UWIR 2021-2024

PL 214 - Utopia Oilfield

Oilwells Inc of Kentucky
ABN 40 161 627 345
Registered Operator Number: 601240

Document Revision and Issue Status

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This UWIR Report (Version 01) for PL 214 Utopia Oilfield is issued by authority of Bridgeport Energy Limited, under the authority of the Bridgeport Chief Technical Officer.

16/11/2022

Barry Smith, Chief Technical Officer

Bridgeport Energy Pty Limited

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Acronym	Definition
ANZECC	Australia New Zealand Environment and Conservation Council
ALARP	May be As Low as Reasonably Possible
ALS	Australian Laboratory Services
AS/NZS	Australia New Zealand Standard
BTEX	Benzene, Toluene, Ethyl-benzene and Xylene
DEHP	*The then* Department of Environment & Heritage Protection
DES	Department of Environment and Science
DNRM	Department of Natural Resources and Mines
EA	Environmental Authority
ESA	Environmentally Sensitive Area
EPM	Equivalent Porous Medium
GAB	Great Artesian Basin
GDE	Groundwater Dependent Ecosystem
IAA	Immediately Affected Area
ML	Mega litres
NATA	National Association of Testing Authorities
LTAA	Long-Term Affected Area
NATA	National Association of Testing Authorities
OWC	Oil Water Contact
OWK	Oilwells Inc. Of Kentucky
PL	Petroleum Lease
STB	Stock Tank Barrel
SET	Senior Executive Team
SWL	Connate water saturation
TDS	Total Dissolved Solids
UWIR	Underground Water Impact Report
WOR	Water Oil Ratio

Executive Summary

This report outlines potential impacts from petroleum related extraction on groundwater and associated ecological and social values relating to the State of Queensland's water resources.

The Utopia Oilfield is situated 84 km west of Eromanga and is currently under production, where groundwater is extracted as a by-product of oil production.

To assess the risk of groundwater extraction on a range of values, this Underground Water Impact Report (UWIR) has been prepared using historic and future predicated production rates, and includes the results from scientific modelling (including production data, geological layers, quantifiable variables and assumptions etc.) that determines water level drawn down in the geological layers around the Utopia oil wells.

Modelling can help indicate the historic and future potential drawdown of pressure as a result of water extraction. In the model, geology is separated into layers, with an upper Layer most accessible and applicable to landholders and environmental values (also being the layer furthest away from production). In this upper-most Layer, modelling shows zero historic drawdown during 2015 up to 2021 using historic production, and zero maximum future drawdowns using future predicted extraction volumes. In the Layer targeted by petroleum production (>1,000 m deep), historic drawdown was 8.29 m, reducing to 6.26 m for future production estimates.

Geological separation and impermeable boundary layers in geology, the relatively small production extraction rates compared to the reservoir volume, as well as the very low-pressure drawdowns predicted by the modelling lead Bridgeport to conclude there would likely be no environmental impacts to groundwater, groundwater users, groundwater dependent ecosystems, environmental values and other water related criteria surrounding PL 214 Utopia. A standard risk assessment was used to determine the likelihood of impacts from water extraction. The risk assessment determined no direct impact to groundwater, groundwater users, groundwater dependent ecosystems, environmental values and other water related criteria.

<u>Bridgeport concludes there would be no direct impact to landholders, or any other value related to groundwater as the result of extraction from PL 214 Utopia.</u>

Statement of Compliance

Since the previous submission by Bridgeport in 2018, there has been limited material change in the information, predictions or impacts from production and extraction of groundwater. However, in this UWIR, a material change is the inclusion of a detailed model developed to inform and quantify water pressure drawdown at PL 214 Utopia Oilfield.

Legislation

The following legislation was used to determine and prepare the contents of this UWIR include:

- Water Act (2000) [reprint current from 1st December 2020 to date, accessed 2021).
- Underground Water Impact Reports and Final Reports – ESR/2016/2000 Version 3.02 Effective 05 JUL 2007 (formerly EM1089) [https://environment.des.qld.gov.au/management/activities/non-mining/water/groundwater#underground_water_impact_report; accessed 2021; https://environment.des.qld.gov.au/__data/assets/pdf_file/0036/88398/rs-gl-uwir-final-report.pdf]

As per the instructions in the *Underground water impact reports final reports Guideline* (DES 2017), "*An UWIR must contain the information that has been outlined in each of the following parts of this guideline*", including;

- Part A: Information about underground water extractions resulting from the exercise of underground water rights
- Part B: Information about aquifers affected, or likely to be affected
- Part C: Maps showing the area of the affected aquifer(s) where underground water levels are expected to decline
- Part D: An assessment of the impacts of the environmental values from the exercise of underground water rights
- Part E: A water monitoring strategy
- Part F: A spring impact management strategy
- Part G (a): For a CMA, assignment of responsibilities to resource tenure holders (N/A)

- Part G (b): Final reports

To ensure Bridgeport have complied with the above requirements, Bridgeport have chosen to itemise the Parts and include the relevant requirements (as sections) of the relevant legislation as they have been laid out in DES (2017).

Project Setting

PL 214 Utopia Oilfield is located 84 km southwest of the township of Quilpie and 50 km southeast of the town of Eromanga, in the local Quilpie Shire Council area, southwest Queensland (Table 1).

Utopia was excised from the original ATP 560P permit when PL 214 was granted in 2006 and encompasses an approximate area of 220 km^2. Within this 220 km^2, the oil production facility or oilfield is approximately 25.4 km^2, with 13 wells currently online. Coordinates for the Utopia production facility are 27°2’21.64” S, 143°34’1.14” E.

Table 1: Oilwells Inc of Kentucky Utopia Field Summary.

Oilfield Name	Oilfield Type	PL Number	Number of Wells currently producing (as at October 2021)
Utopia	Conventional Oil	PL 214	13

The infrastructure at Utopia consists of a small demountable camp and office, beam pumps, flowlines, a production manifold, separation tank, oil storage tanks, load out facilities and a series of ponds for the treatment of produced for water.

Oilwells Inc of Kentucky is the holder of the tenement, which is a subsidiary of Bridgeport Energy Pty Limited. Bridgeport will be used herein to describe the operator.

Figure 1: The location of PL 214 (Utopia) highlighted yellow, in an area 84 km to the west of Quilpie.

Part A*: Underground water extractions

Requirements under section 376(a) of the Water Act
To meet the requirements under section 376(a) of the Water Act, an UWIR must include the following: 1. *The quantity of underground water produced or taken from the area because of the exercise of underground water rights; and* 2. *An estimate of the quantity of water to be produced or taken because of the exercise of underground water rights for a three-year period starting on the consultation day of the report.*

*Part A refers to Section 5.1.1 (page 12) of the guideline (DES 2017).

Bridgeport has developed a monitoring strategy that meets the requirements of Section 376(a)(1) of the Water Act. This section provides specific details of how water related parameters are collected, including water produced or taken as part of exercising underground water rights.

Bridgeport Energy's monitoring strategy is based on three primary parameters:

- Formation water production
- Reservoir oil/water level depth
- Water quality

The volumetric measurements of oil and produced water are required from an operational point-of-view, to aid in the process of facility optimisation. This includes tracking productivity so that separation processes are optimised, processing capacity is increased, and oil production is maximised.

Since 2015, Bridgeport has measured oil and water production, which can be used to calculate the volume of water extracted per well and standardised to beam pump operating time. In the field, each well is flow tested into an isolated test tank at different intervals. After a settlement period, the contents of the tank are volumetrically measured by means of a dip-stick and water-indicating paste. Volumes of both produced oil and water are obtained from this measurement.

Volumetric oil and water calculations are recorded to calculate production rates for oil and water over time.

Daily water and oil production rates (total fluid rates) are also correlated to the beam pump operation time daily, to provide a more accurate water/oil production per unit operation time across the field/s.

As a result, historical water production statistics are available for the field and on a per-well basis (Appendix 2). Consequently, Bridgeport has a detailed understanding of extraction rates throughout its operatorship history.

Methods for measuring underground water level

Another parameter that Bridgeport monitors is the depth of underground water levels. Since a significant portion of the requirements under S376 of the Water Act pertain directly to the relationship between water extraction and underground water level depth, Bridgeport has adopted two methods of evaluating water depth.

The first is through analysis of current wells and their production status. Underground water levels tend to rise as oil is depleted. Consequently, when an existing well “waters out” (ceases to produce oil and only produces water), it is inferred that in the immediate localised area, the underground water level has risen to the depth of the well’s perforations. For the wells drilled in Utopia, this is some 1400 m below surface.

The second of these is through identification of the oil/water contact (OWC) via petrophysical analysis as new wells are drilled. When new wells are drilled; the oil-water contact at the time of drilling is identified by log analysis through independent third-party contractors. Since the depth of the oil/water contact is defined as the top of the aquifer, identification infers aquifer water level. Maintaining records of these parameters helps define the original reservoir water level as well as how water level depth might change over the production life of the field, as water displaces oil. The geological attributes of the targeted Murta or other formations does not allow the consistent determination of the OWC however and is discussed in detail below.

Cumulative assessment of water extracted

From November 2014 to October 2021, a total of 150.00 ML of water was extracted at Utopia. Total water extraction has declined annually over these 7 years, falling from 32.85 ML in 2015 almost consecutively until 2021, where 17.82 ML were extracted (Table 2).

Table 2: Annual water extracted from Utopia between 2014 and 2021.

Year	Total water extracted (ML)
2015	32.85
2016	23.98
2017	25.63
2018	14.85
2019	19.35
2020	16.03
2021	17.28
Total	149.97

Cumulative water production per well (in ML) between November 2014 and October 2021 in Utopia is quantified in

Table 3. There are two large contributors to Utopia's cumulative water production, Utopia 10 with 38.55 ML (25.70%) and Utopia 08 with 31.15 ML (20.77%). The next largest well only contributes 9.34 % of total production, Utopia 14 with 14.01 ML (

Table 3). The only other well which has contributed over ~6% is Utopia 06 (with 13.03 ML or 8.69%). All other wells are rather small contributors to total water extraction (

Table 3).

A years' data is reported from November 1st the previous year, through to the 31st of October that year, to allow reporting (e.g. 2015 data includes 1st November 2014 through to 31st October 2015).

Table 3: Cumulative water (ML) extracted per between 2014 and 2021.

Well	Cumulative water (ML)	Cumulative portion (%)
Utopia 01	3.04	2.03
Utopia 02	1.27	0.85
Utopia 03	1.69	1.12
Utopia 06	13.03	8.69
Utopia 07	6.41	4.27
Utopia 08	31.15	20.77
Utopia 09	10.14	6.76
Utopia 10	38.55	25.70
Utopia 11	8.85	5.90
Utopia 12	3.86	2.57
Utopia 14	14.01	9.34
Utopia 15	2.88	1.92
Utopia 16	0	0
Utopia 17	0	0
Utopia 19	2.42	1.61
Utopia 20	1.77	1.18
Utopia 21	0.36	0.24
Utopia 22	9.84	6.56
Utopia 23	0.65	0.43
Total	**149.97 ML**	

Annual water production (ML) per well across the Utopia field is presented in Table 2. The large relative production estimates provided early are visible, with Utopia 08 being the largest, long term producer. Utopia 10 was the largest water producing well, which was active between 2015 and 2017 (Figure 2). Other wells (Utopia 14 and Utopia 06) remain relatively consistent. Other wells (e.g., Utopia 02, Utopia 07, Utopia 09, Utopia 11 and Utopia 19) have gradually declined, leading to the significant fall in water production over time (Figure 2).

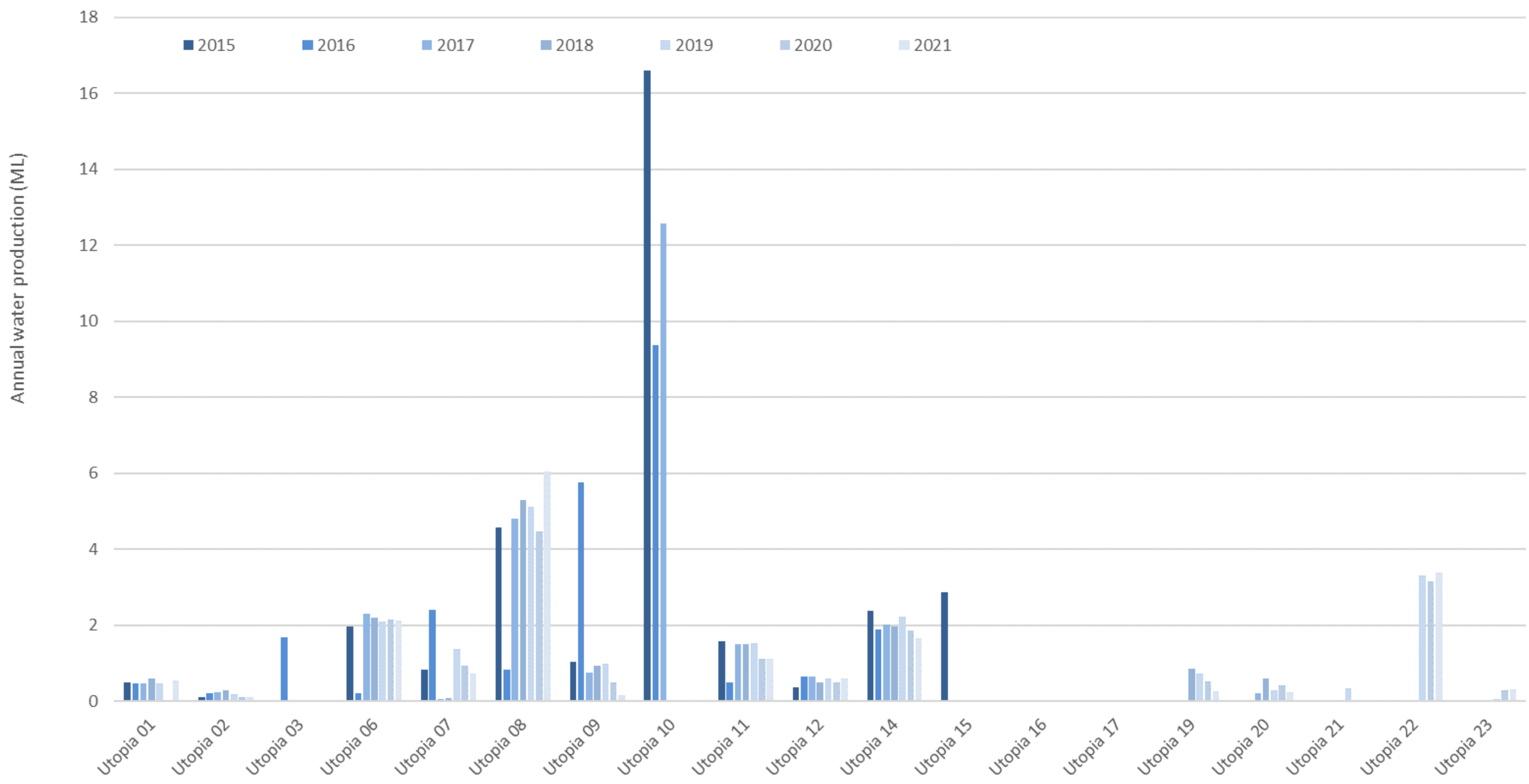

Figure 2: Annual water (ML) production per well at Utopia, from 2015 to 2021.

Previous Production Estimates

In the previous UWIR (Bridgeport 2018), Bridgeport provided a prediction of three future years of production at Utopia. Estimates are based on extrapolation by an appropriately qualified Senior Reservoir Operations Engineer. In 2019, Bridgeport produced 19.35 ML of water across Utopia, a 10.28% increase against the predicted value of 17.36 ML. In 2020, Bridgeport produced 16.03 ML compared to the predicted 18.24 ML, a decrease of 2.21 ML (or 13.78%). In the final year of this reporting period, 2021, Bridgeport produced 17.28 ML compared to the predicted 18.96 ML, an increase of 1.68 ML (or 9.72%) (Table 4).

Table 4: A comparison between the predicted water production from each year from the Bridgeport Utopia UWIR (2018-2021).

Type	Year	Utopia Total (ML)
Predicted	**2019**	17.36
Actual	**2019**	19.35
Predicted	**2020**	18.24
Actual	**2020**	16.03
Predicted	**2021**	18.96
Actual	**2021**	17.28

Future Production Estimates

Section 376(1)(ii) requires an estimate of the quantity of water to be produced or taken because of the exercise of the relevant underground water rights.

Where there was sufficient and consistent production history, the method of decline curve analysis (DCA) was applied in ValNav software, which is an industry-based reservoir engineering platform. As most of the wells have been producing for many years, DCA was undertaken on a well-by-well basis for each of Bridgeport's producing fields. Varity of methods includes DCA of historical oil production, total liquid production and water cut/water oil ratio (WOR) trends.

Bridgeport predicts the annual water production will be 19.11, 19.41 and 19.29 ML at Utopia in 2022, 2023 and 2024, respectively (Table 5).

Bridgeport acknowledges that ageing oilfields produce an increased volume of water as a percentage cut from all fluids extracted. There are several options which can extend the production from fields, including re-perforating other oil producing formations, continued exploration, drilling, optimisation and various stimulation techniques. It is predicted total water extraction will remain relatively constant in the next three years, as there are not significant changes forecast to production wells.

Table 5: Actual and predicted water extraction (ML) from the Utopia oilfield from 2015 to 2024.

Year	Total extracted (ML)
2015	32.85
2016	23.98
2017	25.63
2018	14.85
2019	19.35
2020	16.03
2021	17.28
2022	19.11
2023	19.41
2024	19.29
Combined Total	207.08

The total water production from the last three years (2019, 2020 and 2021) has been compared to the future modelled predictions up until 2024 (Table 5 and Figure 3).

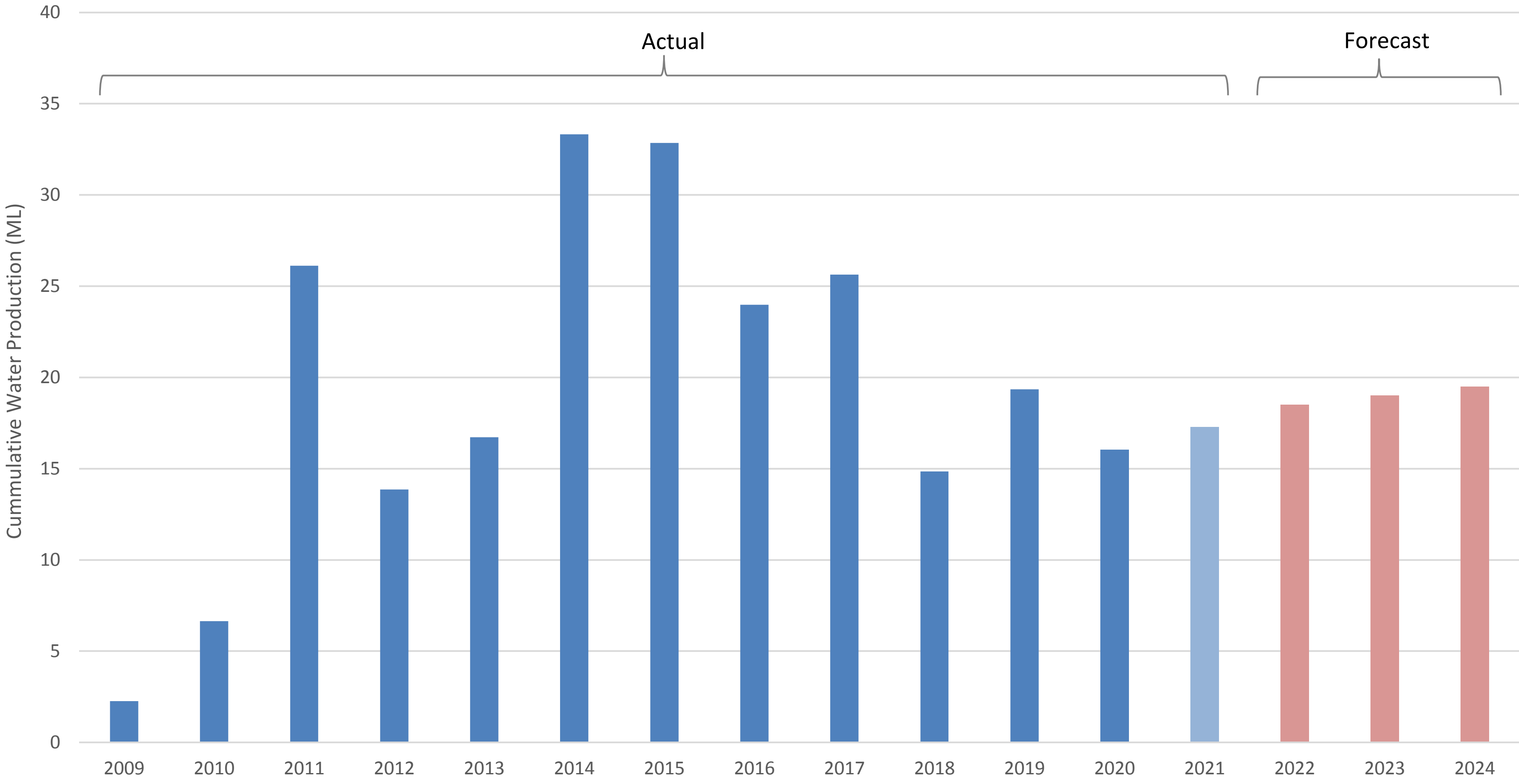

Figure 3: Cumulative water production (ML) per field at Utopia from 2009 to 2024, including three years of forecasts till 2024.

Production Comparisons

Bridgeport focuses on the production and extraction from confined aquifers associated with geological traps that hold petroleum. At each field, the total volumes extracted is a key consideration and monitored as described above. Bridgeport analysed the impacts from the Greater Kenmore and Bodalla Area (GKBA, another Bridgeport owned and operated field) using a reservoir model run by Golder Associates (Golder Associates, 2021, see GKBA 2021 UWIR). The model found all production extraction had extremely limited drawdowns in only the isolated reservoir related to petroleum extraction, with no apparent propagation vertically due to geological sealing units. Propagation of impacts vertically were only limited to the immediate geological layers within the model due to the effectiveness of the vertical seals. Modelling did not extend to the near surface layers, which are the primary target of private landholders for livestock watering bores and not in pressure communication with the petroleum reservoirs.

The total annual water extracted under associated water rights since 2015 at Utopia is approximately ~2% of the water extracted from GKBA respectively (Figure 4). The significant difference in water extraction volume, along with the fact the water is extracted from a similar depth, under similar conditions, with similar geological boundaries that restrict the movement of liquids vertically, limits the propagation of water level drawdown at Utopia. Water production from the Murta will result in no drawdown in the unconfined aquifer in the near surface Winton Formation.

These assumption and hypothesis will be tested by running a model, which will quantify the water pressure drawdown in the associated and surrounding aquifers.

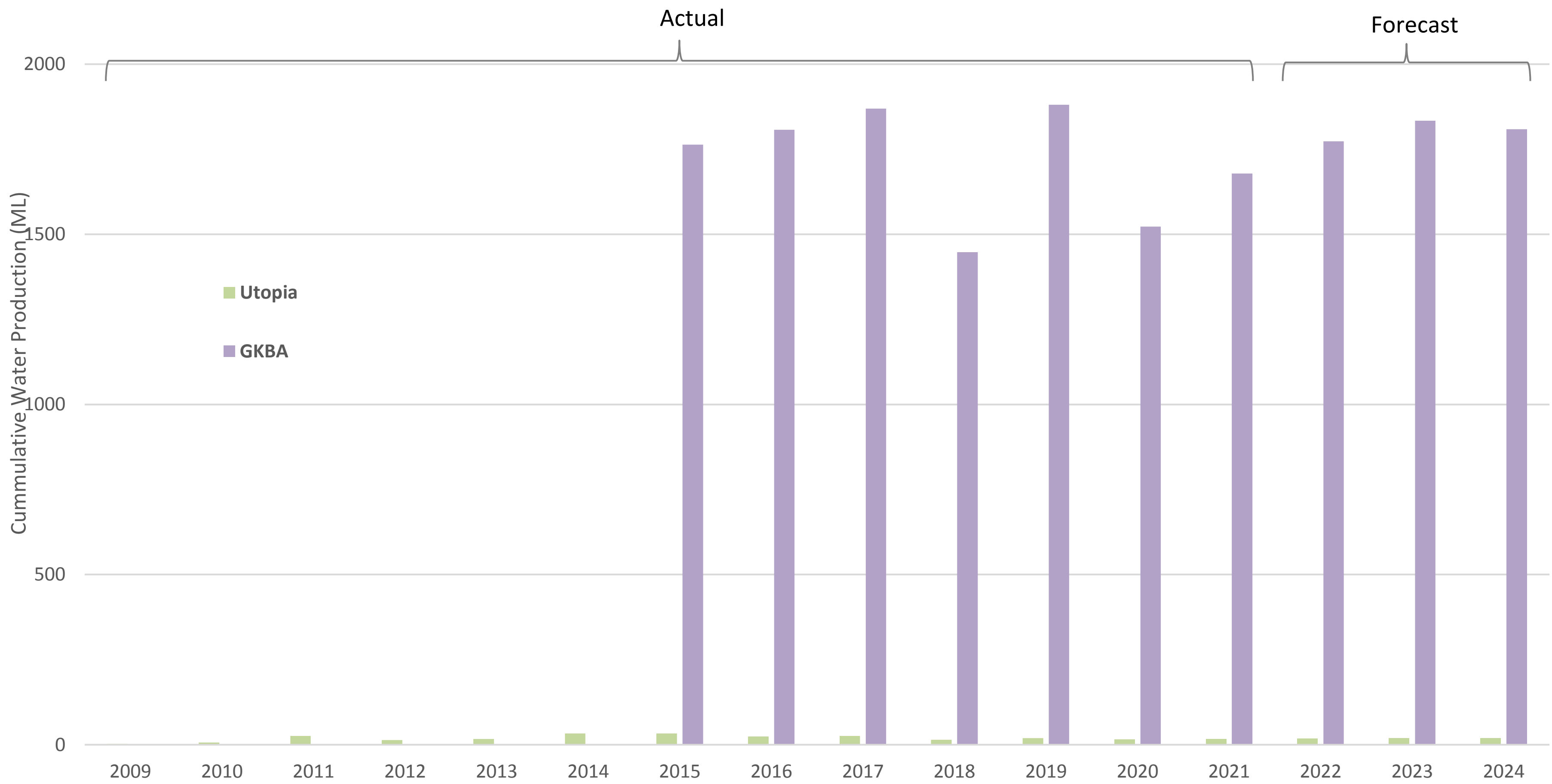

Figure 4: Cumulative water production at Utopia compared to Greater Kenmore & Bodalla Area (ML), including three years forecasts till 2024.

Part B*: Aquifer information and underground water flow

Requirement under sections 376(b)(i) to 376 (b)(iii) of the Water Act
For each aquifer affected, or likely affected, by the exercise of the relevant underground water rights, an UWIR must include: 1. *A description of the aquifer;* 2. *An analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers; and* 3. *An analysis of the trends in water level change for the aquifer because of the exercise of underground water rights.*

*Part B refers to Section 5.1.2 (page 13) of the guideline (DES 2017).

Location

Utopia is located 84 km southwest of the township of Quilpie and 50 km southeast of the town of Eromanga, in the local Quilpie Shire Council area, southeast Queensland (Figure 1). Coordinates for the Utopia production facility are 27°2’21.64” S, 143°34’1.14” E.

Geological setting

Utopia is located within the Great Artesian Basin, and within the Cooper Basin and overlying Eromanga Basin. The Cooper Basin covers a total area of 130,000 km^2 in central and eastern Australia and is described as arid with a uniform climate. It contains a wide diversity of land and ecosystem values that are defined by geological, geomorphological and hydrological influences. The Eromanga Basin extends over one million square kilometres across western Queensland, north western New South Wales, north eastern South Australia, and south east Northern Territory.

The Eromanga Basin is overlain by the Lake Eyre Basin, a succession of Tertiary and Quaternary age sediments occurring extensively throughout central Australia. In the northeast of South Australia, the Lake Eyre, Eromanga Basin sediments were deposited during the Jurassic-Cretaceous period and reach a maximum thickness between 1200 m and

2700 m over the Cooper Basin. These sediments were deposited under fluvial, lacustrine and (later) shallow-marine conditions, and are broadly continuous across the basin. These sediments are gently folded in some areas and contain a succession of aerially extensive sandstone formations that serve as oil reservoirs and regional aquifers. The Eromanga Basin is the largest basin that constitutes a part of the Great Artesian Basin (GAB), one of the largest subterranean aquifers in the world. The Eromanga Basin lies within South Australia, with other components in Queensland and New South Wales. Beneath, and entirely covered by the Eromanga Basin, is the Permo-Triassic Cooper Basin, limited in its distribution by bounding faults and pinch-out edges.

The tectonic history of the Cooper and Eromanga basins is complex and has been characterised by several periods of rift-related subsidence and compressional uplift and erosion. This history has resulted in the Cooper Basin being subdivided into numerous large-scale sub-troughs separated by fault-bounded ridges (Figure 5).

The Utopia feature is an anticlinal structure, the geological section is a standard Eromanga sequence overlying a thin undifferentiated Triassic package of sediments. Current production targets extraction only from the Cretaceous Murta Member, between depths of 1000 and 1400 meters subsea.

Interbedded low permeability sandstones, siltstones and claystones of the lower part of the Murta Formation form a seal between the Murta and the Namur Sandstone. These seals are not always effective, as water from the Namur Sandstone can migrate upwards into the Murta Formation. Where communication exists between the Murta and Namur, water in the Murta can be replenished from the Namur. The upper zone of the Murta Formation and lower part of the Cadna-owie Formation form a large, regionally thick seal, which ensures that there is no migration of fluids of any type above the Murta Formation.

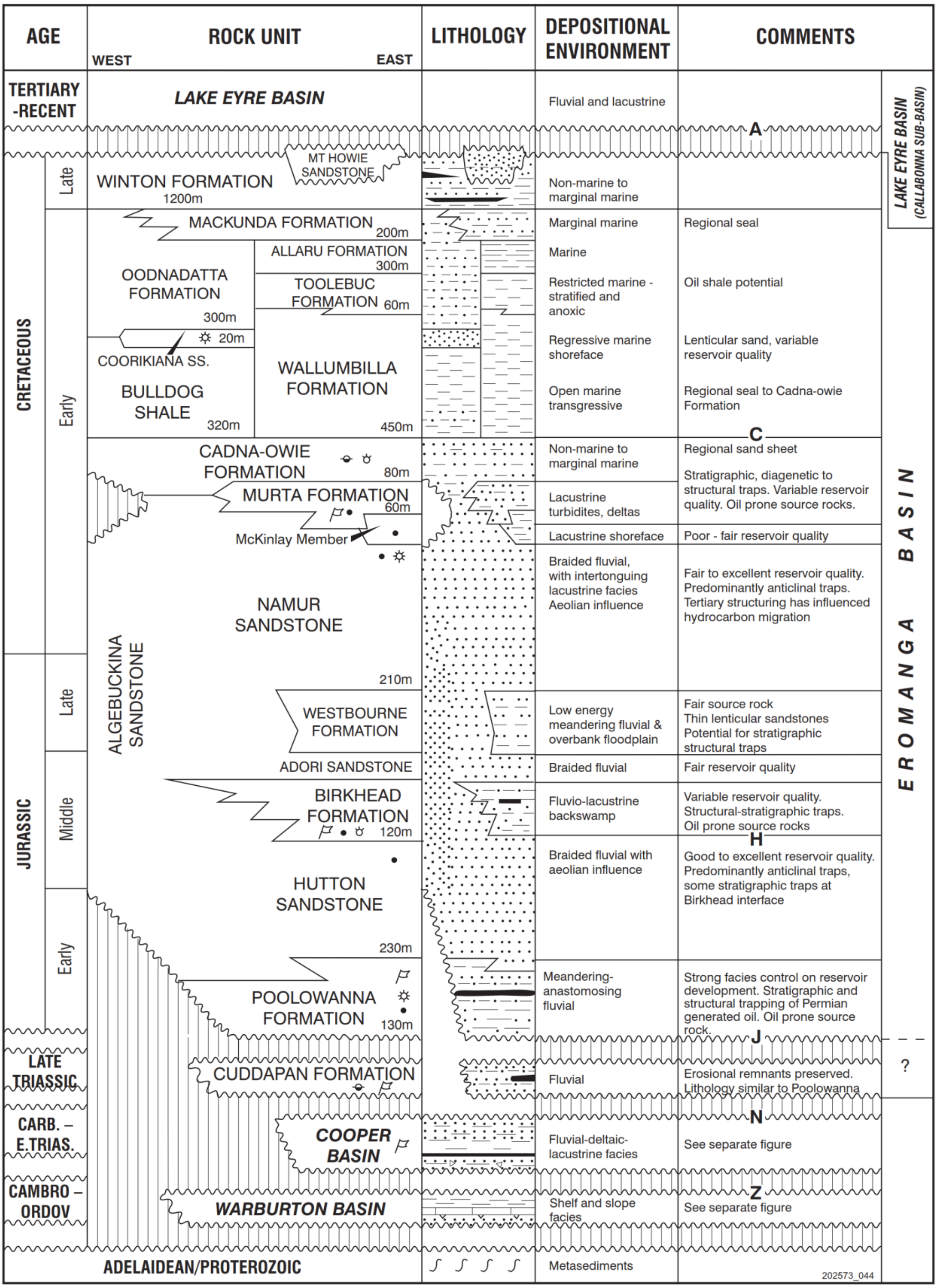

Figure 5: Stratigraphic column of the Eromanga Basin, Utopia targets the Murta Formation.

Hydrogeological setting

Utopia is located within the Great Artesian Basin (GAB). The aquifers of the GAB are composed of predominantly continental sandstones, confined by aquitards of both fluvial and marine mudstone and siltstone of Jurassic and Cretaceous age. The geological basins within the GAB share a similar depositional history and tectonic evolution. However, slight differences in the rates of subsidence and deposition are caused by structures inherited from older, underlying basins, especially in the Eromanga and Surat basins. These structural elements create the depocentres, ridges, and troughs that are the foundation for the hydrogeologic basin observed today (CSIRO, 2012). The Water Plan (Great Artesian Basin) 2006 established 25 management areas and within these Areas it establishes several management units. Utopia's target formation used to fall under the Warrego West management area and under the Warrego West 3 management unit. In September 2017 the Water Plan (Great Artesian Basin) 2006 was superseded by the Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017. The current plan area is divided into groundwater units and the groundwater units are further divided into groundwater sub-areas. PL 214 is located within the Hooray groundwater unit. The primary target of the Utopia field is the Murta. A description follows:

Eromanga South Hooray (includes former Warrego West 3)

The Eromanga South Hooray sub-area encompasses the Hooray Sandstone, made up of the Murta Formation, McKinley Member and the Namur Sandstone. The entire unit ranges in thickness from approximately 120-130m

"The Hooray sandstone and its hydrogeological equivalents are generally the deepest major artesian aquifer intercepted by water bores in the GAB in Queensland. The Late Jurassic Hooray Sandstone aquifer is defined only within the Eromanga Basin" (DNRM, 2005).

"Basin margin facies of the Jurassic and early Cretaceous sandstones and siltstones occur in…the Eromanga sedimentary sequence (Namur Sandstone, McKinlay Member and Murta Formation). These basin margin facies are hydrogeological equivalent to the Hooray sandstone aquifer" (DNRM, 2005).

Murta Formation

The Murta Formation is very fine to fine grained sandstone with interbedded hard siltstone. The sandstone is sub-angular to sub-rounded, moderate to well sorted with a moderate to abundant clay matrix. Moderate amounts of silica cement are present, and it is moderately hard with poor porosity. This is the oil producing unit in Utopia.

McKinlay Member

The McKinlay Member is a fine to medium grained siltstone with minor firm siltstone. The sandstone is subangular to sub-rounded, moderately sorted with occasionally carbonaceous laminae. There is a moderate clay matrix that is slightly calcareous and moderate silica cement. The formation is moderately hard with poor to occasionally fair porosity. This unit is non-producing in Utopia.

Namur Sandstone

The Namur Member is sandstone with interbedded siltstone. The sandstone varies from very fine to coarse. It's moderately sorted with a clay matrix and moderate silica and calcareous cement, and ranges from friable to moderately hard. Poor to fair with occasional good porosity has been observed. This siltstone is argillaceous with moderately to abundant carbonaceous material. Again, this unit is non-producing in Utopia.

Elevations and relative position

The Murta Formation is an Early Cretaceous sedimentary unit within the Hooray Sandstone, with a depth range across the field of -790 to -795 mSS.

Location of any significant faults that intersect aquifer

There are no significant faults in the Utopia field (Figure 6).

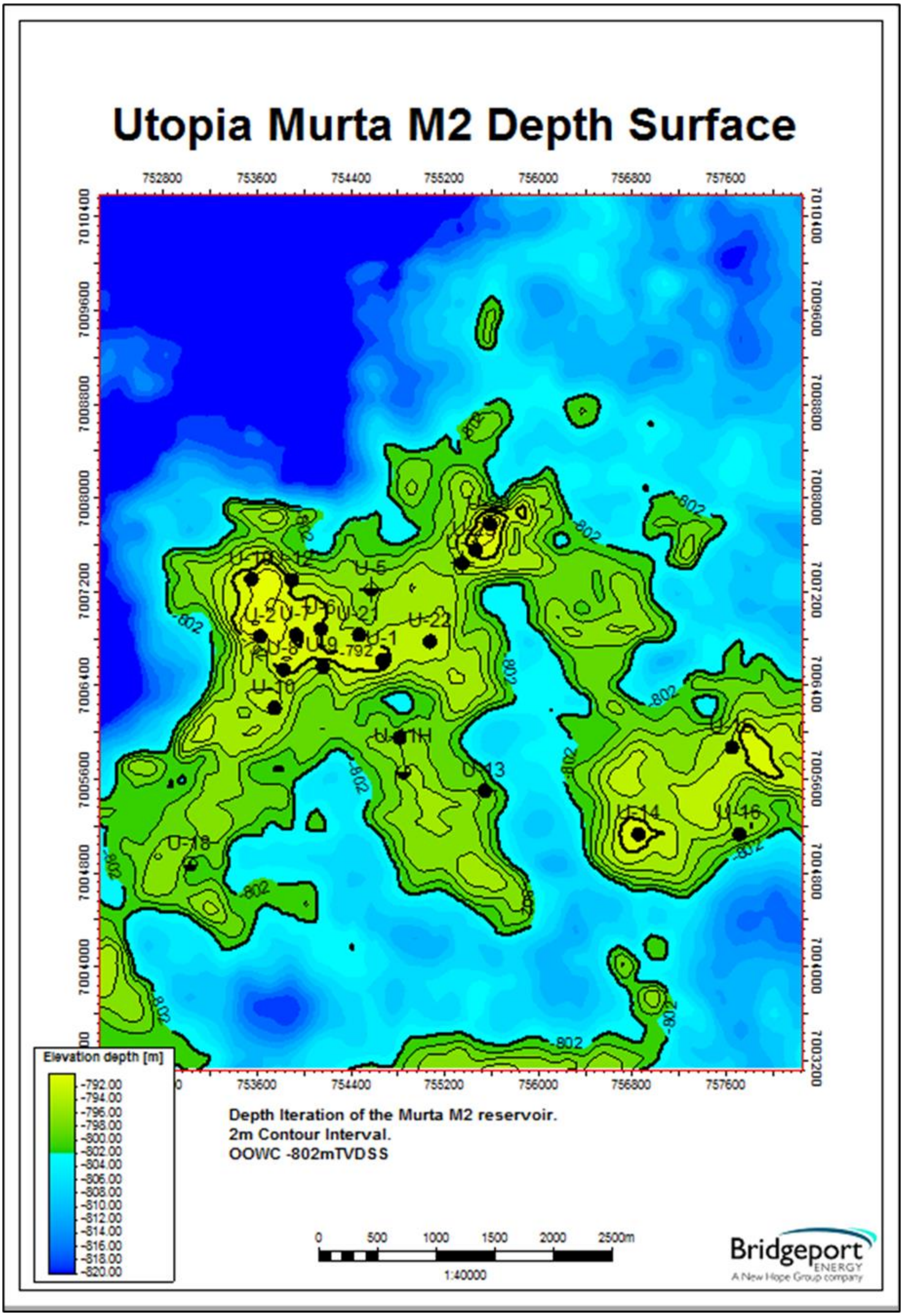

Figure 6: The M2 member of the Murta Formation structure, no significant faults.

Well histories

The structure of the Utopia field has been mapped using 3D seismic data. The free water level at the producing Murta reservoir has been measured through petrophysical analyses of the wells from wireline logs and from water associated with oil production into wellbore perforations.

There are currently 23 drilled wells, some have been abandoned and some are producing. All wells drilled and planned to be drilled within Utopia are detailed in Table 2. Information is based on the current and projected later development plan (Bridgeport Energy 2016).

Table 6: Individual well histories at PL 214 Utopia.

Well	Formation	Status	History
Ufouria 1 (Abandoned)	Murta	Water bore	December 1987 drilled January 1988 plugged back to 990 m, little water production, shut in November 2010 Well transferred to landowner for irrigation purposes
UTA 1	Murta	P&A'd	May 1997 DST recovered 167.6 m of predominantly muddy water. the well was plugged and abandoned
Utopia 1	Murta	Online	March 1997 drilled, production string run and well was suspended June 1997 Murta was perforated in two intervals, a bridge plug was then set above the lowest interval, Mid Basal Jurassic April 2009 work over replacing rods in the hole December 2014 work over replacing rods in the hole December 2017 work over replacing rods and pump, still on production
Utopia 2	Murta	Online	September 1997 drilled October 1997 completed in the Murta June 2004 workover, rod pull and change January 2013 workover: tubing pulled and replaced March 2015 remedial operations to inspect rod, casing and pump. Still on production
Utopia 3	Murta	Suspended	November 1997 drilled, completion string run and well suspended October 2001 perforated October 2005 workover, rod pull and change April 2007 well was shut in due to wellhead problems
Utopia 4	Murta	P&A'd	December 1997 drilled DST recovered 79 L (7.9x10-5 ML) mud and 842.6L (8.4x10-4 ML) water in the drill string, sample chamber collected 3.5 L (3.5x10-6 ML) of water. The well was plugged and abandoned
Utopia 5	Murta	P&A'd	August 2005 drilled September 2005 DST recovered 0.0029 ML of formation water. The well was plugged and abandoned
Utopia 6	Murta	Online	September 2005 drilled DST 1 recovered mud and filtrate; DST 2 recovered oil and mud, no water

Well	Formation	Status	History
			October 2005 the Murta was perforated. Still on production
Utopia 7	Murta	Online	December 1997 drilled and perforated September 2013 workover, tubing and rod string were replaced. Still on production January 2016 work over replacing rods and pump, still on production
Utopia 8	Murta	Online	December 2009 drilled January 2010 perforated and completed into Murta October 2014 workover, replaced parted rods February 2017 replaced tubing. Still on production
Utopia 9	Murta	Shut in	January 2010 drilled and perforated into Murta March 2016 replaced rod string December 2016 rod string failed; workover in January 2017. Still on production
Utopia 10	Murta	Shut in	December 2010 drilled, perforated, fracced to enhance flow October 2014 work over, replaced parted rods. August 2017 parted rods, shut in.
Utopia 11H	Murta	Online	May 2011 drilled, short radius horizontal well, completed with perforated casing October 2014 work over, replaced rod string. July 2016 work over, replaced rod string. Still on production
Utopia 12	Murta	Online	February 2013 drilled June 2013 completed, perforated in the Murta February 2016 reperforation. Still on production
Utopia 13	Murta	Not completed	February 2013 drilled, logged cased and suspended
Utopia 14	Murta	Online	February 2013 drilled June 2013 completed, perforated in the Murta July 2017 work over, replaced rod string. Still on production
Utopia 15	Murta	Shut in	November 2013 drilled January 2014 completed with perforation in the Murta Production ceased in September 2016
Utopia 16	Murta	Shut in	November 2013 drilled Completed and suspended May 2014
Utopia 17	Murta & Hutton	Shut in & Plugged	November 2013 drilled December 2013 completed with perforation into the Hutton. Free flow with water however no signs of oil

Well	Formation	Status	History
			January 2014 re-completed with perforation into the Murta. Put on production, no signs of oil. Shut in
Utopia 18	-	Shut in	
Utopia 19	Murta	Online	June 2017 drilled June 2017 completed and perforations into the Murta. Still on production
Utopia 20	Murta	Online	July 2017 drilled June 2017 completed and perforations into the Murta. Still on production
Utopia 21	Murta	Online	Well drilled November 2018 Online
Utopia 22	Murta	Online	Well drilled November 2018 Online
Utopia 23	Murta	Online	Well drilled December 2018 Online

An analysis of the movement of underground water to and from the aquifer, including how the aquifer interacts with other aquifers

Bridgeport does not collect quantitative data on the movement of underground water into and from other aquifers. Bridgeport focusses on the volumes of crude oil and water extracted, as well as reservoir pressure of hydrocarbon producing reservoirs. Bridgeport does not have wells or resources that target or isolate other aquifers that are not associated with petroleum, and therefore monitoring capability is limited.

Data to inform this section has been sourced from the Ecological and Bioregional Assessment Program, compiled by Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia (Evans et al. 2020). The program was designed to provide independent geological and environmental scientific advice on bioregions, one of which includes the Cooper Basin (and covers Greater Kenmore and Bodalla Area). The assessment of hydrogeology was informed using data from petroleum related activities. Bridgeport has attempted to summarise key points from Evans et al. 2020 (access at;

https://www.bioregionalassessments.gov.au/sites/default/files/gba-coo-stage2-appendix_hydrogeology_final.pdf; as of 2021) that highlight movement to and from targeted aquifers.

The Cooper Basin report also covers the entire Eromanga Basin (that comprises a portion of the Great Artesian Basin (GAB)). Evans et al. (2020) state “From bottom to top these include the artesian GAB aquifers (e.g. Hutton Sandstone and Cadna-owie–Hooray aquifer), the Rolling Downs aquitard and the Winton–Mackunda partial aquifer”. Both the Rolling Downs aquitard and the Westbourne aquitard separate artesian GAB aquifers from shallow aquifers. In the deeper artesian GAB aquifers, hydraulic gradients and therefore flow rates are likely near stagnant.

The primary source of groundwater (for landholder bores) occurs from the Winton-Mackunda aquifer, which is topographically controlled. There are a lower number of bores that target depths below the Winton-Mackunda aquifer. Those that do, would typically target resources such as gas, coal and oil. Petroleum fields likely contribute to localised depressurization (especially on the western flank of the Cooper Basin) leading to variable hydraulic head levels. Other attributes may also influence hydraulic head, including progress of petroleum production over time, reservoir compartmentalisation, permeability and re-charge. Evans et al. (2020) goes on to conclude that pressure and salinity suggests there is some degree of connectivity between artesian aquifers of the Eromanga and Cooper Basins, and that hydrochemistry and dissolved gas concentrations may indicate some connectivity between deep and shallow system components. However, the “uncoupled nature of both deep fault sets, and polygonal fault systems is one impediment for direct connectivity pathways to the near-surface unconfined aquifers”.

Evans et al. (2020) are conscious of the lack of data and assumptions made from both limited temporal and spatial sample points, and conclusions drawn from data from wells that only target specific uses (e.g. petroleum). A feature throughout Evans et al. (2020) is the acknowledgement of a lack of considerable data and knowledge gaps. One of the considerations was the lack of data from points other than petroleum wells targeting hydrocarbons. Petroleum wells have unique caveats, considering they target only specific top zones or peaks of a specific aquifer. The knowledge gap also extends to the shallower Winton-Mackunda aquifer, as few are regularly tested, nor are the perforation or open producing depths known.

Bridgeport acknowledge that the key focus of petroleum operations limits the ability to infer the movement to and from other aquifers. Hydrocarbon traps, are by their nature, capped by impermeable geological layers, which limit the movement of both hydrocarbons and water. These structures are deliberately targeted for resource extraction. Conclusions about lateral or vertical movement would be dependent on pressure gradients, which in turn may be influenced by historic and ongoing production. A lack of wells and a lack of perforations in alternate reservoirs limits the conclusions Bridgeport can make about reservoir interactions. Bridgeport is of the view that the best summary of groundwater interactions between aquifers in the Cooper Basin can be found in a report that encompasses a more complete data set and provides independent research, such as that by Evans et al. (2020). This report is likely the most recent and comprehensive analysis of groundwater movement in the region. The report can be found here; https://www.bioregionalassessments.gov.au/sites/default/files/gba-coo-stage2-appendix_hydrogeology_final.pdf (as of November 2021).

The target reservoirs from which oil and water are co-produced are separated from other aquifers by thick regional to basin scale aquicludes and therefore there is no movement from or to other aquifers. A regional cross-section demonstrates the sedimentary section in key wells across Bridgeport permit areas (Figure 7). The section from the Mackunda down to the top Candna-owie is a series of primarily marine shales approximately 600 metres thick, which form an effective aquiclude trapping hydrocarbons below and separating the target oil bearing sands below the Cadna-owie from the shallow groundwater aquifers above the Mackunda, which are used by landowners and water users regionally. For this reason, there is no local inflow or outflow to or from these aquifers. Empirical data does inform the model and is described in the UWIR.

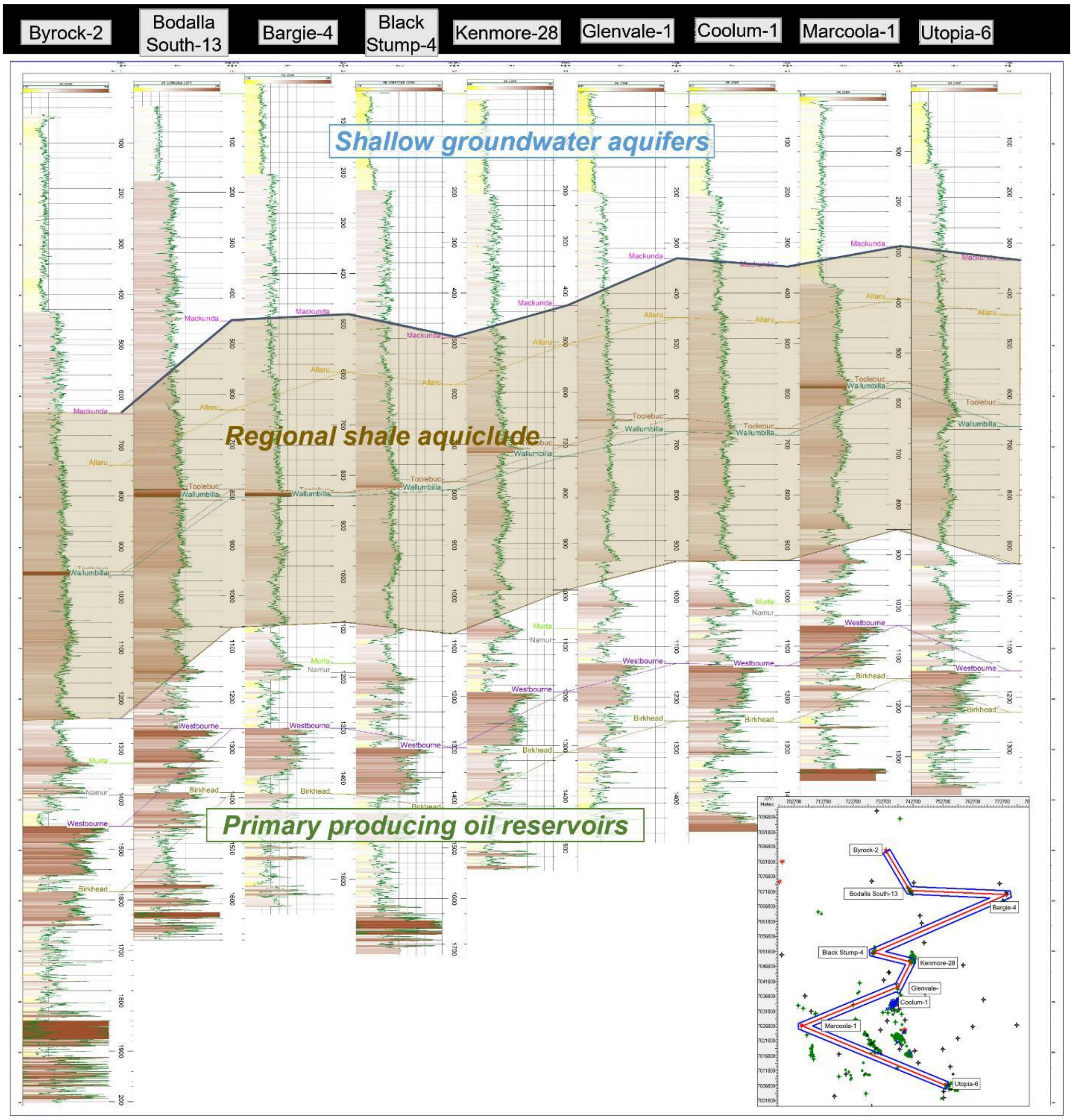

Figure 7: Gamma ray log cross section, correlated with depth from Byrock-2 to Utopia-6.

Localised Impact, connectivity and impact pathway summary

The Principal Geoscientist summarises the localised impacts of petroleum extraction, the connectivity of reservoirs, and potential impact pathways between reservoirs as follows;

The target reservoir in the permit area is a Cretaceous sandstone. The reservoir is comprised of highly laminated sandstone and siltstone with irregularly distributed thin channel sands with variable lateral and vertical continuity. These low-energy lacustrine sediments are in turn overlain by the Early Cretaceous Upper Murta Formation Shales which represent a major flooding event forming a regional seal, which in turn is overlain by the transgressive shales of the Cadna-owie Formation and the thick marine shales from the Walumbilla up to and including the Mackunda Formations.

The shale sequence is approximately 500m thick in the Utopia area, acting as a regional aquiclude, separating the shallow aquifer reservoirs from those that have been targeted for oil extraction and thus preventing the vertical movement of water.

The effectiveness of this aquiclude is evidenced in the trapping of the oil and water at depth in the oilfields of the permit area over the last 60 million years.

A fine scale, tenement level approach within this basin and these specific tenements would not be achievable, due to the distinct lack of finer scale granularity in quantitative information given the age of all wells drilled, the lower proportion of new wells drilled compared to those existing, and information required to continue production. Gathering such data would be inordinately costly given the context of this UWIR, including the basin-scale of the resource, the physical separation/disconnection from the Eromanga reservoir to the shallow groundwater aquifers targeted by landholders, the age and existing extraction from the fields, the existing information within the accepted model and the summary of the geology by Bridgeport's Principal Geoscientist above. The information Beach Energy and Bridgeport provides to the third party to build the appropriately scaled model (that has been previously accepted) is likely at the finest possible scale. Neither Beach Energy nor Bridgeport have data from any other well which is perforated into another target aquifer, who's primary purpose is not the extraction of oil. Dedicated wells would be required to monitor the other aquifers and this has not historically been a licence requirement due to the nature of conventional oil reservoirs in the Eromanga Basin, i.e. there is no connection and/or impact on near surface aquifers. Coal Seam Gas (CSG) fields can and do have an impact on shallow aquifers and that is the reason that dedicated monitoring bores have become licence conditions for such fields. However, this is not appropriate for the fields in question.

Part C*: Predicted water level declines for affected aquifers

Requirements under sections 376(b)(iv) to 376(e) of the Water Act
To meet the requirements of the Water Act, an UWIR must include the following: *1. Maps showing the IAA and the LTAA (sections 376(b)(iv) and 376(b)(v) of the Water Act* *2. A description of the methods used to produce these maps (section 376(c) of the Water Act)* *3. Information about all water bores in the IAA (including the number of bores in the area, maps showing the location of these bores and the authorised use of each bore) (section 376(d) of the Water Act); and* *4. A program for conducting an annual review of the accuracy of maps produced and giving the chief executive a summary of the outcome of each review, including a statement of whether there has been a material change in the information of predictions used to prepare the maps (section 376(e) of the Water Act).*

*Part C refers to Section 5.1.3 (page 15) of the guideline (DES 2017).

Maps showing the IAA and the LTAA (sections 376(b)(iv) and 376(b)(v) of the Water Act

A description of the methods used to produce these maps (section 376(c) of the Water Act)

This data and text has been provided based on previous modelling. The model and methods have not been changed; only new extraction data has changed to draw conclusions on pressure draw down. For a more comprehensive publication on model development, data input, assumptions and variables are available in Beach Energy (2014).

Information about all water bores in the IAA (including the number of bores in the area, maps showing the location of these bores and the authorised use of each bore) (section 376(d) of the Water Act); and

Golder Associates originally developed a model for water extraction for Beach Energy and their Eromanga oilfields in August 2014 (Beach Energy 2014). The model is suitable, and Bridgeport contracted Golder Associates to re-run the same analytical model with updated production data in 2018 and again in 2021/22.

The analytical model was re-run under identical conditions and a comparison of the results reflect an accurate representation of water levels over time, under different extraction conditions, and therefore suits the purposes of the UWIR. The method used to develop the IAA and LTAA maps and model are described below.

The model has been developed to provide indicative potential drawdown levels of the targeted aquifers, using all relevant and accurate data. Some of the relevant modelling data includes quantitative details on geological mapping and formation details, tenure locations, groundwater levels and historical and predicted water and oil production.

Bridgeport outlines the model, its calibration, assumptions and all other details below. The following sections heavily references the description of the model from the Beach Energy (2014) UWIR, which was written by Golder Associates in 2014.

The same model was used recently in the Bridgeport UWIR for the Greater Kenmore and Bodalla Area (GKBA). The model development, testing, analysis and results were accepted by the Department of Environment and Science in July 2022.

The same model was used recently in the Bridgeport UWIR for the Greater Kenmore and Bodalla Area (GKBA). The model development, testing, analysis and results were accepted by the Department of Environment and Science in July 2022 (DES, 2022).

AnAqSIM Software

The groundwater impact assessment estimation was conducted using an analytical software program called AnAqSim (version 2011-2). AnAqSim is analytical software capable of superimposing multiple analytical calculations (using flow equation calculations) to yield a composite solution consisting of equations for head and discharge as a function of location and time. Whilst the analytical equations are written in two-dimensions, three-dimensional flow may be simulated using simple planar multiple levels. In multi-level calculations, the resistance to vertical flow is accounted for in the vertical leakage between levels.

AnAqSim is not a high complexity numerical modelling software, such as MODFLOW or FeFlow. It is indicative in its level of complexity and output. However, AnAqSim is significantly better than many traditional analytical methods, and appropriate for the use in a UWIR and the determination of an IAA and LTAA.

It was necessary to simplify the conceptual hydrogeological model to comply with the capabilities of the analytical calculations (equations). Whilst this did not permit the analysis of basin structure and geometry, it did provide a representative vertical distribution of strata ('layers') and representative levels.

Up to five planar layers with corresponding initial groundwater levels are permitted in the software. To evaluate the potential impact in each basin, analysis was divided into two separate calculation exercises:

1) Eromanga Basin: including tertiary and quaternary sediments overlying Cretaceous to early Jurassic strata, namely the GAB aquifers: and

2) Cooper Basin: containing the deeply confined Permian and Triassic strata, namely the older pre-GAB aquifers.

The separate calculations are show in Table 12 and Table 13 respectively.

The division into two separate domains permitted the allocation of five layers in the Eromanga Basin, as a separate hydraulic system, excluding the underlying Cooper Basin strata. It was anticipated that the impact from extraction in the Cooper Basin would not impact beyond the top of the Tinchoo Formation (i.e. the top of the Cooper Basin) due to the thickness of the low permeability layers and the small abstraction rate (one well).

If no impact was predicted by the analysis at the top of the Cooper Basin, then it was considered reasonable to omit this from the overlying Eromanga Basin calculations.

Assumptions and Limitations

The following assumptions and limitations are inherent to the analytical modelling process:

Calculations for both basins were undertaken in steady state conditions (i.e. not time varying) to investigate the worst-case scenario for groundwater impact estimation. This is considered a worst-case scenario as there is no time varying or limiting extraction from the strata. A steady state solution effectively calculates the response to continued extraction until there is no further (i.e. greater) drawdown effect from extraction. On this basis, two scenarios were investigated in the calculations as it is considered most suited for a steady state calculation of this resolution:

- Immediate Effected Area: was considered to be the average historical annual rate of water plus oil production: and
- Long-term Effected Area: was considered to be the immediate Effected Area rates plus the average predicted annual rate for the next three years of water plus oil production.

Other extractors (e.g. non-Bridgeport wells, for example in the Tintaburra field) were not considered in the calculation, as they are outside of the scope of this study, and no data is available.

Layering in the analysis was maximised when replicating the strata, either to represent all the units in the strata or until the maximum permitted number of layers was reached in the software. Combining adjacent strata in a model is referred to as equivalent porous medium (EPM) modelling. EPM modelling assigns a single value for each hydraulic parameter of the grouped adjacent strata such that the bulk behaviour is represented in the analysis. This was considered reasonable simplification given the availability of hydraulic parameter data, particularly at increasing depths in both areas.

The top layer for each model was assigned as a dummy layer in order to set up the observed heads. This zone was then replicated below (layer 2 in each model) as confined to represent the actual aquifer conditions present. Where no groundwater level data was available in the vicinity of the site, inferred values were used, typical for this kind of deeply confined basin.

The necessary combination of layers (considering these are interbedded high and low permeability layered strata) as a single equivalent porous medium layer results in a worst-case scenario as the bulk hydraulic connectivity of the model layer may not capture some of the lower permeability aquitards present in the basin.

AnAqSim provides the calculated drawdown for the top of each layer (no results are available for each subdivision). The model calculates the drawdown as water head pressure. Where the formations are artesian, the calculated drawdown corresponds to a water pressure decline (unless the extent of the pressure decline is such that the bore reaches sub-artesian conditions). In non-artesian formations (as in the upper formations targeted for water supply by the community), the drawdown corresponds to a decrease of water level. The model is therefore designed to provide indicative worst-case scenario results.

Methodology for measurement and calculation of oil and water extraction volumes

Measurement

Oil and water extracted from each formation is measured via a total fluid test. The desired well is tested for a period, with all formation fluids collected in a dedicated test tank. The formation fluid is allowed to settle out to facilitate the separation process. A water finding chemical (paste stick) is used to find the water-oil contact point and volumes of water and oil are determined from the tank dipstick and measured total volume in the tank as per API procedures. The water oil rates are then converted to a 24-hour test rate, and this test rate is then used on a day to day basis for determining the quantity of oil and water extracted from each formation. These well tests are repeated to confirm results and periodically (generally quarterly) re-tested to update the extraction rates throughout the months and years and can be adjusted for any potential mechanical downtime.

The above method is used at Kenmore. Bodalla uses a combination of the above method and utilises a pressure vessel to separate the oil and water with rates being recorded via a water meter. The oil rate is determined via the amount recovered in the production tank during the test period. The remaining oilfields are mainly single well fields and oil water rates are updated whenever the site is attended to check stocks.

The quantity of water and oil for each well in each formation has been predicted by assuming the most recent oil water rates and applying these for the next three years. The oil rate will decrease over this period due to natural decline; however, the water rate will increase slightly to account for this natural decline in oil rate. As the formations are naturally recharged, the formation pressure is not expected to decrease greatly meaning that the formation fluid extraction rate should be approximately stable for the next three years.

Calculation for Model

Monthly oil and monthly water production volumes in megalitres (ML) was provided by Bridgeport to Golder Associates, split per tenement and per well. The data was provided for all wells that are currently and have historically extracted either groundwater and/or oil at any period in the previous three years.

A monthly average for each well for oil, water and oil + water over the operation of the well was then calculated and converted to m^3/month. These values were then divided by 30 days to produce the rate used by the model (m^3/day) (see Average Extraction Rates for Modelling).

In the model, each well that has currently and historically extracted water and/or oil has, therefore, been modelled with its own individual extraction rate. The value used in the modelling is the average rate for oil plus water as removal of any liquid, specifically oil at the beginning of a wells production life, may result in a depressurisation of the aquifer and possible leakage of groundwater from overlying aquifers used by the community.

Future production rates were supplied by Bridgeport for each well which is planned to continue production over the coming 3 years. No material increase to production is planned.

In order to produce a material change, significant infrastructure would be required, which is unrealistic and unplanned.

This approach enabled the worst-case scenario to be modelled for both the historic production and predicted future production, as it does not take into account wells that may have only been in production for a few years, i.e. only pulling the piezometric surface down minimally in their short duration, but instead applies a constant rate of extraction, calculating maximum drawdown that would occur at that pumping rate over an infinite amount of time. An example of this is Kenmore 4 which was only in production during the 1980's allowing the piezometric surface to re-equilibrate.

Assumptions of the calibration process for the sensitivity analysis

Calibration was used to refine the hydraulic parameters used in the model, particularly where there was a paucity of observed results from field or laboratory testing (e.g. the cap rock).

The section "Observed groundwater levels and calibration targets" discusses the calibration process of fitting modelled groundwater head to a representative groundwater head in each model layer. Calibration was achieved by altering the hydraulic parameters and groundwater flux rates in unpumped conditions, to produce the calibrated model.

All parameters were varied within likely ranges, as determined from available site investigation data, published values and reasonable representative values for each type of strata, as outlined in Section "Rationale for selection of hydraulic parameters".

Throughout calibration, statistical analysis was undertaken on the results to assess the "goodness of fit" of the models results compared to the calibration targets. This process anecdotally informed the subsequent sensitivity analysis in that changes to the vertical hydraulic conductivity had the greatest impact on the distribution of head pressures throughout the model.

Assumptions relating to sensitivity analysis that were derived from the calibration process included demonstrating that the necessary grouping of strata was reasonable, as discussed in Section "Justification for the layering in AnAqSim". This was corroborated though achieving a reasonable fit between modelled and observed groundwater head distribution using reasonable hydraulic parameter values for each layer. Grouping similar hydro stratigraphical units in this way is a common technique to simplify the actual strata present where similar hydraulic parameters are expected for the strata within the grouping.

It was important to establish the accuracy of this assumption during calibration, for example, the single layer in the models used to represent the cap rock truly represented multiple layers of strata present in the Basins. Without reasonable calibration being achieved, this assumption may not have been considered valid and the layering in the model may have required revision. However, as a reasonable vertical head distribution was obtained using reasonable parameters, this was not considered necessary.

Changing the vertical hydraulic conductivity of the cap rock by an order of magnitude during sensitivity analysis was considered reasonable as an upper bound of the range of likely values, as partly derived from calibration modelling.

As the model was run in steady state, there was no requirement to investigate the storage coefficient of the strata.

Groundwater impact calculation input parameters

This section discusses the input parameters necessary for the groundwater impact calculation.

The simplified geological layering used in the calculation for the Eromanga Basin and Cooper Basin is shown in Table 12 and Table 13 respectively. This simplified layering grouped similar adjacent stratum together where appropriate, to reduce the observed stratigraphy into no more than five layers.

Rationale for selection of hydraulic parameters

The following section outlines how the hydraulic parameters in Table 12 and Table 13 that were inferred or derived from supporting information, along with a discussion on the assumptions associated with these parameters.

Thickness of aquifer

The thickness of the aquifer was determined from the details provided on 'Well formation Well Cards' supplied by Beach Energy in 2014. The well cards provided the top and bottom elevations for each formation encountered, for each well drilled in all relevant tenements. Geological cross sections were drawn from a combination of the data off Beach Energy well cards. Data obtained from (the then) Department for Environment and Heritage Protection (DEHP) suggested that the elevations from the two different sources strongly agree with one another, providing a high degree of confidence. For the purposes of modelling, the average elevation of the top and base of each formation was used.

Table 7: Hydraulic Parameters.

Basin	Formation	Hydraulic Classification	Hydraulic Conductivity (m/d)		Porosity (fraction)
			Min.	Max.	
Eromanga Basin	Quaternary and Tertiary Alluvium	Aquifer	-	-	-
	Winton Formation	Major Aquifer	-	-	-
	Mackunda Formation Allaru Mudstone Toolebuc Formation Wallumbilla Formation	Aquifer with confining bed	-	-	-
	Cana-Owie Formation	Aquifer and Aquitard (part)	-	-	-
	Hooray Sandstone	Major Aquifer	4.3×10^{-4}	1.96[4]	0.19[3]
	Westbourne Formation Adori Sandstone and Birkhead Formation	Confining bed/Reservoir Aquifer Water bearing/Reservoir	8.0×10^{-7} [2] 2.8×10^{-5}[3]	2.5×10^{-4} [2] 2.3×10^{1}[3]	0.2 [2] 0.05 to 0.23[3]
	Hutton Sandstone	Major Aquifer/ Reservoir	3.5×10^{-1} 5.7×10^{-5}[3]	9.8×10^{-3} 2.3×10^{1}[3]	[3] 0.01 to 0.24
	Poolowanna Formation	Major Aquifer/Reservoir	1×10^{-7} [2] 2.8×10^{-4}[3]	3.7×10^{-3} [2] 1.59[3]	0.18 [2] 0.11 to 0.19[3]
Cooper Basin	Tinchoo / Arrabury Formations	Primarily confining beds	-	-	-
	Toolachee Formation	Major Aquifer/Reservoir	2.0×10^{-3} [1]	4.3×10^{-3}	0.15 0.1 to 0.15[3]

Sources include (1) Government of South Australia Primary Industries and Resources, SA. Petroleum and Geothermal in South Australia – Cooper Basin, 2009. (2) Alexander, E.M, Reservoirs and Seals of the Eromanga Basin (undated) (3) historical information provided by Beach and (4) DEHP pumping data

Table 8: Eromanga Basin Analytical Calculation Parameters.

Layer	Top Elevation (mAHD)	Bottom Elevation (mAHD)	Average Head (mAHD)	Horizontal Hydraulic Conductivity (m/d)	Vertical Hydraulic Conductivity (m/d)	Average Abstraction per Well (m^3/d)	Number of Beach Energy Wells	Hydraulic Properties
TOP OF MODEL – ground level								
1: UPPER: Tertiary and Quaternary strata, Winton Formation and Mackunda Formation (UNCONFINED)	160 (Ground level) [1&2]	-120 [1&2]	154 [1&2]	5.0×10^{-2} [3]	5.0×10^{-4} [3]	0 [2]	0	Aquifer
2: LOWER: Tertiary and Quaternary strata, Winton Formation and Mackunda Formation (CONFINED)	-120 [1&2]	-400 [1&2]	154 [1&2]	5.0×10^{-2} [3]	5.0×10^{-4} [3]	0 [2]	0	Aquifer
3: Allaru, Toolebuc and Wallumbilla Formations	-400 [1&2]	-870 [1&2]	162 [1]	1.0×10^{-2} [3]	1.0×10^{-4} [3]	0 [2]	0	Aquitard
4: Cadna-owie Formation and Hooray Sandstone	-870 [1&2]	-1080 [1&2]	255 [1]	1.0×10^{-3} [4]	1.0×10^{-5} [4]	0 [2]	0	Aquifer and Aquitard (part)
5: Westbourne, Adori and Birkhead Formations and Hutton Sandstone and Poolowanna Formation	-1080 [1&2]	-1390 [1&2]	480 [2]	1.2×10^{-1} [2]	1.0×10^{-4} [4]	126.8 (See Appendix F for individual well abstraction rates) [2] *	65	Aquifer
BASE OF MODEL – major unconformity at base of Eromanga Basin								

Table 9: Cooper Basin Analytical Calculation Parameters.

Layer	Top Elevation (mAHD)	Bottom Elevation (mAHD)	Average Head (mAHD)	Horizontal Hydraulic Conductivity (m/d)	Vertical Hydraulic Conductivity (m/d)	Average Abstraction per Well (m^3/d)	Number of Beach Energy Wells	Hydraulic Properties
TOP OF MODEL – ground level								
1: UPPER: Tertiary and Quaternary strata, Winton Formation and Mackunda Formation (UNCONFINED)	160 (Ground level) [1&2]	-120 [1&2]	154 [1&2]	5.0×10^{-2} [3]	5.0×10^{-4} [3]	0 [2]	0	Aquifer
2: LOWER: Tertiary and Quaternary strata, Winton Formation and Mackunda Formation (CONFINED)	-120 [1&2]	-400 [1&2]	154 [1&2]	5.0×10^{-2} [3]	5.0×10^{-4} [3]	0 [2]	0	Aquifer
3: Allaru, Toolebuc and Wallumbilla Formations	-400 [1&2]	-870 [1&2]	162 [1]	1.0×10^{-2} [3]	1.0×10^{-4} [3]	0 [2]	0	Aquitard
4: Cadna-owie Formation and Hooray Sandstone	-870 [1&2]	-1080 [1&2]	255 [1]	1.0×10^{-3} [4]	1.0×10^{-5} [4]	0 [2]	0	Aquifer and Aquitard (part)
5: Westbourne, Adori and Birkhead Formations and Hutton Sandstone and Poolowanna Formation	-1080 [1&2]	-1390 [1&2]	480 [2]	1.2×10^{-1} [2]	1.0×10^{-4} [4]	126.8 (See Appendix F for individual well abstraction rates) [2] *	65	Aquifer
BASE OF MODEL – major unconformity at base of Eromanga Basin								

Sources include (1) DEHP database (2) Beach Reports/Beach DST/ Beach groundwater monitoring and extraction data (3) inferred value (4) literature value *total extraction from all strata was grouped into a single model layer in both basins (Eromanga Basin extraction was from Layer 5 and Cooper Basin extraction was from Layer 3) Section "Justification for the layering in AnAqSim" and Section "Assigning abstraction in the calculation" discussed the justification for the selected layering.

^The bottom elevation of the model is based on the depth of the extraction well and not the base of the Toolachee formation. Model assumes horizontal flow only in the reservoir.

Average Head

The average head for all formations in the Eromanga basin, up to and including the Hooray Sandstone were primarily calculated from historical data in the (previously known as) DEHP database. This historical data in considered applicable as the purpose of this UWIR assessment is to assess the total impacts to groundwater from Bridgeport's' current extraction operations, and therefore provides a baseline to the assessment.

Sufficient data existed for the head in Layer 1 and Layer 2 with 237 water level measurements available across the study area (Golder Associates, 2014, Appendix D, Groundwater Elevation Data – Shallow Units), primarily from the DEHP database. Of these 237 measurements, 4 measurements were included from Beach Energy's gauging of surrounding bores in April 2011. These more recent water level measurements tie in well with those supplied by DEHP for this layer. Although there is significantly less coverage available for Layer 3 (10 data points) and Layer 4 (4 data points), the data that is available for each layer is generally within the same range of one another and fits well with the anticipated conceptual model i.e. with increasing depth there is an increase in the elevation of groundwater, attributed to the increase in overburden pressure and the confined nature of the aquifers/reservoirs.

No data was available in the (previously known as) DEHP database for Layer 5 (the target formations of Beach Energy's operations), likely due to the depth of the formations. Head data for this layer was, however, available from DSTs undertaken by Beach Energy (or previous operators) during drilling and installation of the wells (Appendix D, DST and Groundwater Elevation Data). A total of 87 measurements were used to calculate the average head of Layer 5. Again, the measurements obtained from the DSTs are generally within the same range of one another and fit well with the anticipated conceptual model, providing a high degree of certainty in the measurements.

Limited data was available within the study area from both the DEHP database and Beach Energy's records on the groundwater elevations in the deeper Cooper Basin. No data was available for Layer 1 and Layer 2. The average head was therefore inferred, and as a result, there is a high degree of uncertainty associated with these numbers.

Only 2 DST results were available for the Toolachee Formation (Layer 3), with a difference of 206 m AHD between them. There is, therefore, also a high degree of uncertainty associated with these numbers.

Horizontal hydraulic conductivity

No hydraulic conductivity data was available through literature review, the DEHP database or Beach Energy's data for Layer 1 and Layer 2 of the Eromanga Basin model. The values were therefore inferred based on the lithology. A value of 5 x 10^{-2} m/day was used for Layer 1 and Layer 2, composed primarily of sandstone, siltstone and shale, which is typical of a mid-range value for a sandstone (Freeze and Cherry, 1979). There is uncertainty associated with this value due to the lack of site-specific data.

In addition, no data was available for Layer 3. A value of 1 x 10^{-2} m/day was inferred for the Allaru Mudstone, Toolebuc Formation and Wallumbilla Formation, which comprise predominantly mudstones, siltstones, and fine-grained sandstones. Again, this value is typical of a mid-range hydraulic conductivity for a sandstone. This value was inferred as the sandstone units present within Layer 3 are thought to be where the majority of groundwater flow would occur. There is uncertainty associated with this value due to the lack of site-specific data.

No data from Beach Energy was available for specific hydraulic conductivity results in Layer 4. A range of literature values along with pumping test data from DEHP was, however, available for the Hooray Sandstone. These range from 4.3 x 10^{-4} to 1.96 m/day. A value in the lower end of the literature range was chosen to consider the less permeable Cadna-owie Formation contained within the layer (1 x 10^{-3} m/day). There is less uncertainty associated with these values in comparison to those used for Layer 1 to Layer 3.

Both literature values and site-specific values for units within Layer 5 were available. The literature values range from 8 x 10^{-7} to 2.5 x 10^{-4} m/day, however, do not include values for the Poolowanna Formation. The site-specific values, obtained from intrinsic permeability data, flow test data, tenement specific reports and measurements on core plugs (all supplied by Beach Energy) were available for all units in Layer 5. The site-specific values ranged from

2.8×10^{-5} to 22.7 m/day (Golder Associates, 2014, Appendix D). A geometric mean based on the site-specific data of all 5 layers was used for the purposes of modelling (0.12 m/day). This value is within the higher end of permeabilities for a sandstone unit, which is as expected as Layer 5 comprises the sandstone oil reservoirs targeted by Bridgeport. As all geological units have been used from site-specific values, there is greater certainty associated with the values of hydraulic conductivity assigned to this layer.

No literature or site-specific values for hydraulic conductivity were available for the Tinchoo and Arrabury Formations in the Cooper Basin. Limited drilling has been undertaken by Beach Energy or other operators in the Cooper Basin, with only one production well currently and historically installed in the Cooper Basin. Values for the Tinchoo and Arrabury Formations (Layer 1 and Layer 2) have therefore been inferred. There is uncertainty associated with this value due to the lack of site-specific data.

No site-specific values are available for the Toolachee Formation. Literature values are presented above (Table 10, Table 11, Table 12) and range from 2×10^{-3} to 4.3×10^{-3} m/day. A mid-range value of these literature values has been used (3.9×10^{-3} m/day). This value is considered appropriate in the absence of site-specific data and falls with the mid-range of hydraulic conductivities of a sandstone unit.

Vertical hydraulic conductivity

In the absence of published site investigation values, the vertical hydraulic conductivity of the units was generally assumed to be 1% of the horizontal hydraulic conductivity. Due to the interbedded nature of the sandstone bodies in the study area and the presence of vertical barriers to hydrocarbon migration (and therefore groundwater) in the form of laterally extensive siltstone, shale and mudstone units, as previously described, it is considered that vertical groundwater flow is negligible. A value of 1% is therefore considered conservative. Although no site-specific data is available, the presence of hydrocarbon seals indicates the resistance to vertical groundwater movement.

Additional anisotropy was introduced for Layer 5 (Westbourne, Adori and Birkhead Formations and Hutton Sandstone and Poolowanna Formation) of 0.1%. This was considered representative of the likely anisotropy of this stratum.

Cooper Basin anisotropy was assumed to be 10% throughout the model. This value was considered conservative for stratum at this depth and was adopted in-light of the limited hydraulic data available in this basin.

Average abstraction per well

The average abstraction rate per well was calculated based on historical volumes measured by previous operators, including Beach Energy and now Bridgeport, for individual wells on a monthly basis, along with monthly predicted volumes for the next three years of operation. A detailed methodology as to how the volumes were calculated is provided above. As extraction volumes are provided per well, per month, per geological unit over the life of the well there is minimal uncertainty associated with the extraction rates assigned in the model.

More uncertainty is associated with the three-year predicted future rates as the volumes are predictions only.

Number of abstraction wells

The number of abstraction wells was based on the number of current and historic abstraction wells since operations began, and as supplied by both Beach Energy and Bridgeport.

The role of Departmental (registered) monitoring Bores

As discussed in the previous section, information obtained on bores from the (previously known as) DEHP database, along with those supplied by Beach Energy (and subsequently Bridgeport) were used to produce geological cross sections across the study area. Elevations of the tops of each unit were taken from both the DEHP data and well data supplied by Beach Energy. This enabled the validation of elevations obtained from Beach Energy well card information to calculate the aquifer thicknesses.

Data obtained from DEHP was relied upon for the calculation of average head data, specifically for the more shallow units included in Layer 1, Layer 2 and Layer 3 in the Eromanga

Basin model (as previously discussed in Section “Rationale for selection of hydraulic parameters” above), due to the lack of availability of data from Beach Energy on the more shallow units. However, no DEHP data was available for the deeper target formations, whereby, data from Beach Energy was used.

Pumping test data (transmissivity values) were available for limited geological units from DEHP. These values were predominantly for the Hooray Sandstone, but also the Etonvale Formation and the Adavale Group Equivalent, the latter two being in the Adavale Basin, below the Cooper Basin, and therefore irrelevant to this assessment. The values obtained from DEHP pumping test data for the Hooray Sandstone were used in Table 10, Table 11 and Table 12.

The role of departmental bores in model calibration and review is covered in Section “Sensitivity Analysis”, but primarily involves the use of observed groundwater SWLs obtained for the more-shallow units.

Extent of calculation and boundary conditions

The extent of the Cooper Basin and Bridgeport Energy tenements was used in conjunction with the distribution of the relevant extraction wells to form the extent of the calculation domain. This included a buffer to ensure the boundary conditions did not influence the results.

Boundary conditions were set as lines of zero flux (i.e., no flow boundaries) and located at sufficient distance from the area of interest to be far field boundaries.

The upper and lower extents of the model were assigned as head dependant flux, and flux conditions respectively. This permitted the increasing groundwater level with depth conditions by creating the head elevation at the top of the model and a small flux at the base.

In the Eromanga Basin, the value assigned to the head dependant flux was 154 m AHD at the top of the model (to represent the approximated observed water table in the upper layer). The flux at the base of the model was calibrated at 2.5 x 10^{-5} m/d (equivalent to 9.1 mm/year recharge to the base of the model). This was necessary to simulate the observed or likely increasing hydraulic pressure with depth in both basins.

For the Cooper Basin, the upper model boundary had a head dependant flux set at 315 m AHD, to replicate inferred heads, and a flux at the base of 2 x 10^{-5} m/d (equivalent to 7.3 mm/year recharge to the base of the model). The value for the flux at the base of the model was achieved through the calibration process that matched modelled groundwater levels to the approximated observed and inferred groundwater levels.

The extent of the Eromanga Basin calculation can be seen in Beach (2014) and the extent of the Cooper Basin calculation domain can be seen Beach (2014).

No recharge was applied to any model due to the use of the head dependant flux on the upper surface of the model.

Water Production volumes used for the calculation

The water extraction rates for the model were defined as follows:

- The average historical observed water (plus oil) extraction rate represents the Immediate Effected Area; and
- The average historical observed water (plus oil) extraction rates plus the average predicted annual rate for the next three years was used to represent the Long-term Effected Area.

A summary of the extraction rates used in the original modelling is as follows:

Eromanga Basin

- For the Eromanga Basin immediately affected area an average extraction rate (equivalent to the observed historical average extraction) of 120.2 m^3/day was adopted for the wells (with a range of 1.2 m^3/d to 594.2 m^3/d);
- For the Eromanga Basin long term affected area an extraction rate (equivalent to the long-term average extraction) of 124.9 m^3/day was adopted over the 42 wells (with a range of 1.0 m^3/d to 673.3 m^3/d).

- Although the maximum and average extraction is slightly higher in the long term affected area, the total extraction is less because there are fewer wells.

Cooper Basin

- For the Cooper Basin immediately affected area an extraction rate (equivalent to the observed historical average extraction) of 1.2 m^3/day was adopted for the single well used in the model;
- For the Cooper Basin predictive model long term affected area an extraction rate (equivalent to the long-term average extraction) of 1.6 m^3/day was adopted for the single well used in the model.
- The values for historical and predicted extraction were similar for both basins.

Justification for the layering in AnAqSim

The Eromanga Basin was grouped into five EPM layers according to the hydraulic properties of the strata, combining adjacent strata with broadly similar hydraulic properties as well as combining the observed target stratum for oil and gas extraction. Combining target extraction layers was necessary to maintain numerical stability in the analysis.

Layer 1: The shallowest major aquifers in the study area (i.e., those aquifers most heavily developed for water supply, including the unconfined shallow Quaternary, Tertiary, Winton and Mackunda Formation aquifers) were grouped as a single hydro stratigraphic unit, with the entire unit then split into an upper and lower layer in the model (Layer 1 comprising the upper layer). No abstraction was assigned to this upper layer in the model as this upper portion contained the head dependant flux boundary.

Layer 2: consisted of the lower half of the Quaternary, Tertiary and Winton and Mackunda Formation. These have been split into the upper two layers in order to investigate the potential impact of the deeper oil and gas extraction.

Layer 3: consisted of the underlying Allaru, Toolebuc and Wallumbilla Formations. These formations are generally considered to collectively act as an aquitard with very little groundwater abstraction and no oil or gas extraction in the Eromanga Basin.

Layer 4: combined the Cadna-owie Formation and Hooray Sandstone. Oil and gas wells are often screened in both these formations, and they exhibit similar geological characteristics, both being generally thinly interbedded sandstone and siltstone with occasional coarse grained, brecciaed or pebble beds.

Layer 5: consisted of the Westbourne, Adori and Birkhead Formation aquifers and aquitards as well as the underlying Hutton Sandstone and Poolowanna Formation. Oil and gas extraction wells are often screened over a combination of these strata generally comprising interbedded siltstone, shale, fine sandstone and occasional coal seams. The Hutton Sandstone and Poolowanna Formation were considered to be more permeable and accounted for the highest extraction rate by Beach Energy (and subsequently Bridgeport) operations by an order of magnitude. The Hutton Sandstone and Poolowanna Formation are therefore the main targets for oil extraction.

The Base of the model was formed by the base of the Eromanga Basin, which is marked by a major unconformity. Underlying the Eromanga Basin are the aquitards of the Tinchoo and Arrabury Formations. It was considered suitable to separate the Cooper Basin into a separate model due to the hydraulic separation of the two basins as well as the low average extraction from the underlying Cooper Basin.

The Cooper Basin was grouped into three layers, with the upper layer being split into two layers with identical properties. This was to permit the response of pumping to be observed in the Tinchoo and Arrabury Formations. The layers were configured as follows:

Layer 1: the upper portion of the Tinchoo and Arrabury Formations comprise Layer 1. This had the head dependant flux boundary condition applied to the top in order to replicate the inferred groundwater levels. Layer 1 was assigned identical hydraulic properties to the underlying Layer 2 Tinchoo and Arrabury Formations.

Layer 2: represented the lower half of the Tinchoo and Arrabury Formation aquitards. No oil or gas extraction was identified to target these strata. These are generally interbedded siltstone and fine sandstone with low permeabilities.

Layer 3: represented the Toolacheee Formation at the base of the Cooper Basin. This was not utilised for water supply and only a single Beach Energy (and now Bridgeport) extraction well extracts from these strata.

Note that although AnAqSim allows the division of a layer in two sections, the calculated results are provided for the full layer (no results available for each subdivision).

Assigning abstraction in the calculation

Abstraction was assigned to a single layer in each basin model. This was considered a reasonable simplification to represent the behaviour, given the EPM model approach adopted in this analysis. Extraction well details were interrogated to give a single extraction target in each basin. In the Eromanga Basin model, the Westbourne, Adori and Birkhead Formations, Hutton Sandstone and Poolowanna Formation were grouped together as the bottom layer of the model and therefore also combined the abstraction from these strata into the single layer.

In the Cooper Basin, as the single extraction was considered to be at a low rate, it was considered sufficient to investigate this in a separate model and investigate the potential impact at the top of the Cooper Basin.

To simulate an immediately impacted area and a long term impacted area in steady state analysis, average historical and average predicted abstraction rates were analysed respectively, using observed and predicted oil and water extraction data provided by Beach Energy (and subsequently Bridgeport) (refer to Section “Water production volumes for the calculations”).

The grouping of the strata in the software and treating adjacent grouped strata as an EPM removed the necessity to establish the target formation beyond the defined layers within the software. This is because abstraction can only be assigned to defined software layers and not specific target depths or strata within an individual layer. This allowed a much coarser definition of assigning the extraction target formation. Golder considered that this was an acceptable assumption as the software does not allow for further refinement; the EPM approach already provided a bulk representative behaviour of the adjacent grouped strata. As the focus of impact is the strata generally overlying the extraction targets, this was deemed to be a suitable methodology.

Observed groundwater levels and calibration targets

Groundwater levels in the shallow aquifers and those that are utilised for groundwater abstraction or monitored by DEHP (now DES) were generally obtained from the DEHP (now DES) groundwater database.

Hydrostatic pressure data was available for strata targeted for oil extraction. This was obtained from Beach Energy, with representative groundwater levels presented in Table 10, where available. The selected value for groundwater level is derived from numerous spatially distributed wells and from a range of elevations and depths across the basins (relevant to the layer). As the calculation required the layers to be horizontal and planar, the groundwater levels were also set at simplified representative levels.

Where no groundwater level data was available (Tinchoo and Arrabury in the Cooper Basin), it was necessary to use a representative value derived from likely groundwater pressure extrapolated from adjacent layers.

Calibration was undertaken on both calculations using observed/inferred groundwater levels verses calculated groundwater levels in unpumped conditions. The bottom flux and hydraulic conductivity values were altered until a satisfactory fit was achieved. A plot of modelled verses observed groundwater level for the Eromanga Basin is given in Figure 8.

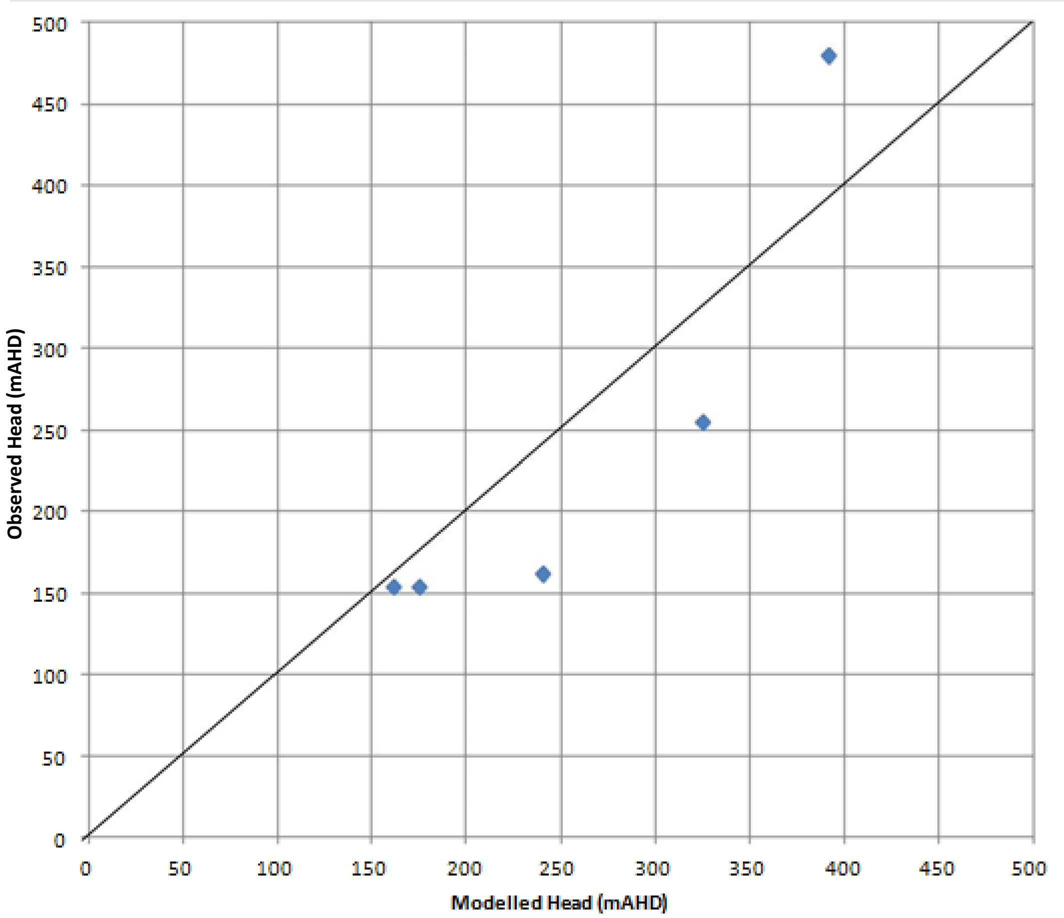

Figure 8: Eromanga Basin: Observed versus modelled groundwater level.

A reasonable fit between modelled and observed groundwater head was achieved in using the parameters given in Table 10.

Table 10: Cooper Basin: Tabulated Observed versus modelled groundwater level.

Calibration Target	Observed Groundwater Level (mAHD)	Modelled Groundwater Level (mAHD)	Residual (m)
OBH Layer 1	Not known	345	n/a
OBH Layer 2	Not known	410	n/a
OBH Layer 3	622	446	176

Both models were considered to contain representative head values sufficient for the purposes of the impact assessment, and able to demonstrate the potential impact of pumping. This is because the likely groundwater gradient was achieved and the resultant drawdown is the important factor in this analysis, this is not impacted by the initial pressure head.

Modelling extent is demonstrated in Figure 9.

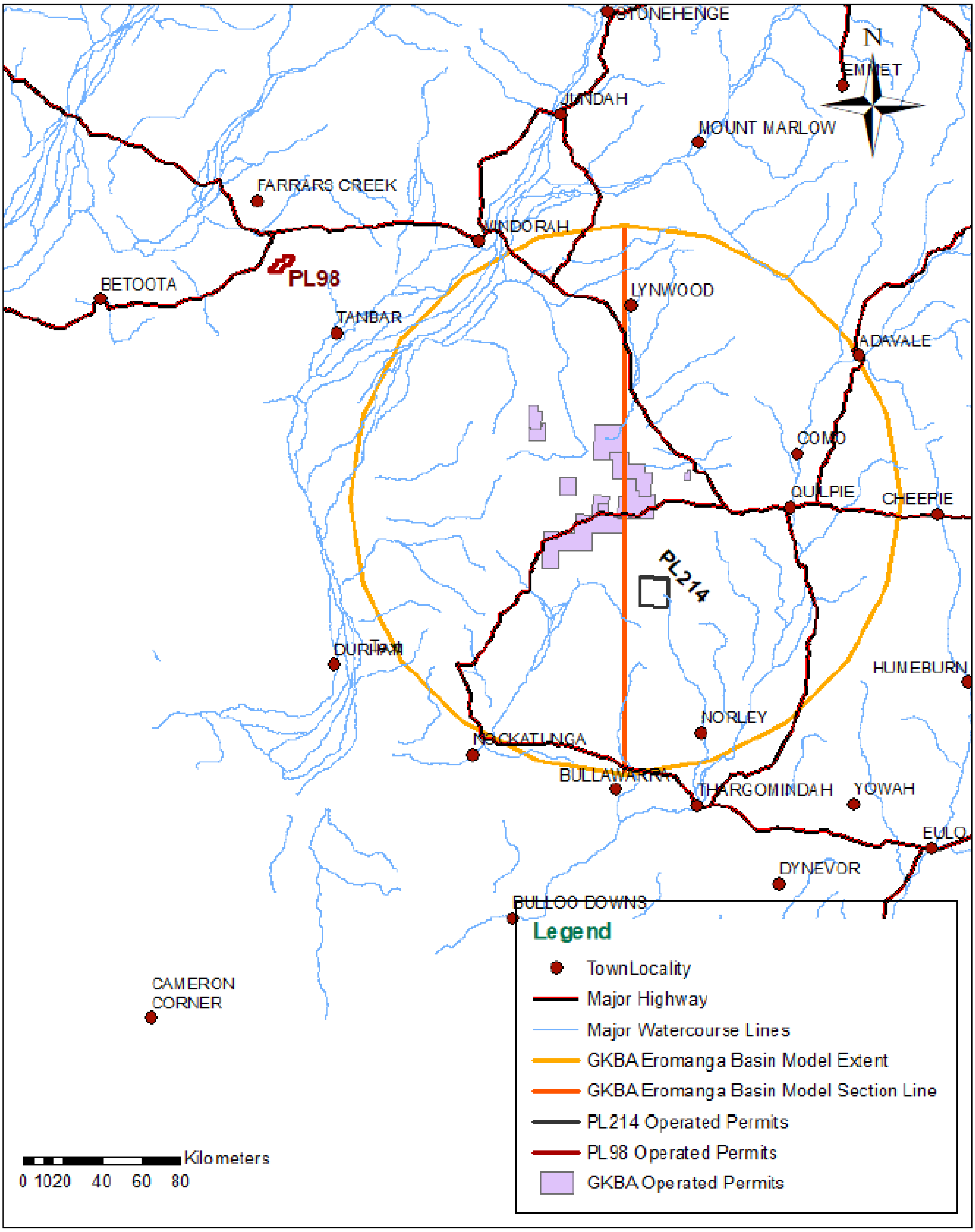

Figure 9: Extent of the Eromanga (orange) and Cooper (red) Basin models, including locations for the hydraulic head calculations.

Results

Sensitivity Analysis

Calibration modelling and sensitivity analysis were undertaken on both the Cooper Basin and Eromanga Basin models, taking into consideration the MDBC (2000) guidelines and the more up to date Australian Groundwater Modelling Guidelines (Barnett et. al. 2012). Hydraulic Parameter sensitivity analysis involved increasing the vertical hydraulic conductivity of the cap rock (overlying aquitard layer above of the extraction targets) by an order to magnitude. All other input parameters in the model remained the same as the calculated impact scenarios described above.

Sensitivity analysis was undertaken in a targeted manner for a number of reasons. The rationale for the selection of the cap rock as well as the vertical hydraulic conductivity as the key parameters to be investigated during sensitivity analysis can be summarised for both models, as follows:

Calibration modelling anecdotally corroborated Golder's hydrogeological assessment that the key calibration parameter was the vertical hydraulic conductivity of the cap rock.

Horizontal hydraulic conductivity was not considered likely to have a significant impact on the results as it is the potential for vertical propagation of groundwater depressurisation through the model layers that would result in a modelled impact on the features of interest (i.e. private bores, springs and groundwater dependant ecosystems). This is because the vertical distance between the target formations for oil extraction and the potentially impacted features is considered to be large. It is the vertical hydraulic conductivity and depth of the target formations that were considered to have a greater influence on the vertical propagation of hydraulic depressurisation, rather than horizontal hydraulic conductivity.

Sensitivity analysis on the cap rock was deemed appropriate as there was a paucity of hydraulic data for these strata. This is likely to be a result of this layer not being a target formation for groundwater, oil or gas in this area of the Eromanga Basin, as discussed in Section "Assumptions for calibration process for the sensitivity analysis". Hydraulic parameter values were obtained for most other strata within the model domain; therefore, the cap rock was considered the least well constrained in terms of its hydraulic characteristics and should therefore be evaluated using sensitivity analysis.

The presence of oil in the Eromanga Oilfields demonstrated that the cap rock was an effective aquitard, as without it, oil would have migrated towards the surface over geological time. It is this layer that was therefore the key driving force in the flow dynamics of the system, and it is this layer that should determine the rate and scale of the propagation a depressurisation effect through the model. Increasing the hydraulic conductivity of model layers overlying the cap rock would not significantly influence the result as the limiting factor in the propagation of potential impacts would still be from the low permeability cap rock.

Altering the hydraulic parameters of the target formation (i.e. below the cap rock) was not considered to be beneficial to achieving a greater impact in the model as it would likely have impacts. These impacts included;

Increasing the hydraulic conductivity of the target formation should reduce the maximum depressurisation in the vicinity of the extraction wells while increasing the radius of influence of the depressurisation. Acting on the base of the low permeability cap rock, this would likely result in a reduced impact above the cap rock. This is because the magnitude of depressurisation would be reduced, therefore reducing the potential propagation of the depressurisation through the cap rock. Given that there are no identified features of interest in close proximity to the trigger level drawdown zone, this was not considered to be significant.

Decreasing the hydraulic conductivity of the target formation may result in unrealistically low hydraulic conductivity values such that the observed yield would not be obtained from the modelled wells. Reducing the hydraulic conductivity of the target formation was therefore considered unrealistic as site observation of the yield of the wells, some extracting since 1984, constrained a lower limit for the target formations and any significant decrease through sensitivity analysis was considered unrealistic.

Hydraulic sensitivity analysis

Analysis of the sensitivity of the groundwater impact estimation scenario result to changes in the vertical hydraulic conductivity of the cap rock was undertaken. To provide a conservative approach to sensitivity analysis, the vertical hydraulic conductivity was increased by an order of magnitude, as follows:

SA1: Hydraulic Parameter Sensitivity Analysis on the Cooper Basin: Layer 1 and Layer 2 (upper and lower portions of the Tinchoo and Arraburry Formation) vertical hydraulic conductivity increased to $1x10^{-4}$ m/d; and

SA2: Hydraulic Parameter Sensitivity Analysis on the Eromanga Basin: Layer 3 (the grouped layer consisting of the early to late Cretaceous Allura Mudstone, Toolebuc Formation and Wallumbilla Formation) vertical hydraulic conductivity increased to $1x10^{-3}$ m/d.

Sensitivity analysis steady state calibration

The sensitivity analysis models (SA1 and SA2) were calibrated in the same manner as the groundwater impact estimation scenario. Results from the final calibrated steady state calculations for all sensitivity scenarios are tabulated in Table 11.

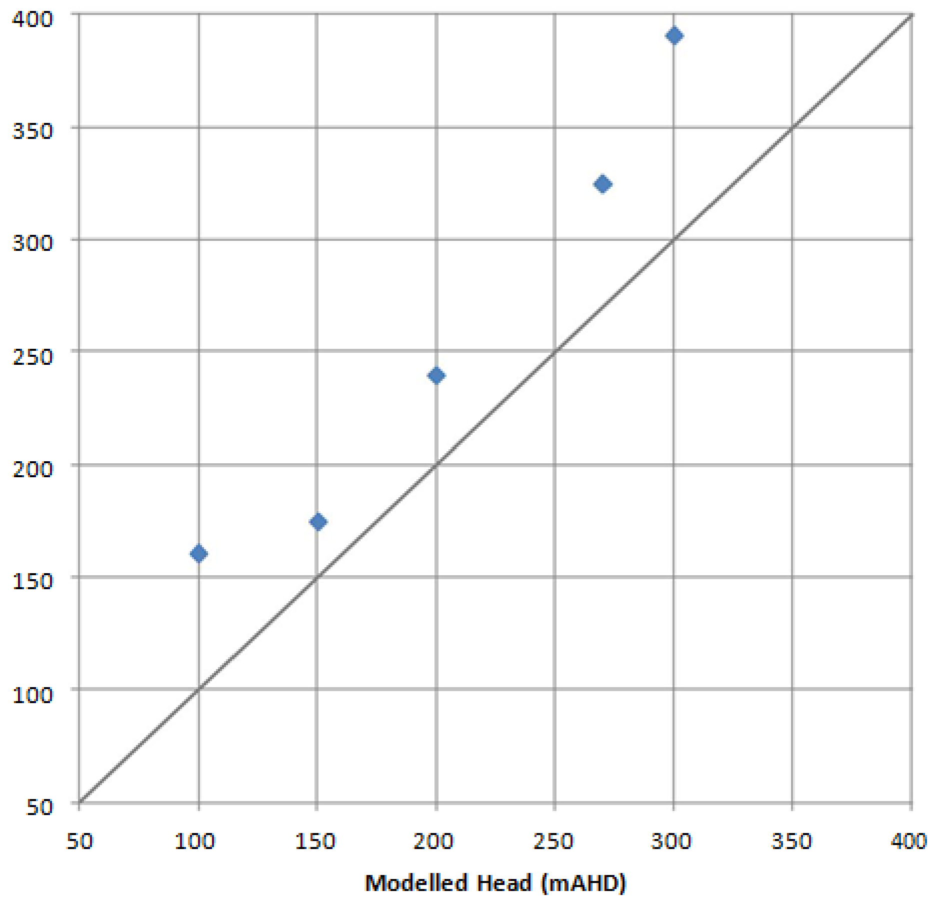

Figure 10: Eromanga Basin SA2: Observed versus modelled groundwater level.

The Cooper Basin SA2 calibration results are shown in tabulated form in Table 11 along with the SA1 calibration results, where possible.

Table 11: Sensitivity analysis calibration.

Model Layer (and modelled groundwater level [mAHD])		Observed Groundwater Level (mAHD)		Sensitivity Analysis versus Observed Groundwater Level Residual (m)	
SA1 Cooper Basin	SA2 Eromanga Basin	Cooper Basin	Eromanga Basin	SA1 Cooper Basin	SA2 Eromanga Basin
Layer 1: 618	Layer 1: 161	Not known	100	n/a	61
Layer 2: 624	Layer 2: 175	Not known	150	n/a	25
Layer 3: 624	Layer 3: 240	622	200	2	40
-	Layer 4: 325	-	270		55
-	Layer 5: 391	-	300		91

These calibration results were considered suitable to conduct the sensitivity analysis modelling.

Results of sensitivity analysis modelling

The calibrated models were run using the long-term scenarios and in steady state to give a conservative, worst case scenario. There were Figures in the original research (not included here), which were graphically represented sensitivity analysis. They included the following;

Cooper Basin:

- a drawdown of less than 5 m is predicted in all layers by the sensitivity analysis

Eromanga Basin:

- Modelled Groundwater Drawdown Contours in Layer 2
- Modelled Groundwater Drawdown Contours in Layer 3
- Modelled Groundwater Drawdown Contours in Layer 4
- Modelled Groundwater Drawdown Contours in Layer 5

Note: all contours shown are one metre contours.

Information about all water bores in the IAA (including the number of bores in the area, maps showing the location of these bores and the authorised use of each bore) (section 376(d) of the Water Act); and Bridgeport Energy has used the Registered water bores (DNRM and private) data, held within the Groundwater and Inland Waters layer of the Queensland Governments Queensland Globe GIS website to identify groundwater bores near GKBA tenements. This information was accessed 2018 (Bridgeport 2018), and again in 2021. No changes were observed to data within Bridgeport tenements.

The extent of the search was within a 20km radius from the centre of the facility, which is a significantly larger area compared with the IAA and LTAA.

A majority of nearby (< 25 km) wells accessed the Winton Formation. The majority of these wells (Table 14) are drilled to a depth not exceeding 100m. In general, groundwater take within this management area is relatively limited, as these are not actively pumped. Some wells in Table 14 have also been abandoned and decommissioned since drilling.

It is highly unlikely the extraction of water from Bridgeport targeted formations (> 1400 m below ground) would influence shallower formations < 100 m deep due to geological barrier to free flow factors limiting the movement of water between such depths. Bridgeport also protects shallower aquifers and reservoirs by installing cemented steel casing in our production wells, and testing and validating the integrity of the boreholes using wireline logging assessment. There is an also extremely restrictive geological boundaries between the lower targeted formations and higher freshwater targeted aquifers. The total water and oil production are also greatly reduced, on overall decline compared to historical extraction figures, with less total volume coming from less wells in each field.

Many individual bores are located around the small township of Eromanga, to the west of Kenmore. Because all bores within Eromanga are a similar distance from the main field of Kenmore, instead of measuring everyone bore separately, a generic distance for 19.08 km was given for each.

Modelling Results

The modelled maximum drawdowns within PL 214 are represented in Table 12.

The shallow model Layers 2 (Quaternary, including Winton) and Layer 3 (Toolebuc) had no drawdowns from historic and modern (2021) production volumes. Predictions on maximum drawdown on modelled production rates also lead to no drawdown.

The closest layers to production extraction targets are the Layer 4 and 5 of the Cadna-owie, Hooray Sandstone and the Westbourne. Layer 4 showed a maximum drawdown of 8.29 m from historic production, declining to 6.26 m drawdown under forecast production rates. In Layer 5 (below targeted formations) saw a modelled drawdown of 1.0 m and 0.9 m under historic forecast productions respectively (Figure 13).

Table 12: Maximum drawdown/depressurisation for PL 214 Utopia.

Layer number	Layer description	Maximum drawdown (m) 2015-2021	Maximum drawdown (m) 2022 - 2024
2	Quaternary, Tertiary, Winton and Mackunda Formations	0.0	0.0
3	Allaru, Toolebuc and Wallumbilla Formations	0.0	0.0
4	Cadna-owie Formation and Hooray Sandstone	8.29	6.26
5	Westbourne, Adori and Birkhead Formations/Hutton Sandstone and Poolwanna Formation	1.0	0.9

These are graphically represented in a cross-section map across the tenement for Layer 4 only (Figure 11). There are no figures for Layer 2, Layer 3 of Layer 5, considering the limited drawdowns, which would not appear on any graphical representation.

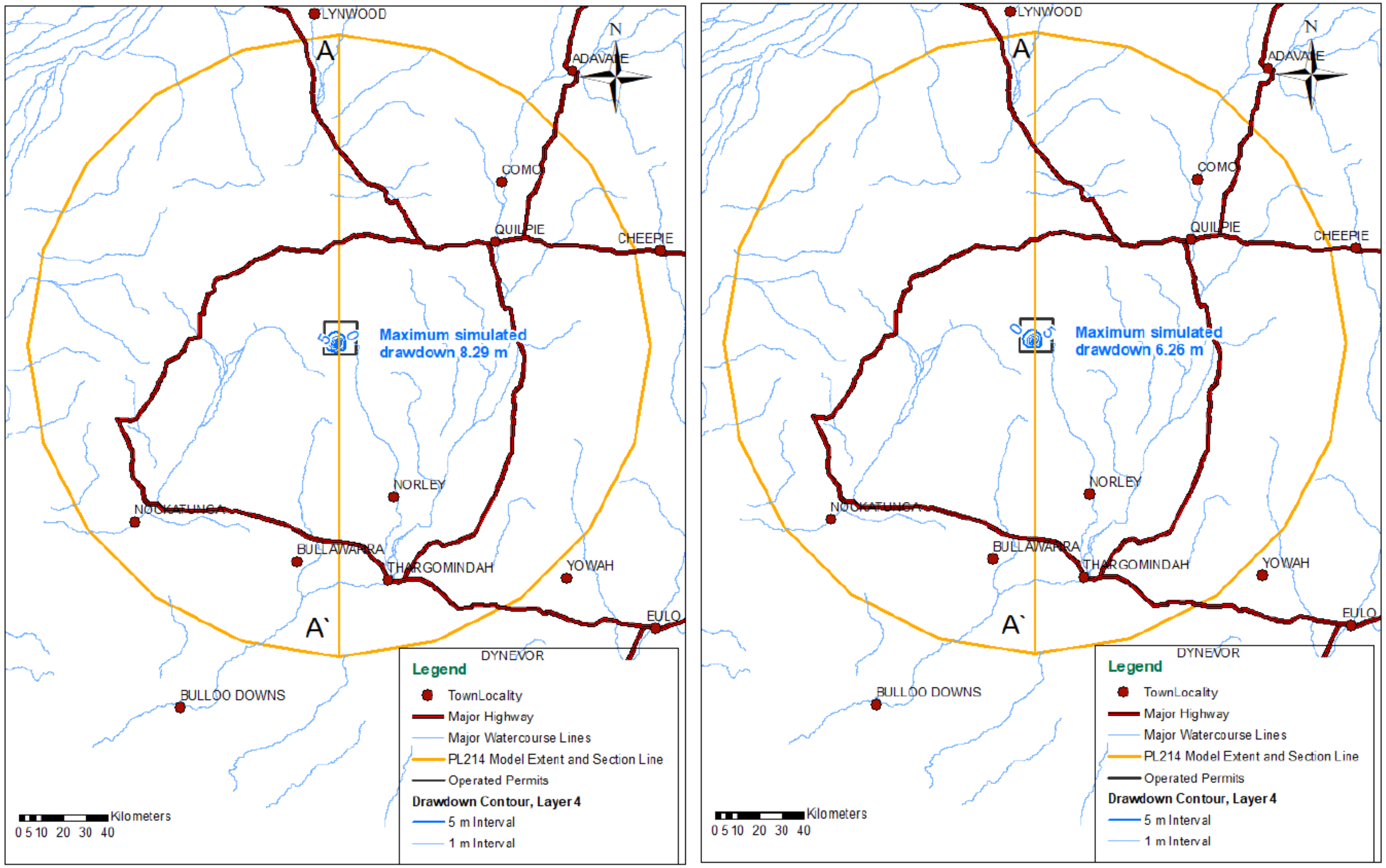

Figure 11: Maximum calculated pressure drawdown in Layer 4 for the period of 2015 to 2021 in the left inset figure and the predicted drawdown in the right hand inset box, for PL 214 Utopia.

Another graphical representation of depressurisation/drawdown within the modelled layers can be demonstrated in the following format. Figure 12 does not include depth as the Y axis, Figure 13 arranges the Layers to depth.

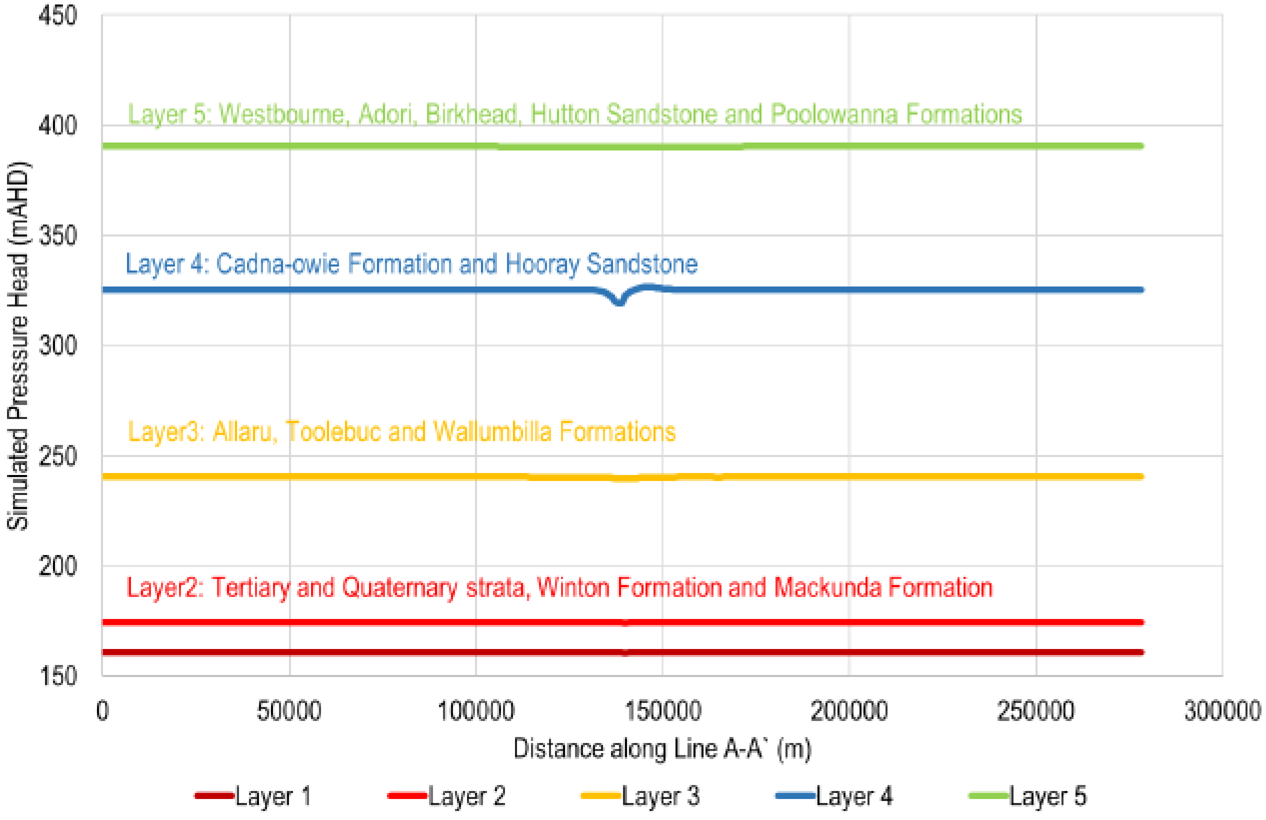

Figure 12: Calculated groundwater levels along the cross section (2015 to 2021).

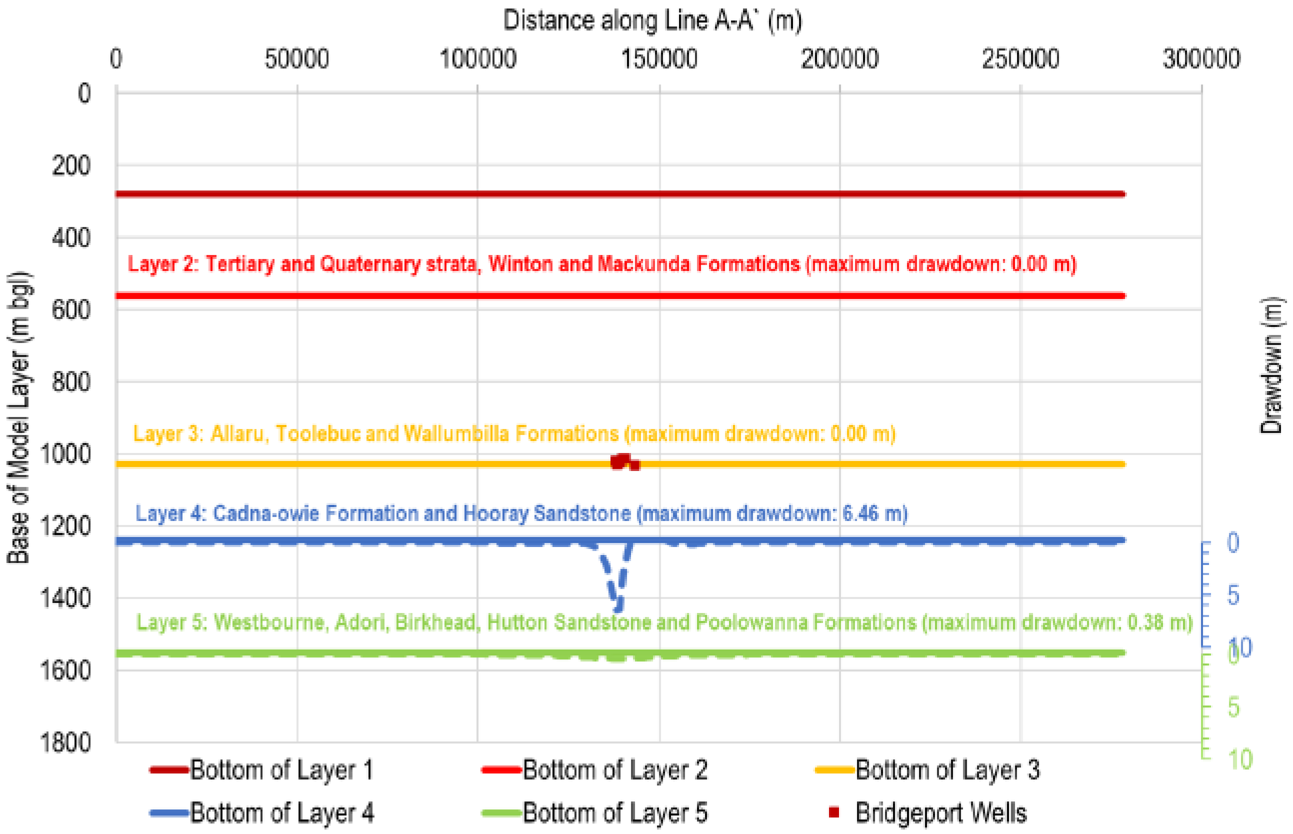

Figure 13: Calculated groundwater levels along the cross section (2015 to 2021).

Information about all water bores in the IAA (including the number of bores in the area, maps showing the location of these bores and the authorised use of each bore) (section 376(d) of the Water Act)

The bore trigger threshold is defined in DES (2017) as a decline in water level of 5 m in bores of a consolidated aquifer, and a 2 m water level decline in bores in an unconsolidated aquifer. All Bridgeport targeted aquifers are confined, and the surface aquifer targeted by landholders are unconfined.

To contextualise for the Department, a bore summary was undertaken, where all bore metadata was collated within a 20 km radius was taken from the centre of Utopia. The Queensland Governments database for quantitative data was used to determine the average total depth of each bore. To create an accurate representation, plugged and abandoned wells and petroleum wells are included in the summary table (Table 10), but were excluded from the average depth calculations (Table 13).

There was a total of 57 wells from the centre of the Utopia field, 13 of which were abandoned or destroyed. The remaining 44 wells (that had available depth data) averaged 108.48 m deep, and their primary purpose would be livestock watering. The points in Figure 14 show all bores per Queensland Globe, with some being abandoned and destroyed, whilst others are still active or unknown.

The average landholder bore within a 20 km radius of the field is 108.48 m deep (Table 13).

Table 13: Average depth of bores within a 20 km radius from the centre of Utopia, after removing all hydrocarbon targeting wells and Abandoned and Destroyed wells.

Tenement	Average Bore Depth (m)
Utopia	108.48 m

None of the bores within a 20 km radius of the PL 214 tenement (reviewed in Table 10) are perforated below 312 m. This 312 m deep well is Uforia-1, perforated into the Winton Formation but abandoned. The next deepest well that is online, is Ross Job No 1761, also perforated into the Hutton Formation (for water use). All other wells within a 20 km radius of PL 214 Utopia, that are drilled deeper than 312 m are all petroleum wells.

Considering the layers of the model and where landholder bores target, there are no Layers within the model, relevant to landowners, that are predicted to be drawn down as a result of the petroleum activity. Only one of four Layers observed a decline greater than the bore trigger threshold for a consolidated aquifer (Layer 3), which only contains bores related to petroleum extraction.

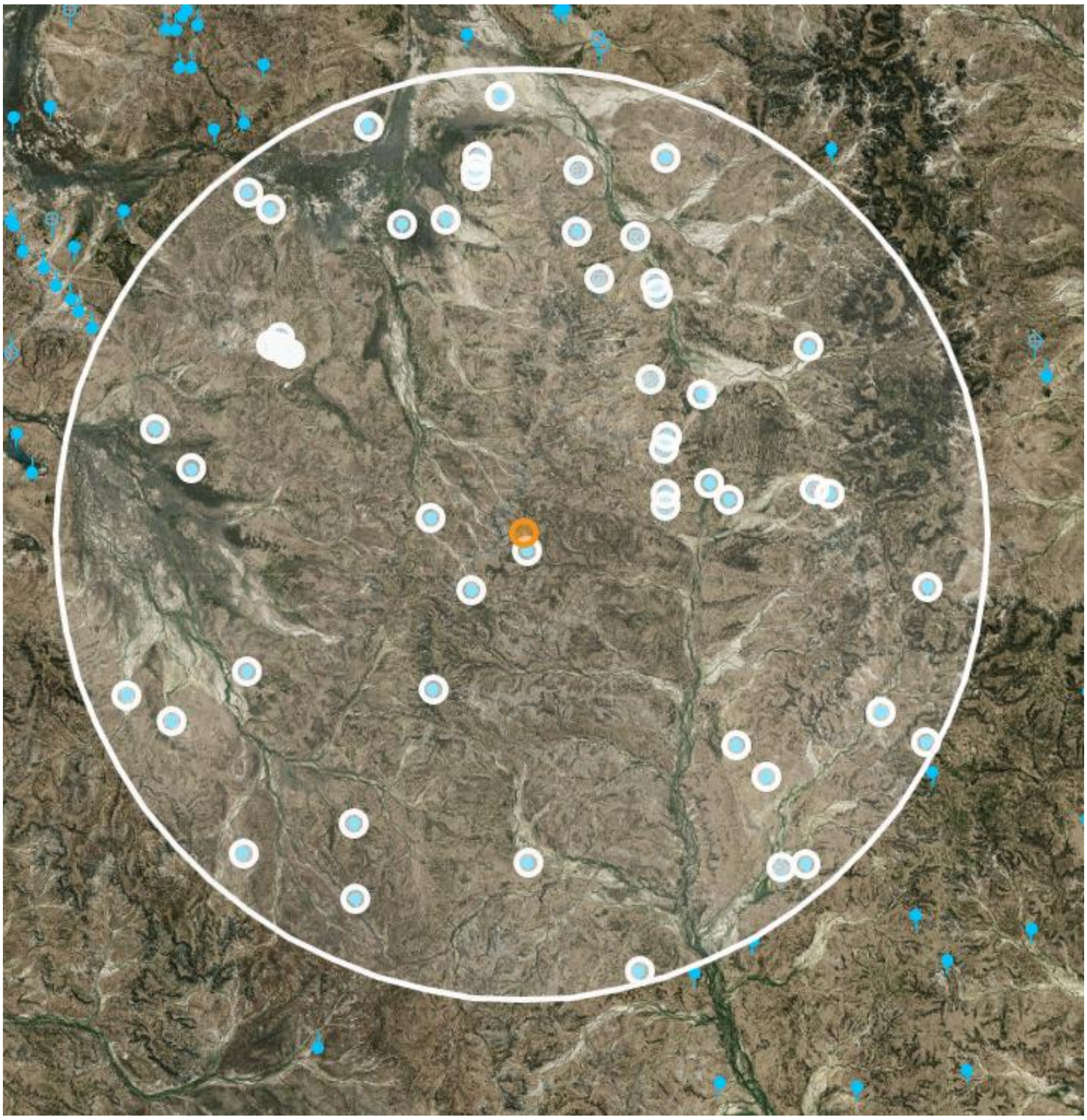

Figure 14: Queensland Government GIS database and the Inland Waters, Groundwater "Registered water bores (DNRM and private)" layer, overlaid the Utopia facility (orange dot).

Table 14: Details of the water bores that occur within a 20 km radius from the centre of Utopia.

Bore Identification #	Location	Drilled Date	Aquifer Screen	Depth/ Thickness	Distance from Utopia Field	Name	Remarks	Likely Use
2093	-26.86402232, 143.59647743	01/01/1917	Winton Formation	21.90 m	19.22 km	House well	Abandoned and Destroyed	
6099	143 38 40 E 26 59 33 S	Unknown	Winton Formation	32.00 m	5.60 km	Boothera	Existing	Unknown
6100	-268876341, 143.52481191	01/01/1923	Winton Formation	19.20 m	17.23 km	Coogee	Existing	Water bore
6214	-26.94929921, 143.72147712	15/09/1937	Winton Formation	111.30 m	18.21 km	Tobermory No 10 Bore	Existing	Water bore
6377	143 30 60 E 27 01 56 S	Unknown	Winton Formation	15.20 m	3.30 km	Boothera 10	Existing	Unknown
9687	143 38 11 E 26 59 32 S	Unknown	Winton Formation	17.10 m	5.20 km	Bloodwood	Abandoned and Destroyed	
10423	143 32 20 E 27 04 00 S	Unknown	Winton Formation	19.80 m	1.20 km	Daleys Bore 17	Existing	Unknown
4548	-26.89596651, 143.62786635	01/01/1951	Winton Formation	215.80 m	16.95 km	Unknown	Abandoned and Destroyed	
6009	-27.14140501, 143.682291	26/04/1937	Winton Formation	111.86 m	16.21 km	Tobermory No 18 Bore	Existing	Water bore
6099	-26.99235534, 143.5048083	01/01/1923	Winton Formation	228.50 m	9.60 km	Boothera	Existing	Water bore
6288	-27.01818816, 143.72453347	18/10/1937	Winton Formation	154.53 m	15.76 km	Tobermory No 11 Bore	Abandoned and Destroyed	
6372	-27.21569035, 143.4760554	01/01/1914	Winton Formation	173.10 m	21.58 km	Areela Bore No 4	Existing	Water bore
6377	-27.03207873, 143.51675832	01/01/1916	Winton Formation	185.32 m	5.20 km	Boothera No 10	Existing	Water bore
6378	-27.11485657, 143.51787046	01/01/1932	Winton Formation	200.00 m	9.84 km	Boothera No 12	Existing	Water bore

6369	-27.00819096, 143.38675959	12/11/1914	Mackunda Formation	285.30 m	18.37 km	Cherry Cherry Bore 1	Existing	Water bore
8065	-27.13986159, 143.7853141	05/05/1940	Winton Formation	80.20 m	24.24 km	Tobermory No 15 Bore	Existing	Water bore
8066	-27.20068838, 143.70648043	25/05/1940	Winton Formation	94.48 m	22.85 km	Tobermory No 16 Bore	Abandoned and Destroyed	
8067	-27.12558498, 143.7610053	18/06/1940	Winton Formation	69.20 m	21.41 km	Tobermory Bore No 17	Existing	Water bore
9345	-27.02291066, 143.6781451	30/07/1943	Winton Formation	137.50 m	11.61 km	Boundary	Existing	Water bore
9687	-26.96513317, 143.63592262	16/10/1943	Winton Formation	36.58 m	10.79 km	Bloodwood	Abandoned and Destroyed	
9728	-26.91652226, 143.60814455	01/09/1943	Winton Formation	116.43 m	13.93 km	Unknown	Abandoned and Destroyed	
10423	-27.06652301, 143.53870289	17/05/1945	Winton Formation	158.50 m	4.08 km	Daleys Bore no 17	Existing	Water bore
11907	-27.19846731, 143.56925981	24/02/1952	Winton Formation	307.85	17.56 km	Ross Job No 1761	Existing	Water bore
11924	-26.98902446, 143.3670373	17/02/1952	Mackunda Formation	217.00 m	21.04 km	Koolboora Job No 1762	Existing	Water bore
17059	-27.17957922, 143.47537179	20/09/1966	Winton Formation	86.87 m	18.09 km	Five Mile Bore no 24	Existing	Water bore
23414	-26.95207934, 143.4384249	12/07/1985	Hutton Sandstone	1305.80 m	16.10 km	HEP Talgeberry 1	Existing	Oil & Gas
23542	-26.94819054, 143.4298138	31/07/1985	Hutton Sandstone	1359.20 m	17.04 km	HEP Talgeberry 2	Existing	Oil & Gas
23593	-27.04763383, 143.5692579	04/01/1988	Winton Formation	4.8/312.8 m	0.98 km	Uforia-1	Abandoned	
23678	-26.95235712, 143.4403693	05/08/1987	Metasediments	1307.60	15.89 km	HEP Talgeberry 3	Existing	Oil & Gas
23718	-27.11763579, 143.3520391	20/11/1987	Metasediments	1109.20 m	23.05 km	HEP Mugginaah 1	Existing	Oil & Gas

23983	-27.19374642, 143.4150949	01/11/1991	Hutton Sandstone	1041.80	22.58 km	AMP AROS 1	Existing	Oil & Gas
24802	-26.82818933, 143.554533	01/01/1943	Winton Formation	30.50 m	23.34 km	Naroo	Existing	Water bore
32952	-27.10596855, 143.41731595	03/11/1969	Winton Formation	169.50 m	16.46 km	Apollo Bore	Existing	Water bore
50112	-26.84291221, 143.48286747	Unknown	Winton Formation	18.28 m	23.20 km	Blackstump Well	Existing	Water bore
50206	-26.88985653, 143.50092333	Unknown	Winton Formation	12.00 m	17.74 km	MacDonalds Well	Existing	Water bore
50207	-26.88291271, 143.42981301	Unknown	Winton Formation	17.00 m	21.94 km	Montgomerys Well	Existing	Water bore
50324	-27.19902171, 143.72009143	28/04/1980	Winton Formation	106.70 m	23.59 km	Unknown	Existing	Water bore
50325	-27.15652169, 143.69842432	03/06/1980	Winton Formation	116.40 m	18.59 km	Unknown	Existing	Water bore
50315	-27.02041033, 143.7328668	02/04/1980	Winton Formation	167.03 m	16.50 km	No.11	Existing	Water bore
50455	-27.02624426, 143.64397891	17/04/1984	Winton Formation	ND*	2.80 km	Congie Well	Abandoned and Destroyed	
50486	-27.12985781, 143.37648342	Unknown	Winton Formation	61.00 m	21.34 km	Unknown	Existing	Water bore
50634	-26.97207741, 143.6637002	26/11/1992	Winton Formation	110.00 m	12.30 km	Bloodwood Replacement	Existing	Water bore
50635	-27.01513297, 143.6678674	27/11/1992	Winton Formation	101.00 m	10.34 km	Broncos Bore	Existing	Water bore
50636	-26.99818869, 143.6428675	Unknown	Winton Formation	ND*	5.00 km	Boothera Replacement	Abandoned and Destroyed	
100030	-26.87485726, 143.41759086	16/06/1992	Basal Jurassic	1400.70	23.36 km	AMP Gimboola 1	Existing	Oil & Gas
100286	-26.89374458, 143.59564441	09/08/1992	ND	ND	16.14 km	CON Utwelve 1	Existing	Unknown

100310	-26.94485716, 143.43509152	12/09/1995	ND	ND	16.68 km	SSL Talgeberry 4	Existing	Unknown
116074	-26.85740173, 143.54230042	Unknown	ND	ND	20.63 km	Never Drilled	Abandoned and Destroyed	
116078	-26.91823363, 143.638022	Unknown	ND	ND	14.93 km	Never Drilled	Abandoned and Destroyed	
116152	-26.86330104, 143.5414785	28/01/2005	Winton Formation	80.00 m	20.33 km	Congie House	Abandoned and Destroyed	
116153	-26.92377677, 143.6401333	02/02/2005	Winton Formation	116.00 m	14.73 km	Congie South	Existing	Water bore
116155	-27.020142, 143.6443231	31/01/2005	Winton Formation	100.00 m	3.30 km	Congie Replacement	Existing	Water bore
116305	-26.86638889, 143.5411111	07/02/2014	Winton Formation	78.00 m	19.12 km	Unknown	Existing	Water bore
116342	-27.06527778, 143.7858333	09/04/2014	Winton Formation	150.00 m	22.2 km	Unknown	Existing	Water bore
116344	-27.25027778, 143.6297222	14/04/2014	Winton Formation	162.00 m	24.26 km	Unknown	Existing	Water bore
160220	-26.94916667, 143.4311889	02/05/2012	Winton Formation	18.02 m	16.71 km	Unknown	Existing	Water bore
160226	-26.94972222, 143.4361111	04/04/2012	Winton Formation	20.00 m	17.00 km	Unknown	Existing	Water bore
23374	-26.85797973, 141.6442526	20/02/1986	Buckabie Formation	1273.50 m	21.52 km	PPL Toolerha Creek 1	Existing	Oil & Gas

A program for conducting an annual review of the accuracy of maps produced and giving the chief executive a summary of the outcome of each review, including a statement of whether there has been a material change in the information of predictions used to prepare the maps (section 376(e) of the Water Act).

Bridgeport provides the following detail to form the basis of a groundwater monitoring strategy (same as below), which includes parameters, locations and frequency to help define and inform the program. This program will be used to monitor against historic conditions, and data will inform assumptions made by this UWIR for each subsequent yearly period that data is collected. Considering the on-going consistency of field production, field life, the predicted drawdowns and physical factors relating to the reservoir and those above it, little material change to the predictions are expected. This however will be monitored and submitted to the chief executive annually, with appropriate data, interpretation and statements.

The monitoring will be as follows;

Regional Groundwater Monitoring (~all well target depth TD)

Shut-in wellhead pressure will be monitored across the fields in a series of wells (Table 15). Shut-in tubing head pressure (SITHP) is taken and extrapolated to determine reservoir pressure.

Well selection is based on position within the field, as well as target formation. All wells are perforated in the Murta at Utopia, which will be tested for this monitoring program. If any well is brought back online, another similar well will be chosen in its place, or online wells may require to be shut in prior to sampling.

Table 15: Shut-in wells in the Murta (Utopia) that will be monitored for shut-in well head pressure.

Utopia (Murta)
Utopia-09
Utopia-10
Utopia-15
Utopia-16
Utopia-17
Utopia-18

Frequency of Measurements

Shut-in tubing head pressure will be monitored quarterly. Any influence to the groundwater system is extremely slow acting, which supports this monitoring schedule.

Significant changes in the reservoir pressure can infer changes in well bore conditions or reservoir conditions. The SITHP will be assessed against the previous monitoring figures every quarter, to be reported in the annual updates.

Each annual update and three yearly report will include;

- A summary of the previous (12 or 36 months) monitoring data
- Assessment of monitoring program (applicability, improvements)
- Results review

Changes in predictions

Any material change in predictions would equate to a significant increase in current and predicted production. There is no material limit to the extraction of oil and water from a petroleum tenement. If any significant change was to occur, it would require a significant and material change to the physical infrastructure at the facility (which is not planned). Bridgeport would include any increased production and extraction into the subsequent reporting, modelling and water drawdown predictions, but no physical change would occur to day to day operations.

Summary

A simple but effective monitoring strategy will allow for accurate and best-practice data to be repetitive, which will be easier to determine potential impacts. There is little to no material change expected, and a review using monitoring data will occur annually to confirm this assumption.

Part D*: Impacts on environmental values

Requirements under sections 376(da) and 376 (db) of the Water Act
To meet the requirements of the Water Act, an UWIR must include the following; 1. *A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);* 2. *An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act)-* ***i.*** *For a three-year period starting on the consultation day for the report; &* ***ii.*** *Over the projected life of the resource tenure.*

*Part D refers to Section 5.1.4 (page 17) of the guideline (DES 2017).

To better describe the Bridgeport potential impacts on Environmental Values (EVs), an analysis tool was developed using templates from Work Health and Safety & Environment templates used in other Bridgeport areas of operation (such as Production). The use of matrices provides a better understanding and classification of the potential risk to EVs and provides the Department of Environment and Science clarity on how Bridgeport has come to conclusions around potential impacts. The following table represents Bridgeport's EV risk allocation framework. The use of the framework is simply to define the Likelihood and Consequence, that determines the Level of Risk (Table 17).

Table 16: Bridgeport Energy Risk Allocation Framework applied to Environmental Values.

EV Risk Allocation Framework						
Likelihood		**Consequence**				
		Insignificant	**Minor**	**Moderate**	**High**	**Catastrophic**
A	**Almost certain**	Medium	High	Extreme	Extreme	Extreme
B	**Likely**	Medium	High	High	Extreme	Extreme
C	**Possible**	Low	Medium	High	Extreme	Extreme
D	**Unlikely**	Low	Low	Medium	High	Extreme
E	**Rare**	Low	Low	Low	Medium	High
F	**Incapable of occurring**	No risk	No risk	No risk	No risk	No risk

Consequence Rating		
Level	**Description**	**Definition**
Insignificant	**Almost Certain**	No unauthorised adverse impact on environment values
Minor	**Likely**	Temporary and minor unauthorised effect on environmental values – non reportable environmental harm
Moderate	**Possible**	Serious temporary or minor permanent unauthorised damage to environmental values – reportable incident with local attention
High	**Unlikely**	Significant unauthorised harm to environmental values - reportable incident with adverse national publicity
Catastrophic	**Rare**	Major unauthorised event causing significant unauthorised harm to environmental values, loss of company credibility with stakeholders and likely prosecution

Likelihood Rating**		
Level	**Description**	**Definition**
A	**Almost Certain**	(1) Reasonably expected to occur within a month (2) Will likely occur in most circumstances
B	**Likely**	(1) Likely to occur within the next year (2) Probably occur in the near future
C	**Possible**	(1) Likely to occur over ten years (2) Might occur at some time
D	**Unlikely**	(1) Not specifically expected to occur but may occur sometime (2) May occur in exceptional circumstances
E	**Rare**	(1) Foreseeable but not normally expected to occur (2) May occur in exceptional circumstances
F	**Incapable of occurring**	(1) Incapable of occurring regardless of time (2) Impossible to occur physically
**Please note this table is a guide to determining the likelihood rating. The frequency may change depending on the risk type and the context in which it occurs.		

Environmental Risks		
Level of Risk	**Authority to approve the risk**	**Action Required**
Extreme	Senior Executive Team (SET) Board of Director must be made aware	Unacceptable Risk – STOP or DO NOT START the action until controls are established to reduce the risk to an acceptable level. Establish permanent control measures and review for effectiveness. The highest level of management must be made aware.
High	Operations Manager sign off Board of Director must be made aware	Activity may only proceed if: likelihood is tolerable; personnel are competent; risks are adequately assessed; legal and mandatory requirements are met;
Medium	SSM to sign off Manager must be made aware	Acceptable – apply adequate safeguards and review for effectiveness. Monitor for changes which may cause escalation of risk level.
Low	No approval but must document risk in the UWIR	Acceptable – apply safeguards as considered necessary. Monitor for changes which may cause escalation of risk level.
No risk	No approval but must document risk in the UWIR	Acceptable – apply safeguards as considered necessary. Monitor for changes which may cause escalation of risk level.

Bridgeport used the definition of environmental values (EVs) as provided by legislation and other Government policies, procedures or departments as outlined below.

Environment Protection Act (1994) define EVs as;

(a) a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety;

(b) another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.

The Environmental Protection (Water) Policy (2009) also has an EV definition,

"those qualities of the waterway that make it suitable to support particular aquatic ecosystems or human use".

The Department of Environment and Science (2019) also have an apt definition;

"EVs for water are the qualities that make it suitable for supporting aquatic ecosystems and human water uses."

Environmental values are scheduled into the Environment Protection (EPP) (Water and Wetland Biodiversity) Policy 2019 through a legislative process. These EVs are described in Schedule 1 of the EPP (Water and Wetland Biodiversity Policy 2019).

In Queensland, all tidal and non-tidal waters, including wetlands, lakes and groundwater have EVs, as described in the Environmental values and water quality objectives under the Environmental Protection (Water and Wetland Biodiversity) Policy document (Department of Environment and Science, 2019).

A short list of Environmental Values includes;

- Aquatic Ecosystem Health
- Agricultural uses (e.g. stock watering and irrigation)
- Recreational uses (e.g. swimming, wading, boating, fishing and aesthetics)
- Drinking water (raw water supply)

- Industrial uses (e.g. mining, mineral refining and processing) and
- Cultural and spiritual values

Using the Department of Environment and Sciences' website [https://environment.des.qld.gov.au/__data/assets/image/0021/214590/qld-basin-map.jpg; accessed 2021], a basic map of the EPP (Water and Wetland Biodiversity) scheduled data [https://environment.des.qld.gov.au/__data/assets/image/0021/214590/qld-basin-map.jpg; accessed 2021] was accessed. The interactive map [https://apps.des.qld.gov.au/protection-policy-water/; accessed 2021] was also accessed. Further, the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 Schedule 1 was accessed [https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2019-0156#sch.1; accessed 2021], to summarise the type and presence of EVs.

The two mapping resources reveal the absence of spatial data for EVs over the Bridgeport Utopia field. For the EPP schedule mapping, Utopia is within a project area classified as "future programs", which implies a current lack of development of spatial layers relating to EVs, which are likely to be added at a later date, if applicable at all. Likewise, the live spatial data services reveal an absence of almost all layers over the project area, focussing heavily on the eastern coast ecosystems. The actual Schedule also does not include definitions relating to the Eromanga area (the predominant area covering Bridgeport assets). The closest EPP (Water and Wetland Biodiversity) Overview Map region relating to the Utopia field is the Queensland Murray-Darling and Bulloo Basins map. The Utopia field would likely be classified in the "Lake Eyre" region of the EPP (Water) mapping, which has been described for the Queensland Water Quality Guidelines (Department of Environment and Science 2018).

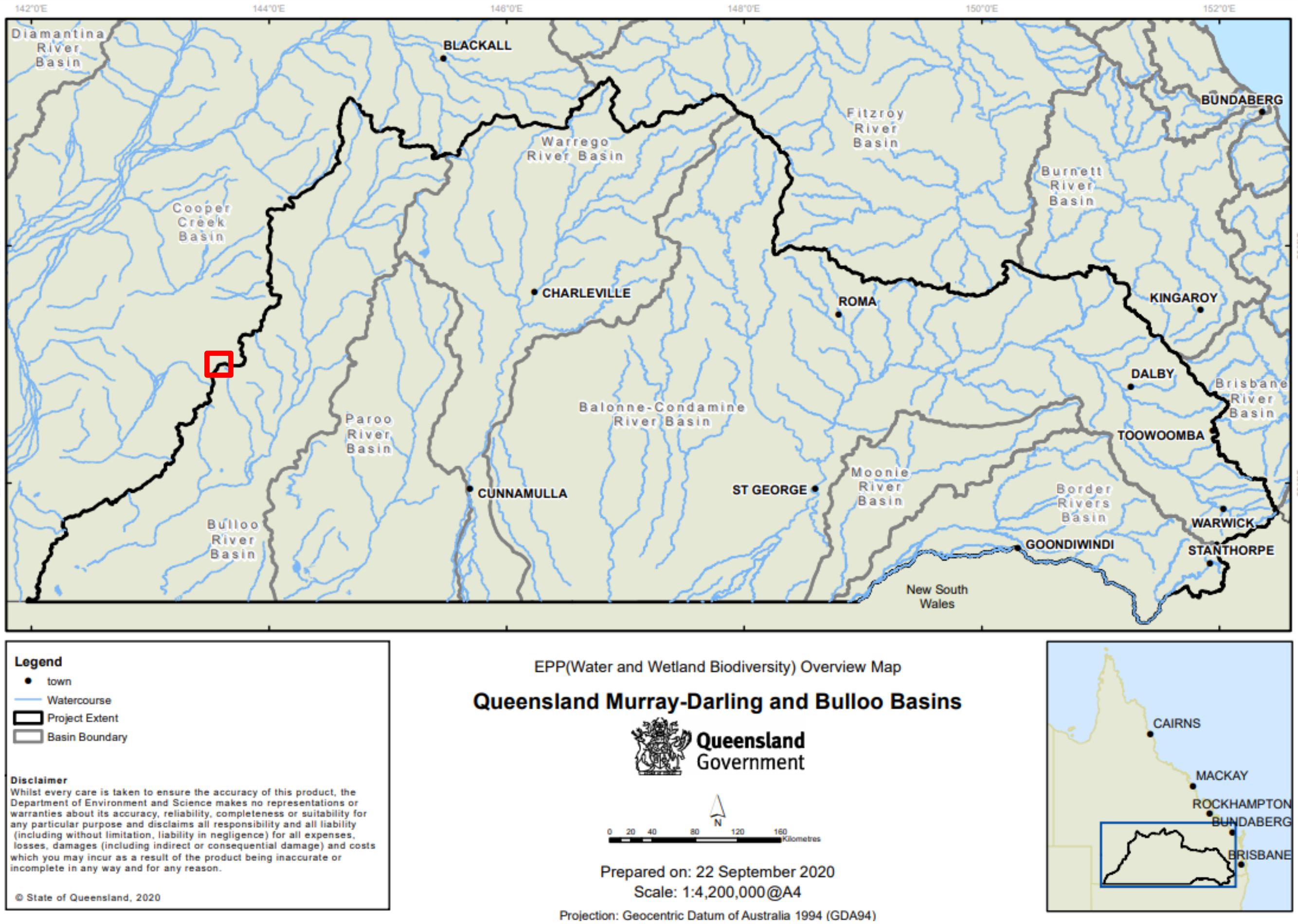

Figure 15: The EPP (Water and Wetland Biodiversity) Overview Map region that is closest to Utopia (red square). The dark line represents the Queensland Murray-Darling and Bulloo Basins. Utopia straddles the Bulloo River Basin.

Regardless, the absence of spatial data and the mapping classification within the EPP (Water and Wetland Biodiversity) Guideline for the specific region relating to Utopia was merely highlighted above to demonstrate our attempt to use specific Queensland Government resources, and why they do not feature further in this process.

Bridgeport summarise and describe EVs relevant to the exercise of water rights associated with Utopia in Table 17. Later, Bridgeport assess these as per the Risk Allocation Framework in Table 16 in reference to UWIR requirements and physical conditions/ecosystems etc around Utopia.

At the end of this section, a summary of all environmental values, risks and consequences is included.

Table 17: Environmental Values, as described in Healthy waters for Queensland: Environmental values, management goals and water quality objectives as well as in the EPP (Water and Wetland Biodiversity) Schedule 2.

Section	Environmental Value	Definition
D.1	**Aquatic ecosystem**	'A community of organisms living within or adjacent to water, including riparian or foreshore area'. (EPP (Water and Wetland Biodiversity), schedule 2). The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water. Waterways include perennial and intermittent surface waters, groundwaters, tidal and non-tidal waters, lakes, storages, reservoirs, dams, wetlands, swamps, marshes, lagoons, canals, natural and artificial channels and the bed and banks of waterways.

		(This EV incorporates the 'wildlife habitat' EV used in the South East Queensland Regional Water Quality Management Strategy (SEQRWQMS)).
D.2	**High ecological/conservation value waters**	'Waters in which the biological integrity of the water is effectively unmodified or highly valued.'
D.3	**Slightly disturbed waters**	'Waters that have the biological integrity of high ecological value waters with slightly modified physical or chemical indicators but effectively unmodified biological indicators'.
D.4	**Moderately disturbed waters**	'Waters in which the biological integrity of the water is adversely affected by human activity to a relatively small but measurable degree.'
D.5	**Highly disturbed waters**	'Waters that are significantly degraded by human activity and have lower ecological value than high ecological value waters or slightly or moderately disturbed waters.'
D.6	**Irrigation**	Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.
D.7	**Farm water supply/use**	Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.
D.8	**Stock watering**	Suitability of water supply for production of healthy livestock.
D.9	**Human consumers of aquatic foods**	The suitability of the water for producing aquatic foods for human consumption such as fish, crustaceans and shellfish from natural waterways.
D.10	**Primary recreation**	Means a use that involves the following types of contact with the water—full body contact, frequent immersion by the face and trunk, frequent contact with spray by the face where it is likely some water will be swallowed or

		inhaled, or come into contact with ears, nasal passages, mucous membranes or cuts in the skin e.g. diving, swimming, surfing.
D.11	**Secondary recreation**	Means a use that involves the following types of contact with the water—contact in which only the limbs are regularly wet, and other contact, including the swallowing of water, is unusual (examples—boating, fishing, wading) or occasional inadvertent immersion resulting from slipping or being swept into the water by a wave.
D.12	**Visual recreation**	Means a use that does not ordinarily involve any contact with the water—for example angling from the shore, sunbathing near water.
D.13	**Drinking water supply**	Suitability of the water for supply as drinking water having regard to the level of treatment of the water.
D.14	**Industrial use**	Suitability of water supply for industrial purposes, for example, food, beverage, paper, petroleum and power industries, mining and minerals refining/processing. Industries usually treat water supplies to meet their needs.
D.15	**Cultural and spiritual values**	Means scientific, social or other significance to the present generation or past or future generations, including Aboriginal People or Torres Strait Islanders. This includes custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities, symbols, landmarks and icons (such as waterways, turtles and frogs). • lifestyles (such as agriculture and fishing).
D.16	**Environmentally Sensitive Areas**	ESAs are areas of habitat, described as important for key ecological functions in legislation (e.g. Nature Conservation Act 1994, Marine Parks Act 2004, etc.). ESAs are split into two categories, Category A and Category B, and the appropriate formal definition can be found in the Environment Protection Regulation (2019).

D.1 Aquatic ecosystem

Definition: 'A community of organisms living within or adjacent to water, including riparian or foreshore areas'. (EPP (Water and Wetland Biodiversity), schedule 2). The intrinsic value of aquatic ecosystems, habitat and wildlife in waterways and riparian areas, for example, biodiversity, ecological interactions, plants, animals, key species (such as turtles, platypus, seagrass and dugongs) and their habitat, food and drinking water. Waterways include perennial and intermittent surface waters, groundwaters, tidal and non-tidal waters, lakes, storages, reservoirs, dams, wetlands, swamps, marshes, lagoons, canals, natural and artificial channels and the bed and banks of waterways. (This EV incorporates the 'wildlife habitat' EV used in the South East Queensland Regional Water Quality Management Strategy (SEQRWQMS)).

UWIR requirements

D.1.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.1.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act) -

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

To determine the extent of watercourse, wetlands, springs (including other relevant environmental values and layers) or river improvement trust asset areas on PL 214, the following layers, including water course areas, pondage, major water course lines, groundwater dependent ecosystems (areas, watercourses and springs), water plans (waterholes and lakes), pondage, active springs, directory of important wetlands, groundwater dependent ecosystems – springs, high ecological significance wetlands, water course identification map (watercourses), MSES (high ecological significance wetlands), the River Improvement Trust Areas and EPP Water Environmental Value Zones. All shapefiles were downloaded from the Queensland Governments resources and overlaid on the boundaries of the petroleum tenement.

The Utopia tenement overlaps (approximately 40% of the tenement area) with the EPP Water Value Zone known as Bulloo River, whilst 60% of the tenement area sites outside.

There is a very small (3.1 km length) section of a major water course line in lower south-east of the tenement boundary of PL 214. It is the beginning of a larger ephemeral water course known as Boothera Creek. The catchment of this river begins 6.1 km from the main production facility and 3.6 km from the nearest production well.

There are no wetlands, groundwater dependent ecosystems or springs located within PL 214.

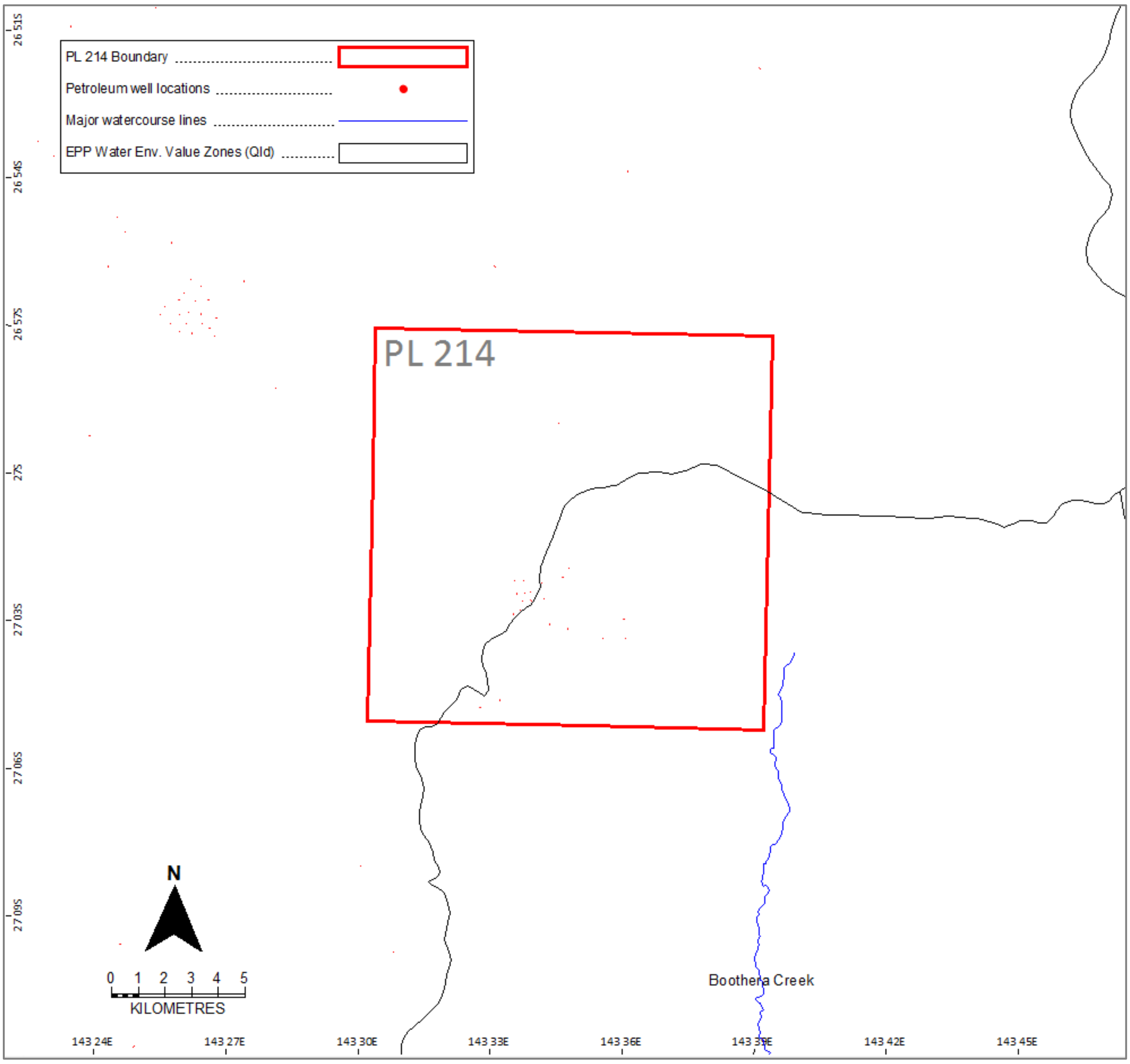

Figure 16: Aquatic ecosystem shapefiles from the Queensland Government, applied to Utopia.

The aquatic features around the tenement area are completely absent, but if present, the ecosystems are in a generally degraded state. The small channels (that only temporarily fill during high rainfall events) that are local, are characterised by little to no riparian vegetation, with mature trees only. Mature trees are tall enough to withstand constant grazing. Young, new recruitment find it difficult once climatic conditions reduce groundcover and animals forage on alternate, unprotected new trees and shrubs. Waters would be open to livestock (both domestic and feral), including cattle, sheep, kangaroos, goats, pigs and horses) with vegetation constantly grazed to a literal bare soil condition for large portions of the year.

The aquatic features near tenements like Utopia are ephemeral, in that they only contain water when the region receives large rainfall. There are no ecosystems which rely on groundwater, and the region (known as Channel Country) is known for the large influx of rainfall, quick flooding and quick retreat of surface waters.

Any potential impacts from operations would likely include small impacts from localised spills of hydrocarbon or chemicals (although they are contained in bunded areas).

These features/descriptions do not preclude Bridgeport's' right to take water from having an impact on aquatic EVs but is provided with the aim to set a realistic context to the land in which we operate.

Note, this information will be relevant to subsequent EVs, but will not be repeated in each section. A reference back to this section will be provided.

Bridgeport Risk Allocation

D.1.1. Bridgeport have assessed the likelihood of aquatic ecosystem environmental values being impacted by the previous exercise of underground water rights as a Likelihood of D, or Unlikely, with the explanation being (1) Not specifically expected to occur but may occur sometime. The consequence of impact is Minor, leading to a Low consequence level of risk. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are limited aquatic ecosystems within or in proximity to, Bridgeport petroleum production that would be influenced by the exercise of underground water rights for the remaining life of the project.

D.1.2.i. Bridgeport have assessed the likelihood of aquatic ecosystem environmental values being impacted by the exercise of underground water rights for the next three years as a Likelihood of D, or Unlikely, with the explanation being (1) Not specifically expected to occur but may occur sometime. The consequence of impact is Minor, leading to a Low consequence level of risk. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are limited aquatic ecosystems within or in proximity to, Bridgeport petroleum production that would be influenced by the exercise of underground water rights for the remaining life of the project.

D.1.2.ii. Bridgeport have assessed the likelihood of aquatic ecosystem environmental values being impacted by the exercise of underground water rights for the remainder of the project life as a Likelihood of D, or Unlikely, with the explanation being (1) Not specifically expected to occur but may occur sometime. The consequence of impact is Minor, leading to a Low consequence level of risk. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are limited aquatic ecosystems within or in proximity to, Bridgeport petroleum production that would be influenced by the exercise of underground water rights for the remaining life of the project.

D.2 High ecological/conservation value waters

Definition: 'Waters in which the biological integrity of the water is effectively unmodified or highly valued.'

UWIR requirements

D.2.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.2.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no waters of high ecological values or conservation value waters within or nearby to Utopia. All environmental values related to highly disturbed waters.

See section D.1 Aquatic ecosystem above, for a comprehensive summary of the ecological/conservation waters values.

Bridgeport Risk Allocation

D.2.1. Bridgeport have assessed the likelihood of high ecological/conservation water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that would be influenced by previous exercise of underground water rights.

D.2.2.i. Bridgeport have assessed the likelihood of high ecological/conservation water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that will occur in the next three-year period.

D.2.2.ii. Bridgeport have assessed the likelihood of high ecological/conservation water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that will occur over the life of the project.

D.3 Slightly disturbed waters

Definition: 'Waters that have the biological integrity of high ecological value waters with slightly modified physical or chemical indicators but effectively unmodified biological indicators'.

UWIR requirements

D.3.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.3.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no slightly disturbed ecological water values within or nearby to Utopia. All environmental values related to highly disturbed waters.

See section D.1 Aquatic ecosystem above, for a comprehensive summary of the ecological/conservation waters values.

Bridgeport Risk Allocation

D.3.1. Bridgeport have assessed the likelihood of slightly disturbed water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that would be influenced by previous exercise of underground water rights.

D.3.2.i. Bridgeport have assessed the likelihood of slightly disturbed water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that will occur in the next three-year period.

D.3.2.ii. Bridgeport have assessed the likelihood of slightly disturbed water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no high ecological or conserved ecosystems within or in proximity to Bridgeport petroleum production that will occur over the life of the project.

D.4 Moderately disturbed waters

Definition: 'Waters in which the biological integrity of the water is adversely affected by human activity to a relatively small but measurable degree.'

UWIR requirements

D.4.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.4.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no moderately disturbed waters within or nearby to Utopia. All environmental values related to highly disturbed waters.

See section D.1 Aquatic ecosystem above, for a comprehensive summary of the ecological/conservation waters values.

Bridgeport Risk Allocation

D.4.1. Bridgeport have assessed the likelihood of moderately disturbed water values being impacted by the previous exercise of underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no moderately disturbed waters within or in proximity to Bridgeport petroleum production that would be influenced by previous exercise of underground water rights.

D.4.2.i. Bridgeport have assessed the likelihood of moderately disturbed water values being impacted by the preceding three years of exercising underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no moderately disturbed waters within or in proximity to Bridgeport petroleum production that would be influenced by the exercise of underground water rights for the next three years.

D.4.2.ii. Bridgeport have assessed the likelihood of moderately disturbed water values being impacted by the preceding life if the project exercising underground water rights as a Likelihood of F, or incapable of occurring, with the explanation being impacts are (2) Impossible to occur. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are no moderately disturbed waters within or in proximity to Bridgeport petroleum production that would be influenced by the exercising of underground water rights for the remainder of the project’s life.

D.5 Highly disturbed waters

Definition: 'Waters that are significantly degraded by human activity and have lower ecological value than high ecological value waters or slightly or moderately disturbed waters.'

UWIR requirements

D.5.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.5.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

The water values within or the Utopia tenement meets the definition of highly disturbed waters. The lack of environmental values within or near the majority of tenements precludes a lot of direct impacts. The most common possible impacts would be from incidental spilling of chemicals or petroleum related products, as well as the release of water for emergency stock use (see D.8 below). The limited aquatic environmental feature mapped as occurring within Utopia (Boothera Creek) is far removed from actual petroleum assets. For example, 3.2 km distance between the nearest producing well and the water course crossing PL 214. It is highly unlikely there would be any physical impact from petroleum activities from such petroleum related activities.

The depth from which Bridgeport extract water, the extremely low volume of water extracted and the highly disturbed nature of the water values (which are not reliant on subsurface water reservoirs), would preclude impacts to surface waters from extraction.

Bridgeport Risk Allocation

D.5.1. Bridgeport have assessed the likelihood of highly disturbed water values being impacted by the previous exercise of underground water rights as a Likelihood of D or Unlikely, with the explanation being impacts are (2) May occur in exceptional circumstances. The consequence of impact is Minor, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are very few highly disturbed waters within or in proximity to Bridgeport petroleum production. And what highly disturbed water features there are, are not reliant on water reservoirs related to or impacted by water extracted in the process of producing petroleum by previous exercise of underground water rights.

D.5.2.i. Bridgeport have assessed the likelihood of highly disturbed water values being impacted by the future three-year exercise of underground water rights as a Likelihood of D or Unlikely, with the explanation being impacts are (2) May occur in exceptional circumstances. The consequence of impact is Minor, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are very few highly disturbed waters within or in proximity to Bridgeport petroleum production. And what highly disturbed water features there are, are not reliant on water reservoirs related to or impacted by water extracted in the process of producing petroleum over the next three-year period of exercising underground water rights.

D.5.2.ii Bridgeport have assessed the likelihood of highly disturbed water values being impacted by the future exercise of underground water rights over the life of the project as a Likelihood of D or Unlikely, with the explanation being impacts are (2) May occur in exceptional circumstances. The consequence of impact is Minor, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. continued monitoring) and escalate risk level if appropriate.

The risk and consequence levels determined by Bridgeport are based on the fact there are very few highly disturbed waters within or in proximity to Bridgeport petroleum production. And what highly disturbed water features there are, are not reliant on water reservoirs related to or impacted by water extracted in the process of producing petroleum over the remaining project of exercising underground water rights.

D.6 Irrigation

Definition: Suitability of water supply for irrigation, for example, irrigation of crops, pastures, parks, gardens and recreational areas.

UWIR requirements

D.6.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.6.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

The predominant land use during and after petroleum operations will be broad acre marginal/extensive sheep and cattle grazing of remnant native vegetation. There will be no pasture or cropping. There are no irrigation programs run at Utopia. Soil is not suitable for vegetation other than what currently exists. No gardens, parks, pasture or recreational areas and their irrigation is affected by the exercise of groundwater extraction.

Bridgeport Risk Allocation

D.6.1. Bridgeport have assessed the likelihood of irrigation environmental values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no irrigation programs whose water quality values that would be impacted by previous operators exercising underground water rights. The physical environment, habitat types, landforms, soil type, current and future land use precludes irrigation.

D.6.2.i. Bridgeport have assessed the likelihood of irrigation environmental values being impacted by the exercise of underground water rights for the next three years as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no irrigation programs whose water quality values would be impacted by exercising underground water rights over the next three years. The physical environment, habitat types, landforms, soil type, current and future land use precludes irrigation.

D.6.2.ii. Bridgeport have assessed the likelihood of irrigation environmental values being impacted by the exercise of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no irrigation programs whose water quality values would be impacted by exercising underground water rights over the life of the project. The physical environment, habitat types, landforms, soil type, current and future land use precludes irrigation.

D.7 Farm water supply/use

Definition: Suitability of domestic farm water supply, other than drinking water. For example, water used for laundry and produce preparation.

UWIR requirements

D.7.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.7.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no domestic farm facilities that consume water directly from Bridgeport operations, which would include laundry or industrial purposes. They are therefore not affected by the exercise of water extraction within Bridgeport tenements.

Bridgeport Risk Allocation

D.7.1. Bridgeport have assessed the likelihood of farm water supply/use values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no farms that are dependent on water supply or water quality values that would be impacted by previous exercise of underground water rights.

D.7.2.i. Bridgeport have assessed the likelihood of farm water supply/use values being impacted by the following three years of exercising of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no farms that are dependent on water supply or water quality values that would be impacted by future exercise of underground water rights for three years.

D.7.2.ii. Bridgeport have assessed the likelihood of farm water supply/use values being impacted by the exercising of underground water rights for the remainder of the project life as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no farms that are dependent on water supply or water quality values that would be impacted by future exercise of underground water rights for remainder of the project’s life.

D.8 Stock watering

Definition: Suitability of water supply for production of healthy livestock.

UWIR requirements

D.8.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.8.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

A majority of local landholder wells that are installed regionally are to provide livestock watering access only the Winton Formation. The majority of these wells (Table 14) are drilled to a depth not exceeding 100 m (on average, they are even shallower). In general, groundwater take within this management area is relatively limited, as these are not actively pumped if they are installed, or by non-commercial sized pumps. Some non-petroleum wells in Table 14 have also been abandoned and decommissioned since drilling.

It is highly unlikely the extraction of water from Bridgeport targeted formations (> 1400 m below ground) would influence shallower formations < 100m deep due to geological barriers to free flow limiting the movement of water between such depths. Bridgeport also protects shallower aquifers and reservoirs by installing cemented steel casing in our production wells, and testing and validating the integrity of the boreholes using wireline logging assessment/sono-log/pressure recordings. There is an also extremely restrictive geological boundaries between the lower targeted formations and higher freshwater targeted aquifers.

Bridgeport Risk Allocation

D.8.1. Bridgeport have assessed the likelihood of livestock water supply/use values being impacted by the previous exercise of underground water rights as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is Minor, leading to a Low risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no impacts to livestock from previous exercise of underground water rights, barriers both natural (geological) and engineered (concrete and steel casing) preventing resource extraction from impacting the much higher and distinct targeted aquifers of landholders. Modelling by Golder Associates has confirmed these conclusions.

D.8.2.i. Bridgeport have assessed the likelihood of livestock water supply/use values being impacted by the future three years of exercising underground water rights as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is Minor, leading to a Low risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no impacts to livestock from previous exercise of underground water rights (no change to the proposed activities which previously occurred either), barriers both natural (geological) and engineered (concrete and steel casing) preventing resource extraction from impacting the much higher and distinct targeted aquifers of landholders. Modelling by Golder Associates has confirmed these conclusions.

D.8.2.ii. Bridgeport have assessed the likelihood of livestock water supply/use values being impacted over the remaining life of the project, and its exercising underground water rights as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is Minor, leading to a Low risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no impacts to livestock from previous exercise of underground water rights (no change to the proposed activities which previously occurred either), barriers both natural (geological) and engineered (concrete and steel casing) preventing resource extraction from impacting the much higher and distinct targeted aquifers of landholders. Modelling by Golder Associates has confirmed these conclusions.

D.9 Human consumers of aquatic foods

Definition: The suitability of the water for producing aquatic foods for human consumption such as fish, crustaceans and shellfish from natural waterways.

UWIR requirements

D.9.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.9.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

The predominant land use during and after petroleum operations will be broad acre marginal/extensive sheep and cattle grazing of remnant native vegetation. There is no aquaculture, mariculture, or freshwater fisheries within or in proximity to the Utopia tenement.

Bridgeport Risk Allocation

D.9.1. Bridgeport have assessed the likelihood of irrigation aquatic food values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no aquaculture programs whose water quality values would be impacted by previous operators exercising underground water rights.

D.9.2.i. Bridgeport have assessed the likelihood of aquatic food values being impacted by the exercise of underground water rights for the next three years as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no aquaculture programs whose water quality values would be impacted by exercising underground water rights over the next three years.

D.9.2.ii. Bridgeport have assessed the likelihood of aquatic food values being impacted by the exercise of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no aquaculture programs whose water quality values would be impacted by exercising underground water rights over the life of the project.

D.10 Primary recreation

Definition: Means a use that involves the following types of contact with the water—full body contact, frequent immersion by the face and trunk, frequent contact with spray by the face where it is likely some water will be swallowed or inhaled, or come into contact with ears, nasal passages, mucous membranes or cuts in the skin e.g. diving, swimming, surfing.

UWIR requirements

D.10.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.10.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no primary recreation activities that take place within or near the Utopia petroleum lease. If there were, we'd like to know. There is no immersive swimming, frequent bodily contact, inhalation or contact with products related to or impacted by production, or the exercise of underground water rights.

Bridgeport Risk Allocation

D.10.1. Bridgeport have assessed the likelihood of primary recreation values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no primary recreational areas in any proximity to areas impacted by previous operators exercising underground water rights.

D.10.2.i. Bridgeport have assessed the likelihood of primary recreation values being impacted by the following three-year period exercising of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no primary recreational areas in any proximity to areas impacted by operators exercising underground water rights over the next three years.

D.10.2.ii. Bridgeport have assessed the likelihood of primary recreation values being impacted by exercising of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no primary recreational areas in any proximity to areas impacted by operators exercising underground water rights, at any time during the life of the project.

D.11 Secondary recreation

Definition: Means a use that involves the following types of contact with the water—contact in which only the limbs are regularly wet, and other contact, including the swallowing of water, is unusual (examples—boating, fishing, wading) or occasional inadvertent immersion resulting from slipping or being swept into the water by a wave.

UWIR requirements

D.11.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.11.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no secondary recreation activities that take place within or near Utopia. There is no boating, fishing or wading commonly occurring, nor occasional incidental contact with products related to or impacted by, the exercise of underground water rights. If there were fishing opportunities, we would have trouble getting our field staff to work.

Bridgeport Risk Allocation

D.11.1. Bridgeport have assessed the likelihood of secondary recreation values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no secondary recreational areas in any proximity to areas impacted by previous operators exercising underground water rights.

D.11.2.i. Bridgeport have assessed the likelihood of secondary recreation values being impacted by the following three-year period exercising of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no secondary recreational areas in any proximity to areas impacted by operators exercising underground water rights over the next three years.

D.11.2.ii. Bridgeport have assessed the likelihood of secondary recreation values being impacted by exercising of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no secondary recreational areas in any proximity to areas impacted by operators exercising underground water rights, at any time during the life of the project.

D.12 Visual recreation

Definition: Means a use that does not ordinarily involve any contact with the water—for example angling from the shore, sunbathing near water.

UWIR requirements

D.12.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.12.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no visual recreation activities that take place within or near the Utopia petroleum lease, the field site is…aesthetically limited. There is no recreational activities or amenities near these tenements, especially none that are related to or impacted by, the exercise of underground water rights. The only instance of visual recreation at these fields is likely incidental tourism whereby tourists take pictures near a specifically constructed "tourist appropriate" beam pump designed and installed for that purpose.

Bridgeport Risk Allocation

D.12.1. Bridgeport have assessed the likelihood of visual values being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no visual recreational areas in any proximity to areas impacted by previous operators exercising underground water rights.

D.12.2.i. Bridgeport have assessed the likelihood of visual recreation values being impacted by the following three-year period exercising of underground water rights as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no visual recreational areas in any proximity to areas impacted by operators exercising underground water rights over the next three years.

D.12.2.ii. Bridgeport have assessed the likelihood of visual recreation values being impacted by exercising of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the Explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there will be no visual recreational areas in any proximity to areas impacted by operators exercising underground water rights, at any time during the life of the project.

D.13 Drinking water supply

Definition: Suitability of the water for supply as drinking water having regard to the level of treatment of the water.

UWIR requirements

D.13.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.13.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

Regarding the treatment of water, no water is sourced from or near the Utopia field for drinking water supply. The ongoing extraction of water from around Utopia would not negatively affect the water treatment required at the nearest township. Any local landholder bores are extremely shallow, and access water from bores less than 50 m deep, far removed from the great than ~1,300 m petroleum wells (as detailed in appropriate sections earlier in this document). These landholder bores are not for human consumption.

Bridgeport Risk Allocation

D.13.1. Bridgeport have assessed the likelihood of drinking water being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no drinking water or treatment facilities whose water quality values that would be impacted by previous operators exercising underground water rights.

D.13.2.i. Bridgeport have assessed the likelihood of drinking water being impacted in the next three years as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no drinking water or treatment facilities whose water quality values that would be impacted by exercising underground water rights for a further three years.

D.13.2.ii. Bridgeport have assessed the likelihood of drinking water being impacted over the remaining life of the project as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no drinking water or treatment facilities whose water quality values that would be impacted by exercising underground water rights for the remaining years of the project.

D.14 Industrial use

Definition: Suitability of water supply for industrial purposes, for example, food, beverage, paper, petroleum and power industries, mining and minerals refining/processing. Industries usually treat water supplies to meet their needs.

UWIR requirements

D.14.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.14.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

There are no alternate industries in or near the Utopia field…it's like, really barren. There are no food or beverage manufacturers, no power producers, light or commercial industrial groups. The predominant land use during and after petroleum operations will be broad acre marginal/extensive sheep and cattle grazing of remnant native vegetation. There will be no pasture, cropping or (very likely) any other commercial activities. There are no mineral leases over PL 214 (e.g. opal mining). If they were, the low impact nature of Bridgeport disturbances would not affect the collection other States resources.

Bridgeport Risk Allocation

D.14.1. Bridgeport have assessed the likelihood of industrial uses being impacted by the previous exercise of underground water rights as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no industrial uses or programs whose water quality values would be impacted by previous operators exercising underground water rights.

D.14.2.i. Bridgeport have assessed the likelihood of irrigation industrial uses being impacted by the exercise of underground water rights for the next three years as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no industrial uses or programs whose water quality values would be impacted by exercising underground water rights over the next three years.

D.14.2.ii. Bridgeport have assessed the likelihood of industrial use values being impacted by the exercise of underground water rights for the life of the project as a Likelihood of F, or Incapable of Occurring, with the explanation being (2) Impossible to occur physically. The consequence of impact is Insignificant, leading to a No risk consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring) and escalate risk level if appropriate. This conclusion is appropriate because there are currently no industrial uses or programs whose water quality values would be impacted by exercising underground water rights over the life of the project.

D.15 Cultural and spiritual values

Definition: Means scientific, social or other significance to the present generation or past or future generations, including Aboriginal people or Torres Strait Islanders.

• custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities

• symbols, landmarks and icons (such as waterways, turtles and frogs)

• lifestyles (such as agriculture and fishing).

UWIR requirements

D.15.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.15.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

Bridgeport Energy tenements overlay numerous Native Title claims. Bridgeport's' Utopia tenement overlays the Native Title Claim of the Boonthamurra and Kullilli People. Their claims are represented by several classifications by the Aboriginal and Torres Strait Islander Partnerships. The Native Title claims are represented graphically over the Utopia Bridgeport tenement in Figure 17.

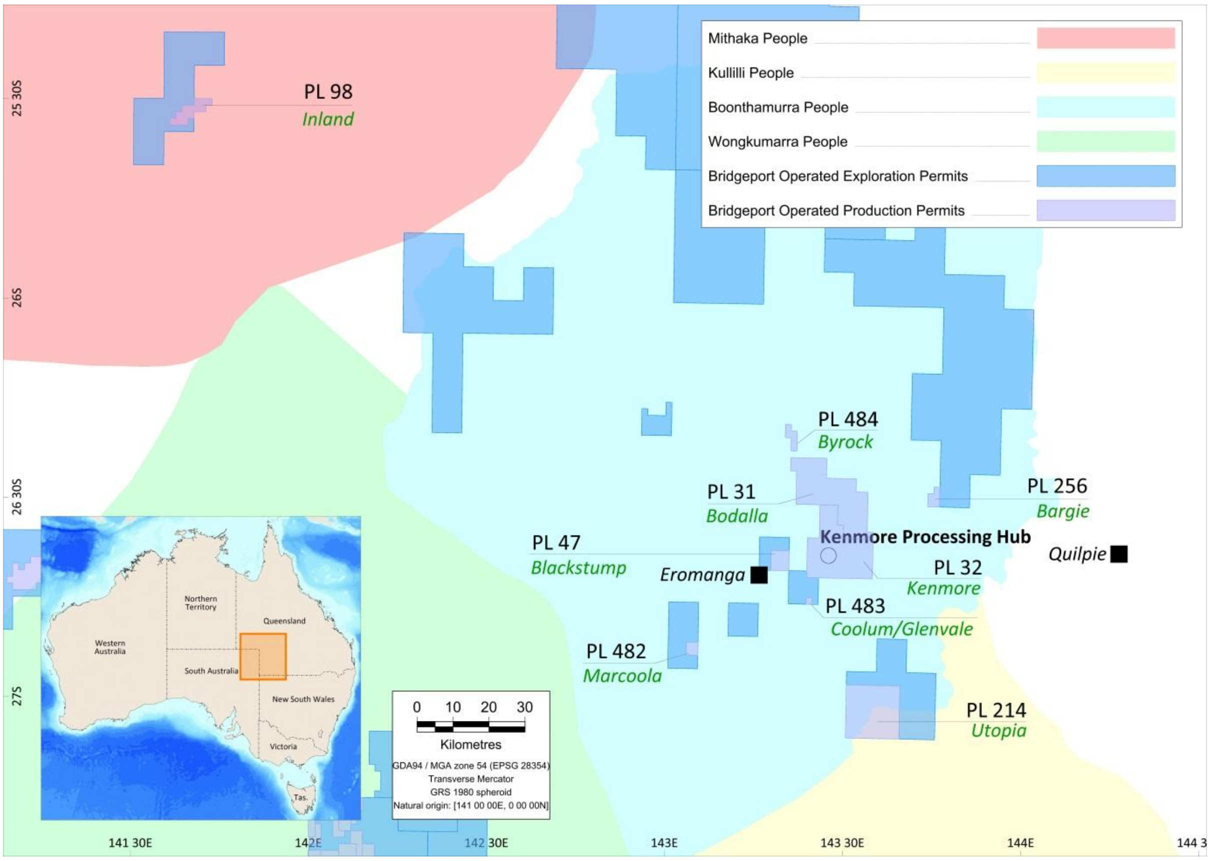

Figure 17: The Native Title claim relevant to the Utopia tenement is the Boonthamurra People and Kullilli People, who have a determination over this land.

Bridgeport Energy have a Native Title Policy that guides staff and contractors on their awareness and treatment of Aboriginal culture heritage, as well as a Cultural Heritage Management Plan with the Boonthamurra and Kullilli People that guide our working relationship and decisions on key areas of interest to both parties.

Regardless of these technical/legal agreements, Bridgeport are aware of the potential for cultural heritage points and areas to reside within the area of our lease, and potentially outside the direct leases and into areas potentially impacted by our water extraction. Bridgeport are actively engaged with protecting this cultural heritage wherever possible.

The potential impacts to cultural heritage as a result of exercising underground water rights, in the past and into the future, would primarily be the physical disturbance to surface cultural heritage, including physical objects/features (e.g. artefacts). This physical disturbance is avoided by applying industry best-practice and the processes agreed to by the Boonthamurra and Kullilli People, for cultural clearance prior to any disturbance to undisturbed/previously uncleared areas.

These impacts could potentially occur any time physical disturbance is undertaken on Bridgeport tenements, which includes the three-year period and the projected life of the resource tenure.

To describe some of the registered physical cultural heritage recorded at the Utopia tenement, a tenement search was requested and provided by the Aboriginal and Torres Strait Islander Cultural Heritage Database and Register. All tenement searches were requested with a 5 km radius buffer around the tenement boundary.

Table 18: Tenement Search by the Queensland Government Department of Aboriginal and Torres Strait Islander Partnerships for Utopia.

Tenement	A&TSI Cultural Heritage Site Points	A&TSI Cultural Heritage Polygons	Figure Reference
PL 214	Yes	No	Figure 18

There were two recognised cultural heritage partners in PL 214, the Boonthamurra and Kullilli People. Bridgeport have appropriate cultural heritage management plans with both parties. There were no Designated Landscape Areas (DLA) and no Registered Cultural Heritage Study Areas recorded in these search areas.

Bridgeport are aware of other significant Aboriginal cultural heritage features within the boundary of Bridgeport tenements. Water extraction does not nor will affect these directly or indirectly, for either the three-year period or for the life of the tenure. No physical harm comes to these features as a result of the current petroleum activities or the associated water extraction and have been left in place untouched as they were. When surface disturbance takes place, Bridgeport follows its comprehensive Cultural Heritage Management Plan, which involves surface a pre-disturbance desktop survey, further on-site clearance from the appropriate Native Title Party and approval from them for work to proceed.

A Register of National Estate (RNE) was a register of places throughout Australia, including Commonwealth heritage places of local and state significance. Sections within the *Environment Protection and Biodiversity Conservation Act* (1999) and the *Australian Heritage Council Act 2003* referring to the RNE have since been repealed and the register closed. Within the closed register (which is still searchable) there are no references to cultural heritage areas surrounding Utopia.

The following cultural heritage points have been registered and are provided by the Aboriginal and Torres Strait Islander Cultural Heritage Database and Register.

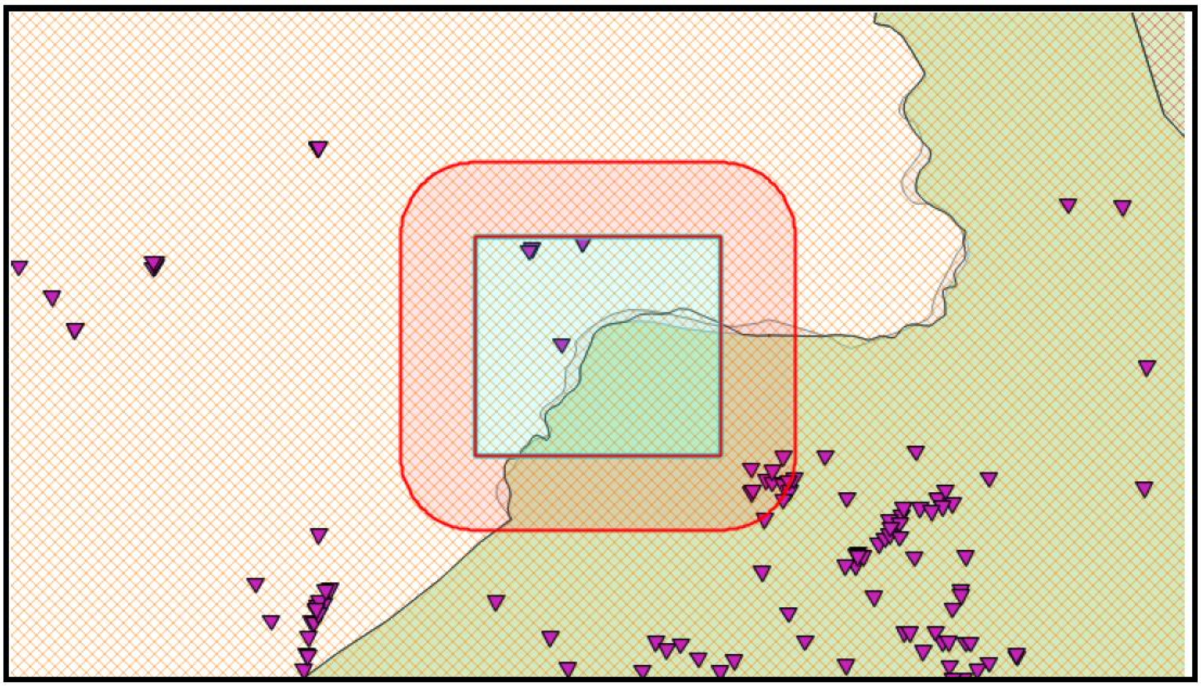

Figure 18: Cultural heritage points around the PL 214 boundary, 5 km buffer zone.

The above description of physical places of cultural significance indicate there are areas of cultural importance/value in relation to the surface area of these tenements and surrounding areas.

The impact to these cultural values has been and will be reduced by appropriate Aboriginal Cultural Heritage clearance and management procedures prior to physical disturbance.

Bridgeport Risk Allocation

D.15.1. Bridgeport have assessed the likelihood of Cultural and spiritual values being impacted by the previous exercise of underground water rights as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is High, leading to a Medium consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there have been appropriate safeguards in place to review cultural and spiritual values prior to any physical activity taking place (e.g. cultural heritage clearance by appropriate Native Title groups).

D.15.2.i. Bridgeport have assessed the likelihood of Cultural and spiritual values being impacted by the exercise of underground water rights for the following three years as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is High, leading to a Medium consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there has and always will be appropriate safeguards in place to review cultural and spiritual values prior to any additional physical activity taking place (e.g. cultural heritage clearance by appropriate Native Title groups).

D.15.2.ii. Bridgeport have assessed the likelihood of Cultural and spiritual values being impacted by the exercise of underground water rights for the life of the project as a Likelihood of E, or Rare, with the explanation being (1) Foreseeable but not normally expected to occur. The consequence of impact is High, leading to a Medium consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there has and always will be appropriate safeguards in place to review cultural and spiritual values prior to any additional physical activity taking place (e.g. cultural heritage clearance by appropriate Native Title groups) for the remainder of the project life.

D.16 Environmental Sensitive Areas (ESAs)

Definition: ESAs are areas of habitat, described as important for key ecological functions in legislation (e.g. Nature Conservation Act 1994, Marine Parks Act 2004, etc.). ESAs are split into two categories, Category A and Category B, and the appropriate formal definition can be found in the Environment Protection Regulation (2019).

UWIR requirements

D.16.1. A description of the impacts of environmental values that have occurred, or are likely to occur, because of any previous exercise of underground water rights (section 376(da) of the Water Act);

D.16.2. An assessment of the likely impacts on environmental values that will occur, or are likely to occur, because of the exercise of underground water rights (section 376(db) of the Water Act);

i. For a three-year period starting on the consultation day for the report; &

ii. Over the projected life of the resource tenure.

Description

Bridgeport used the Queensland Governments' Department of Environment and Sciences' website to update (2021) the geographic extent of all tenement boundaries in relation to environmentally sensitive areas (ESAs).

1: Environmentally Sensitive Areas (ESAs) – non-mining resource activities

Environmentally sensitive areas (ESAs) are defined in the *Environmental Protection Regulation (2019)* (Schedule 19, Part 1, Section 2) and can be related to EVs. There are multiple Categories of ESA, category A and B. The most applicable ESAs relating to the Bridgeport tenements in Utopia include;

(a) any of the following areas under the Nature Conservation Act (1992)

i. *a coordinated conservation area (e.g. conservation park, national park, marine park etc.);*
ii. *an area of critical habitat or major interest identified under a conservation plan;*
iii. *an area subject to an interim conservation order;*

(b) an area subject to the following conventions to which Australia is a signatory

i. *the 'Convention on the Conservation of Migratory Species of Wild Animals' (Bonn, 23 June 1979);*
ii. *the 'Convention on Wetlands of International Importance, especially as Waterfowl Habitat' (Ramsar, Iran, 2 February 1971);*
iii. *the 'Convention Concerning the Protection of the World Cultural and Natural Heritage' (Paris, 23 November 1972);*

(e) the following under the Queensland Heritage Act 1992

i. *a place of cultural heritage significance;*
ii. *a Queensland heritage place, unless there is an exemption certificate issued under that Act;*

(f) an area recorded in the Aboriginal Cultural Heritage Register established under the Aboriginal Cultural Heritage Act 2003, section 46, other than the area known as the 'Stanbroke Pastoral Development Holding', leased under the Land Act 1994 by lease number PH 13/5398;

(g) a feature protection area, State forest park or scientific area under the Forestry Act 1959;

(h) a declared fish habitat area under the Fisheries Act 1994;

(j) an endangered regional ecosystem identified in the database known as the 'Regional ecosystem description database' published on the department's website.

The Queensland Government Department of Environment and Sciences' Maps of environmentally sensitive areas webpage has a feature where maps can be downloaded with ESAs, relevant to specific resource authority boundaries (in this instance, petroleum leases). Bridgeport downloaded Petroleum lease maps [https://environment.des.qld.gov.au/management/maps-of-environmentally-sensitive-areas] throughout 2021.

These maps are used to overlay each ESA category over the boundary of the Utopia tenement. The most common feature over the Utopia tenement is regional ecosystem classifications. The "Of concern Regional Ecosystems (remnant biodiversity status)" layer, is categorised as Category C. A regional ecosystem is classified as category C under the Environment Protection Act (1994) if remnant vegetation is 10 - 30% of its pre-clearing extent across the bioregion. This Category C mapping is considered indicative only.

The largest contributor to the general ecosystems, biology and vegetation remaining across these tenements is climate, rainfall and existing land use. The low general rainfall, extremely dry and extreme climate reduce the abundance and diversity of the species and habitats that can survive across the region. Further restricting the ecosystems that are present, their health and abundance is heavily impacted by the surrounding and predominant land use, broad acre grazing. Broad acre grazing is where large, unrestricted acreage is freely opened to extreme numbers of domestic hard-hooved animals such as cattle and sheep. The un-controlled and vast nature of the land, as well as the readily accessible watering points for domestic animals, allows introduced species such as horses, goats and pigs to thrive, who also heavily impact the surrounding ecosystems negatively, by over grazing, destructive grazing and habitat destruction.

As evidenced by these maps, no category A (e.g. National or Conservation Parks) or Category B (e.g. heritage, special habitat) areas occur within or in proximity to Utopia.

In order to provide the Department an indication of the much broader context in which water extraction and petroleum related activities occur, several of the most relevant ESA's were explored using shapefiles downloaded from Queensland Government's QSpatial webpage [http://qldspatial.information.qld.gov.au/catalogue/custom/index.page] and added to a graphic below. The following layers were downloaded and compared in context against the the Utopia tenement (Figure 19).

Shapefiles include:

- Coordinated conservation areas – Queensland
- Special wildlife reserves
- Nature refuges – Queensland
- Protected areas of Queensland
- Ramsar sites
- Fish habitat areas

None of these layers overlap with the Utopia tenement (Figure 19). None of these layers would be affected or potentially affected by the water extraction within Utopia.

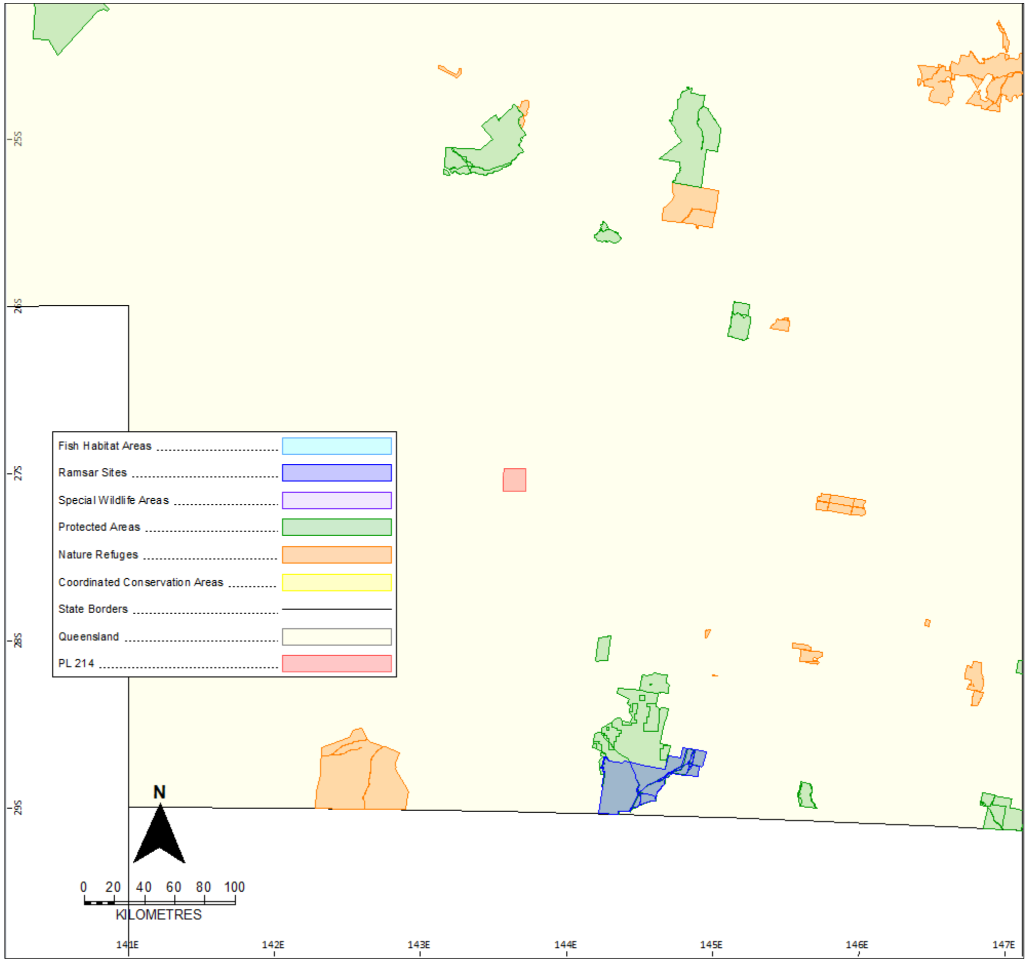

Figure 19: Conservation layers of ESAs on Utopia field, none of which overlap, or occur within a 100 km radius.

Additional descriptions of environmentally relevant activities and or layers have been extracted for Utopia from the Queensland Government.

2: Environmentally Sensitive Areas (Category A, B & C Vegetation) under the Environmental Protection Regulation (2008)

Environmentally sensitive areas are determined by the State of Queensland, and fall into three categories, A B and C.

A map for Environmentally Sensitive Areas (ESAs) was requested from the Department of Environment and Science, regarding environmentally sensitive areas on non-mining petroleum leases.

Environmentally Sensitive Areas for non-mining resource activities under the Environment Protection Act was requested for PL 214 (Figure 20). There are no Category A or B ESA's within or near the boundaries of the PL 214 petroleum lease.

The most predominant land category within the boundaries of PL 214 is the "Queensland" basic layer, which indicates the absence of an ESA or other essential habitat. This area is predominantly agriculture, cultivated and pre-cleared land of low environmental significance (Figure 20).

There are two Category C ESAs within the PL 214 lease, including a river (see above for more detail) or river improvement trust asset areas and Of Concern Regional Ecosystems (remnant biodiversity status). Remnant vegetation is defined by being 10 - 30% of its pre-clearing extent across the bioregion or more than 30% of its pre-clearing extent remains and the remnant extent is less than 100 km^2. In addition to the "remnant vegetation" category, under the EP Act (1994), the category can be deemed 'Of concern' if 10 - 30% of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.

All the 'Of Concern' Regional Ecosystem (remnant biodiversity status) areas within the PL 214 lease boundary do not overlap or interact with the petroleum operations within the lease. The vegetation types and Broad Vegetation Groups (BVGs) are described in more detail in the following section.

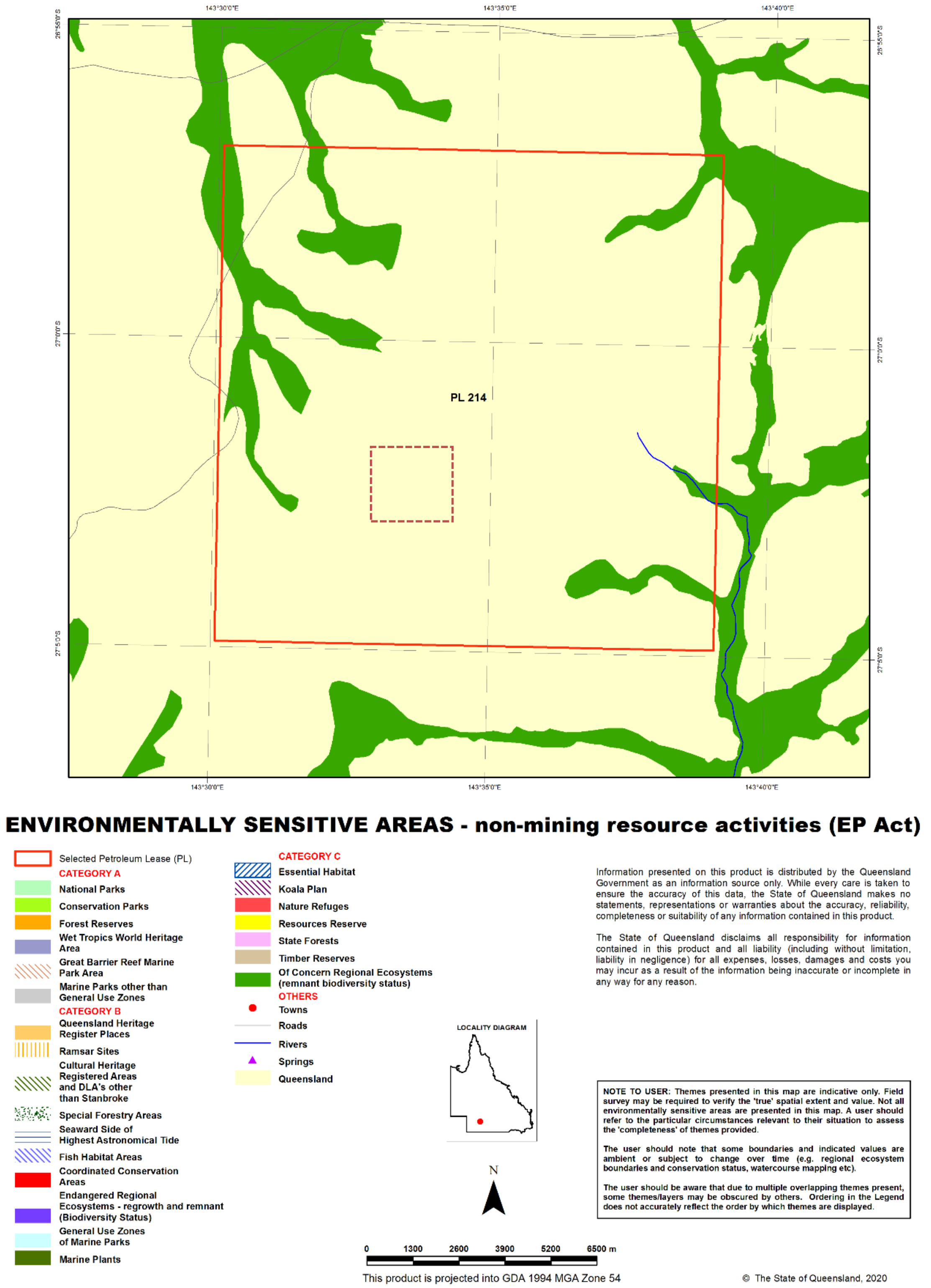

Figure 20: Map of the Environmentally Sensitive Areas (for non-mining resource activities) under the Environment Protection Act (1994).

Bridgeport tenements occur over a limited range of regional ecosystems. At the PL 214 Utopia facility, this is because the majority of the surface area has been previously disturbed (cleared) and the ongoing continued land use is broad acre grazing.

To provide a description of the land and ecosystems on which our petroleum activities occur, we use mapping data from the State of Queensland. The State has mapped broad regional ecosystems, defined by vegetation communities that are consistently associated with a combination of geology, landform and soil type. Within these regional ecosystems, there can be numerous vegetation types. Bridgeport describe the vegetation communities, and then the broad vegetation groups (BVG's) that are mapped (summarised in the following tables).

Within PL 214 Utopia, the regional ecosystems include (16a) Open forests and woodlands dominated by *Eucalyptus camaldulensis* (river redgum) (or *E. tereticornis* (blue gum)) and/or *E. coolabah* (Coolibah) (or *E. microtheca* (Coolabah)) fringing drainage lines. Associated species may include *Melaleuca* spp., *Corymbia tessellaris* (Carbeen), *Angophora spp., Casuarina cunninghamiana* (River Sheoak). Does not include alluvial areas dominated by herblands or grasslands or alluvial, plains that are not flooded, (16c) Woodlands and open woodlands dominated by *Eucalyptus coolabah* (Coolibah) or *E. microtheca* (Coolibah) or *E. largiflorens* (Black Box) or *E. tereticornis* (Blue Gum) or *E. chlorophylla* on floodplains. Does not include alluvial areas dominated by herb lands or grasslands or alluvial plains that are not flooded, (23a) Woodlands to low woodlands dominated by *Acacia aneura* on red earth plains or sandplains (soft mulga), (23b) Tall shrublands to low open woodlands dominated by *Acacia aneura* on shallow red earth plains (hard mulga), (24a) Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals. Species include *A. shirleyi* (Lancewood), *A. catenulata* (Bendee), *A. microsperma* (Bowyakka), *A. clivicola, A. sibirica* (Bastard Mulga), *A. rhodoxylon* (Rosewood) and *A. leptostachya* (Townsville Wattle), and (31a) Open forbelands to open tussock grasslands which may be composed of *Atriplex* spp. (saltbush), *Sclerolaena* spp. (burr), *Asteraceae* spp. and/or short grasses on alluvial plains and (non-rem) or non-remnant (basically no defined remnant) vegetation groups. These references can be found in The Vegetation of Queensland, Descriptions of Broad Vegetation Groups (Version 4.0) by Nelder et al. (2019).

Within these regional ecosystems, there are broad vegetation groups (BVGs) which are too numerous to mention. They predominantly included *Eucalyptus camaldulensis* (Coolabah), *E. ochrophloia* (Yapunyah), *Acacia aneura* (Mulga) and *A. cambagei* (Gidgee). A detailed summary of each vegetation group is detailed in Table 19.

Table 19: A detailed summary of each regional ecosystem in PL 214.

BVG (BVG1M)	BVG Short Description	Regional Ecosystem	Component Regional Ecosystem Short Description	Vegetation Management Act Class	Biodiversity Status
6.3.3	*Eucalyptus camaldulensis* ± *E. coolabah* ± *E. populnea*, *Acacia stenophylla* woodland on alluvium	16a	Open forests and woodlands dominated by *Eucalyptus*	Least Concern	Of Concern
6.3.5	*Eucalyptus ochrophloia* +/- *Acacia cambagei* +/- *E. coolabah* woodland on alluvium	16a	Open forests and woodlands dominated by *Eucalyptus*	Least Concern	No Concern at Present
6.3.6	*Acacia cambagei* low woodland on braided channels or alluvial plains	31a, 26a	Open forbelands to open tussock grasslands	Least Concern	No Concern
6.3.13	*Atriplex* spp., *Sclerolaena* spp., species of *Asteraceae* and/or short grasses open herb land on alluvial plains	31a, 26a	Open forbelands to open tussock grasslands	Least Concern	No Concern
6.5.8	*Acacia aneura*, *Eucalyptus populnea* +/- *Eremophila gilesii* subsp. *gilesii* low woodland	23a	Woodlands to low woodlands dominated by *Acacia aneura*	Least Concern	No Concern at Present
6.5.16	*Acacia aneura* groved with *Corymbia terminalis* or *C. blakei* tall open shrubland on Quaternary sediments	23a	Woodlands to low woodlands dominated by *Acacia aneura*	Least Concern	No Concern at Present
6.7.7	*Acacia catenulata* ± *Eucalyptus thozetiana* and/or *A. ensifolia* low open woodland with *Triodia* spp. and/or *A. petraea* ± *A. aneura* on scarps and plateaus	24a, 23b	Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals	Least Concern	No Concern
6.7.9	*Acacia aneura* ± *A. clivicola* ± *Eremophila latrobei* tall open shrubland on residuals	24a, 23b	Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals	Least Concern	No Concern
6.7.14	*Acacia clivicola* ± *Eucalyptus* spp. open shrubland on crests and tops of residuals.	24a, 23b	Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals	Least Concern	No Concern
6.7.17	*Eriachne mucronata* open grassland wooded with *Acacia aneura* and/or *Corymbia terminalis* on plains or flat tops of residuals	23a	Woodlands to low woodlands dominated by *Acacia aneura*	Least Concern	No Concern at Present
6.9.4	*Acacia cambagei*, *Senna* spp., *Sida platycalyx* tall open shrubland on undulating mantled pediments and scarp retreat zones	24a, 23b	Low woodlands to tall shrublands dominated by *Acacia* spp. on residuals	Least Concern	No Concern at Present

3: Matters of Environmental Significance (MNES) under the *Environmental Protection and Biodiversity Conservation Act* (1999)

To determine Matters of Environmental Significance (MNES) under the Environmental Protection and Biodiversity Conservation Act (1999), the Australian Federal Governments Protected Matters Interactive Search Tool (the tool) was used. A radius was extended from a central coordinate within the PL 214 Utopia tenement, to cover a 12 km search radius from the central point. The tool provides information and details matters of national environmental significance overlapping the user defined search area. This includes threatened species, and those listed under the Environmental Protection and Biodiversity Conservation Act (1999). The tool lists all matter which “may occur in, or may relate to” the search area, so this resource is an indicative tool only. Regarding threatened species, the tool compares the search area to known distribution ranges for each species, categorised as “Species or species habitat likely to occur” and “Species or species habitat may occur” within the search area. The species listed below may or may not occur within Bridgeport tenements, and local knowledge should be applied with the information from the tool.

The search using the MNES tool details Wetlands of National Environmental Significance and Wetlands of International Importance (Ramsar). There is one wetland in proximity to PL 214 Utopia, which is 200 - 300 km upstream of the tenement. The wetland is known as Coongie Lakes and a such is not impacted by Bridgeport Petroleum activities.

Table 20: A list of Wetlands of International Importance (Ramsar listed), surrounding PL 214.

Wetland		
Wetland Name	**Status**	**Proximity**
Coongie Lakes	Ramsar Listed	200-300 m (Upstream)

To Bridgeport’s knowledge, there has been no record of a threatened species observed on PL 214. Threatened species and their status under the Environment Protection and Biodiversity Conservation Act (1999). A list of the threatened species distributions which may occur within and surrounding PL 214 are listed in Table 21. The list includes birds, mammals, vegetation, fish and reptiles. To our knowledge, none of these species occur within PL 214.

Table 21: A list of Threatened Species surrounding PL 214.

Species		
Species Name	**Status**	**PL 214**
Birds		
Curlew Sandpiper (*Calidris ferruginea*)	Critically Endangered	√
Grey Falcon (*Falco hypoleucos*)	Vulnerable	√
Painted Honeyeater (*Grantiella picta*)	Vulnerable	√
Plains-wanderer (*Pedionomus torquatus*)	Critically Endangered	√
Night Parrot (*Pezoporus occidentalis*)	Endangered	√
Australian Painted Snipe (*Rostratula australis*)	Endangered	√
Mammals		
Yellow-footed Rock Wallaby *(Petrogale xanthopus celeris*)	Vulnerable	√
Vegetation		
Unknown Burr (*Sclerolaena walker*)	Vulnerable	√
Unknown (*Xerothamnella parvifolia*)	Vulnerable	√
Fish		
Flinders Ranges Mogurnda or Flinders Ranges Purple-Spotted Gudgeon (*Mogurnda clivicola*)	Vulnerable	√

The region is less important for migratory species, as the evaporation Ponds are quite limited in surface area. However, there are some listed migratory species which may occur on or near the Utopia tenement (as listed under the EPBC Act) (Table 22).

Table 22: A list of Listed Migratory Species surrounding PL 214.

Species		
Species Name	**Status**	**PL 214**
Birds		
Fork-tailed Swift (*Apus pacificus*)	Threatened	√
Grey Wagtail (*Motacilla cinereal*)	Threatened	√
Yellow Wagtail (*Motacilla flava*)	Threatened	√
Common Sandpiper (*Actitis hypoleucos*)	Threatened	√
Sharp-tailed Sandpiper (*Calidris acuminata*)	Threatened	√
Curlew Sandpiper (*Calidris ferruginea*)	Threatened	√
Pectoral Sandpiper (*Calidris melanotos*)	Threatened	√
Latham's Snipe, Japanese Snipe (*Gallinago hardwickii*)	Threatened	

The EPBC Act also lists other species, including the threatened species. In the case of the Utopia field site, and the 12 km radius from the central point, there are numerous marine species which are listed in Table 23.

Table 23: A list of Threatened Species surrounding PL 214.

Species		
Species Name	**Status**	**PL 214**
Birds		
Common Sandpiper (*Actitis hypoleucos*)	Threatened	√
Fork-tailed Swift (*Apus pacificus*)	Threatened	√
Great Egret (*Ardea alba*)	Threatened	√
Cattle Egret (*Ardea ibis*)	Threatened	√
Sharp-tailed Sandpiper (*Calidris acuminata*)	Threatened	√
Curlew Sandpiper (*Calidris ferruginea*)	Threatened	√
Pectoral Sandpiper (*Calidris melanotos*)	Threatened	√
Black-eared Cuckoo (*Chrysococcyx osculans*)	Threatened	√
Latham's Snipe, Japanese Snipe (*Gallinago hardwickii*)	Threatened	√
White-bellied Sea-Eagle (*Haliaeetus leucogasteri*)	Threatened	√
Rainbow Bee-eater (*Merops ornatus*)	Threatened	√
Grey Wagtail (*Motacilla cinereai*)	Threatened	√
Yellow Wagtail (*Motacilla flava*)	Threatened	√
Painted Snipe (*Rostratula benghalensis (sensu lato)*)	Threatened	√

There are also numerous invasive species which occur within the area of PL 214 (Table 24). The most observed include the Goat (*Capra hircus*) and Pigs (*Sus scrofa*). The Jerusalem Thorn is said to be present within the tenement, but to date, has not been observed.

Table 24: A list of Invasive Species surrounding PL 214.

Invasive Species	
Species Name	**Type of Presence**
Birds	
Rock Pigeon (*Columba livia*)	Species or species habitat may occur within area
House Sparrow (*Passer domesticus*)	Species or species habitat may occur within area
Mammals	
Domestic Dog (*Canis lupus familiaris*)	Species or species habitat may occur within area
Goat (*Capra hircus*)	Species or species habitat may occur within area
House/Domestic Cat (*Felis catus*)	Species or species habitat may occur within area
House Mouse (*Mus musculus*)	Species or species habitat may occur within area
European Rabbit (*Oryctolagus cuniculus*)	Species or species habitat may occur within area
Pig (*Sus scrofa*)	Species or species habitat may occur within area
Red Fox (*Vulpes vulpes*)	Species or species habitat may occur within area
Vegetation	
Parkinsonia, Jerusalem Thorn, Horse Bean (*Parkinsonia aculeata*)	Species or species habitat may occur within area

This geospatial/distribution information was accessed from the Australian Governments Department of Environment and Energy's Protected Matters Search Tool website [http://www.environment.gov.au/webgis-framework/apps/pmst/pmst-coordinate.jsf].

*Environment Protection and Biodiversity Conservation Act 1999

4: Matters of State Environmental Significance (MNES) under the Environmental Offsets Regulation (2014)

There are no areas that trigger an Offset requirement (Spatial Catalogue layer: MSES_Legally_secured_offset_area__vegetation_offsets.shp) within the boundaries of PL 214.

5: Areas of regional interest under the Regional Planning Interest Act 2014

To determine areas of regional interest under the Regional Planning Interest Act 2014, three layers were surveyed, including Queensland Regional planning interests' Priority living areas, Priority agricultural areas and Strategic Environmental Areas shape files. None of these planning interests overlap PL 214 Utopia.

6: Endangered, vulnerable, rare or near threatened wildlife species under the Nature Conservation Act 1992

To determine areas of endangered, vulnerable, rare or near threatened wildlife species under the Nature Conservation Act 1992, layers from the Queensland Spatial Catalogue, including protected areas of Queensland and Nature Refuges Queensland were applied. None were present within PL 214 Utopia.

7: Watercourse, wetlands, springs (including relevant environmental values) or river improvement trust asset areas

Watercourses, wetlands and springs are discussed in appropriate Sections above.

Table 25: Summary of the important environmental features of the land to which the UWIR applies, using spatial layering from the DES.

Category	PL 214	GIS data used to determine relevance*
1: Environmentally Sensitive Areas (ESAs) – non-mining resource activities	☑ No ☐ Yes	Queensland Government Department of Environment and Sciences' Maps of environmentally sensitive areas webpage
2: Category A environmentally sensitive areas (ESA) under the Environmental Protection Regulation (2008)	☑ No ☐ Yes	Vegetation_management_regional_ecosystem_map_(Restricted to Eromanga Basin)
2: Category B & C environmentally sensitive areas (ESA) under the Environmental Protection Regulation 2008	☑ No ☐ Yes	MSES___Regulated_vegetation___category_B_endangered_or_of_concern.shp) MSES___Regulated_vegetation___category_C_endangered_or_of_concern.shp)
3: Matters of Environmental Significance (MNES) under the *Environmental Protection and Biodiversity Conservation Act* (1999)	☑ No ☐ Yes	Australian Federal Governments Protected Matters Interactive Search Tool, that provides indicative ranges.
4: Matters of State Environmental Significance (MNES) under the Environmental Offsets Regulation (2014)	☑ No ☐ Yes	Matters of state environmental significance - Legally secured offset area - offset register – Queensland.
5: Areas of regional interest under the *Regional Planning Interest Act* 2014	☑ No ☐ Yes	Regional_planning_interests_Priority_living_area Regional_planning_interests_Priority_agricultural_area Regional_planning_interests_Strategic_environmental_area
6: Endangered, vulnerable, rare or near threatened wildlife species under the *Nature Conservation Act* 1992	☑ No ☐ Yes	Protected_areas (estate) Protected_areas (nature refuges) Nature Conservation Act Protected Plant Species
7: Watercourse, wetlands, springs (including relevant environmental values) or river improvement trust asset areas	☐ No ☑ Yes	Watercourse areas Major watercourse lines Groundwater Dependent Ecosystems (Watercourses) Pondage Water plan (waterholes and lakes) Active Springs Directory of important wetlands Groundwater Dependent Ecosystems (Springs) MSES (high ecological significance wetlands) Watercourse identification map (watercourses) River Improvement Trust Areas (Queensland)

Bridgeport Risk Allocation

D.16.1 Bridgeport have assessed the likelihood of environmentally sensitive areas being impacted by the previous exercise of underground water rights as a Likelihood of E, or Rare, with the explanation being (2) May occur in exceptional circumstances. The consequence of impact is Moderate, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there are no environmentally sensitive areas that would be impacted on or near Bridgeport tenements, and there has been appropriate safeguards in place to review environmentally sensitive areas prior to any physical activity taking place.

D.16.2.i. Bridgeport have assessed the likelihood of environmentally sensitive areas being impacted by the exercise of underground water rights for the following three years as a Likelihood of E, or Rare, with the explanation being (2) May occur in exceptional circumstances. The consequence of impact is Moderate, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there are no environmentally sensitive areas that would be impacted on or near Bridgeport tenements, and there has been appropriate safeguards in place to review environmentally sensitive areas prior to any physical activity taking place, and these are not likely to change in the coming three years.

D.16.2.ii. Bridgeport have assessed the likelihood of environmentally sensitive areas being impacted by the exercise of underground water rights for the remaining project period as a Likelihood of E, or Rare, with the explanation being (2) May occur in exceptional circumstances. The consequence of impact is Moderate, leading to a Low consequence level. Actions required from this risk allocation include applying relevant safeguards (e.g. monitoring), review for effectiveness and escalate risk level if appropriate. This conclusion is appropriate because there are no environmentally sensitive areas that would be impacted on or near Bridgeport tenements, and there will likely be no significant change to ESAs in the future of the project.

Environmental Value Conclusions

The Utopia tenement occurs in a rugged part of south-western Queensland. The land has been influenced by broad scale agricultural land grazing for decades, and as a result, in conjunction with a tough climate, has limited environmental values over a broad area, but also in proximity to petroleum production assets. Whenever there are environmental features and values, these features do not rely on groundwater (e.g. are not groundwater dependent ecosystems). Considering the licenced extraction of water occurs from an isolated region sub 1400 m below the surface, it is geologically and artificially (engineered concrete and steel) separate from the primarily landholder water target in the Winton Formation (sub 100m), which maybe more relevant to any environmental values. As a result, the likelihood of environmental values being impacted are rare, unlikely or incapable of occurring.

Table 26: Important environmental sensitive areas and the associated likelihood, consequence and associated environmental risk to Utopia, using justifications in individual sections above.

Section	Environmental Value	UWIR Requirement	Likelihood	Consequence	Environmental Risk
D.1	**Aquatic ecosystem**	**D.1.1**	Unlikely	Minor	Low
		D.1.2.i	Unlikely	Minor	Low
		D.1.2.ii	Unlikely	Minor	Low
D.2	**High ecological/conservation value waters**	**D.2.1**	Incapable of occurring	Insignificant	No Risk
		D.2.2.i	Incapable of occurring	Insignificant	No Risk
		D.2.2.ii	Incapable of occurring	Insignificant	No Risk
D.3	**Slightly disturbed waters**	**D.3.1**	Incapable of occurring	Insignificant	No Risk
		D.3.2.i	Incapable of occurring	Insignificant	No Risk
		D.3.2.ii	Incapable of occurring	Insignificant	No Risk
D.4	**Moderately disturbed waters**	**D.4.1**	Incapable of occurring	Insignificant	No Risk
		D.4.2.i	Incapable of occurring	Insignificant	No Risk
		D.4.2.ii	Incapable of occurring	Insignificant	No Risk
D.5	**Highly disturbed waters**	**D.5.1**	Unlikely	Minor	Low
		D.5.2.i	Unlikely	Minor	Low
		D.5.2.ii	Unlikely	Minor	Low
D.6	**Irrigation**	**D.6.1**	Incapable of occurring	Insignificant	No Risk
		D.6.2.i	Incapable of occurring	Insignificant	No Risk
		D.6.2.ii	Incapable of occurring	Insignificant	No Risk
D.7	**Farm water supply/use**	**D.7.1**	Incapable of occurring	Insignificant	No Risk
		D.7.2.i	Incapable of occurring	Insignificant	No Risk
		D.7.2.ii	Incapable of occurring	Insignificant	No Risk

D.8	Stock watering	D.8.1	Rare	Minor	Low
		D.8.2.i	Rare	Minor	Low
		D.8.2.ii	Rare	Minor	Low
D.9	Human consumers of aquatic foods	D.9.1	Incapable of occurring	Insignificant	No Risk
		D.9.2.i	Incapable of occurring	Insignificant	No Risk
		D.9.2.ii	Incapable of occurring	Insignificant	No Risk
D.10	Primary recreation	D.10.1	Incapable of occurring	Insignificant	No Risk
		D.10.2.i	Incapable of occurring	Insignificant	No Risk
		D.10.2.ii	Incapable of occurring	Insignificant	No Risk
D.11	Secondary recreation	D.11.1	Incapable of occurring	Insignificant	No Risk
		D.11.2.i	Incapable of occurring	Insignificant	No Risk
		D.11.2.ii	Incapable of occurring	Insignificant	No Risk
D.12	Visual recreation	D.12.1	Incapable of occurring	Insignificant	No Risk
		D.12.2.i	Incapable of occurring	Insignificant	No Risk
		D.12.2.ii	Incapable of occurring	Insignificant	No Risk
D.13	Drinking water supply	D.13.1	Incapable of occurring	Insignificant	No Risk
		D.13.2.i	Incapable of occurring	Insignificant	No Risk
		D.13.2.ii	Incapable of occurring	Insignificant	No Risk
D.14	Industrial use	D.14.1	Incapable of occurring	Insignificant	No Risk
		D.14.2.i	Incapable of occurring	Insignificant	No Risk
		D.14.2.ii	Incapable of occurring	Insignificant	No Risk
D.15	Cultural and spiritual values	D.15.1	Rare	High	Medium
		D.15.2.i	Rare	High	Medium
		D.15.2.ii	Rare	High	Medium

D.16	**Environmentally Sensitive Areas**	**D.16.1**	Rare	Moderate	Low
		D.16.2.i	Rare	Moderate	Low
		D.16.2.ii	Rare	Moderate	Low

Part E*: Water monitoring strategy

Requirements under section 378 of the Water Act
To meet the requirements of the Water Act, an UWIR must include the following; 1. A rationale for the strategy 2. A timetable for strategy 3. The parameters to be measured 4. The locations for taking measurements 5. The frequency of the measurements 6. A program for the responsible tenure holder or holders to undertake a baseline assessment for each water bore that is outside the area of a resource tenure, but within the predicted LTAA; and 7. A program for reporting to the OGIA about the implementation of the monitoring strategy.

*Part E refers to Section 5.1.5 (page 22) of the guideline (DES 2017).

Bridgeport provides the following detail to form the basis of a groundwater monitoring strategy. It includes parameters, locations, and frequency to help define and inform the program.

Regional Groundwater Monitoring (~all well target depth TD)

The requirement to develop a monitoring strategy (s378) is detailed in a following section. The plan considers monitoring plans put forth by Bridgeport for PL 31, 32 & 47, and aims to keep consistency with best practice and historic brown fields operations.

Shut-in wellhead pressure will be monitored across the fields in a series of wells. Shut-in tubing head pressure (SITHP) is taken and extrapolated to determine reservoir pressure (and therefore water level).

Well selection is based on position within the field, as well as target formation. All wells are perforated in the Murta at Utopia, which will be tested for this monitoring program. If any well is brought back online, another similar well will be chosen in its place (Table 27).

Table 27: Shut-in wells in the Murta (Utopia) that will be monitored for shut-in well head pressure.

Utopia (Murta)
Utopia-09
Utopia-10
Utopia-15
Utopia-16
Utopia-17
Utopia-18

Production volume monitoring strategy

Production monitoring occurs regularly through the production separator and testing facilities. Production from a single well is isolated into a test tank, where a volumetric measure is recorded over a period of time (usually 24 hours). Once this measure is taken, production per hour can be calculated, and applied to the well for all uptime hours over any given period. Wells are regularly tested on an ad-hoc or as needs basis. This data can then be compiled over any required timeframe.

Frequency of Measurements

Shut-in tubing head pressure will be monitored quarterly. Any influence on the groundwater system is extremely slow acting, which supports this monitoring schedule.

Significant changes in the reservoir pressure can infer changes in well bore conditions or reservoir conditions. The SITHP will be assessed against the previous monitoring figures every quarter, to be reported in the annual updates.

Each annual update and three yearly reports will include;

- A summary of the previous (12 or 36 months) monitoring data
- Assessment of monitoring program (applicability, improvements)
- Results review

Rationale for Strategy

Bridgeport took over the already mature Utopia oilfield from a previous operator. Bridgeport recognises a sensible approach would be to implement a monitoring program using a similar method and technique to other fields (e.g. Kenmore), but which also is easily maintained and replicated into the future. This will accomplish the same goals and allows consistent comparisons over time.

The Cooper-Eromanga Basin is extremely large, extremely slow acting hydrogeological groundwater basin. The overall extraction from the Utopia fields has been deemed to be very low, with little to no influence on groundwater dependent ecosystems or regional groundwater users (either of which do not feature around not only the topographical extent of the tenement or the depth of extraction). The following parameters and frequency are deemed appropriate for the scale of monitoring and have been justified through the previous UWIRs.

Summary

A simple but effective monitoring strategy will allow for accurate and best-practice data to be repetitive, which will be easier to determine potential impacts from. There is little to no material change expected.

Part F*: Spring impact management strategy

Requirements under section 379 of the Water Act
To meet the requirements of the Water Act, an UWIR must include the following: 1. *The details of the spring, including its location;* 2. *An assessment of the connectivity between the spring and the aquifer(s) over which the spring is located:* 3. *The predicted risk to, and likely impact on, the ecosystem and cultural and spiritual values of the spring because of the decline in water level of the aquifer over which the spring is located;* 4. *A strategy for preventing or mitigating the predicted impacts outlined above; or if a strategy for preventing or mitigating the predicted impacts is not included, the reason for not including the strategy;* 5. *A timetable for implementing the strategy; and* 6. *A program for reporting to OGIA about the implementation of the strategy.*

*Part F refers to Section 5.1.6 (page 23) of the guideline (DES 2017).

There are no Great Artesian Basin (GAB) Springs within the boundaries of Utopia, nor anywhere near the tenement. The nearest GAB Spring is located 157 km to the south-east of Utopia. Considering the volumes extracted, lack of drawdown from modelling, distance to the springs and completely different depth of target aquifer to any surface feature which is reliant on groundwater, it is considered there is no connectivity between this spring and the aquifers which are potentially impacted by Bridgeport and its extraction.

No other Groundwater Dependent Ecosystem (GDE) has been identified within the boundaries of PL 214, or nearby.

The predicted risk and impact to springs is therefore zero, given their complete absence from areas related to resource extraction, including within or near the tenement boundaries of PL 214 Utopia or the LTAA/IAA/drawdown.

Part G (a)*: For a CMA assign responsibilities to resource tenure holders

Requirements under section 365, 369, 374 et. al. of the Water Act
If OGIA is responsible for preparing the UWIR or final report, the UWIR must: 1. *Propose a responsible tenure holder for each report obligation; and* 2. *For each IAA, propose a responsible tenure holder who must comply with any make good obligations for water bores within the IAA.* *Report obligations may include obligations relating to Part E and F of the UWIR.*

*Part G refers to Section 5.1.7 (page 27) of the guideline (DES 2017).

Under the Water Act, a Cumulative Management Area (CMA) can be declared where there are multiple resource tenures operating, who may have a cumulative impact on groundwater resulting from their resource extraction.

The Queensland Chief Executive has declared the Surat Cumulative Management Area under the Water Act (2000). The GKBA tenements (PL 31, 32 & 47, PL 256, PL 482, 483 & 484), as well as Utopia (PL 214) and Inland (PL 98) are not within this declared Cumulative Management Area, or any other declared CMA. The Surat Cumulative Management Area is the only CMA in Queensland. Therefore, there is no responsible tenure holder nor obligation related to a CMA for this UWIR.

Part G (b): Final Reports

Requirements under section 377 of the Water Act
In addition, a final report must include the following additional information to meet the requirements of the Water Act: *1. A summary about underground water bores in the LTAA (including the number of bores and the location and authorised use or purpose of each bore);* *2. A summary about how the make good obligations of the responsible tenure holder for each water bore to which the final report relates have been compiled with by the holder over the term of the tenure;* *3. A summary of the make good obligation of the responsible tenure holder for each water bore that have not yet been compiled with by the holder and a plan about how these obligations will be complied with; and* *4. Statements about any matters outlined in previous strategies that have not yet been complied with, along with a timetable of planned actions to address these outstanding matters.*

*Part G refers to Section 6.1 (page 28) of the guideline (DES 2017).

A summary about underground water bores in the LTAA (including the number of bores and the location and authorised use or purpose of each bore);

No bores were identified in the IAA/LTAA, due to the relatively minor modelled drawdown occurring in formations isolated from landholder bores, which focus on unconfined shallow aquifers.

A summary about how the make good obligations of the responsible tenure holder for each water bore to which the final report relates have been compiled with by the holder over the term of the tenure;

There are no make good obligations that the responsible tenure holder has identified to be complied with, as no bores sit within an IAA or LTAA.

A summary about how the make good obligations of the responsible tenure holder for each water bore to which the final report relates have been compiled with by the holder over the term of the tenure;

There are no make good obligations that the responsible tenure holder has not yet complied with.

Statements about any matters outlined in previous strategies that have not yet been complied with, along with a timetable of planned actions to address these outstanding matters.

There were no matters outlined in previous strategies that have not yet been complied with. There is therefore no timetable or planned actions to address any outstanding matters.

Part H*: Additional Information, including public consultation

Requirements under section 382(3) of the Water Act
To meet the requirements under section 382(3) of the Water Act, a public notice must state the following; - *A description of the area to which the report relates;* - *That copies of the report may be obtained from the responsible entity;* - *How the copies may be obtained;* - *That written submissions on the report may be given;* - *That submissions must be given to the responsible entity:* - *That a copy of the submission must be given to the Chief Executive* - *A day that is at least 20 business days after the notice is published by which submissions may be made; and* - *Where the submissions may be given.*

*Part H refers to Section 4.5 (page 11) of the guideline (DES 2017).

Bridgeport has undertaken public consultation that follows the requirements of the Underground water impact reports and final reports Guideline (DES 2017).

A description of the area to which the report relates;

The public consultation notice included a brief description of the area to which the report relates;

> *e.g. "…Bridgeport Energy Pty Ltd has developed an underground water impact report (UWIR) for its operations within PL 98 and PL 214 located in the Eromanga Basin, in an area around Eromanga (PL 214) and Windorah (PL 98)".*

A map of the region, including main roads, main town names, highlighted tenements and rivers (a feature many people use in the region) to also graphically represent the area to which the report relates were included (Figure 21).

That copies of the report may be obtained from the responsible entity;

The public consultation notice included a statement on where the report may be obtained;

> *e.g. "You have the opportunity to review and comment on this UWIR. From October 2022 you can access the UWIR by visiting Bridgeport Energy Pty Ltd at: www.bridgeport.net.au. You can also phone (02) 8960 8403 to arrange for hard copy to be posted to you"*

How the copies may be obtained;

The public consultation notice included a statement on how the copies could be obtained;

> *e.g. "…you can access the UWIR by visiting Bridgeport Energy Pty Ltd at: www.bridgeport.net.au. You can also phone (02) 8960 8403 to arrange for hard copy to be posted to you"*

That written submissions on the report may be given;

The public consultation notice included a statement on written submissions;

> *e.g. "Written submissions on any of the UWIR may be made to Bridgeport Energy Pty Ltd and mailed to: Attn: Ben Hamilton, Bridgeport Energy, Level 7, 111 Pacific Highway Sydney, NSW, 2060"*

That submissions must be given to the responsible entity;

The public consultation notice included a statement on how submissions must be given to the responsible entity;

> *e.g. "Written submissions on any of the UWIRs may be made to Bridgeport Energy Pty Ltd and mailed to: Attn: Ben Hamilton, Bridgeport Energy, Level 7, 111 Pacific Highway Sydney, NSW, 2060"*

That a copy of the submission must be given to the Chief Executive;

The public consultation notice included a statement on how all submissions must be given to the chief executive;

e.g. "Please note that as required by Section 382(3)(d) of the Water Act, copies of all received submissions must be provided to the chief executive. These submissions will be considered as part of the assessment process for the UWIR".

A day that is at least 20 business days after the notice is published by which submissions may be made;

The public consultation notice included a statement on a date, which was at least 20 business days after the publication notice, by which submissions could be made;

e.g. "Your submission must be: -In writing, and -Received by COB 18thof November 2022"

Where the submissions may be given;

The public consultation notice included a statement on where the submission may be given;

e.g. "Written submissions on any of the UWIRs may be made to Bridgeport Energy Pty Ltd and mailed to: Attn: Environment & Compliance Department, Bridgeport Energy, Level 7, 111 Pacific Highway Sydney, NSW, 2060"

The classic public advertisement (18 cm x 13 cm full colour ad) occurred across multiple issues of an appropriate paper to the area, the Warrego Watchman. The Shires in which the Warrego Watchmen is circulated include Bulloo, Balonee, Murweh, Paroo and Quilpie Shires. Relevant towns to Bridgeport operations, in which the publication is distributed include Quilpie, Charleville and Eromanga. The publication is now run fortnightly.

During the planned public advertisement campaign, the Warrego Watchman staff informed Bridgeport that the newspaper would cease publication of all physical formats until calendar year 2023. The Warrego Watchman instead offered a digital advertisement, which Bridgeport accepted. This digital advertisement campaign included the identical Public Notice (Figure 21) being placed in multiple online locations owned by The Warrego Watchman. The identical public notice was published on their social media facebook™ page titled South West Newspaper Company, and on their webpage (https://www.warregowatchman.com.au).

A close-up copy of the proof as provided by the Warrego Watchman (and how they are expected to appear), below.

Figure 21: The proposed proof as provided by the Warrego Watchman.

PUBLIC NOTICE

Pursuant to Section 382 of the Water Act 2000

Release of UNDERGROUND WATER IMPACT REPORT

In accordance with the requirements of Section 381 and Section 382 of the Water Act 2000 (Water Act), Bridgeport Energy Pty Ltd has developed an underground water impact report (UWIR) for its operations within PL 98 and PL 214, located in the Eromanga Basin, in an area near Eromanga (PL 214) and Windorah (PL 98).

You have the opportunity to review and comment on this UWIR.
From October 2022 you can access the UWIR by visiting Bridgeport Energy Pty Ltd at:

www.bridgeport.net.au

You can also phone (02) 8960 8403 to arrange for a hard copy to be posted to you.
Written submissions on any of the UWIRs may be made to Bridgeport Energy Pty Ltd and mailed to:

Attn: Environment & Compliance Department
Bridgeport Energy, Level 7, 111 Pacific Highway, Sydney NSW 2060

Your submission must be:
• In writing • Received by COB Friday 18th November 2022

Please note that as required by Section 382(3)(d) of the Water Act, copies of all received submissions must be provided to the chief executive. These submissions will be considered as part of the assessment process for the UWIR.

For more information please phone (02) 8960 8403

The total number of business days the public consultation ad has been featured in the physical The Warrego Watchman will be 10 business days (a single fortnightly run from Wednesday 19th October). The online digital advertisement took place from the 2nd of November for two additional weeks (10 business days), for a public advertisement period of 20 business days.

A draft UWIR was available online [http://bridgeport.net.au] from 19/10/2022 up to 16/11/2022, after the end of the public notices in the Warrego Watchman.

Bridgeport considers the publication of the Public Notice in the South West Newspaper Co and the online media platforms of the same company, as appropriate. The South West Newspaper Co's Warrego Watchman was considered a relevant entity, appropriately distributed in the relevant areas and being of interest to the local community. It is one of the only remaining printed distribution methods remaining. As suggested in the previous UWIR< and now demonstrated in these examples, DES should consider altering the guideline to offer alternatives to printed media. Relevant regional areas are seeing a dramatic decline in print media, and it being rapidly replaced by online and social media platforms. Section 382 (3) must change to reflect this.

Bridgeport used the standard template provided DES for the public advertisement.

Requirements under section 383(1 & 2) of the Water Act
To meet the requirements under section 383(1 & 2) of the Water Act, the responsible entity must; *Before giving the chief executive a UWIR;* - *Consider each properly made submission about the report;* - *Prepare a summary of the submissions;* *In the UWIR submission, summarise;* - *The properly made submission about the report;* - *How the responsible entity addressed the submissions, and* - *Any changes the responsible entity has made to the report because of the submissions.*

During the public advertisement period, Bridgeport received no submissions on the PL 214 UWIR. This includes no submissions via mail, phone or email.

Bridgeport did not need to address within nor change the report, because there were no submissions.

References

Australian Government Department of Environment and Water Resources, 2000, Water Act 2000.

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Beach Energy (2015) Annual review - Underground water impact report for Beach Energy oilfields, Eromanga area, SWQ (2015) pp. 1 – 9.

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Bridgeport Energy (2018) UWIR 2018 Annual Update, Bridgeport Energy, Sydney Australia.

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Department of Environment and Science (2018) Mapping procedural guide, Environmental Protection Policy (Water) 2009 Management intent and water type mapping methodology, March 2018, pp. 1-18. Queensland.

Department of Environment and Science (2019) Environmental values and water quality objectives; Under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019, pp. 1-4. Queensland.

Department of Environment and Science (2022) Notice of approval of Underground Water Impact Report, pp. 1 – 3. Queensland.

Evans TJ, Martinez J, Lai ÉCS, Raiber M, Radke BM, Sundaram B, Ransley TR, Dehelean A, Skeers N, Woods M, Evenden C and Dunn B (2020) Hydrogeology of the Cooper GBA region. Technical appendix for the Geological and Bioregional Assessment.

Program: Stage 2. Department of the Environment and Energy, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

Freeze, RA and Cherry JA (1979) Groundwater, Prentice-Hall, the University of Michigan, United States.

Golder Associates (2014) Underground water impact report for Beach energy oilfields, Eromanga area, SWQ, pp. 1 – 341, South Australia.

Golder Associates (2018) Technical Memorandum: Update of groundwater impact assessment for the Eromanga area, SWQ, report prepared for Bridgeport Energy Pty Ltd.

Golder Associates (2021) Technical Memorandum: Update of groundwater impact assessment for the Eromanga area, SWQ, report prepared for Bridgeport Energy Pty Ltd.

Legislation

Environmental Protection Act 1994 (Reprint current from 1st January, 2018) (Queensland)

Environmental Protection (Water) Policy 2009 (Reprint current from 6th December, 2016) under the Environmental Protection Act 1994 (Queensland)

Environment Protection (Water and Wetland Biodiversity) Policy 2019, Reprint current from 2 October 2020 to date (accessed 2021)

Environment Protection Regulation (2019)

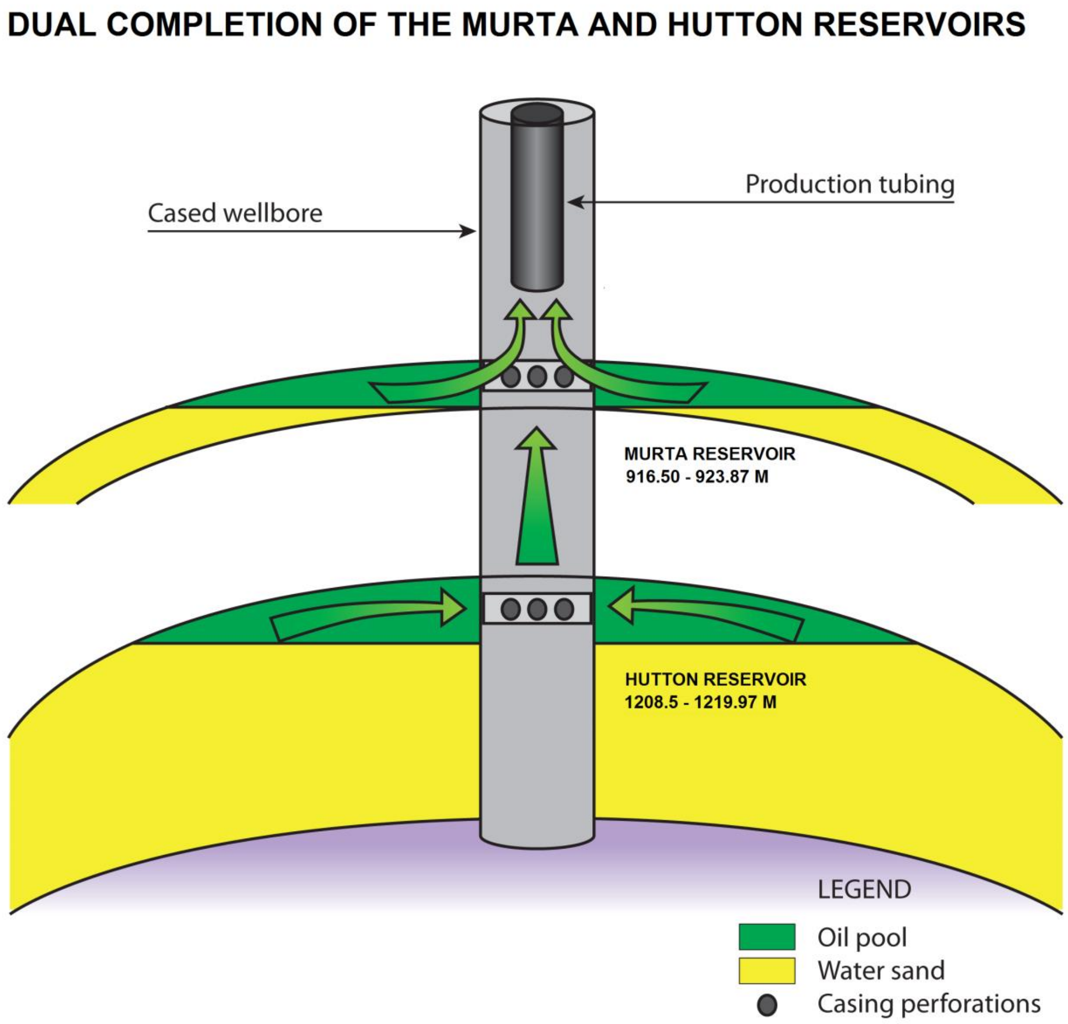
Nature Conservation Act 1994

Marine Parks Act 2004

Petroleum and Gas (Production and Safety) Act 2004 (2021) (Queensland)

Water Act 2000 (Reprint current from 2nd July, 2018) (Queensland)

Appendix 1: Dual-Completion Well



Appendix 2: Data

2019		November	December	January	February	March	April	May	June	July	August	September	October	Annual (ML)
	Well Name	2017	2017	2018	2018	2018	2018	2018	2018	2018	2018	2018	2018	-
	Utopia 1	0.0524	0.0543	0.0471	0.0472	0.0447	0.0433	0.0433	0.0427	0.0433	0.0442	0.0033	0.0000	**0.4658**
	Utopia 2	0.0240	0.0217	0.0198	0.0174	0.0139	0.0193	0.0207	0.0165	0.0099	0.0095	0.0095	0.0095	**0.1917**
	Utopia 6	0.1806	0.1981	0.1829	0.1786	0.1912	0.1704	0.0000	0.1808	0.2015	0.2066	0.1998	0.2070	**2.0974**
	Utopia 7	0.0274	0.0620	0.0618	0.0520	0.1085	0.1473	0.2326	0.1953	0.1185	0.1229	0.1238	0.1253	**1.3773**
	Utopia 8	0.4352	0.4370	0.4467	0.4051	0.4485	0.3538	0.3979	0.4214	0.4352	0.4361	0.4293	0.4690	**5.1152**
	Utopia 9	0.0821	0.0852	0.0849	0.0770	0.0821	0.0800	0.0852	0.0809	0.0845	0.0852	0.0765	0.0898	**0.9936**
	Utopia 10													
	Utopia 11	0.1329	0.1391	0.1374	0.1249	0.1357	0.1180	0.1086	0.1230	0.1262	0.1359	0.1313	0.1083	**1.5215**
	Utopia 12	0.0632	0.0776	0.0774	0.0550	0.0408	0.0420	0.0434	0.0420	0.0414	0.0422	0.0397	0.0399	**0.6046**
	Utopia 14	0.2142	0.1972	0.1911	0.1778	0.1888	0.1908	0.1972	0.1650	0.1824	0.1799	0.1755	0.1762	**2.2359**
	Utopia 15													
	Utopia 16													
	Utopia 17													
	Utopia 19	0.0435	0.0642	0.0531	0.0605	0.0642	0.0995	0.0964	0.0495	0.0538	0.0527	0.0419	0.0504	**0.7299**
	Utopia 20	0.0522	0.0527	0.0317	0.0031	0.0478	0.0029	0.0030	0.0028	0.0031	0.0151	0.0429	0.0408	**0.2981**
	Utopia 21	0.0000	0.0095	0.0073	0.0751	0.1335	0.0359	0.0645	0.0000	0.0267	0.0000	0.0000	0.0000	**0.3526**
	Utopia 22	0.0000	0.0556	0.2325	0.5512	0.3180	0.2560	0.3295	0.3247	0.3174	0.3051	0.3001	0.3105	**3.3006**
	Utopia 23	0.0000	0.0000	0.0000	0.0112	0.0048	0.0053	0.0052	0.0048	0.0052	0.0232	0.0048	0.0048	**0.0693**
	Total	**1.3076**	**1.4543**	**1.5737**	**1.8361**	**1.8225**	**1.5646**	**1.6275**	**1.6494**	**1.6490**	**1.6587**	**1.5784**	**1.6316**	**19.3536**

2020		November	December	January	February	March	April	May	June	July	August	September	October	Annual (ML)
	Well Name	2018	2018	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	-
	Utopia 1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**
	Utopia 2	0.0092	0.0091	0.0093	0.0089	0.0244	0.0080	0.0081	0.0091	0.0091	0.0098	0.0029	0.0000	**0.1079**
	Utopia 3													
	Utopia 6	0.2000	0.2003	0.2067	0.1934	0.0392	0.2003	0.1705	0.2003	0.1973	0.2066	0.1622	0.1676	**2.1443**
	Utopia 7	0.1101	0.0916	0.0660	0.0684	0.0539	0.0700	0.0650	0.0763	0.0789	0.0836	0.0811	0.0838	**0.9284**
	Utopia 8	0.4545	0.4696	0.4538	0.4078	0.0208	0.4545	0.3869	0.4318	0.4696	0.4928	0.4387	0.0000	**4.4808**
	Utopia 9	0.0938	0.0974	0.0974	0.0911	0.0141	0.0911	0.0126	0.0000	0.0000	0.0000	0.0000	0.0000	**0.4975**
	Utopia 10													
	Utopia 11	0.1050	0.1081	0.1083	0.1015	0.0077	0.1050	0.0894	0.1041	0.1085	0.0956	0.0954	0.0954	**1.1240**
	Utopia 12	0.0371	0.0430	0.0432	0.0406	0.0157	0.0420	0.0358	0.0370	0.0492	0.0492	0.0477	0.0493	**0.4897**
	Utopia 14	0.1765	0.1824	0.1176	0.1036	0.0441	0.1765	0.1399	0.1812	0.1873	0.1869	0.1812	0.1848	**1.8619**
	Utopia 15													
	Utopia 16													
	Utopia 17													
	Utopia 19	0.0432	0.0542	0.0538	0.0471	0.0245	0.0513	0.0490	0.0525	0.0524	0.0541	0.0238	0.0246	**0.5305**
	Utopia 20	0.0333	0.0309	0.0344	0.0322	0.0487	0.0334	0.0308	0.0410	0.0432	0.0380	0.0415	0.0148	**0.4222**
	Utopia 21	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0024	0.0011	0.0000	0.0000	**0.0035**
	Utopia 22	0.2992	0.2546	0.2956	0.2218	0.1077	0.2909	0.2546	0.2814	0.2796	0.2951	0.2862	0.2957	**3.1624**
	Utopia 23	0.0047	0.0041	0.0198	0.0256	0.0587	0.0281	0.0244	0.0238	0.0216	0.0231	0.0219	0.0246	**0.2807**
	Total	**1.5666**	**1.5451**	**1.5060**	**1.3420**	**0.4594**	**1.5511**	**1.2670**	**1.4385**	**1.4991**	**1.5360**	**1.3826**	**0.9406**	**16.0339**

2021		November	December	January	February	March	April	May	June	July	August	September	October	Annual (ML)
	Well Name	2019	2019	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	-
	Utopia 1	0.0196	0.0493	0.0493	0.0445	0.0493	0.0469	0.0490	0.0470	0.0465	0.0493	0.0477	0.0493	**0.5476**
	Utopia 2	0.0066	0.0099	0.0099	0.0089	0.0086	0.0094	0.0096	0.0086	0.0095	0.0090	0.0082	0.0095	**0.1077**
	Utopia 3													
	Utopia 6	0.1622	0.1676	0.1676	0.1513	0.1922	0.1860	0.1909	0.1715	0.1777	0.1728	0.1834	0.1904	**2.1137**
	Utopia 7	0.0811	0.0838	0.0838	0.0668	0.0739	0.0477	0.0490	0.0464	0.0475	0.0493	0.0477	0.0493	**0.7261**
	Utopia 8	0.3999	0.5175	0.5175	0.4636	0.5046	0.5246	0.5385	0.5246	0.5224	0.5421	0.5246	0.4583	**6.0384**
	Utopia 9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0782	0.0939	0.0000	0.0000	0.0000	**0.1721**
	Utopia 10													
	Utopia 11	0.0939	0.0986	0.0986	0.0890	0.0986	0.0906	0.0930	0.0906	0.0902	0.0857	0.0906	0.0936	**1.1131**
	Utopia 12	0.0435	0.0542	0.0542	0.0490	0.0542	0.0525	0.0476	0.0447	0.0522	0.0496	0.0525	0.0542	**0.6083**
	Utopia 14	0.1807	0.1873	0.1873	0.1533	0.1479	0.1359	0.1169	0.0815	0.1047	0.1282	0.1242	0.1117	**1.6595**
	Utopia 15													
	Utopia 16													
	Utopia 17													
	Utopia 19	0.0222	0.0246	0.0246	0.0223	0.0246	0.0238	0.0223	0.0215	0.0237	0.0226	0.0238	0.0183	**0.2745**
	Utopia 20	0.0143	0.0133	0.0113	0.0190	0.0246	0.0236	0.0227	0.0153	0.0194	0.0226	0.0238	0.0246	**0.2347**
	Utopia 21	0.0000	0.0000	0.0000	0.0000	0.0027	0.0032	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0059**
	Utopia 22	0.2862	0.2846	0.2957	0.2760	0.3056	0.2957	0.2661	0.2366	0.2817	0.2797	0.2760	0.2961	**3.3799**
	Utopia 23	0.0232	0.0183	0.0197	0.0223	0.0296	0.0286	0.0268	0.0248	0.0268	0.0296	0.0262	0.0296	**0.3054**
	Total	**1.3333**	**1.5089**	**1.5194**	**1.3660**	**1.5164**	**1.4686**	**1.4323**	**1.3913**	**1.4965**	**1.4404**	**1.4288**	**1.3850**	**17.2869**