848	180	Strike Energy monitoring bore locked with padlock.
MB (West)	335475, 6748839	172	Strike Energy monitoring bore locked with padlock.
N1MB	337471, 6763428	167	50mm monitoring bore adjacent to NED-1. WL = 68.75 mbgl. Camera log and EC/temperature profile conducted.
Neat Tree Block	331254, 6750590	179	Solar pump bore, WL = 39.65 mbgl. Water used for stock water.
NED-1	337568, 6763420	179	WL = 69.18 mbgl, completed downhole camera log and EC/temperature profile. Production bore.
PB1	334733, 6749425	148	Production bore on-site (linked to GWL156102(13)).
West End	325243, 6750583	161	Bore high up on ridge, could not access to dip water level. Bore used for stock water.

*Location IDs relate to DWER water information reporting website.

Water information reporting data has been extracted for nearby bores and is shown in Figure 8, indicating a long-term recovering trend since the start of monitoring at these bores. These two bores are less than 2km's south of the CPF border and along the edge of the Sand Plain Creek. The result of continual groundwater level recovery in this area is suspected to be a result of native vegetation clearing (DoW, 2017).

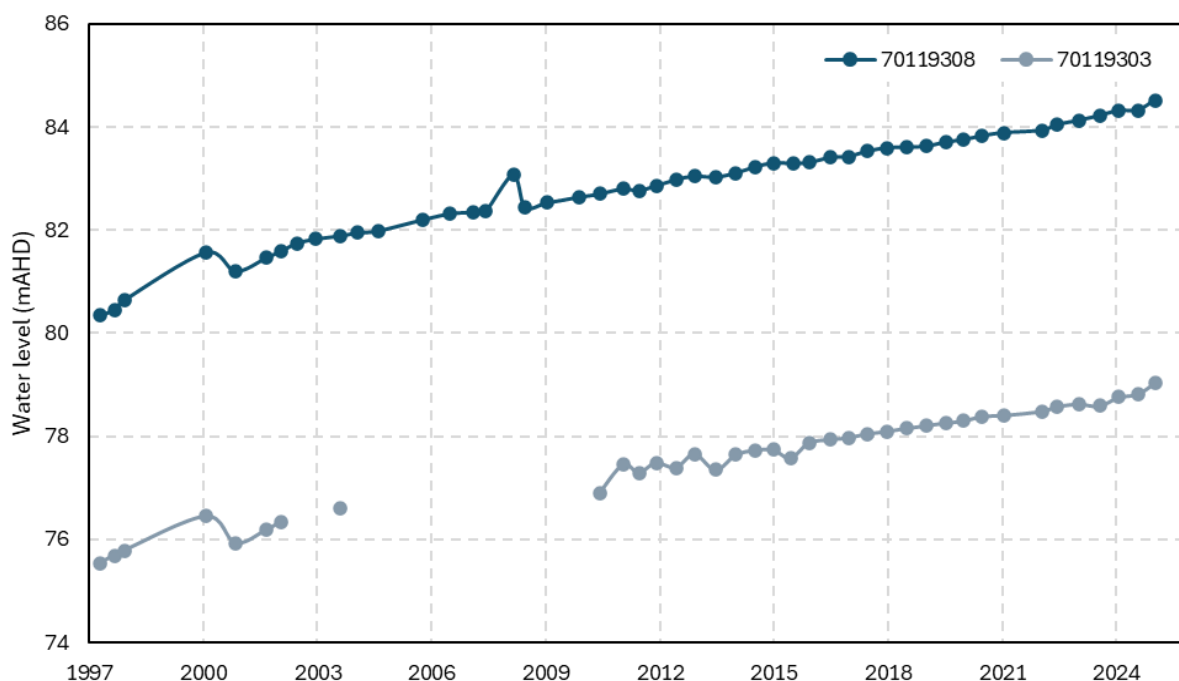


Figure 8: Groundwater elevation trends for nearby water information reporting bores.

Note that during the site visit, Hancock Energy (pers. comms., 28/11/2025) made reference to water saturated conditions observed during shallow test pitting in an area located to the south east of the CPF (in between the CPF and Sand Plain Creek). Water saturated sands were observed to occur above a clay layer, located within 3 m of the ground surface. The observations suggest the presence of a shallow perched aquifer in this area, the extent of which is unknown. If this aquifer extends to the CFP, it may present a shallow groundwater pathway.

3.3.2 Laboratory Results

Major ion composition of the water samples is shown in the Piper Diagram presented in Appendix F with respect to regional datasets. As with the surface water samples, all groundwater samples were found to be of the sodium chloride type.

The collated groundwater water chemistry data from the laboratory analysis were screened against livestock drinking water guidelines (ANZG, 2023), freshwater toxicants for Australia and New Zealand (ANZG, 2018) and the Australian Drinking Water Guidelines (ADWGs) (NHMRC, 2011) given the identified groundwater use (see Section 3.4.1).

Exceedances of ADWGs were identified for lead only (reported at a concentration of 15 µg/L which exceeds the ADWG of 5 µg/L) at the PB1 groundwater bore, in June 2025.

Reported concentrations exceeding the livestock drinking water guidelines were limited to exceedances of TDS in groundwater samples taken from WE PB1 and EMB. Historical exceedances were recorded in 2015 and 2022 at PB1 for copper and zinc, while a number of metals were in exceedance in 2020 for the ANZG Freshwater Toxicant 95th Percentile Default Guideline Values (DGVs) at the West Erregula bores (WE PB1 and EMB). A summary of the exceedances and locations is shown in Figure 9. Collated laboratory results are summarised in Appendix G.

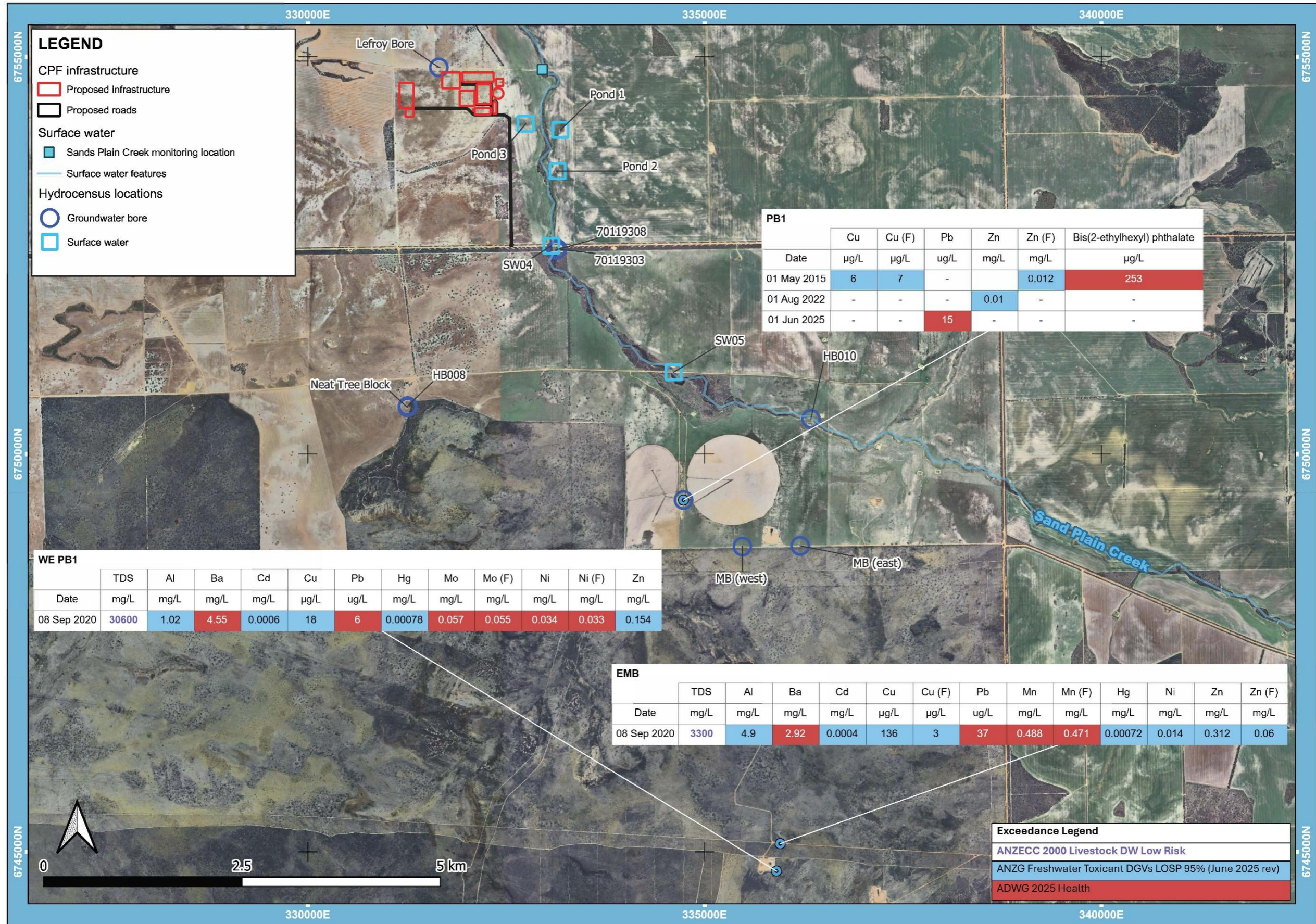


Figure 9: Sample locations and exceedance results comparison.

3.4 Identified Environmental Values

As described in the Environmental Protection Authority (EPA) Environmental Factor Guideline: Inland Waters (EPA, 2018), environmental values include both beneficial use of water resources as well as ecosystem health values.

3.4.1 Beneficial Use

The identification of beneficial groundwater use is based on a combination of:

- Evaluation of existing use.
- Considering potential use of water.

To evaluate existing use of groundwater, a bore search was undertaken using the BOM Australian Groundwater Explorer (BOM, 2025a) and DWER Water Information Reporting Tool (DWER, 2025b). Lead water agencies from each state provide water bore information to the BOM database and the database is updated on an annual basis. The survey included an area extending 2 km from the CPF boundaries and including the development envelope. A total of five bores were identified within this area through the BOM groundwater bore database, then later an additional three bores were identified through the site visit, shown in Figure 7.

The eight bores included:

- Five monitoring bores.
- One bore for stock and domestic purposes.
- One bore with unknown purpose.
- One bore for potential water supply.

The closest identified bore to Proposal infrastructure is the Lefroy's bore, located less than 100 m's to the north west of the proposed CPF. Coordinates for all identified bores, as well as available information are provided in Appendix H.

Based on the results of the bore search, and the baseline groundwater conditions described in Section 3.3, beneficial use include:

- Stock watering and agricultural use.
- Domestic supply (including drinking water in areas where TDS levels are below 1,200 mg/L).

3.4.2 Ecosystem Health Values

As described in the Environmental Factor Guideline: Inland Waters (EPA, 2018), the EPA is focussed on impacts to significant ecosystems, which include (but are not limited to):

- Ramsar Wetlands.
- Wetlands listed in the Directory of Important Wetlands in Australia (DIWA).
- Wetlands protected by Environmental Protection Policies under Part III of the Environmental Protection (EPA) Act 1986.

- Ecosystems that support significant flora or fauna species or communities including subterranean fauna.
- Wild Rivers as identified by the Australian Heritage Commission and DWER.

No Ramsar wetlands, wetlands listed in DIWA, wetlands protected under the EP Act or Wild Rivers were identified within a 20 km radius of the Proposal infrastructure. At the time of completing this Inland Waters assessment the outcomes of studies for the identification of significant flora or fauna species or communities in the Proposal area were not yet available. Freshwater aquatic ecosystems associated with the Irwin River is considered to present a water dependant ecosystem health value.

A number of low to medium potential terrestrial GDEs has been identified within the Proposal area and disturbance envelope through a search of the BOM GDE Atlas (BOM, 2025c). There are no aquatic GDEs within the project area, however a single aquatic GDE has been identified to the West of the CPF location, Warradong Spring. These potential GDE's may support ecologically valuable systems for fauna and flora. A summary of the environmental values for the project area is shown in Figure 10.

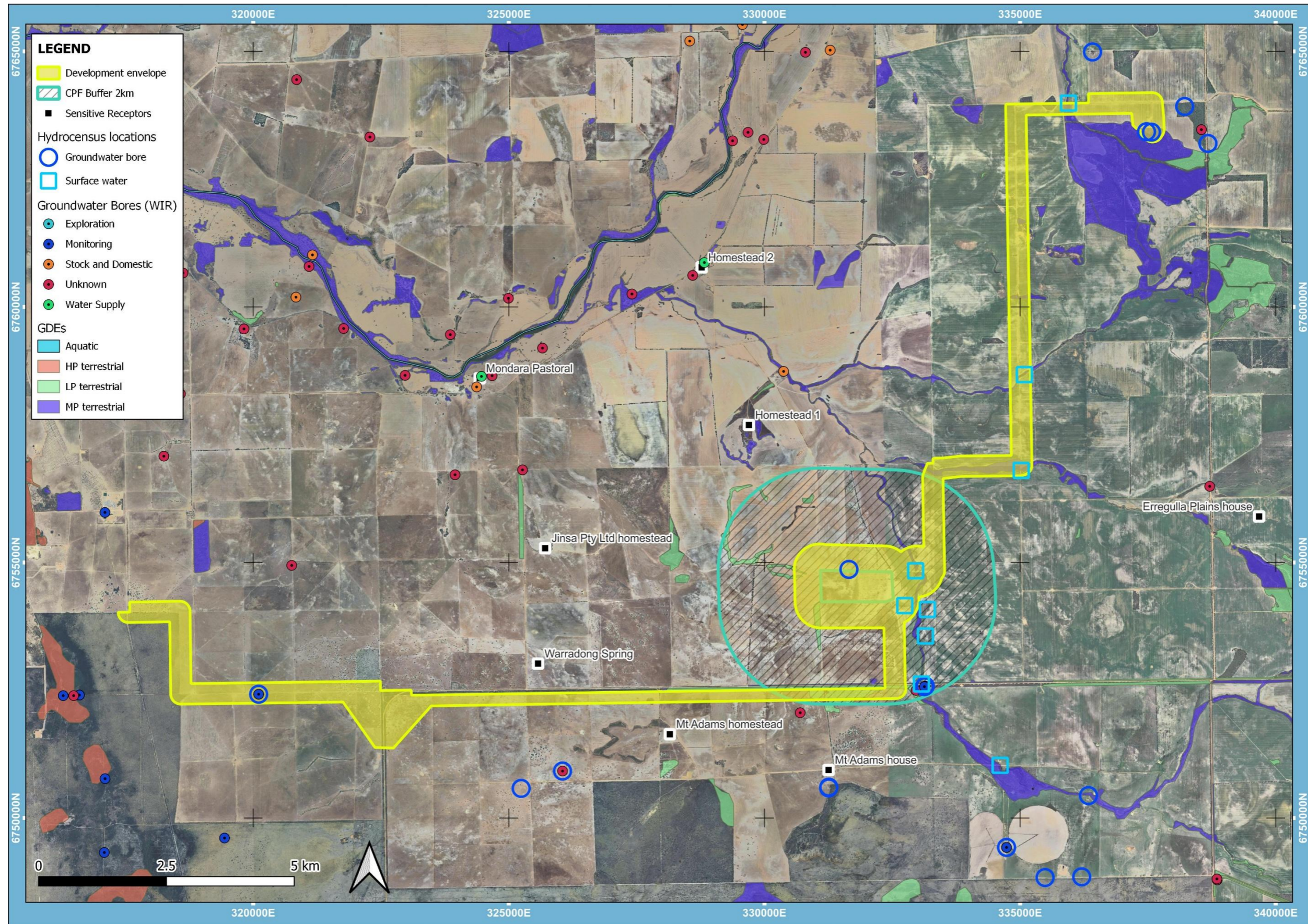


Figure 10: Identified environmental values surrounding project area.

4 IMPACT ASSESSMENT

4.1 Activity Description

The gas will be sourced from the fields predominantly associated with the Lockyer Gas Project located in Exploration Permits EP-368 and EP-426 and other surrounding new gas discoveries. The key components of the Proposal include:

- An infield gathering system comprising underground flowlines.
- A CPF, including on-site infrastructure to support the operations phase including power generation, administration and control rooms, warehousing, workshops, switch room infrastructure, sedimentation pond, evaporation ponds and accommodation buildings.
- An underground gas export pipeline connecting the CPF to the DBNGP.
- Condensate stabilisation, storage, and offloading system to support road transport of liquid product.
- This is a conventional gas project and therefore does not require hydraulic fracturing (fracking).

Where flow lines intersect the Sand Plain Creek, Horizontal Directional Drilling (HDD) will be conducted to allow the pipeline to be sufficiently deep beneath the rivers to not impact surface water.

Water supply for the project will be sourced from a nearby production bore, currently under license with Hancock Energy. Hancock Energy currently hold one groundwater licences (GWL 156102[13]) with an allocation of 1.69 GL/annum (Hancock Energy, 2025c), for the purposes of irrigation (up to 160 ha of pasture) and firefighting (DWER, 2025a).

4.2 Potential Sources of Water Impacts

Potential sources of water impacts include:

- Sediment loads if excessive erosion were to occur during ground disturbance activities associated with the construction phase.
- Spills or leaks from the operational activities, pipelines connecting to the CPF, condensate storage, condensate piping, gas export pipelines, and evaporation ponds. Potential contaminants include natural-gas condensate, saline groundwater, and operational fuel and petroleum products.
- Spills or leaks of hazardous materials stored and handled onsite during construction and operations, including fuels for powering vehicles and equipment.
- Spills and leaks of effluent and grey water from the temporary construction village or permanent camp.
- Groundwater level drawdown associated with groundwater abstraction for water supply during the construction and operational phase of the Project.

4.3 Pathways of Water Impacts

4.3.1 Surface Water Drainage

Surface water drainage pathways would include:

- Overland run-off from areas of ground disturbance (for potential sediment load impacts).
- Overland run-off from areas of spills (for potential water quality impacts).
- Transport within natural drainages such as Sand Plain Creek if sediment / spills have reached these features.

The likelihood of pathways to receptors being complete would depend on the size and location of the spill/sediment load impact. Distances from the CPF to the Sand Plain Creek (400m) would make the completeness of surface drainage pathways to this drainage channel unlikely. The most likely complete surface water drainage pathway would be in the case of a leak or spill from a pipeline that is in close proximity to Sand Plain Creek or the associated alluvium surrounding the creek.

Surface spills may further seep into the subsurface, potentially affecting groundwater if the spills were to reach the underlying Yarragadee aquifer.

Hancock Energy have developed a Stormwater Management Plan, where within the CPF, self-contained skids will collect water (typically from rainfall) that may be potentially contaminated with contaminants (including during the construction phase), this will be directed to a collection area and disposed of regularly at a licenced facility using a vac-truck (Hancock Energy, 2025a).

4.3.2 Groundwater

Groundwater pathways would include:

- Transport of contaminants through the Yarragadee aquifer if surface spills have seeped sufficiently through the vadose zone with subsequent transport in the aquifer.
- Transport of contaminants through the Yarragadee aquifer or underlying groundwater units, if leaks within a pipeline has occurred within the groundwater saturated zone.
- Transport of contaminants through the potential shallow perched aquifer to the south east of the CPF development area if this shallow aquifer extends to the CPF.

Groundwater flow could then potentially present a pathway for water quality impacts to groundwater users, including groundwater bores used for abstraction and GDEs.

At the time of writing up this assessment, it was unclear as to the direction of the groundwater flow directions, directly below the CPF. Figure 11 indicates historical (2011) flow directions (based on water bores screened at depths greater than 400 mbgl), towards the west, away from the Sand Plain Creek, however, this is in contrast to the site topography, descending towards the east. Another factor to consider, is that groundwater elevations in the area have become shallower since 2011 (DoW, 2017), potentially developing a localised flow direction zone around the CPF that is alternate to the regional flow direction. There is then also the potential that a shallow perched aquifer with likely flow following topography to the east may be present.

Following the site visit in November 2025, HGG developed interpolated groundwater elevation contours based on groundwater level measurements taken during the bore reconnaissance. These are shown in Figure 12 for the area closest to the proposed CPF development area, along with inferred groundwater flow direction. The latest groundwater level measurements indicate potential for a localised groundwater flow in an easterly direction towards Sand Plain Creek.

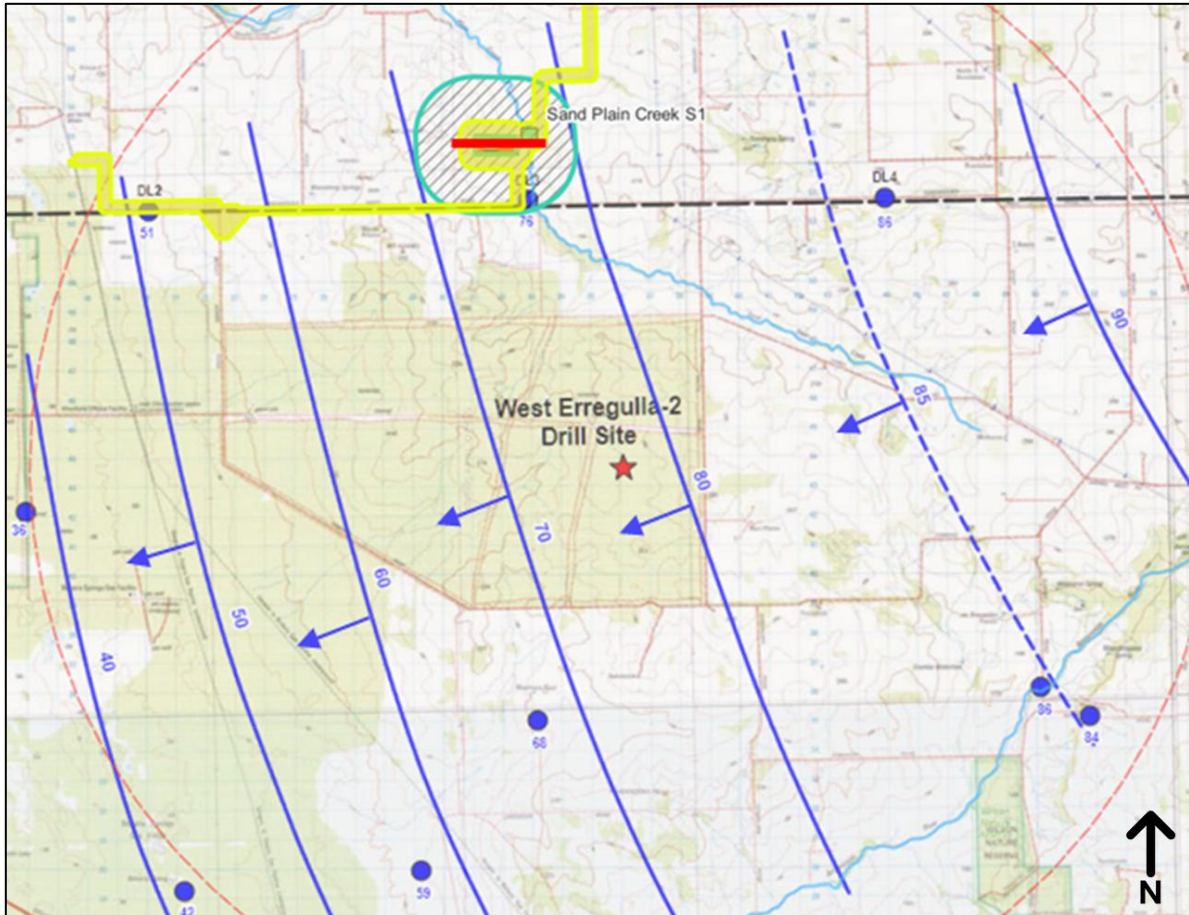


Figure 11: Interpolated groundwater elevation contours and inferred flow directions (adapted from RPS Aquaterra [2011]).

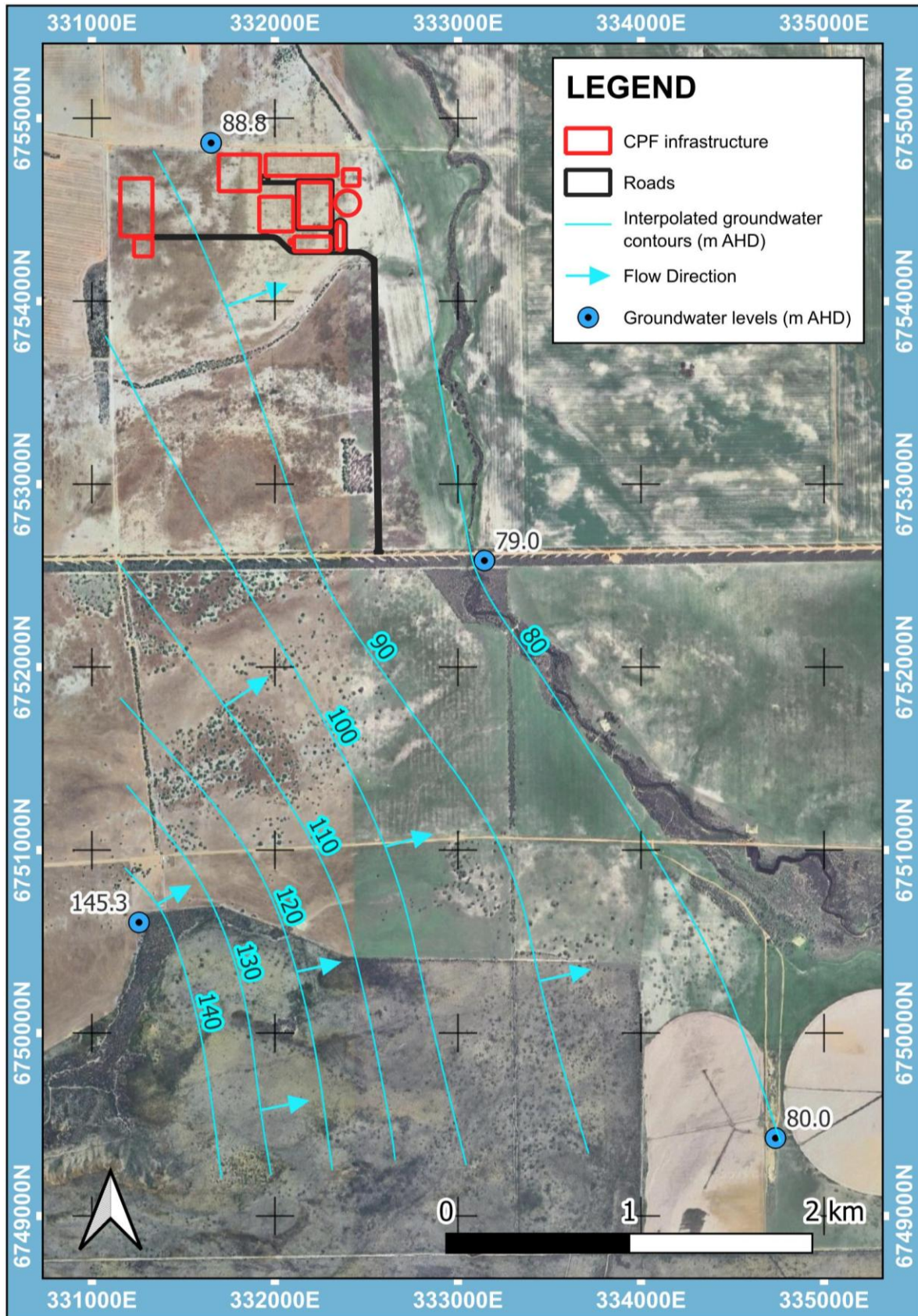


Figure 12: Interpolated groundwater elevation contours and inferred flow directions.

4.4 Potentially Affected Environmental Values and Receptors

4.4.1 Surface Water

Potentially affected environmental values and receptors for surface water impacts include the following:

- Freshwater aquatic species in the ephemeral Sand Plain Creek.

4.4.2 Groundwater

Potentially affected environmental values and receptors for groundwater impacts include the following:

- Livestock receptors from pastoral bores.
- Domestic users of pastoral bores.
- The GDE's outlined in Section 3.4 may be adversely affected by groundwater impacts through water quality degradation or large fluctuations in groundwater levels.

4.5 Risk Assessment

4.5.1 Risk Identification, Analysis, and Evaluation

The likelihood of an impact occurring and the consequence of that impact on environmental factors and values forms the risk.

The consequence likelihood categories adopted for this risk assessment are listed in Table 5 and Table 6 respectively. The consequence assessment was informed both by the factors determined in Sections 4.2, and 4.3, and by the sensitivity of the environmental values and receptors in Section 4.4.

A site-specific interpretation of the consequences is listed in Table 7, with consideration of potential water quality impacts and potential impacts on (physical) hydrogeological processes. The combined likelihood and consequence ratings matrix shown in Table 8 was used to form the overall risk rating for each identified risk at the Proposal.

Table 5: Consequences categories adopted in risk assessment.

CONSEQUENCE OR SEVERITY OF IMPACT	DESCRIPTION
Severe	A severe impact has two or more of the following characteristics: <ul style="list-style-type: none"> • Widespread – Impact occurs at a state scale (Western Australia), or greater. • High Intensity – Impact irreversibly compromises the integrity of environmental values. • Permanent – environmental values will not recover on human time scales.
Major	A major impact has two or more of the following characteristics: <ul style="list-style-type: none"> • Regional – Impact extends to the regional scale (Greater North Perth Basin). • Moderate Intensity – Integrity of environmental values altered but impact can practicably be reversed. • Long Term – Impact to environmental values measurable after Project closure.
Moderate	A moderate impact has two or more of the following characteristics: <ul style="list-style-type: none"> • Localised – Impact is confined to the Project area and adjacent areas, such as neighbouring allotments and watercourses.

CONSEQUENCE OR SEVERITY OF IMPACT	DESCRIPTION
	<ul style="list-style-type: none"> Low Intensity – Impact alters the quality, abundance or distribution of environmental values without compromising their integrity and can be reversed. Medium Term – Impact to environmental values measurable until completion of the Project.
Minor	<p>A minor impact has two or more of the following characteristics:</p> <ul style="list-style-type: none"> Limited – Impact is limited to the Project area. Very Low Intensity – Impact does not significantly alter the quality, abundance or distribution of environmental values. Short Term – Impact to environmental values measurable until completion of construction of the Project.
Insignificant	No noticeable or measurable impacts to environmental values.

Table 6: Likelihood categories adopted in risk assessment.

LIKELIHOOD CATEGORY	DESCRIPTION
Almost Certain	The impact will occur or is expected to occur within 1 year. The impact occurs regularly in association with similar projects or similar environments.
Likely	The impact will probably occur in most circumstances, likely within 1 to 10 years. The impact has occurred on more than one occasion in association with similar projects or similar environments.
Possible	The impact could occur in some circumstances, likely within 10 to 50 years. The impact has occurred infrequently on similar projects or in similar environments.
Unlikely	The impact is not expected to occur once within 50 years. The impact occurs very infrequently on similar projects or similar environments.
Rare	The impact is very unlikely to occur once within 100 years. The impact has not occurred on similar projects or in similar environments.

Table 7: Consequence categories adopted in risk assessment adapted for site-specific factors.

LIKELIHOOD CATEGORY	WATER QUALITY	HYDROGEOLOGICAL PROCESSES
Severe	Exceedance of baseline water quality that permanently alters the ecological function and / or amenity of the Irwin River and Sand Plain Creek, Indian Ocean, and groundwater receptors.	Change in surface water flow regimes or groundwater levels that permanently alter functioning and / or amenity of the Irwin river and Sand Plains Creek and significantly alters potential GDEs and the beneficial uses of groundwater.
Major	Exceedance of baseline water quality that alters the regional ecological function and / or amenity of the Irwin River, Sand Plain Creek and groundwater receptors for several years after Project closure.	Reduction in surface water flow regimes or groundwater levels that compromises regional ecological functioning of the Irwin river, Sand Plain Creek, alters potential GDEs and the beneficial uses of groundwater for several years after Project closure.
Moderate	Localised exceedances of baseline water quality that occurs throughout Project operations that cease within months of Project closure.	Localised alteration in surface water flow regimes and drawdown of groundwater that has a negligible to low impact on the ecological health of the Irwin river, Sand Plain Creek, potential GDEs and groundwater receptors for several months after Project closure.
Minor	Exceedances of baseline water quality at the Project until completion of Project construction.	Localised alteration in surface water flow regimes and drawdown of groundwater that has a negligible to low impact on the ecological health of the Irwin river, Sand Plain Creek,

LIKELIHOOD CATEGORY	WATER QUALITY	HYDROGEOLOGICAL PROCESSES
Insignificant	No significant change to baseline water quality.	potential GDEs and groundwater receptors until completion of Project construction. No measurable change to hydrogeological processes.

Table 8: Risk matrix adopted in risk assessment.

		CONSEQUENCE				
		1	2	3	4	5
		Insignificant	Minor	Moderate	Major	Severe
LIKELIHOOD	5 Almost Certain	Medium	Medium	High	Very High	Very High
	4 Likely	Medium	Medium	High	Very High	Very High
	3 Possible	Low	Medium	Medium	High	Very High
	2 Unlikely	Low	Low	Medium	Medium	High
	1 Rare	Low	Low	Low	Medium	High

4.5.2 *Inherent Risk Assessment*

For each potential impact to an environmental value, an inherent risk rating was assigned by ranking the likelihood and consequence of the impact in the absence of any mitigation. Site-specific environmental factors were considered when determining the inherent risk rating, including potential impact sources and pathways, environmental conditions, and sensitivity of environmental values and receptors.

4.5.3 *Responses to Inherent Risk Levels*

The response matrix shown in Table 9 was used to determine the level of mitigation required for each inherent risk rating.

Table 9: Risk level and mitigation response matrix.

RISK LEVEL	RESPONSE
Very High	Risk is unacceptable. Immediate intervention and specific action plans required to reduce risk to an acceptable level.
High	Risk is unacceptable. Immediate intervention and specific action plans required to reduce risk to 'as low as reasonably practicable'.
Medium	Risk is generally acceptable. Proactive action is required to reduce risk to 'as low as reasonable possible', with routine monitoring and management.
Low	Risk is acceptable. Management by routine policies and procedures.

4.5.4 *Residual Risk Assessment*

Practicable mitigation measures were developed for each risk rating with a very high, high, or medium risk levels. Each risk with mitigation measures was reassessed with the assumption of implementation of proposed mitigation measured to determine a residual risk rating.

4.6 **Environmental Risk Assessment**

Appendix I presents the environmental risk assessment undertaken for the Project, incorporating the methodology described in Section 4.5.

Residual risk ratings were all low to medium, with no high to very high residual risks identified. The highest residual risks, classified as medium based on the risk rankings, included water quality risks

associated with potential spills from above ground infrastructure, uncertainty on groundwater flow direction (with mitigation measures recommended) and leaks through evaporation ponds.

5 CONCLUSIONS

5.1 Conclusions

The main surface water drainage in the project area is the Sand Plain Creek. The Sand Plain Creek acts as a tributary to the Irwin River, with the confluence of the surface water drainages located approximately 7 km from the northwestern boundary of the CPF. From the confluence, the Irwin River drains in a general westerly direction towards Dongara. No Ramsar wetlands, wetlands listed in DIWA, wetlands protected under the EPA Act or Wild Rivers were identified within a 20 km radius of the project infrastructure. Freshwater aquatic ecosystems associated with the Sand Plain Creek and Irwin river is considered to present a water dependant ecosystem health value. Sections of these rivers have been identified as low to medium terrestrial potential GDEs.

The Yarragadee aquifer that underlies the project area presents a groundwater resource. The aquifer consists of a multilayered sequence of sandstone units with interbedded siltstone, claystone and shale. There is limited data available for the water quality within the groundwater system, that is recent, however latest compliance results indicated that lead, is in exceedance of the ADWG value (NHMRC, 2011).

The impact assessment included consideration of the Proposal activities and potential impacts (to environmental values including beneficial uses) that could be associated with activities during construction and operational phases. Potential impacts include water quality impacts from increased erosion during ground disturbance activities, spills/leaks if they were to occur from above ground or underground infrastructure, leaks from evaporation cells and spills/leaks associated with ancillary services (such as refuelling areas). Potential water level drawdown impacts could further be associated with groundwater abstraction for water supply purposes.

The risk assessment evaluated potential risk to environmental values including beneficial use on the basis of likelihood and consequence, with the residual impact including consideration of risk mitigation measures. Mitigation measures are summarised in Appendix I and include engineering controls as well as monitoring controls.

Residual risk ratings were all low to medium, with no high to very high residual risks identified. The highest residual risks, classified as medium based on the risk rankings, included water quality risks associated with potential spills from above ground infrastructure, uncertainty on groundwater flow direction (with mitigation measures recommended) and leaks through evaporation ponds.

6 REFERENCES

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7 LIMITATIONS

Attention is drawn to the document “Limitations”, which is included in Appendix C of this report. The statements presented in this document are intended to provide advice on what the realistic expectations of this report should be, and to present recommendations on how to minimise the risks associated with this project. The document is not intended to reduce the level of responsibility accepted by Hydro Geochem Group, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in doing so.

APPENDIX A ABBREVIATIONS

ABBREVIATION	DEFINITION
ADWG	Australian Drinking Water Guideline
ANZG	Australia and New Zealand Guidelines
BCGP	Belisama Conventional Gas Project
BoM	Bureau of Meteorology
BTEXN	Benzene, Toluene, Ethyl Benzene, Xylene and Naphthalene
CPF	Central Processing Facility
CSM	Conceptual Site Model
DBNGP	Dampier Bunbury Natural Gas Pipeline
DGV	Default Guideline Values
DIWA	Directory of Important Wetlands in Australia
DoW	Department of Water
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EP	Exploration Permit
EPA	Environmental Protection Authority
GDE	Groundwater Dependent Ecosystem
HAC	Halogenated Aliphatic & Aromatic Compounds
HDD	Horizontal Directional Drilling
HGG	Hydro Geochem Group
IWA	Inland Waters Assessment
MAH	Monocyclic Aromatic Hydrocarbons
MDW	Mobile Dewatering Environmental Services Pty Ltd
OC	Organochlorine
OP	Organophosphorus
PAH	Polynuclear Aromatic Hydrocarbons
SPR	Source-Pathway-Receptor
SVOC	Semi Volatile Organic Compounds
SW	Surface Water
TDS	Total Dissolved Solids
TJ	Tera Joules
TKN	Total Kjeldahl Nitrogen
TPH	Total Petroleum Hydrocarbon
TRH	Total Recoverable Hydrocarbon
VOC	Volatile Organic Compounds

APPENDIX B DEFINITIONS

TERM	DEFINITION
Aquifer Boundaries	A physical barrier to ground water flow identified as the contact between geologic materials defined as an aquifer and materials defined as non-aquifer (or as an aquifer but with a significantly lower hydraulic conductivity).
Central Processing Facility	A CPF receives materials from the production wells and processes them by separating them into gas and condensate.
Conceptual Site Model	A CSM is a way of capturing and presenting collated information about site activities in relation to the environment and receptors.
Conventional Gas	Conventional gas is stored in porous and permeable sedimentary rocks such as in a geological structure known as a trap. Impermeable rocks directly above the structure trap the gas. A well drilled into the structure intersects the porous reservoir and gas flows into the well.
Ephemeral River	A stream or river that flows for a short period of time, typically after periods of high rainfall.
Groundwater	Groundwater is water that exists underground in saturated zones beneath the land surface. The upper surface of the saturated zone is called the water table.
Groundwater Dependent Ecosystems	Groundwater dependent ecosystems (GDEs) are ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services.
Hydrogeology	Hydrogeology is the study of groundwater – it is sometimes referred to as geohydrology or groundwater hydrology. Hydrogeology deals with how water gets into the ground (recharge), how it flows in the subsurface (through aquifers) and how groundwater interacts with the surrounding soil and rock (the geology).
Inland Waters Assessment	The occurrence, distribution, connectivity, movement and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality).
Jurassic Period	Jurassic Period, second of three periods of the Mesozoic Era. Extending from 201.3 million to 145 million years ago, it immediately followed the Triassic Period.
Piper diagram	The Piper diagram helps in the segregation of analytical data necessary for determining the sources of the constituents dissolved in water.
Source Pathway Receptor Assessment	Source, pathway and receptor (SPR) risk assessments are a framework used in environmental risk assessment to systematically evaluate and understand the potential impacts of contaminants on human health and the environment.
Surface water	Streams, rivers, lakes and reservoirs - collectively referred to as surface water - are important natural resources for irrigation, public supply, wetlands and wildlife.

APPENDIX C LIMITATIONS

This Document has been provided by Hydro Geochem Group Pty Ltd (HGG) subject to the following limitations:

This Document has been prepared for the particular purpose outlined in HGG's proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of HGG's services are as described in HGG's proposal, and are subject to restrictions and limitations. HGG did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in this Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by HGG in regards to it.

Conditions may exist which were undetectable given the limited nature of the enquiry HGG was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. HGG's opinions are based upon information that existed at the time of the production of this Document. It is understood that the services provided allowed HGG to form no more than an opinion of the actual conditions of the site at the time the site was reviewed and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Document.

Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by HGG for incomplete or inaccurate data supplied by others.

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APPENDIX D FEEDBACK PRESENTATION



**HYDRO
GEOCHEM
GROUP**
GREENROAD GROUP

Belisama Gas Project

Inland Waters Assessment – CSM & SPR

J-H-AU0283-005-P-Rev0

04 November 2025



INTRODUCTIONS



AGENDA

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. Source pathway receptor assessment
6. Next steps



PROJECT OBJECTIVES

Primary objectives:

- A baseline Inland Waters assessment of the proposed disturbance areas which satisfies state and commonwealth regulatory assessment requirements.
- Assessment of potential impacts to Inland Waters and associated values as a result of construction and implementation of the Project.

1. Introductions
- 2. Project objectives**
3. Project progress
4. Conceptual site model
5. Source pathway receptor
6. Next steps



PROJECT OBJECTIVES

Primary objectives:

- A baseline Inland Waters assessment of the proposed disturbance areas which satisfies state and commonwealth regulatory assessment requirements.
- Assessment of potential impacts to Inland Waters and associated values as a result of construction and implementation of the Project.

Meeting objectives:

- Feedback on CSM, SPR and key risks for proposal, including opportunities for reducing risk & uncertainty.

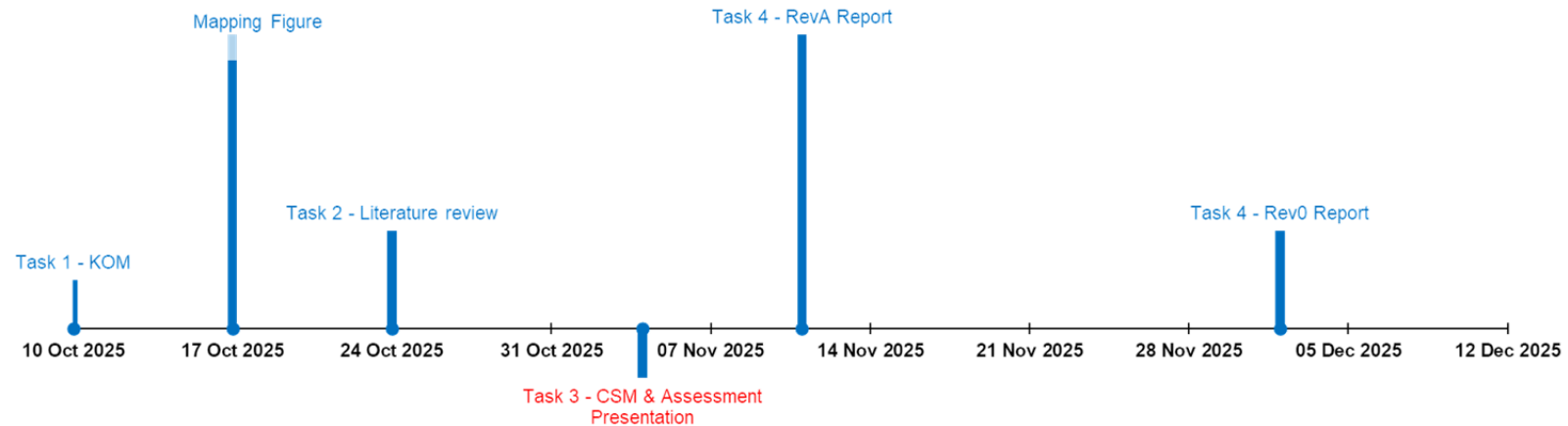
1. Introductions
- 2. Project objectives**
3. Project progress
4. Conceptual site model
5. Source pathway receptor
6. Next steps



PROJECT PROGRESS

1. Introductions
2. Project objectives
- 3. Project progress**
4. Conceptual site model
5. Source pathway receptor
6. Next steps

TASK	TASK DESCRIPTION	DELIVERABLES
1	Kick off meeting and project management	-
2	Review of relevant background information	-
3	CSM development and Inland Waters assessment	DELIVERABLE 1: CSM and assessment findings presentation to Hancock Energy
4	Reporting	DELIVERABLE 2: Draft Report DELIVERABLE 3: Final Report



CONCEPTUAL SITE MODEL

1. Introductions
2. Project objectives
3. Project progress
- 4. Conceptual site model**
5. Source pathway receptor
6. Next steps

“A conceptual site model is a way of capturing and presenting collated information about site activities. It depicts the relationships between:

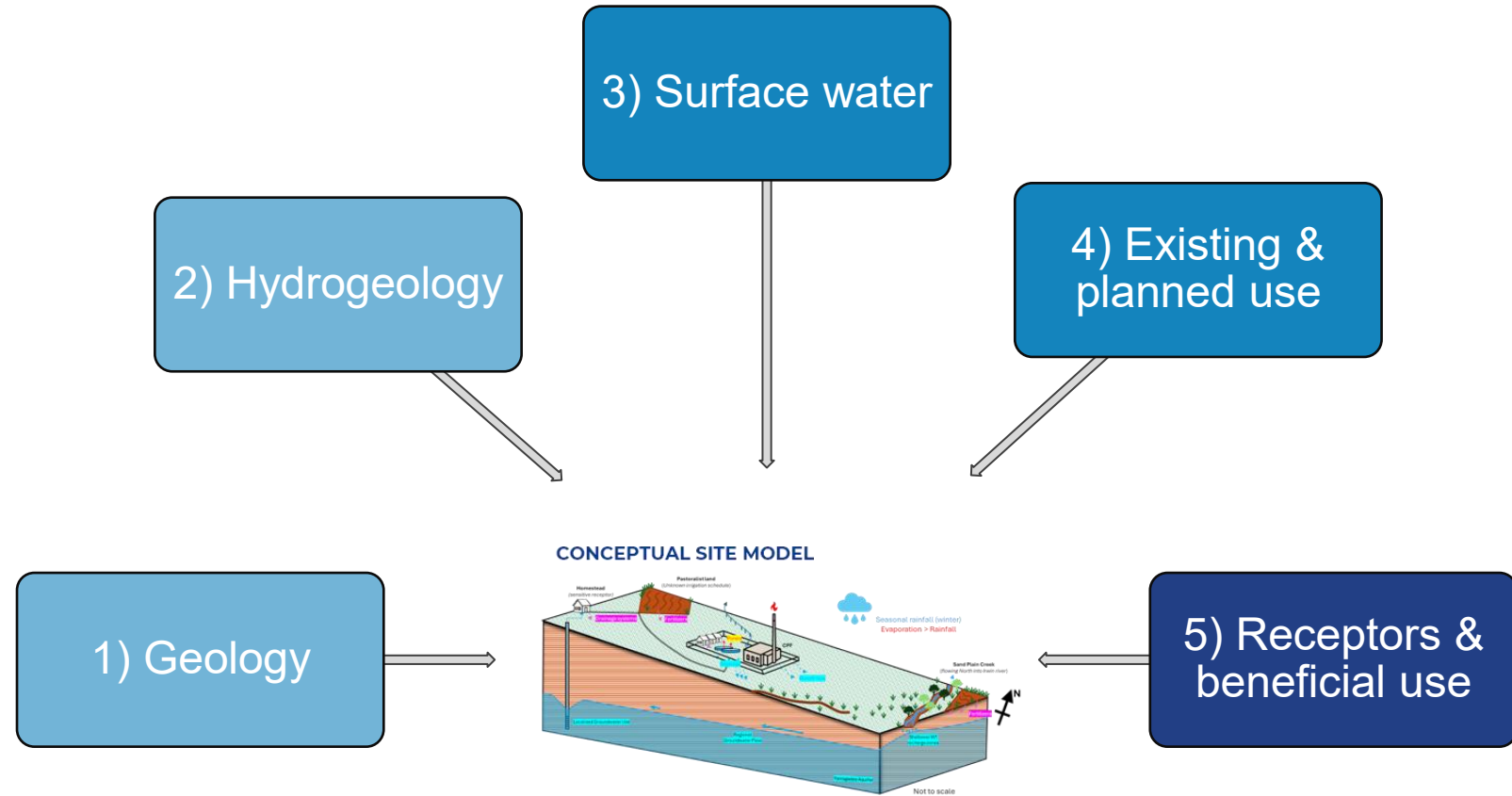
- *site activities, hazards and the environment;*
- *risk pathways; and*
- *potential impacts on environmental receptors.”*

Existing data for current CSM dependant on third-party data sources (e.g. BOM, WIR).



CONCEPTUAL SITE MODEL

1. Introductions
2. Project objectives
3. Project progress
- 4. Conceptual site model**
5. Source pathway receptor
6. Next steps

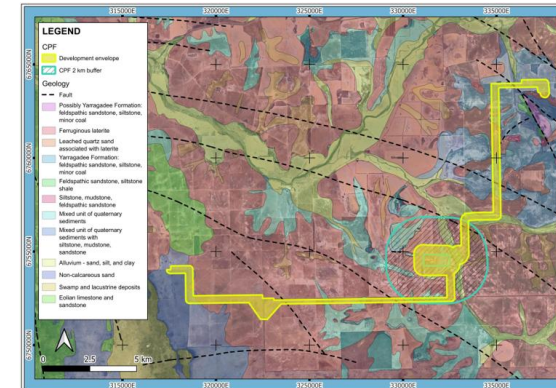
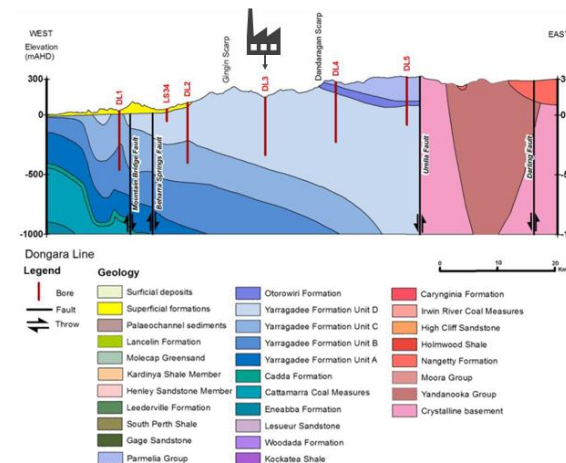
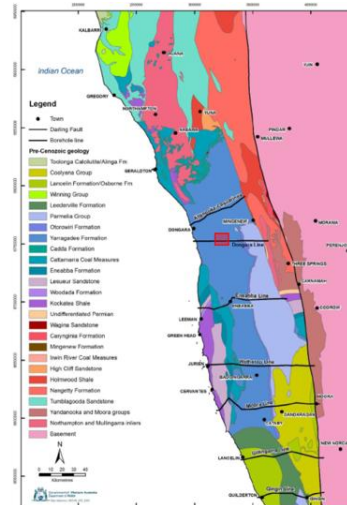


CONCEPTUAL SITE MODEL

1) Geology:

- Yarragadee formation unit D (DoW, 2017):
 - Mid to late Jurassic (~180 mya), predominantly sandstone unit.
 - Interbedded sandstone, siltstone, shale and minor conglomerate. Sediments deposited in non-marine fluvial environment.
 - Dipping towards the East.
 - Series of Faults intersect through project area (NW to SE).

1. Introductions
2. Project objectives
3. Project progress
4. **Conceptual site model**
5. Source pathway receptor
6. Next steps

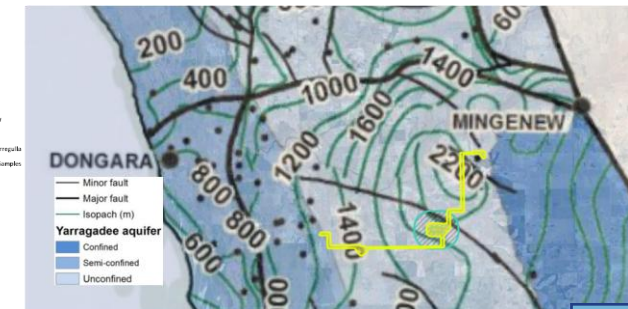
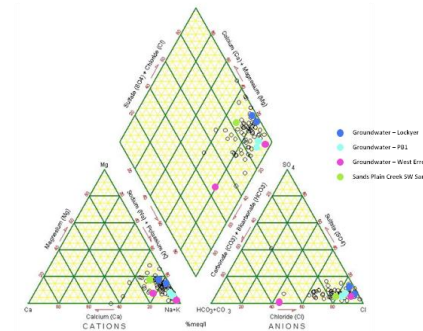
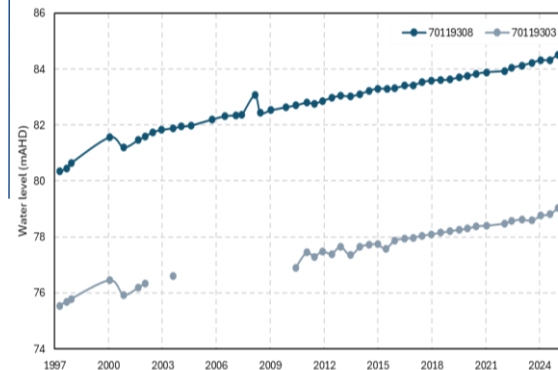


CONCEPTUAL SITE MODEL

2) Hydrogeology:

1. Introductions
2. Project objectives
3. Project progress
- 4. Conceptual site model**
5. Source pathway receptor
6. Next steps

- Yarragadee Aquifer (largest regional aquifer in N. Perth Basin). Unconfined and compartmentalised by faulting and stratigraphy.
- Recharge – direct rainfall (outcrop areas) and focused around rivers / streams. Recharge is 4-6% of annual rainfall.
- Native vegetation clearing = persistent recovering water level trends (~0.3 m/year).
- Regional GW flow towards the Indian Ocean. General bore yields range from 22 – 46 l/s (cases > 70 l/s, PB1 = 72 l/s).
- Hydrochemistry is typically of sodium chloride type, slightly acidic, becoming more enriched in calcium bicarbonate with depth.

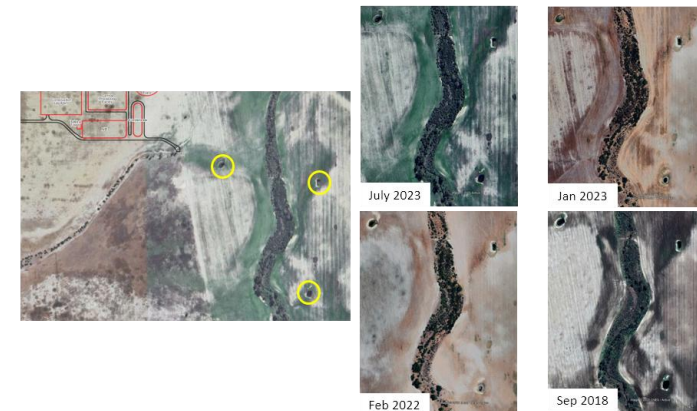
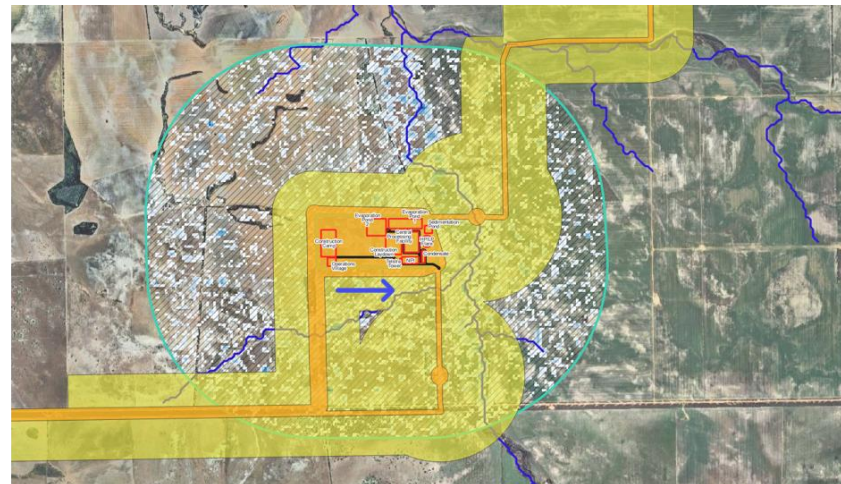


CONCEPTUAL SITE MODEL

3) Surface Water (Hydrology):

1. Introductions
2. Project objectives
3. Project progress
4. **Conceptual site model**
5. Source pathway receptor
6. Next steps

- Overland flow downgradient towards Sands Plain Creek (West to East).
- SW features:
 - Sand Plains Creek
 - Evaporation Ponds x2
 - Sedimentation Pond
 - Isolated SW features – to be discussed (GW / SW connection).

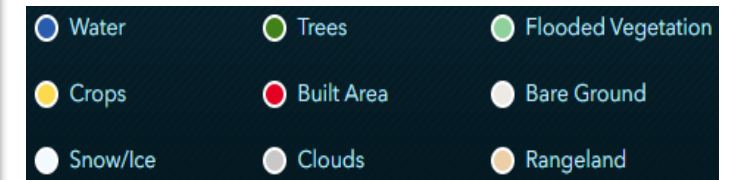
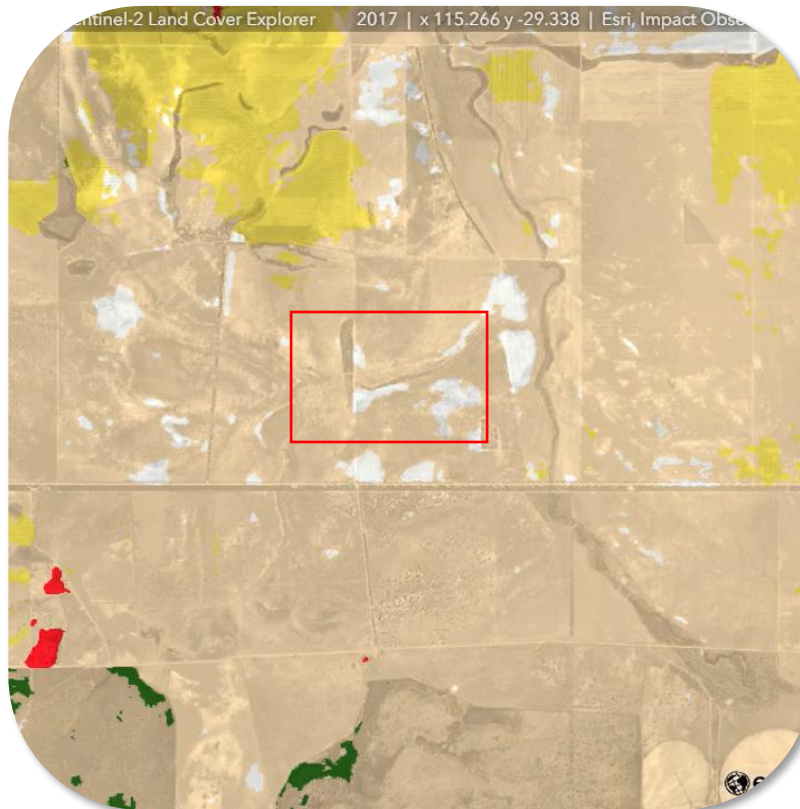


CONCEPTUAL SITE MODEL

4) Existing / historical & planned use:

- Irrigated land (multivariant)
- Livestock
- CPF & related infrastructure.

1. Introductions
2. Project objectives
3. Project progress
- 4. Conceptual site model**
5. Source pathway receptor
6. Next steps

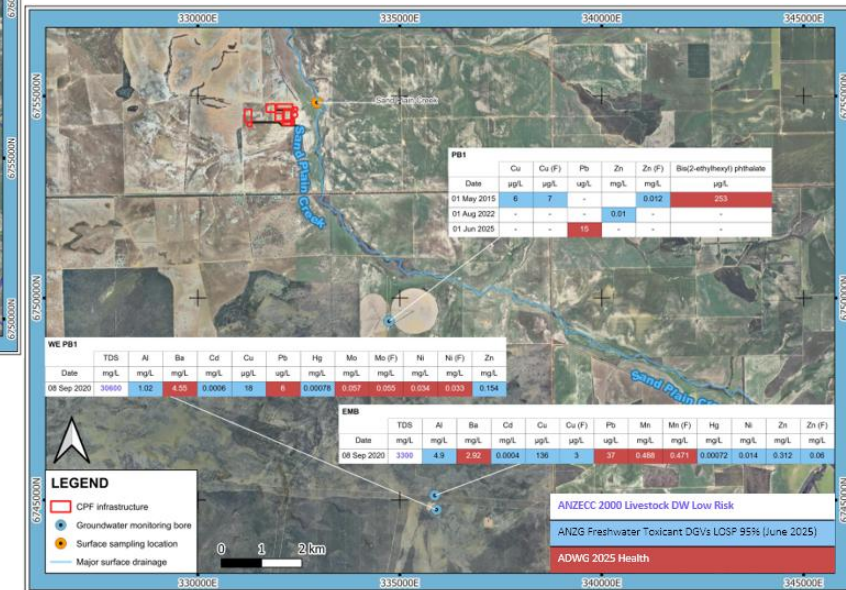
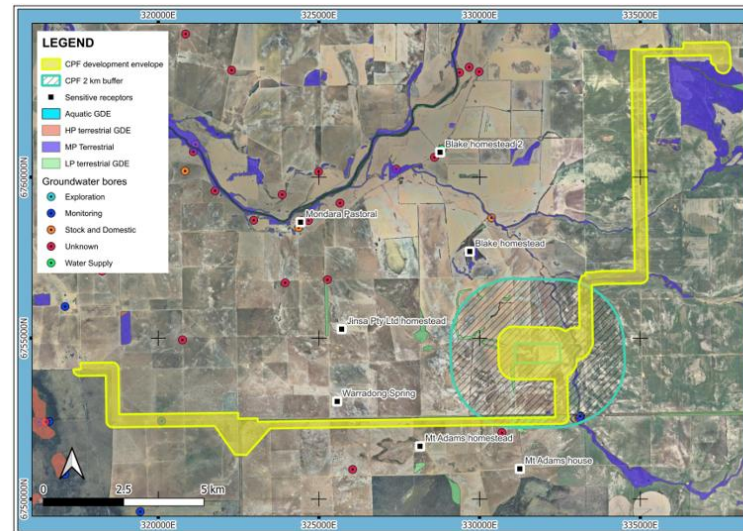


CONCEPTUAL SITE MODEL

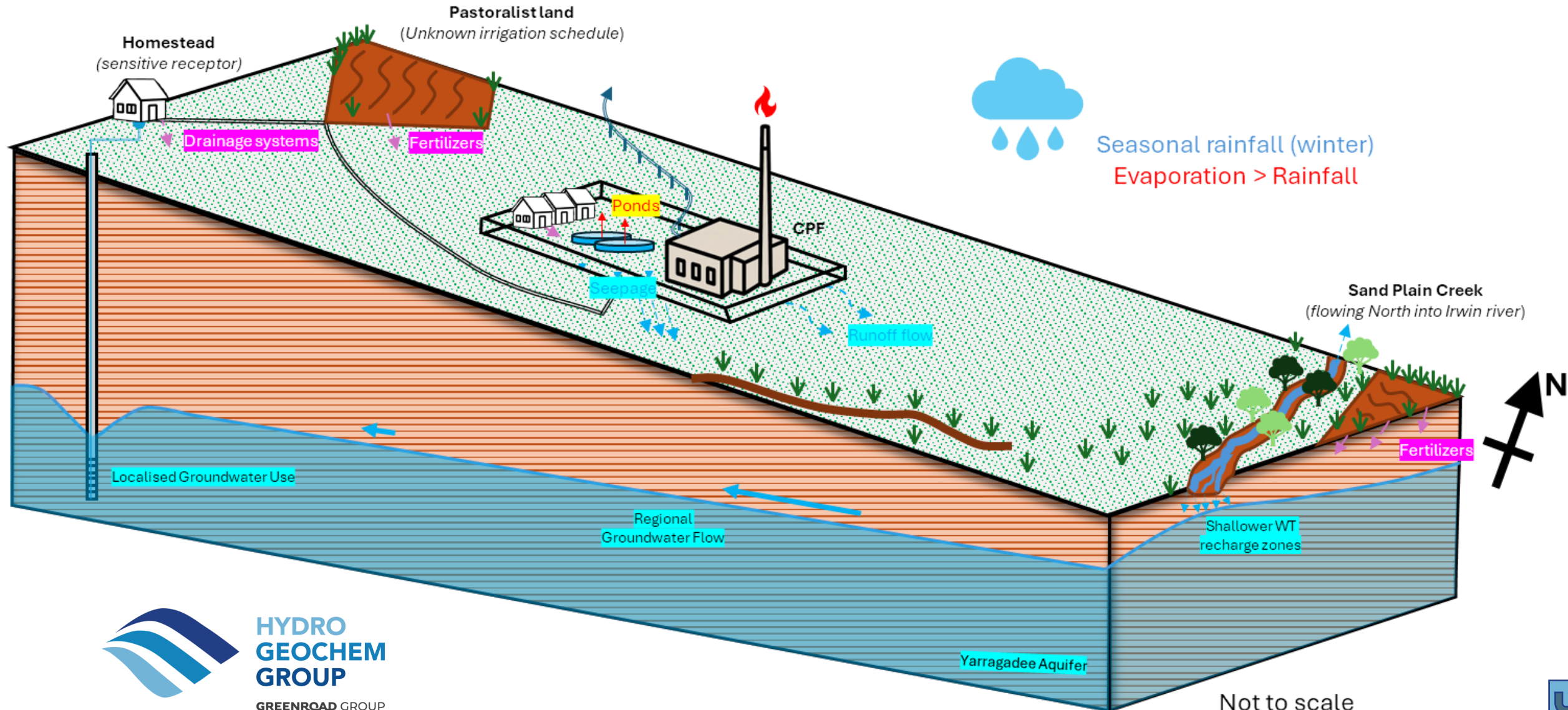
5) Receptors & beneficial use:

- Potable water (homesteads), closest 3.1 km (from CPF boundary) NW direction.
- GDEs (no aquatic, multiple terrestrial (low to high potential), on-site and adjacent. Nearest aquatic GDE, 5.5 km West (Warradong Spring).

1. Introductions
2. Project objectives
3. Project progress
4. **Conceptual site model**
5. Source pathway receptor
6. Next steps



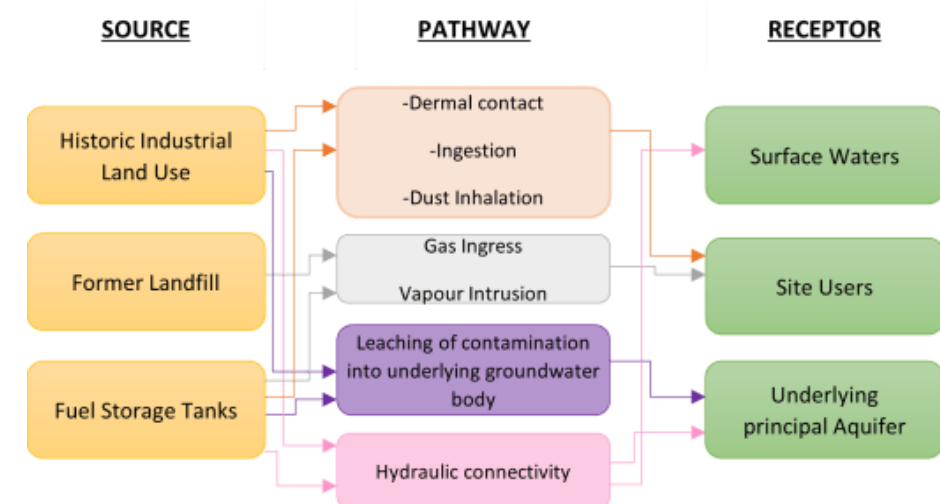
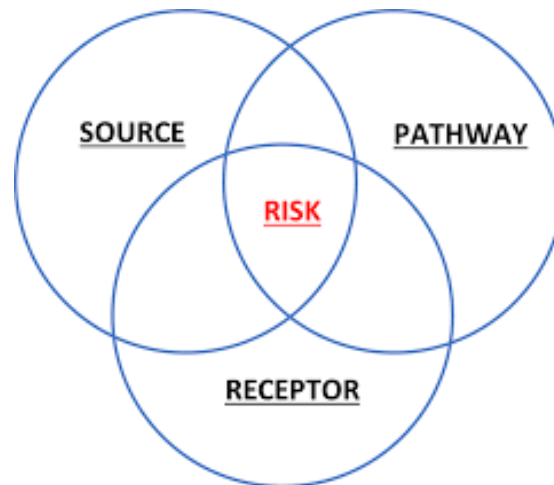
CONCEPTUAL SITE MODEL



SOURCE PATHWAY RECEPTOR

“Source, pathway and receptor (SPR) risk assessments are a framework used in environmental risk assessment to systematically evaluate and understand the potential impacts of contaminants on human health and the environment.”

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. **Source pathway receptor**
6. Next steps



SOURCE PATHWAY RECEPTOR

Sources of potential water impacts:

- Sediment loads
- Spills or leaks (petroleum hydrocarbons)
- Nitrates / Ammonium (site camp)
- PFAS (Fire-fighting).

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
- 5. Source pathway receptor**
6. Next steps

*The **Source** is the origin point of a potential contaminant within a system. The designation of a source can vary widely.*



SOURCE PATHWAY RECEPTOR

Pathways of water potential impacts:

- Runoff (from site downgradient to Sand Plain Creek).
- Shallow seepage into vadose zone (and down hydraulic gradient).
- Within engineered water circuit (i.e recycling).

The **Pathway** is how COPCs travel from the Source to the Receptor. It is the route, or medium, through which the material moves. Pathways can be diverse and complex.

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. **Source pathway receptor**
6. Next steps



SOURCE PATHWAY RECEPTOR

Receptors of water potential impacts:

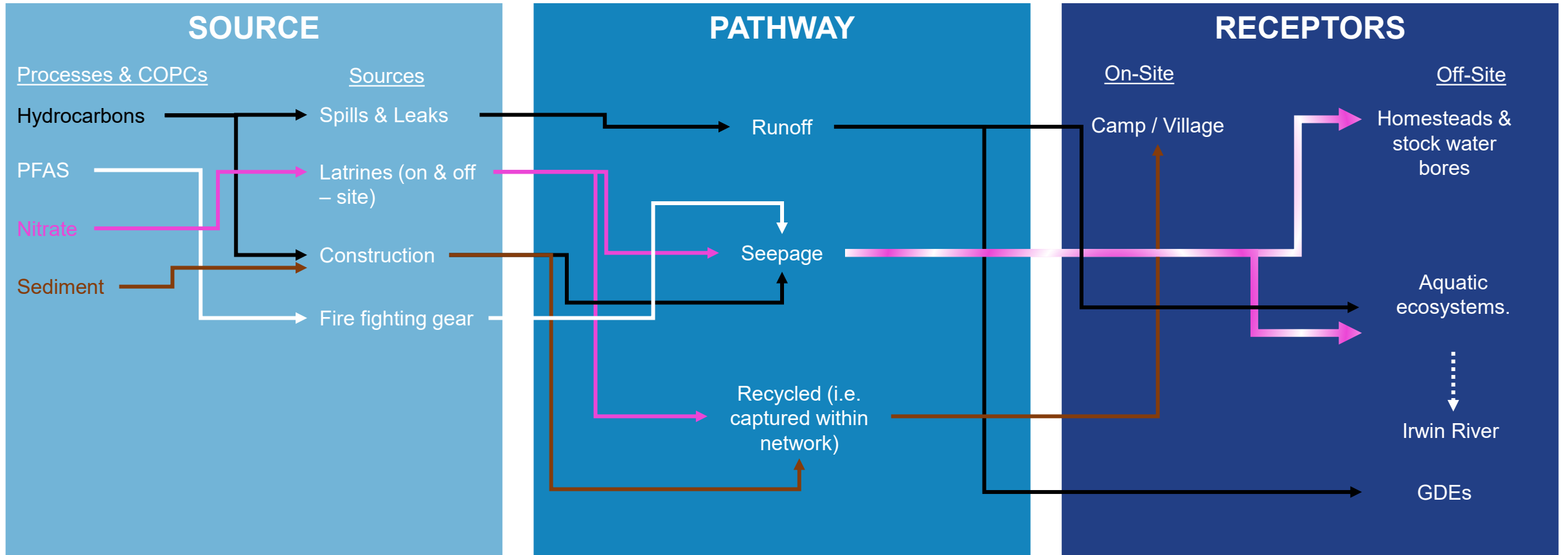
- Sand Plain Creek
 - Irwin River
- Stock water bore users & homesteads (potable water)
- GDEs
- On-site Personnel (i.e. camp/village).
- Yarragadee Aquifer

*The **Receptor** is a potential receiver that contaminants travels to, from Source and through Pathways. Receptors can include humans and sensitive natural environments.*

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
- 5. Source pathway receptor**
6. Next steps



SPR ASSESSMENT



NEXT STEPS

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. Source pathway receptor
6. Next steps



Risk Assessment:

- Multiple parallel risks with Lockyer IWA (HGG, 2024). Example:

HAZ_ID	ENVIRONMENTAL HAZARD	RISK PATHWAYS	IMPACTS	L	C	RISK RATING	RISK MITIGATION	L	C	RESIDUAL RISK RATING	PHASE
Environmental Factor: Water Quality											
1	Site construction works and earthworks exposing underlying soil followed by increased erosion and sediment load.	Transported sediment through surface water runoff towards Sands Plain creek.	Increased sediment load, reduction of surface water quality within Sand Plain creek.	4	2	Medium	- Development, incorporation of erosion and sediment control during construction phase. - During earthworks, conduct routine inspections of stormwater pathways for sediment load.	2	2	Low	Construction
2	Leaks and spills of fuel and other hazardous chemicals.	Transport in overland runoff, surface water drainage and/or groundwater flow	Adverse changes to the quality of surface water in the Sand Plain creek and groundwater in the Project area.	3	2	Medium	- Hazardous chemicals to be stored in banded areas, with a register of on-site chemicals. - Record and report all chemical/hazardous substance spills. - Ensure spill kits are compliant, readily available and personnel are trained to apply in a spill scenario. - Dispose of contaminated soil and absorbent material at designated disposal sites approved by regulator.	1	2	Low	Construction and Operation

- Uncertainty / Gap in GW flow direction (Belisama-specific).

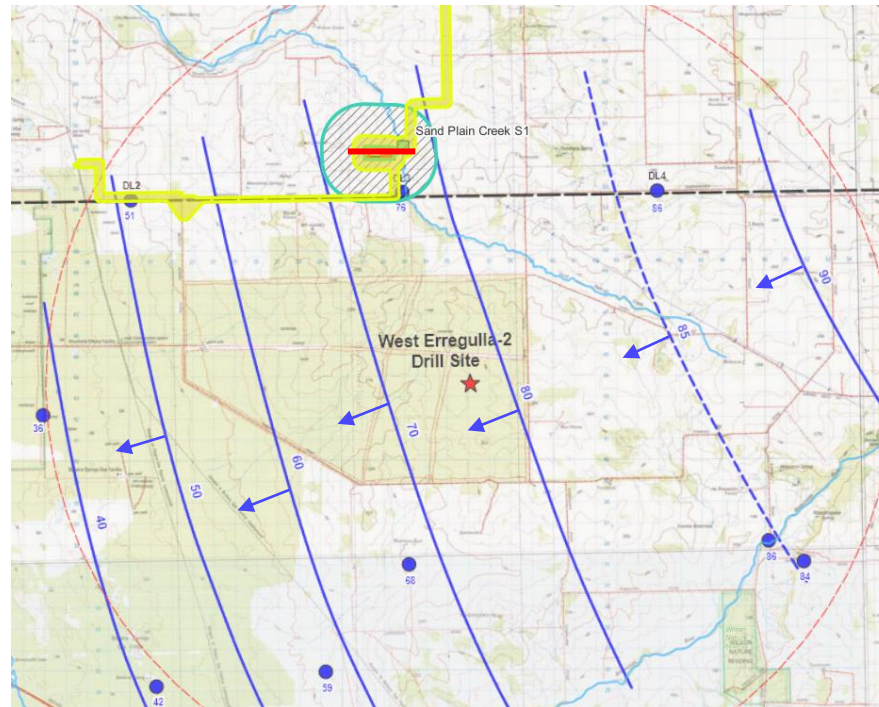
HAZ_ID	ENVIRONMENTAL HAZARD	RISK PATHWAYS	IMPACTS	L	C	RISK RATING	RISK MITIGATION	L	C	RESIDUAL RISK RATING	PHASE
Environmental Factor: Water Quality											
6	Leaks and spills of fuel and other hazardous chemicals.	Uncertainty in groundwater flow pathways (and subsequent receptors)	Negative impacts to the groundwater quality of the Yarragadee Aquifer in the project area. Regional GW flow direction towards West, however surface topography drains East. GWL (mAHD) vs RL (mAHD). Mitigation measures may be in opposite direction to actual flow impact pathways.	3	4	High	- Groundwater bore recon and confirmation of groundwater flow directions. - Establishment of bore network for impact assessment (including upgradient, downgradient and on-site).	2	4	Medium	Operations

NEXT STEPS

Risk Assessment:

- Uncertainty / Gap in GW flow direction.
 - 2011 GW flow direction “West”, topography runoff “east”.
 - Recent WL data inconclusive (flow direction uncertain), as a result of water level recovery.

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. Source pathway receptor
6. **Next steps**



NEXT STEPS

Gaps and opportunities for reducing uncertainty:

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. Source pathway receptor
- 6. Next steps**

- Localised groundwater and surface water conditions.
 - Hydro-census for confirmation & verification.
 - Opportunity to collect updated “baseline” data.
- Surface water feature clarifications & GW/SW relationship.
 - Understanding the connectivity between GW/SW and impact of one on the other (or vice-versa).
- Centralised database
 - Supports development of baseline data, comparison with regional datasets, development of SSTVs, overall CSM improvement.

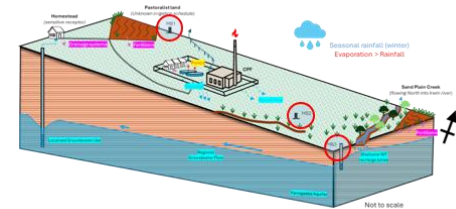


NEXT STEPS

Gaps and opportunities for reducing uncertainty:

1. Introductions
2. Project objectives
3. Project progress
4. Conceptual site model
5. Source pathway receptor
6. **Next steps**

- Localised groundwater and surface water conditions.
- Surface water feature clarifications & GW/SW relationship.
- Centralised database
- Reserve water (backup).
 - One production bore (PB1) ~4km away, with uncertain storage capacity. What happens if bore goes “offline”? Contingency planning?
- Groundwater network establishment (upgradient, on-site and downgradient (“sentry bores”), TBC.
 - Assess and monitoring of SPR.
 - NB to identify target locations.
- Delivery of DRAFT Inland Waters Assessment



GREENROAD



APPENDIX E SITE PHOTOS (18 - 20 NOVEMBER 2025)



SW01 – 19 November 2025



SW02 – 19 November 2025



SW03 – 19 November 2025



SW04 – 19 November 2025



SW05 – 19 November 2025



Pond 01 – 19 November 2025



Pond 02 – 19 November 2025



Pond 03 – 19 November 2025



61710413 – 19 November 2025



70119303 - 19 November 2025



70119308 - 19 November 2025



PB1 - 20 November 2025



HB001 - 18 November 2025



HB002 - 18 November 2025



HB008 - 19 November 2025



HB010 - 19 November 2025



Lefroys Bore - 19 November 2025



Lockyer 5 - 19 November 2025



MB (East) - 20 November 2025



MB(West) - 20 November 2025



N1MB - 19 November 2025



Neat Tree Block - 19 November 2025



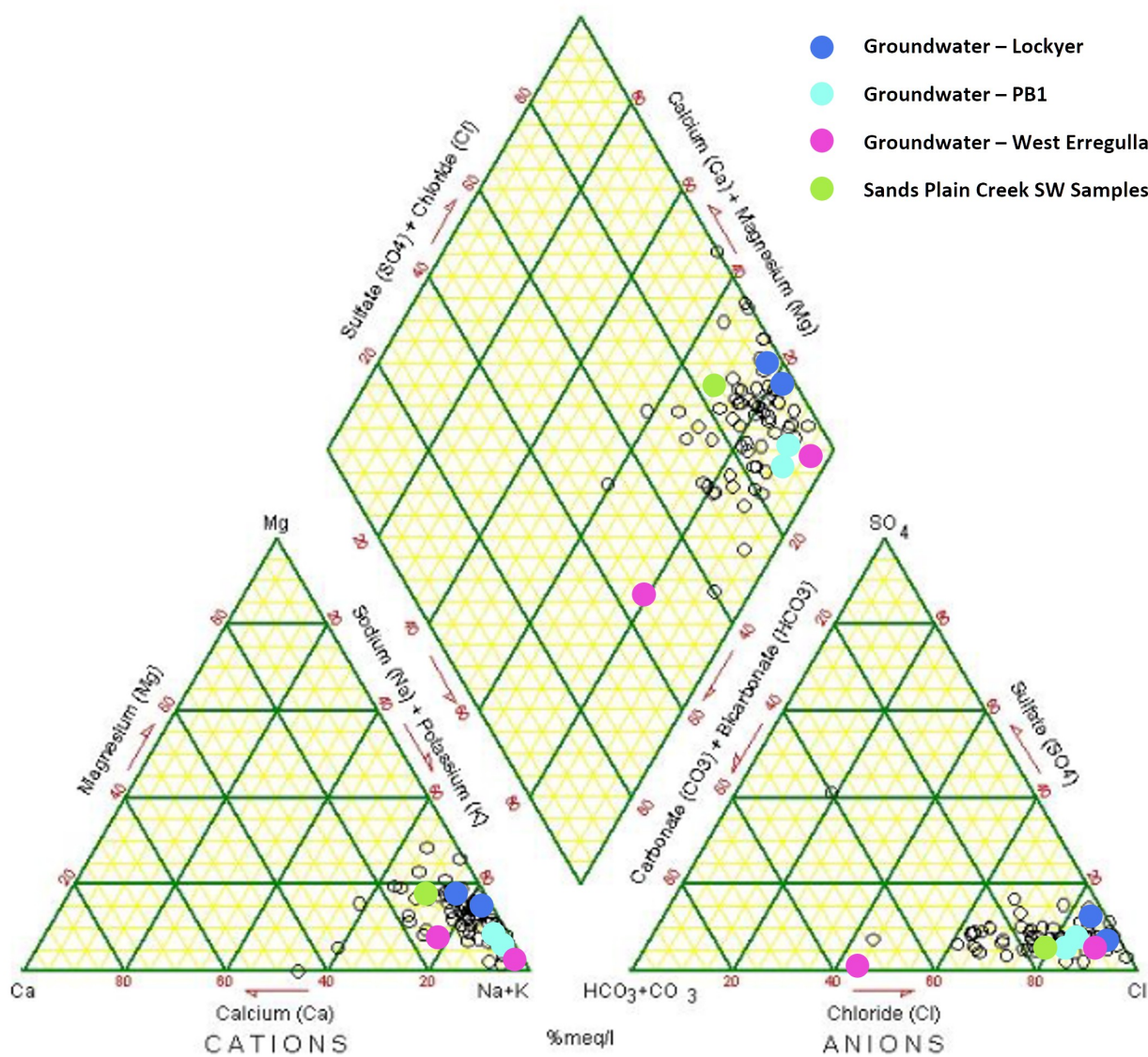
NED-1 - 19 November 2025



West End - 19 November 2025

APPENDIX F PIPER DIAGRAM

- Groundwater – Lockyer
- Groundwater – PB1
- Groundwater – West Erregulla
- Sands Plain Creek SW Samples



APPENDIX G COLLATED LABORATORY CHEMISTRY RESULTS



Water Quality Parameters				Major Ions						Nutrients					
Electrical Conductivity (Lab)	pH (Lab)	Total Dissolved Solids (Lab)	Turbidity (Lab)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulphate	Nitrogen (Total)	Kjeldahl Nitrogen Total	Nitrate (as N)	Ammonia as N	Total Phosphorus (Organic Phosphate)	Ammonium as NH4
µS/cm	-	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL															
ADWG 2025 Health															
ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)															
ANZECC 2000 Livestock DW Low Risk															
		2,000		1,000					1,000			90			

Site ID	Lab Name	Date	Location Code	Field ID	Monitoring Zone	Lab Report Number	Sampling Method	Electrical Conductivity (Lab)	pH (Lab)	Total Dissolved Solids (Lab)	Turbidity (Lab)	Calcium	Magnesium	Sodium	Potassium	Chloride	Sulphate	Nitrogen (Total)	Kjeldahl Nitrogen Total	Nitrate (as N)	Ammonia as N	Total Phosphorus (Organic Phosphate)	Ammonium as NH4	
Belisama	ALS Laboratories	01 May 2015	PB1	-	Groundwater	EP1510205-003	Unknown	1,640	6.3	934	-	-	-	-	-	494	23	2.4	0.4	-	0.05	0.01	-	
	ALS Laboratories	08 Sep 2020	EMB	EMB East Monitoring Bore	Groundwater	EP2009584-002	Bailer	2,040	7.6	3,300	546	72	26	445	52	383	-	19.6	-	-	0.37	-	-	
	ALS Laboratories	08 Sep 2020	WE PB1	PB1 Production Bore 1	Groundwater	EP2009584-001	Bailer	42,800	7.96	30,600	65	84	53	6,480	5,320	15,000	-	-	18.7	-	0.56	-	-	
	Nutrien Water	01 Aug 2022	PB1	-	Groundwater	-	Existing Pump	720	6.2	400	-	1.2	5.5	140	6.1	190	25	-	-	0.8	-	-	-	
	Agrifood Technologies	01 Jun 2025	PB1	-	Groundwater	412100	Existing Pump	760	6.4	430	-	1.3	5.3	130	6.7	200	23	-	-	-	-	-	-	
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S1	Surface Water	430112	Grab sample	1,300	7.4	680	-	29	26	180	8.8	340	34	-	-	0.2	-	-	-	0.2
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S2	Surface Water	430112	Grab sample	1,300	7.4	660	-	29	26	180	8.8	320	32	-	-	0.2	-	-	-	0.2

Statistics																								
Number of Results								7	7	7	2	6	6	6	6	7	5	2	2	3	3	1	2	
Minimum Concentration								720	6.2	400	65	1.2	5.3	130	6.1	190	23	2.4	0.4	0.2	0.05	0.01	0.2	
Maximum Concentration								42,800	7.96	30,600	546	84	53	6,480	5,320	15,000	34	19.6	18.7	0.8	0.56	0.01	0.2	
Average Concentration *								7,223	7	5,286	306	36	24	1,259	900	2,418	27	11	9.5	0.4	0.33		0.2	
Median Concentration *								1,300	7.4	680	305.5	29	26	180	8.8	340	25	11	9.55	0.2	0.37	0.01	0.2	

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NHMRC, June 2025, ADWG 2025 Health

ANZG, June 2025, ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)

DoE, 2000, ANZECC 2000 Livestock DW Low Risk



Inorganics																
Hardness	Iron Oxide - Total	Total Phosphorus as P (Organic Phosphate as P)	Total Alkalinity (pH 4.5)	Total Kjeldahl Nitrogen as N	Total Phosphorus (Kjeldahl Digestion) as PO4	Total Phosphorus (Kjeldahl Digestion) as PO4 (filtered)	Sulfate as SO4 - Turbidimetric	Silicon as SiO2	Nitrite + Nitrate as N	Alkalinity (Bicarbonate as CaCO3)	Bicarbonate	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Ionic Balance	Nitrate (as NO3-)
mg/L	µg/L	mg/L	mg/L	mg N / L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%	mg/L
EQL																
ADWG 2025 Health																
ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)																
ANZECC 2000 Livestock DW Low Risk																

Site ID	Lab Name	Date	Location Code	Field ID	Monitoring Zone	Lab Report Number	Sampling Method																	
Belisama	ALS Laboratories	01 May 2015	PB1	-	Groundwater	EP1510205-003	Unknown	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	1.99	
	ALS Laboratories	08 Sep 2020	EMB	EMB East Monitoring Bore	Groundwater	EP2009584-002	Bailer	-	-	0.14	-	19.6	-	-	1	59.4	0.02	659	-	659	24	26.4	4.82	0.02
	ALS Laboratories	08 Sep 2020	WE PB1	PB1 Production Bore 1	Groundwater	EP2009584-001	Bailer	-	-	13.4	-	-	-	-	1,140	9.6	-	1,050	-	1,050	468	426	4.62	-
	Nutrien Water	01 Aug 2022	PB1	-	Groundwater	-	Existing Pump	25	380	-	30	-	-	-	-	-	-	-	35	-	-	-	-	0.2
	Agrifood Technologies	01 Jun 2025	PB1	-	Groundwater	412100	Existing Pump	-	520	-	30	-	-	-	-	49	-	-	40	-	-	-	-	0.2
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S1	Surface Water	430112	Grab sample	-	-	-	90	-	0.32	0.3	-	-	-	-	110	-	-	-	-	1
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S2	Surface Water	430112	Grab sample	-	-	-	90	-	0.3	0.3	-	-	-	-	105	-	-	-	-	0.9

Statistics	1	2	2	5	1	3	2	2	3	1	2	4	2	2	2	2	6
Number of Results	1	2	2	5	1	3	2	2	3	1	2	4	2	2	2	2	6
Minimum Concentration	25	380	0.14	21	19.6	0.3	0.3	1	9.6	0.02	659	35	659	24	26.4	4.62	0.02
Maximum Concentration	25	520	13.4	90	19.6	0.33	0.3	1,140	59.4	0.02	1,050	110	1,050	468	426	4.82	1.99
Average Concentration *		450	6.8	52		0.32	0.3	570	39		854	72	854	246	226	4.7	0.72
Median Concentration *	25	450	6.77	30	19.6	0.32	0.3	570.5	49	0.02	854.5	72.5	854.5	246	226.2	4.72	0.55

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NHMRC, June 2025, ADWG 2025 Health

ANZG, June 2025, ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)

DoE, 2000, ANZECC 2000 Livestock DW Low Risk



Silica as SiO2	Sulphur as S	Hardness as CaCO3	Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Boron	Boron (filtered)	Cadmium	Chromium (Trivalent)	Chromium (Trivalent) (filtered)	Cobalt	Cobalt (filtered)	Copper
mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	mg/L	ug/L	ug/L	ug/L
EQL																
ADWG 2025 Health					10	10	2,000	2,000	4,000	4,000	2					2,000
ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)			55	55					940	940	0.2					1.4
ANZECC 2000 Livestock DW Low Risk			5,000	5,000	500	500			5,000	5,000	10			1,000	1,000	400

Site ID	Lab Name	Date	Location Code	Field ID	Monitoring Zone	Lab Report Number	Sampling Method	Silica as SiO2	Sulphur as S	Hardness as CaCO3	Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Boron	Boron (filtered)	Cadmium	Chromium (Trivalent)	Chromium (Trivalent) (filtered)	Cobalt	Cobalt (filtered)	Copper
Belisama	ALS Laboratories	01 May 2015	PB1	-	Groundwater	EP1510205-003	Unknown	-	-	-	-	-	-	-	216	220	60	-	-	-	-	1	-	6
	ALS Laboratories	08 Sep 2020	EMB	EMB East Monitoring Bore	Groundwater	EP2009584-002	Bailer	-	-	287	4,900	10	9	4	2,920	404	130	150	0.4	0.018	0.002	25	12	136
	ALS Laboratories	08 Sep 2020	WE PB1	PB1 Production Bore 1	Groundwater	EP2009584-001	Bailer	-	-	428	1,020	-	9	7	4,550	242	-	320	0.6	0.126	0.113	-	-	18
	Nutrien Water	01 Aug 2022	PB1	-	Groundwater	-	Existing Pump	49	-	-	-	-	-	-	320	-	120	-	-	-	-	-	-	-
	Agrifood Technologies	01 Jun 2025	PB1	-	Groundwater	412100	Existing Pump	-	7.4	-	-	-	-	-	170	-	140	-	-	-	-	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S1	Surface Water	430112	Grab sample	-	12	-	-	-	-	-	59	-	100	-	-	-	-	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S2	Surface Water	430112	Grab sample	-	12	-	-	-	-	-	59	-	100	-	-	-	-	-	-	-

Statistics	Silica as SiO2	Sulphur as S	Hardness as CaCO3	Aluminium	Aluminium (filtered)	Arsenic	Arsenic (filtered)	Barium	Barium (filtered)	Boron	Boron (filtered)	Cadmium	Chromium (Trivalent)	Chromium (Trivalent) (filtered)	Cobalt	Cobalt (filtered)	Copper
Number of Results	1	3	2	2	1	2	2	7	3	6	2	2	2	2	2	1	3
Minimum Concentration	49	7.4	287	1,020	10	9	4	59	220	60	150	0.4	0.018	0.002	1	12	6
Maximum Concentration	49	12	428	4,900	10	9	7	4,550	404	140	320	0.6	0.126	0.113	25	12	136
Average Concentration *		10	358	2,960		9	5.5	1,185	289	108	235	0.5	0.072	0.058	13		53
Median Concentration *	49	12	357.5	2,960	10	9	5.5	216	242	110	235	0.5	0.072	0.0575	13	12	18

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NHMRC, June 2025, ADWG 2025 Health

ANZG, June 2025, ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)

DoE, 2000, ANZECC 2000 Livestock DW Low Risk



Metals																		
Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Molybdenum	Molybdenum (filtered)	Nickel	Nickel (filtered)	Silicon	Strontium	Strontium (filtered)	Vanadium	Vanadium (filtered)	
ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	µg/L	ug/L	ug/L	ug/L	ug/L	
EQL																		
ADWG 2025 Health	2,000		5	5	100	100	1	1	50	50	20	20	100,000					
ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)	1.4		3.4	3.4	1,900	1,900	0.6	0.6			11	11						
ANZECC 2000 Livestock DW Low Risk	400		100	100			2	2	150	150	1,000	1,000						

Site ID	Lab Name	Date	Location Code	Field ID	Monitoring Zone	Lab Report Number	Sampling Method	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Molybdenum	Molybdenum (filtered)	Nickel	Nickel (filtered)	Silicon	Strontium	Strontium (filtered)	Vanadium	Vanadium (filtered)	
Belisama	ALS Laboratories	01 May 2015	PB1	-	Groundwater	EP1510205-003	Unknown	7	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	
	ALS Laboratories	08 Sep 2020	EMB	EMB East Monitoring Bore	Groundwater	EP2009584-002	Bailer	3	10,100	320	37	1	488	471	0.72	-	12	8	14	9	-	795	730	20	-	
	ALS Laboratories	08 Sep 2020	WE PB1	PB1 Production Bore 1	Groundwater	EP2009584-001	Bailer	-	1,380	700	6	-	64	53	0.78	0.13	57	55	34	33	-	490	452	70	60	
	Nutrien Water	01 Aug 2022	PB1	-	Groundwater	-	Existing Pump	-	-	-	-	-	10	-	-	-	-	-	-	-	-	23,000	20	-	-	-
	Agrifood Technologies	01 Jun 2025	PB1	-	Groundwater	412100	Existing Pump	-	-	-	-	15	-	27	-	-	-	-	-	-	-	23,000	19	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S1	Surface Water	430112	Grab sample	-	1,300	-	-	-	-	26	-	-	-	-	-	-	-	6,700	270	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S2	Surface Water	430112	Grab sample	-	1,300	-	-	-	-	26	-	-	-	-	-	-	-	6,700	270	-	-	-

Statistics	Copper (filtered)	Iron	Iron (filtered)	Lead	Lead (filtered)	Manganese	Manganese (filtered)	Mercury	Mercury (filtered)	Molybdenum	Molybdenum (filtered)	Nickel	Nickel (filtered)	Silicon	Strontium	Strontium (filtered)	Vanadium	Vanadium (filtered)
Number of Results	2	4	2	3	1	6	2	2	1	2	2	3	3	4	6	2	2	1
Minimum Concentration	3	1,300	320	6	1	10	53	0.72	0.13	12	8	2	2	6,700	19	452	20	60
Maximum Concentration	7	10,100	700	37	1	488	471	0.78	0.13	57	55	34	33	23,000	795	730	70	60
Average Concentration *	5	3,520	510	19		107	262	0.75		34	32	17	15	14,850	311	591	45	
Median Concentration *	5	1,340	510	15	1	26.5	262	0.75	0.13	34.5	31.5	14	9	14,850	270	591	45	60

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NHMRC, June 2025, ADWG 2025 Health

ANZG, June 2025, ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)

DoE, 2000, ANZECC 2000 Livestock DW Low Risk



Zinc	Zinc (filtered)	BTEX		Other	TRH				Phenols	Phthalates	TPH					
		Toluene	Total BTEX		Silica (SiO2)	C6-C10 Fraction (F1)	>C16-C34 Fraction (F3)	>C10-C40 Fraction (Sum)			Aromatic >C6-C10 minus BTEX (F1 Aromatic)	Phenolics	Bis(2-ethylhexyl) phthalate	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction
ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
EQL																
ADWG 2025 Health			800								10					
ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)	8	8	180													
ANZECC 2000 Livestock DW Low Risk	20,000	20,000														

Site ID	Lab Name	Date	Location Code	Field ID	Monitoring Zone	Lab Report Number	Sampling Method	Zinc	Zinc (filtered)	Toluene	Total BTEX	Other	C6-C10 Fraction (F1)	>C16-C34 Fraction (F3)	>C10-C40 Fraction (Sum)	Aromatic >C6-C10 minus BTEX (F1 Aromatic)	Phenols	Phthalates	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum)
Belisama	ALS Laboratories	01 May 2015	PB1	-	Groundwater	EP1510205-003	Unknown	7	12	44	44	-	80	310	310	40	2	253	70	260	60	320
	ALS Laboratories	08 Sep 2020	EMB	EMB East Monitoring Bore	Groundwater	EP2009584-002	Bailer	312	60	-	-	-	-	-	-	-	-	-	-	-	-	-
	ALS Laboratories	08 Sep 2020	WE PB1	PB1 Production Bore 1	Groundwater	EP2009584-001	Bailer	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Nutrien Water	01 Aug 2022	PB1	-	Groundwater	-	Existing Pump	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Agrifood Technologies	01 Jun 2025	PB1	-	Groundwater	412100	Existing Pump	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S1	Surface Water	430112	Grab sample	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-
	Agrifood Technologies	03 Sep 2025	Sand Plain Creek S1	Sand Plain Creek S2	Surface Water	430112	Grab sample	-	-	-	-	14	-	-	-	-	-	-	-	-	-	-

Statistics	Zinc	Zinc (filtered)	Toluene	Total BTEX	Other	C6-C10 Fraction (F1)	>C16-C34 Fraction (F3)	>C10-C40 Fraction (Sum)	Aromatic >C6-C10 minus BTEX (F1 Aromatic)	Phenols	Phthalates	C6-C9 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum)
Number of Results	4	2	1	1	2	1	1	1	1	1	1	1	1	1	1
Minimum Concentration	7	12	44	44	14	80	310	310	40	2	253	70	260	60	320
Maximum Concentration	312	60	44	44	14	80	310	310	40	2	253	70	260	60	320
Average Concentration *	121	36			14										
Median Concentration *	82	36	44	44	14	80	310	310	40	2	253	70	260	60	320

* A Non Detect Multiplier of 0.5 has been applied.

Environmental Standards

NHMRC, June 2025, ADWG 2025 Health

ANZG, June 2025, ANZG Freshwater Toxicant DGVs LOSP 95% (June 2025)

DoE, 2000, ANZECC 2000 Livestock DW Low Risk

**APPENDIX H IDENTIFIED GROUNDWATER AND SURFACE WATER
LOCATIONS**

PROJECT ID	SITE ID	MONITORING ZONE	LOCATION CODE	ALTERNATIVE NAME	DATA SOURCE	LOCATION TYPE	PURPOSE	X-CO	Y-CO	LATITUDE	LONGITUDE	DISTANCE FROM CPF (km)	DEPTH (m)	SCREENS (m)	ELEVATION (mAHD)
J-H-AU0283	Belisama	Groundwater	Lefroy's Bore	-	Bore Recon	BH	Stock	331651	6754865	-29.324	115.266	0.10	-	-	131.00
J-H-AU0283	Belisama	Surface Water	Pond 3	-	Bore Recon	SW	Surface Water	332744	6754157	-29.331	115.277	0.39	-	-	119.00
J-H-AU0283	Belisama	Surface Water	Sand Plain Creek S1	-	Hancock Energy	SW	Surface Water	332955	6754838	-29.324	115.280	0.47	-	-	119.00
J-H-AU0283	Belisama	Surface Water	Pond 1	-	Bore Recon	SW	Surface Water	333184	6754081	-29.331	115.282	0.84	-	-	126.00
J-H-AU0283	Belisama	Surface Water	Pond 2	-	Bore Recon	SW	Surface Water	333148	6753562	-29.336	115.281	1.06	-	-	123.00
J-H-AU0283	Belisama	Groundwater	70111704	-	WIR	BH	Unknown	332964	6752500	-29.346	115.279	1.80	67.06	-	129.00
J-H-AU0283	Belisama	Surface Water	SW04	-	Bore Recon	SW	Surface Water	333068	6752623	-29.344	115.281	1.80	-	-	129.00
J-H-AU0283	Belisama	Groundwater	70119303	DL3A	WIR	BH	Monitoring	333144	6752583	-29.345	115.281	1.81	435	429-435	129.21
J-H-AU0283	Belisama	Groundwater	70119308	DL3W	WIR	BH	Monitoring	333128	6752572	-29.345	115.281	1.81	109	103-109	129.13
J-H-AU0283	Belisama	Groundwater	70111703	-	WIR	BH	Unknown	330699	6752061	-29.349	115.256	2.20	140.21	-	200.00
J-H-AU0283	Belisama	Surface Water	SW03	-	Bore Recon	SW	Surface Water	335021	6756802	-29.307	115.301	3.34	-	-	132.00
J-H-AU0283	Belisama	Groundwater	HB008	-	Bore Recon	BH	Production	331257	6750605	-29.362	115.262	3.64	39.3	0-39.3	180.00
J-H-AU0283	Belisama	Groundwater	Neat Tree Block	HB009	Bore Recon	BH	Stock	331254	6750590	-29.363	115.262	3.65	-	-	179.00
J-H-AU0283	Belisama	Groundwater	70111705	-	WIR	BH	Stock	330374	6758740	-29.289	115.254	3.95	42.67	30.48-42.67	101.00
J-H-AU0283	Belisama	Surface Water	SW05	-	Bore Recon	SW	Surface Water	334609	6751032	-29.359	115.296	3.95	-	-	137.00
J-H-AU0283	Belisama	Surface Water	SW02	-	Bore Recon	SW	Surface Water	335082	6758676	-29.290	115.302	4.75	-	-	131.00
J-H-AU0283	Belisama	Groundwater	PB1	70140017	Hancock Energy	BH	Monitoring	334733	6749425	-29.374	115.297	5.34	347	162.2-329.6	148.00
J-H-AU0283	Belisama	Groundwater	HB010	-	Bore Recon	BH	Stock	336339	6750444	-29.365	115.314	5.52	-	-	144.00
J-H-AU0283	Belisama	Groundwater	61710413	-	WIR	BH	Unknown	326050	6750921	-29.359	115.208	6.04	-	-	179.00
J-H-AU0283	Belisama	Groundwater	MB (West)	HB011	Bore Recon	BH	Monitoring	335475	6748839	-29.379	115.305	6.27	-	-	172.00
J-H-AU0283	Belisama	Groundwater	MB (East)	HB012	Bore Recon	BH	Monitoring	336204	6748848	-29.379	115.312	6.65	-	-	180.00
J-H-AU0283	Belisama	Groundwater	West End	HB006	Bore Recon	BH	Stock	325243	6750583	-29.362	115.200	7.03	-	-	161.00
J-H-AU0283	Belisama	Groundwater	EMB	-	West Erregula Project	BH	Monitoring	335952	6745101	-29.413	115.309	9.70	179	147-160	221.00
J-H-AU0283	Belisama	Groundwater	WMB	-	West Erregula Project	BH	Monitoring	335425	6744950	-29.414	115.304	9.70	166	158-163	218.00
J-H-AU0283	Belisama	Surface Water	SW01	-	Bore Recon	SW	Surface Water	335945	6763989	-29.242	115.312	9.87	-	-	133.00
J-H-AU0283	Belisama	Groundwater	N1MB	HB004	Bore Recon	BH	Monitoring	337471	6763428	-29.248	115.327	10.03	84.5	64.75-84.5	167.00
J-H-AU0283	Belisama	Groundwater	NED-1	HB003	Bore Recon	BH	Production	337568	6763420	-29.248	115.328	10.08	127.65	104.4-127.65	179.00
J-H-AU0283	Belisama	Groundwater	WE PB1	-	West Erregula Project	BH	Production	335905	6744758	-29.416	115.309	10.10	276	198-217; 259-274	227.00
J-H-AU0283	Belisama	Groundwater	HB002	-	Bore Recon	BH	Production	338673	6763199	-29.250	115.340	10.50	>150	-	192.00
J-H-AU0283	Belisama	Groundwater	HB001	Main Camp Bore	Bore Recon	BH	Production	338219	6763945	-29.243	115.335	10.80	-	-	212.00
J-H-AU0283	Belisama	Groundwater	Lockyer 5	HB005	Bore Recon	BH	Production	336416	6764990	-29.233	115.317	10.97	97.25	43.75-97.25	136.00
J-H-AU0283	Belisama	Groundwater	70119302	-	WIR	BH	Monitoring	320107	6752423	-29.344	115.147	11.15	427	421-427	85.48
J-H-AU0283	Belisama	Groundwater	70119307	-	WIR	BH	Monitoring	320107	6752423	-29.344	115.147	11.15	69	63-69	85.16

APPENDIX I RISK ASSESSMENT

HAZ_ID	ENVIRONMENTAL HAZARD	RISK PATHWAYS	IMPACTS	L	C	RISK RATING	RISK MITIGATION	L	C	RESIDUAL RISK RATING	PHASE
Environmental Factor: Water Quality											
1	Site construction works and earthworks exposing underlying soil followed by increased erosion and sediment load.	Transported sediment through surface water runoff towards Sands Plain creek.	Increased sediment load, reduction of surface water quality within Sand Plain creek.	4	2	Medium	- Development, incorporation of erosion and sediment control during construction phase. - During earthworks, conduct routine inspections of stormwater pathways for sediment load.	2	2	Low	Construction
2	Leaks and spills of fuel and other hazardous chemicals.	Transport in overland runoff, surface water drainage and/or groundwater flow	Adverse changes to the quality of surface water in the Sand Plain creek and groundwater in the Project area.	3	2	Medium	- Hazardous chemicals to be stored in bunded areas, with a register of on-site chemicals. - Record and report all chemical/hazardous substance spills. - Ensure spill kits are compliant, readily available and personnel are trained to apply in a spill scenario. - Dispose of contaminated soil and absorbent material at designated disposal sites approved by regulator.	1	2	Low	Construction and Operation
3	Leaks and spills of hydrocarbon condensate from above ground infrastructure.	Transport in overland runoff, surface water drainage and/or groundwater flow.	Negative impacts to the surface water quality of the Sand Plain creek and subsequent groundwater in the project area.	3	4	High	- Conduct routine visual inspections of above-ground pipelines for leaks. - Monitor pipeline pressures for signs of pressure drop, indicating potential leaks in the network. - Conduct routine monitoring and sampling of surface water and groundwater in the Project area to identify impacts to the environment. - Development of site stormwater management plan to collect runoff water within the CPF.	2	4	Medium	Operations
4	Leaks through evaporation ponds	Contamination of surface water and groundwater from spills, leaks, and transport in runoff.	Negative impacts to the surface water quality of the Sand Plain creek and subsequent groundwater in the project area.	5	3	High	- Ponds to be constructed with a HDPE and/or geosynthetic clay liner or similar to create hydraulic barrier and prevent vertical migration of water into the subsurface. - Inspection of liner prior to commissioning of evaporation ponds. - Routine monitoring and sampling of nearby monitoring bores and surface water locations to assess against baseline conditions.	2	3	Medium	Operations
5	Spills from evaporation / condensate ponds	Contamination of surface water and groundwater from spills, leaks, and transport in runoff.	Negative impacts to the surface water quality of the Sand Plain creek and subsequent groundwater in the project area. Damage to infrastructure during overtopping.	5	3	High	- Inspection and monitoring of freeboard to monitor and manage water on-site. - Discharge management plan should be available on-site should the cutoff levels be reached. - A site-wide water balance should be conducted for the 1:100 year storm events to effectively determine whether sufficient storage available on-site.	2	3	Medium	Operations

HAZ_ID	ENVIRONMENTAL HAZARD	RISK PATHWAYS	IMPACTS	L	C	RISK RATING	RISK MITIGATION	L	C	RESIDUAL RISK RATING	PHASE
6	Leaks and spills of fuel and other hazardous chemicals.	Uncertainty in groundwater flow pathways (and subsequent receptors)	Negative impacts to the groundwater quality of the Yarragadee Aquifer in the project area. Regional GW flow direction towards West, however surface topography drains East. GWL (mAHD) vs RL (mAHD). Mitigation measures may be in opposite direction to actual flow impact pathways.	3	4	High	- Groundwater bore recon and confirmation of groundwater flow directions. - Establishment of bore network for impact assessment (including upgradient, downgradient and on-site). - Development of SAQP for impact assessment of potential COPCs.	2	4	Medium	Operations
7	Leaks and spills of fuel and other hazardous chemicals.	Potential for shallow perched aquifer within development envelope and south east of CPF to be impacted by runoff.	Potential shallow pathway for contaminants to reach perched water table and impact on groundwater dependant ecosystems.	3	2	Medium	- Further investigation and delineation of shallow perched aquifer south east of the CPF development area. Including review of previous test-pitting work completed in the vicinity. - Field investigations using either a combination of near surface geophysics or hand auger tools to support delineation of area. - Inclusion of potential area into monitoring plans and development of site-specific trigger values for further investigation. - Installation of in-field monitoring units at the closest pond, downgradient of CPF.	2	1	Low	Construction and Operation
8	Leaks and spills of effluent and grey water from the construction and operational camp.	Contamination of surface water and groundwater from spills, leaks, and transport in runoff.	Adverse changes to the quality of surface water in the Sand Plain creek and groundwater in the Project area.	2	2	Low	- Conduct routine visual inspections of above ground pipelines. - Routine monitoring sampling at the camp facilities to include analysis for microorganisms (e.g. E.coli) at specified intervals.	1	2	Low	Construction and Operation
Environmental Factor: Hydrogeological Processes											
9	Groundwater abstraction.	Alteration of groundwater levels.	Increased drawdown from groundwater abstraction impacting surrounding groundwater users and GDEs.	2	3	Medium	- Groundwater abstraction to be compliant with conditions set out in 5C licence. - Abstraction bores to be metered and routinely monitored. Abstraction volumes to be reported to DWER as per licence conditions. - Local monitoring bores to be routinely monitored for groundwater levels, with a trigger action response plan (TARP) to be implemented as required.	1	3	Low	Construction and Operation
10	Groundwater supply	Continued operations of site and construction works.	Insufficient reserve water supply for the use of fire-fighting and/or water supply.	2	3	Medium	- Development of sufficient on-site storage for fire-fighting purposes specifically (72 hours supply). - Drilling of reserve water supply or access to nearby pastoral bores for a water cart to deliver water to the CPF.	1	3	Low	Construction and Operation
11	Site earthworks and layout.	Alteration of surface hydrology.	Increased volume of surface water runoff and / or ponding of surface water runoff. Site flooding from heavy rainfall.	3	2	Medium	- Design stockpiled material, earthworks, and excavations as to reduce alterations to natural stormwater runoff.	1	2	Low	Construction and Operation



**HYDRO
GEOCHEM
GROUP**

GREENROAD GROUP