Centurion North Extension Project

Groundwater Assessment

Centurion Coal Mining Pty Ltd

Level 14. 31 Duncan Street, Fortitude Valley,
Queensland 4006

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 620.042334.00001

22 January 2026

Revision: 2.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
2.0	22 January 2025	Daniel Ashton Dariarne Edwards Scott Weeks	Scott Weeks John Barlow	Ben Brooks

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Centurion Coal Mining Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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1.0 Introduction

The following report describes the hydrogeological environment, and numerical groundwater modelling undertaken to assess potential impacts on groundwater receptors resulting from groundwater extraction during coal seam gas (CSG) production and limited scale underground development proposed for Centurion North Extension Project.

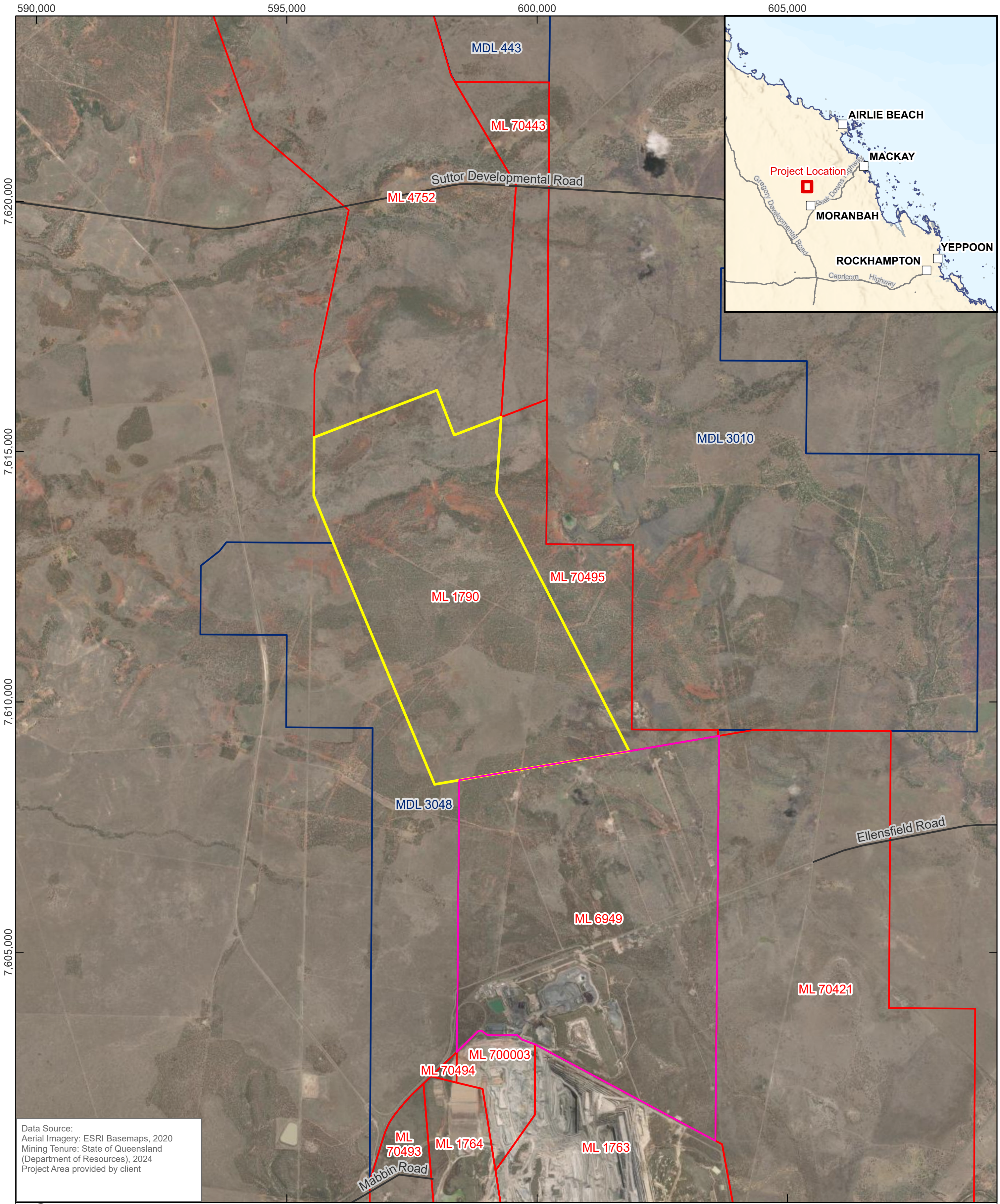
1.1 Project Background

The Centurion North Extension Project (the Project), is located within Mining Lease (ML) 1790 (**Figure 1-1**), approximately 40 km north of Moranbah. The Project is located immediately adjacent to, and north of, the Centurion Coal Mine (CCM), which is located in ML 6949. For the purposes of this assessment, the Project Area includes the Project to the mining lease extents, where there may be some influence on groundwater from the proposed development.

The Project involves the development of supporting infrastructure to enable (CSG) extraction and safe underground coal mining operations within the Project Area. All works associated with the Project will be undertaken within ML 1790. Project activities include the following:

- Construction of new access tracks;
- Installation of a laydown area;
- Construction of drill pads for Surface-to-Inseam (SIS) wells, Vertical Production Wells (VPW), gas risers, service boreholes, sampling boreholes and a bleeder shaft;
- Drilling and operation of vertical and lateral SIS wells to drain gas from coal seams;
- Construction of gas risers to manage gas transfer to surface facilities;
- Construction of service boreholes to transfer materials from the surface to underground;
- Drilling of sampling boreholes for gas, coal propensity, geotechnical and exploration sampling purposes;
- Development of a bleeder shaft for mine ventilation and safe gas management; and
- Disturbance for future goaf drainage lines.

The key disturbance activities relevant to this groundwater assessment are detailed in the below section.



Data Source:
Aerial Imagery: ESRI Basemaps, 2020
Mining Tenure: State of Queensland (Department of Resources), 2024
Project Area provided by client

0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:100,000 at A4
Project Number:	620.040594.00001
Date Drawn:	10-Jul-2025
Drawn by:	RB

CENTURION

LEGEND

- Road
- Mining Lease
- Mineral Development Licence
- Project Area
- Centurion Coal Mine

CENTURION NORTH DEVELOPMENT

PROJECT LOCATION

FIGURE 1-1

Path: \\au.slr.local\Corporate\Projects-SLR\620-BNE\620-BNE\620.040594.00001 North Centurion Environmental\06 SLR Data\01 CADGIS\GIS\North Centurion Environmental\North Centurion Environmental.aprx\620040594_EA_2nd_F03-01_Project Location

1.2 Proposed Development Activities Relevant to Potential Groundwater Impacts

1.2.1 Coal Seam Gas Extraction

Groundwater extraction will occur at the CSG production wells that may have impact on groundwater levels in the area. The extraction of groundwater from the production wells is the primary activity to be assessed for potential hydrogeological impacts.

Proposed activities will include drilling of 66 vertical and lateral production wells to target the Lower Goonyella seam between 260-350 mbGL. The summary presented below focuses on the relevant information for prediction of potential groundwater impacts.

Groundwater in the coal seam will be pumped from the wells, reducing the hydrostatic pressure in the production seam by a planned 40 kilopascals (kPa) per day, or 4 metres water head (mH_2O). Based on information provided by Peabody, it is anticipated that depressurisation of the coal seam will take up to 90 days.

Currently, Peabody estimates a total water production of 20 kilolitres (kL) per day over the operational life of one CSG well. This figure is based on data from 12 Surface to Inseam (SIS) wells installed at Centurion (ML6949) for the GM South works currently in progress. The data collection period is up to 6 months from commissioning the wells during the second half of 2024 through to the end of 2024. Summary of this data is presented in **Table 1-1**. The raw data of extraction rates used in this calculation are shown in **Appendix A**.

Table 1-1 Flow rate data from CSG wells at ML6949

Hole ID	Start Date	End Date	Number of Days	Peak (10-min interval) (kL/day)	Avg. (10-min intervals) (kL/day)
5017-00000-SIS001	01-07-2024	31-12-2024	184	13.41	3.2
5017-00000-SIS002	01-07-2024	31-12-2024	184	14.44	3.94
5017-00000-SIS003	01-07-2024	31-12-2024	184	13.57	4.17
5017-00000-SIS004	01-07-2024	31-12-2024	184	13.99	4.79
5017-00000-SIS005	06-08-2024	31-12-2024	148	59.64	7.6
5017-00000-SIS006	09-07-2024	31-12-2024	176	31.19	5.25
5017-00000-SIS007	09-07-2024	31-12-2024	176	35.28	4.98
5017-00000-SIS008	06-08-2024	31-12-2024	148	38.02	6.46
5017-00000-SIS009	03-09-2024	31-12-2024	120	32.39	8.71
5017-00000-SIS010	03-09-2024	31-12-2024	120	36.52	6.41

5017-00000-SIS011	26-09-2024	31-12-2024	97	9.38	3.26
5017-00000-SIS012	28-09-2024	31-12-2024	95	6.1	1.94

The average flow rate presented here is the statistical average of all extraction volume data points (including zeros, if any) – ignoring any time periods where data record indicates no data (“nan”). Based on this data, the assumed flow rates in the modelling are overstated by approximately 400% (20kL/day vs 5kL/day), reflecting a very conservative approach to water extraction rates.

A report on SIS well performance at North Goonyella (Weisstech, 2023) demonstrates that gas production effectively ceased at four production locations before the 800th day online, indicating that CSG production per bore will likely be less than 800 days. As a conservative assumption, the following prediction of impact is based on well life of 21 months.

The CSG extraction wells are represented in the following groundwater assessment as linear features, running north to south, from well head to gas riser.

1.2.2 Underground Gate Roads

The Project will involve the construction of four (4) underground gate roads to enable safe and efficient transport of personnel, equipment and extracted materials. The gate roads are designed to advance the development of future underground mine activities by establishing the first longwall mining panels.

The gate road development scheduled for installation is illustrated in **Figure 1-2** and will support the extraction of three (3) longwall panels in the future. Gate roads will be constructed using single pass continuous miners to a width of 5.4 m and a ceiling height of 3.6 m. The gate road network will be developed in three years, staged as per **Figure 1-2** below.

Roof and rib (sidewall) support (e.g. bolts, mesh and/or shotcrete) will be installed progressively to ensure adequate strata reinforcement. Services such as ventilation systems, conveyor systems, power cables, water pipes, compressed air lines and communication systems will then be installed to ensure the safety of personnel, control of contaminants, conveyance of coal and movement of equipment. Underground roadways are constructed such that they remain stable for the life of the mine and will become unserviceable following extraction of an adjacent longwall panel or if abandoned for a significant time.

This hydrogeological assessment treats the gate roads as areas where groundwater will be drained to maintain dry operations.

Figure 1-2 Indicative timing of gate road excavation

1.2.3 Other Proposed Activities

In addition to the CSG extraction and underground gate road excavation outlined above, there are a number of proposed disturbances included in this EA Amendment application that are not considered in this hydrogeological study. This list, and the corresponding justification for the exclusion from the groundwater assessment, is detailed in Table 1-2.

Table 1-2 List of proposed disturbance works included within this EA Amendment application

Proposed Infrastructure/Activity	Comment
Drill pads	Surface disturbance, no significant hydrogeological impact.
Gas conformance boreholes	Cased and fitted with monitoring equipment, no significant water extraction and minimal down-hole disturbance.
Goaf drainage lines	Gas management for underground development draining formation. Aligned with proposed gate roads and hydraulically insignificant compared with size of tunnels.
Geotechnical boreholes	Investigation points, not long-term water production
Gas risers	Part of gas management from gate road network. While this will likely drain water from parts of the aquifer, it will not be hydraulically significant compared with size of gate road tunnels.
Shallow geothermal energy (SGE) boreholes	Cased and fitted with monitoring equipment, no significant water extraction
Service boreholes	Lined boreholes. No long-term water production or aquifer drainage
Exploration boreholes	Investigation points, not long-term water production
Spontaneous combustion testing boreholes	Investigation points, not long-term water production
Bleeder shaft	Lined borehole. No long-term water production or aquifer drainage
Water bores	Water monitoring only, no significant water extraction anticipated
Access Road	Surface disturbance. No hydrogeological impact.

2.0 Existing Environmental Values

2.1 Climate

SILO is a database of Australian climate data from 1889 to the present. It provides daily meteorological datasets for a range of climate variables in ready-to-use formats suitable for biophysical modelling, research and climate applications. SILO is hosted by the Queensland Department of Tourism Environment, Science and Innovation (DETSI). From the database, historical data for the closest location to Centurion Coal Mine (Lat -21.60 / Long 147.95) was downloaded for the time between October 2024 to October 2025. The Project Area is characterised by a subtropical climate with hot, humid summers and mild to cold winters. Figure 2-1 shows average monthly rainfall and pan evaporation for the Centurion Coal Mine (SILO, 2025). The highest rainfall months are February and March and the highest potential evaporations rates occur during the wet season from October to march.

At the start of the wet season (October), evaporation is high (>200 mm) but gradually declines as rainfall increases, with rainfall exceeding evaporation in February and March. After the wet season, average monthly rainfall reduces remaining low from May to September while evaporation increases from July through to November.

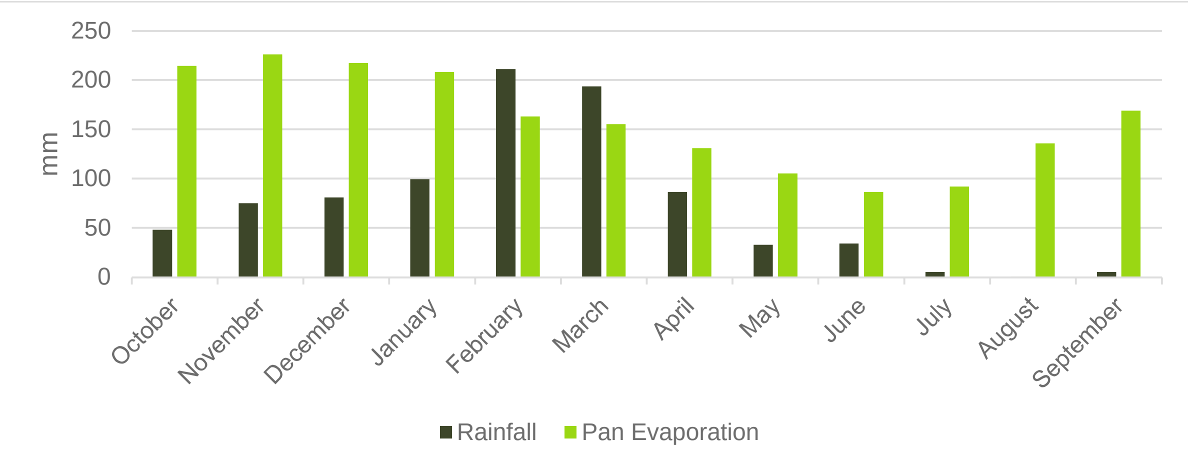


Figure 2-1 Mean monthly rainfall and mean pan evaporation (SILO, 2025)

2.2 Geology and Hydrostratigraphy

2.2.1 Hydrostratigraphy

The hydrostratigraphy relevant to the Project comprises the Quaternary alluvium, Tertiary strata (basalt and sediments) and Permian strata. The conceptual cross section of the hydrogeological setting is provided in **Figure 2-2** and the surface geology of the Project Area is shown in **Figure 2-3**. The cross section illustrates how the steeply dipping Permian coal measures subcrop into a thick tertiary sequence (up to 150 metres thick). This Tertiary sequence is primarily comprised of basalt, with lenses of sedimentary material throughout, termed interlens sand and silt. A basal tertiary sand unit has been mapped in the paleochannel of the Permian/Tertiary contact. This section outlines the known geological relationships and input to numerical model in more detail.

The representation of the solid geology (excluding Tertiary and Quaternary cover sequences) across the Project Area within the numerical model has been based on the geological model for the Project Area provided by Peabody.

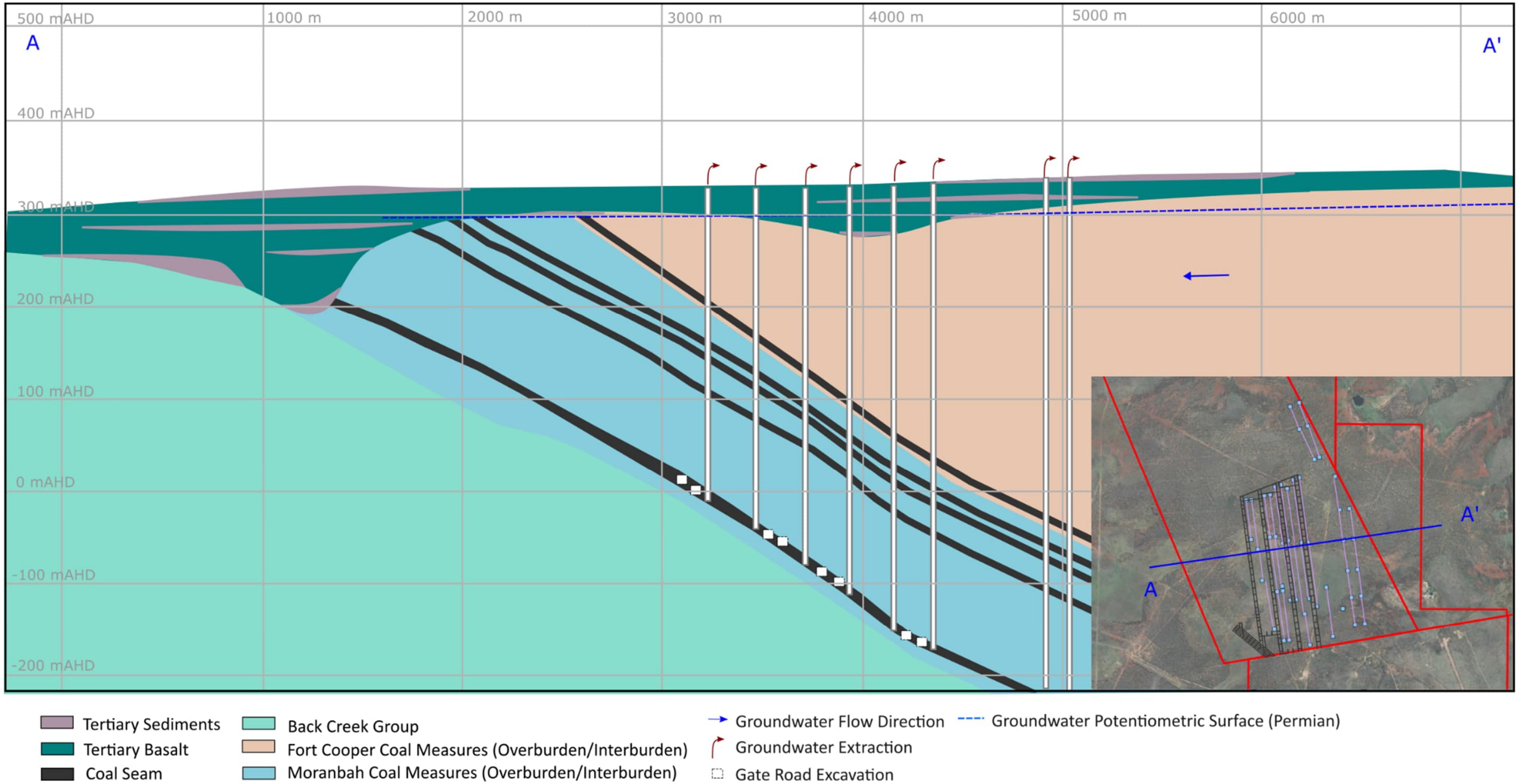
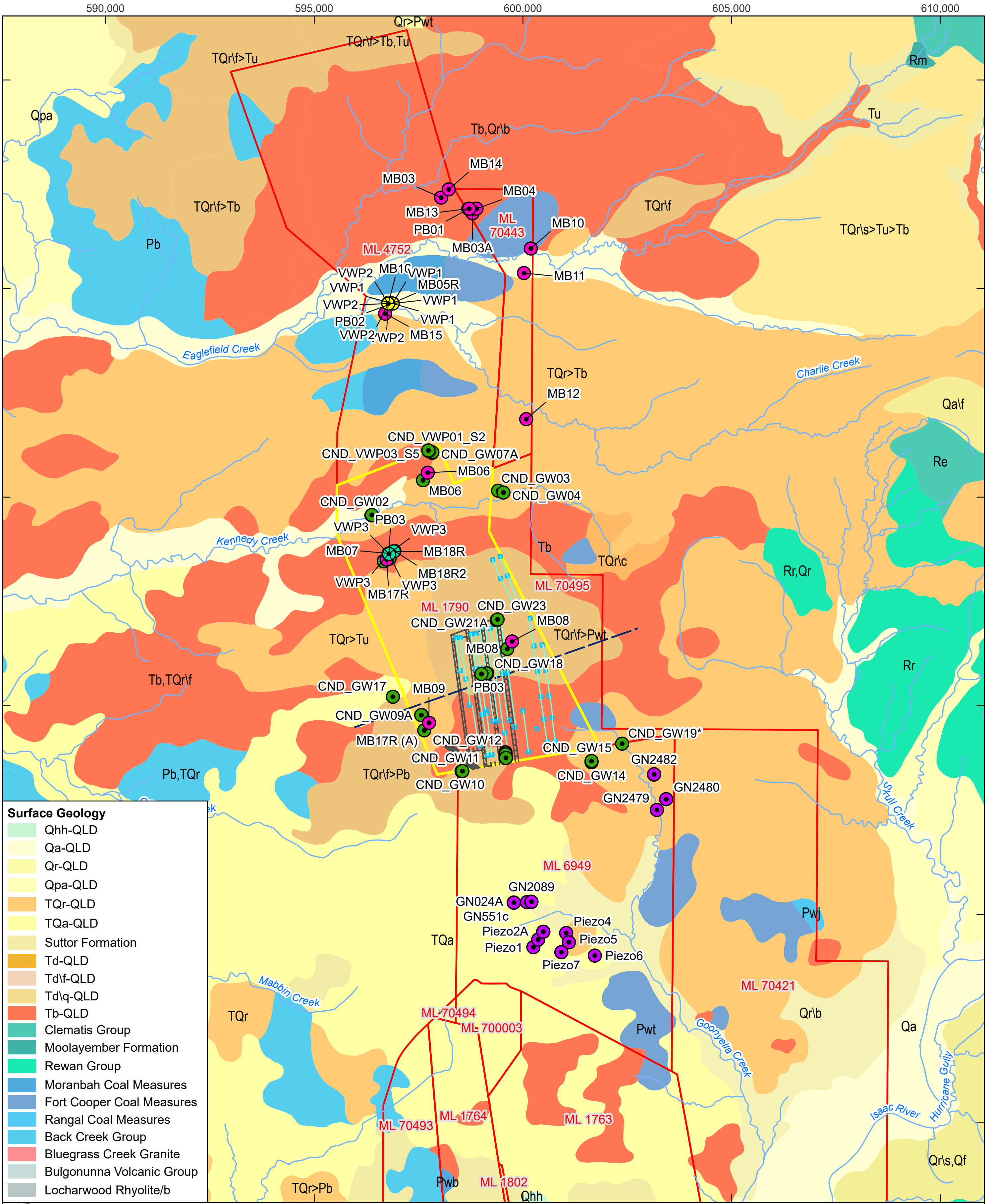


Figure 2-2 Conceptual hydrogeological cross section



0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:120,000 at A4
Project Number:	620.042334
Date Drawn:	22-Jan-2026
Drawn by:	RB

CENTURION

LEGEND

Monitoring Bore

- Basalt
- Permian (Coal)
- Permian (Interburden/Overburden)
- Tertiary Sediments
- Installed Q4 2025
- Centurion South Monitoring

- Hydrogeological Cross Section
- Watercourse
- Mining Lease
- Project Area
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

CENTURION NORTH DEVELOPMENT

SURFACE GEOLOGY AND MONITORING NETWORK

FIGURE 2.3

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F02-03_Surface Geology and Monitoring Network

2.2.1.1 Quaternary Alluvium

The distribution of Quaternary alluvium is associated with creeks and drainage lines. Where present, the thickness of the alluvium is likely to be highly irregular, with estimates of maximum thicknesses in the range of 15 to 25m (Golder, 2020). Groundwater flow within the alluvium (if/where saturated) will follow topographic gradients but it is considered unlikely that, where present, the alluvium forms a continuous saturated aquifer. Relative to the proposed production wells, the nearest Quaternary Alluvium is located along Kennedy Creek, approximately 7.5 kilometres (km) northwest of the proposed production well field.

Recharge to the Quaternary alluvium will occur via direct infiltration of rainfall and occasional creek flow/flooding during the wet season (Golder, 2020, BMC, 2021). Discharge mechanisms from the alluvium include evapotranspiration, leakage to underlying/adjacent aquifers and groundwater extraction (BMC, 2021). Previous conceptualisations have noted all creeks in the area are ephemeral, however no quantitative assessment of potential for baseflow have been carried out. No water level data for this unit is available in the monitoring network.

2.2.1.2 Tertiary

The Tertiary strata includes thick basalt flows interbedded with sediments. The flows and sediments occupy Tertiary paleochannels in the Permian coal measures basement. These strata represent the most significant groundwater resource in the region.

Groundwater within the basalt is stored and transmitted through fractures, joints, and discontinuities within the rock mass. The aquifer is layered due to the presence of sediments and weathering horizons which develop between individual flows. Typically, low permeability is associated with massive basalt in the centre of the flows, separating higher permeability vesicular basalts, which develop at the top and bottom individual flows (Golder, 2017).

As outlined in Krasny & Sharp (2007), properties of volcanic rocks vary with their position relative to the emission point or line. Distal formations tend to be dominated by successions of lava flows with top and bottom breccias and intercalated sediments, fine ashes, and soils that may control groundwater flow. These structures and vertical heterogeneities are likely present within the Project and are represented in the numerical model.

In most areas the basalt is underlain by sediments of variable thickness, however, in some areas the basalt is directly in contact with the underlying Permian strata. The sediments between the basalt and underlying Permian strata include lenses of sand (“basal sands”) that may be hydrogeologically significant due to high primary porosity and hydraulic conductivity. In addition to basal sands at the bottom of the unit, there are “interflow” (i.e. in between basalt flows) sands present where sediment has accumulated before the subsequent basaltic flow deposition.

Data on the thickness and key features within the Tertiary basalt is presented in Golder (2017). As displayed in (**Figure 2-4**), this investigation used exploration drilling data to establish mapping for the base of the Tertiary, basalt thickness, the inferred thickness of Tertiary sediments underlying the basalt across ML1790, and the immediate surroundings. The basalts are thickest along the western, north-western and northern edge of ML1790 reaching thicknesses of up to 150m, including one data point at the south-western corner of ML 1790, proximal to the proposed well field. Building on this information, Umwelt (2025), mapped inferred interflow basalt zones, and their relationship to the basal sediments mapped to be present in channel areas of the basalt flows (**Figure 2-5**).

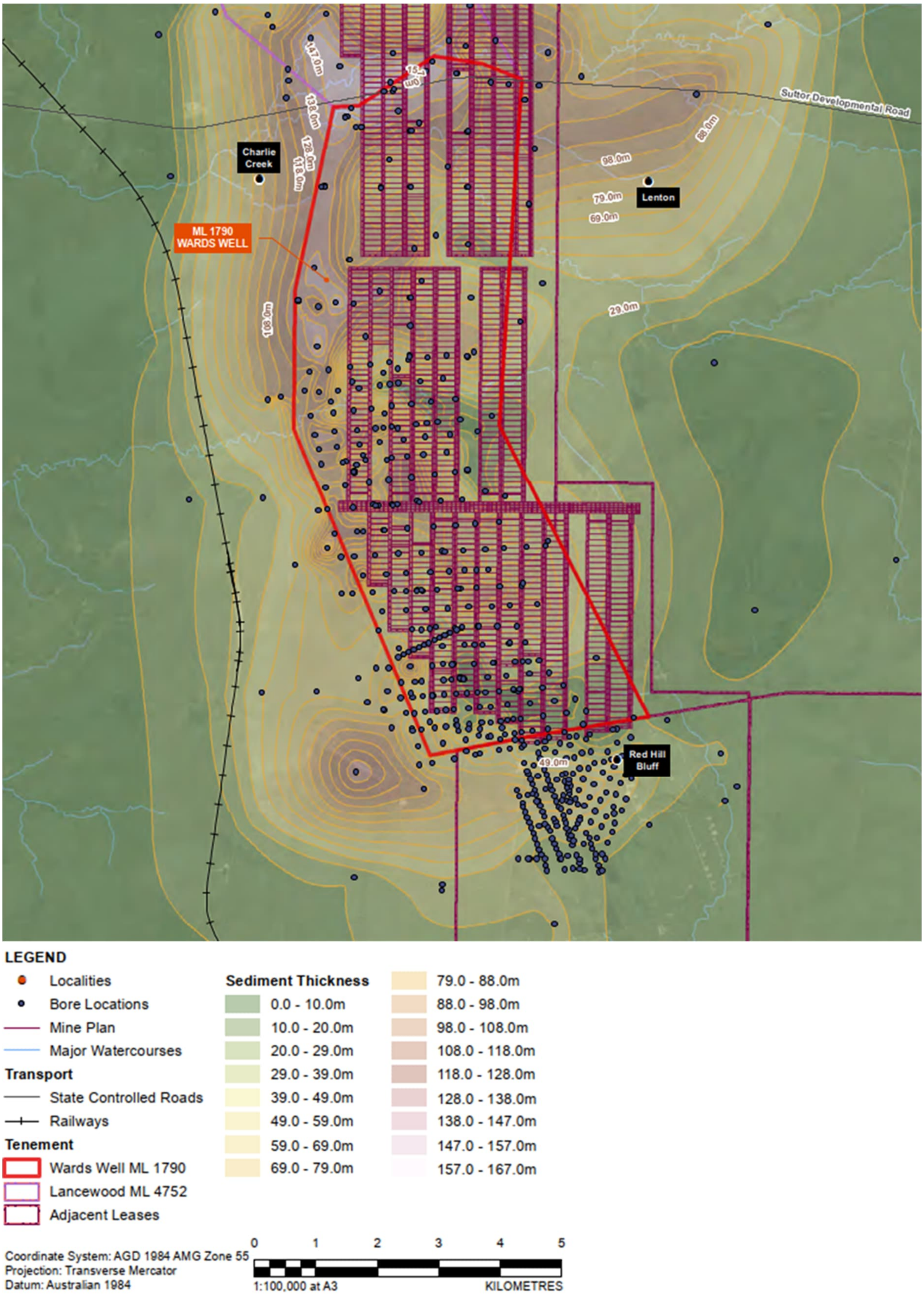


Figure 2-4 Tertiary Basalt Thickness Across ML 1790 (Golder, 2017)

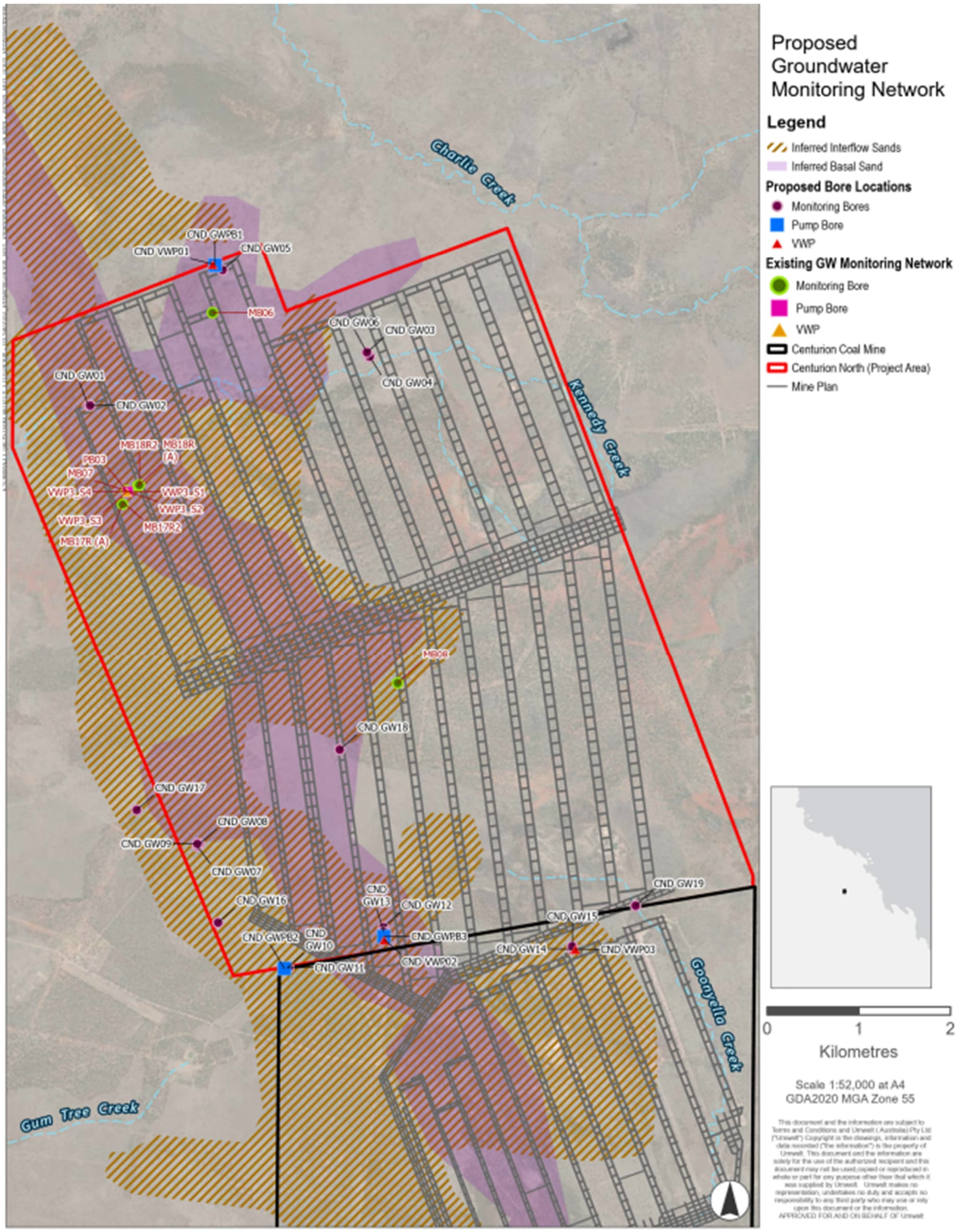


Image Source: ESRI Basemap (2024) | **Data Source:** NSW DFSI (2024)

Figure 2-5 Inferred interflow sands and basal sands extent within basalt (Umwelt, 2025)

2.2.1.3 Permian

Beneath the Quaternary and Tertiary cover sequences, the Permian sedimentary strata are the deepest formations relevant to the Project. These units include the Fort Cooper Coal Measures (FCCM), the Moranbah Coal Measures and Back Creek Group. They are predominantly made up of siltstone, sandstone, calcareous and carbonaceous shale and coal seams, dipping between 5 and 10 degrees to the east north east in most areas of site.

The coal seams and jointed sandstone units are generally the most transmissive units within in the coal measures with water moving through the coal seams via joints and fractures. The lower permeability interburden/overburden units (siltstones and mudstones / shales) may have some fracture permeability but typically confine groundwater within the coal seams.

Recharge to the Permian occurs via downwards seepage from overlying aquifers, though faults or discontinuities and where these units outcrop / subcrop through the direct infiltration of rainfall or overland flow (Golder, 2020, BMC, 2021). Discharge from the Permian is expected to occur through downgradient flow, downwards seepage through structural discontinuities and groundwater extraction (including dewatering) (Golder, 2020, BMC, 2021).

Fort Cooper Coal Measures

The Fort Cooper Coal Measures conformably overlie the Moranbah Coal Measures and subcrop east of throughout the study area . Regionally, the formation has a maximum thickness of approximately 350 m (HydroSimulations, 2018) and drill logs indicate the Fort Cooper Coal Measures comprise lithic sandstone, conglomerate, mudstone, carbonaceous shale, coal, tuff and tuffaceous (cherty) mudstone.

Moranbah Coal Measures

This unit contains the target coal seams for The Project. It comprises laterally persistent sandstone, siltstone, claystone, mudstone, and coal sedimentary sequences, dipping between 5 and 10 degrees to the east in most areas. The unit contains three main seam groups within the Project Area, Goonyella Upper, Goonyella Middle and Goonyella Lower seam groups. The target unit for all proposed extractive activities is the Goonyella Middle.

Back Creek Group

Along the western margin of the Centurion mining lease is the subcrop of the Back Creek Group, comprising the German Creek Formation and other undifferentiated mudstone, sandstone, siltstone and shale packages. This unit is considered basal for the groundwater system within the Project Area, underlying the coal seams of the Moranbah Coal Measures. The contact between this unit and the overlying formations dips approximately 3° to 6° towards the east, in line with the regional syncline, and the unit subcrops to the base of tertiary cover throughout the western margin of the modelled area.

2.2.2 Hydraulic Properties

Site specific hydraulic conductivity estimates from field testing are presented in **Table 2-1**.

Hydraulic conductivity estimates for the Quaternary alluvium indicate a range from 2 to 20 metres per day (m/day). However, this is based on testing of the regional studies and no site specific testing has been conducted.

Hydraulic conductivity estimates from one bore in the shallow Tertiary sediments (sandy sediments of the Suttor Formation), shows a range from 0.3 to 0.8 m/day. The silt and clay layers of this formation would be expected to have permeabilities several orders of magnitude lower. The Tertiary sediments distribution model (Silwa, 2011) indicates a varied composition and distribution of sand, clay and mixed material for these sediments.

Two long term pumping tests in the basalt (AGE, 2012a) were conducted at the northern end of ML 1790 some 8-10 km north of the proposed production well area. These tests provided hydraulic conductivity estimates for the basalt ranging from 0.01 m/d to 2.4 m/d. Hydraulic conductivity, transmissivity and storage of the Tertiary basalt is likely to vary significantly across the area.

Hydraulic conductivity estimates for the Permian interburden/overburden range from 2 x 10^{-6} to 0.33 m/day. Hydraulic conductivity estimates for the Permian coal seams ranged from 2 x 10^{-6} to 0.47 m/day, with estimates for the Goonyella seams in the range 0.003 to 0.47 m/day.

Table 2-1 Hydraulic conductivity estimates from field testing

Aquifer	K (m/day)	Test bore/area	Type	Source
Alluvium	2 to 20	Regional study		Arrow 2012[1]
	3	Suttor Creek	-	Golder, 2005[1]
Tertiary sediments	0.3 to 0.8	PB03	CRT	AGE, 2012a
Tertiary Basalt	0.5 to 2.4	PB01	CRT	AGE, 2012a
	0.01 to 0.4	PB02	CRT	AGE, 2012a
Permian GM[2] Seam	0.003 to 0.034	GBMC	-	URS, 2013[1]
	0.01	GBMC	-	Golder, 2016[1]
Permian GL[3] Seam	0.06 to 0.47	GBMC	-	URS, 2013[1]
	0.01 to 0.1	GBMC	-	URS, 2013[1]
	0.01	GBMC	-	Golder, 2016[1]
Permian GU[4] Seam	0.01	GBMC	-	Golder, 2016[1]
Permian coal seams (undifferentiated)	1 x 10^{-6} to 0.001	Wards Well ML	packer	AGE, 2012a
Permian Interburden	2 x 10^{-5} to 0.33	GBMC	-	URS, 2013[1]
	2 x 10^{-6} to 3 x 10^{-5}	Red Hill	-	URS, 2013[1]
Permian Overburden/Interburden	8 x 10^{-4}	GBMC	-	Golder, 2016

1 as reported by Golder (2020)
- test type not reported
CRT = Constant Rate Test
GBMC = Goonyella Broad Meadow Complex
[2]GM = Goonyella Middle
[3]GL = Goonyella Lower
[4]GU = Goonyella Upper

Storage values were derived from pumping tests (reported in AGE, 2012a) and are tabulated in **Table 2-2**. The specific storage value for the Tertiary basalt derived from the pumping test analysis varies between 1 x 10^{-5} and 5 x 10^{-2}, with a median value of 1 x 10^{-4}.

Table 2-2 Storage coefficient estimates from field testing

Aquifer	Storage Coefficient	Test bore/area	Type	Source
Tertiary sediments	0.00007 to 0.007	PB03	CRT	AGE, 2012a
Tertiary Basalt	0.0001 to 0.05	PB01	CRT	AGE, 2012a
	0.00002 to 0.00006	PB02	CRT	AGE, 2012a

2.3 Groundwater Conditions

This section outlines the baseline understanding of hydrogeological conditions that informs model design and impact assessment. SLR understands that work is currently underway to establish additional monitoring locations and increase the information available for the Project.

2.3.1 Existing Monitoring Network

The groundwater monitoring network within the Project site comprises 22 monitoring bores the details of which are provided in **Table 2-3**. Bore locations are shown on **Figure 2-3**.

The network includes a combination of open standpipe bores and vibrating wire piezometers. Most were installed in 2011 and monitored regularly from 2011 to 2015. There are currently no monitoring bores installed Alluvium within the Project Area.

Table 2-3 Centurion North Groundwater Monitoring Network

Bore ID	Installation Type	Easting (AGD84z55)	Northing (AGD84z55)	Surface Elevation (mAHD)	Screen Top (mAHD)	Screen Base (mAHD)	Screened Unit
MB03	Open Standpipe	597925	7621999	317.394	267.7	255.7	Basalt
MB03A	Open Standpipe	598677	7621620	324.198	188.2	176.2	Basalt
MB04	Open Standpipe	598774	7621735	325.76	186.8	177.8	Basalt
MB05R	Open Standpipe	596746	7619459	303.27	170.3	164.3	Basalt
MB06	Open Standpipe	597606	7615404	314.62	235.1	229.1	Basalt (weathered)
MB07	Open Standpipe	596667	7613469	311.91	248.9	242.9	Basalt
MB08	Open Standpipe	599625	7611360	335.89	267.9	264.9	Basalt
MB09	Open Standpipe	597636	7609408	323.26	274.3	271.3	Basalt
MB10	Open Standpipe	600074	7620779	320.71	218.7	203.7	Basalt
MB11	Open Standpipe	599910	7620191	319.7	204.7	198.7	Basalt
MB12	Open Standpipe	599966	7616689	322.4	291.4	288.4	Basalt
MB13	Open Standpipe	598577	7621732	325.69	198.7	180.7	Basalt (weathered)
MB14	Open Standpipe	598107	7622196	317.67	247.4	235.4	Basalt
MB15	Open Standpipe	596585	7619217	303.31	173.3	164.3	Basalt
MB16	Open Standpipe	596665	7619480	311.52	185.3	173.3	Basalt
MB17R	Open Standpipe	596623	7613321	312.67	247.7	244.7	Basalt
MB18R	Open Standpipe	596792	7613520	312.66	222.7	216.7	Tertiary Sediments (sand)

MB18R (2)	Open Standpipe	596807	7613531	312.68	234.7	228.7	Basalt (weathered)
PB01	Pumping Bore	598598	7621736	325.78	225.2	187.1	Basalt
PB02	Pumping Bore	596750	7619459	303.03	187.6	157.6	Basalt
PB03	Pumping Bore	596679	7613458	311.91	236.7	230.7	Tertiary Sediments
VWP1_S1	Vibrating Wire Piezometer	596765	7619461	303.31	-9.2		Overburden
VWP1_S2					-30.2		Goonyella Upper 0
VWP1_S3					-142.2		Goonyella Middle 0
VWP1_S4					-208.2		Goonyella Lower 8
VWP2_S1	Vibrating Wire Piezometer	596658	7619459	302.98	103		Overburden
VWP2_S2					90		Goonyella Lower 8
VWP2_S3					73		Interburden
VWP2_S4					57.5		Goonyella Lower 10
VWP3_S1	Vibrating Wire Piezometer	596669	7613460	311.84	146.4		Interburden
VWP3_S2					105.84		Goonyella Middle 0
VWP3_S3					79.84		Goonyella Lower 3
VWP3_S4					47.84		Goonyella Lower 8

The CCM (ML 6949) groundwater monitoring network was also considered at the latest stages of groundwater model refinement (**Table 2-4**). The provided data included a number of gaps including screen depths and screened units that limited the utility of this data for the assessment.

Table 2-4 CCM monitoring network

Bore ID	Installation Type	Easting (AGD84z55)	Northing (AGD84z55)	Bore Depth (m)	Screen Top (mAHD)	Screen Base (mAHD)	Screened Unit
GN024	MB	599785	7605279	77	No data	No data	Unknown
GN024A	MB	599781	7605283	121	No data	No data	Unknown
GN063	MB	600096	7605292	146.7	No data	No data	Unknown
GN066	MB	600198	7605292	153	No data	No data	Unknown
GN2089	MB	600205	7605302	No data	No data	No data	Unknown
GN2479	MB	603210	7607502	102	No data	No data	Unknown
GN2480	MB	603433	7607761	21	286.52	277.52	Basalt
GN2481	MB	603140	7608349	26	291.77	279.77	Basalt
GN2482	MB	603143	7608358	35	284.07	272.07	Basalt
GN551c	MB	599785	7605279	555	No data	No data	Unknown
Piezo1	TSF MB	600250.9	7604211.7	6.9	No data	No data	Unknown
Piezo2A	TSF MB	600366	7604393	11	299.09	289.59	Quaternary clay

Piezo2B	TSF MB	600491	7604584	14	289.63	286.63	Quaternary loam
Piezo3	TSF MB	600487	7604583	11.1	No data	No data	Unknown
Piezo4	TSF MB	601037	7604551	11.5	No data	No data	Unknown
Piezo5	TSF MB	601102	7604329	16.5	No data	No data	Unknown
Piezo6	TSF MB	601722	7604010	8	297.49	290.99	Fill - grey shale
Piezo7	TSF MB	600921	7604092	11.6	299.06	289.56	Quaternary sandy clay

Additional groundwater monitoring was installed in Q4 2025 and these locations area shown in **Table** 2-5. They are additionally shown visually on **Figure 2-3**. These additions to the existing groundwater monitoring network were designed an implemented by Umwelt consultants. No groundwater level or quality monitoring is currently available for these locations.

Table 2-5 Recently installed groundwater monitoring at Centurion North

Bore ID	Installation Type	Easting (AGD84z55)	Northing (AGD84z55)	Surface Elevation (mAHD)	Screen Top (mAHD)	Screen Base (mAHD)	Screened Unit
CND_GW01	MB	596372	7614563	300.4	293.4	290.4	Sand
CND_GW02	MB	596383	7614572	300.5	286.5	280.5	Weathered basalt
CND_GW03	MB	599405	7615155	318.7	311.7	308.7	Unconsolidated sediments
CND_GW04	MB	599534	7615110	318.2	293.2	287.2	Weathered basalt
CND_GW05	MB	597825	7616063	317.5	230.0	218.0	Basalt
CND_GW06	MB	597764	7616093	316.5	196.5	190.5	Sand
CND_GW07A	MB	597831	7616075	317.2	265.2	259.2	Basalt
CND_GW08	MB	597577	7609777	324.3	292.1	283.1	Basalt
CND_GW09A	MB	597565	7609775	324.1	192.2	189.2	Coal
CND_GW10	MB	598531	7608430	320.0	264.7	258.7	Sand/clay
CND_GW11	MB	598551	7608433	320.1	284.9	275.9	Weathered basalt
CND_GW12	MB	599583	7608884	325.8	286.8	280.8	Basalt
CND_GW13	MB	599583	7608849	326.0	258.3	252.3	Sand/weathered basalt
CND_GW14	MB	601644	7608645	319.0	253.3	256.3	Sand
CND_GW15	MB	601644	7608675	317.9	284.8	275.8	Weathered basalt
CND_GW16A	MB	Still to be installed			0.0	0.0	Coal
CND_GW17	MB	596886	7610214	312.0	274.0	268.0	Weathered basalt
CND_GW18	MB	599147	7610778	325.6	311.6	305.6	Weathered basalt
CND_GW19*	MB	602377	7609090	310.0	294.0	291.0	Clay
CND_GW20	MB	599125	7610777	325.5	295.5	289.5	Weathered basalt
CND_GW21A	MB	599373	7612051	336.7	237.4	225.4	Fractured siltstone
CND_GW22	MB	599586	7608836	326.2	270.2	267.2	Upper Sand
CND_GW23	MB	599393	7612068	336.8	288.8	282.8	Basalt
CND_PB1	PB	597749	7616105	317.2	230.6	219.2	Basalt

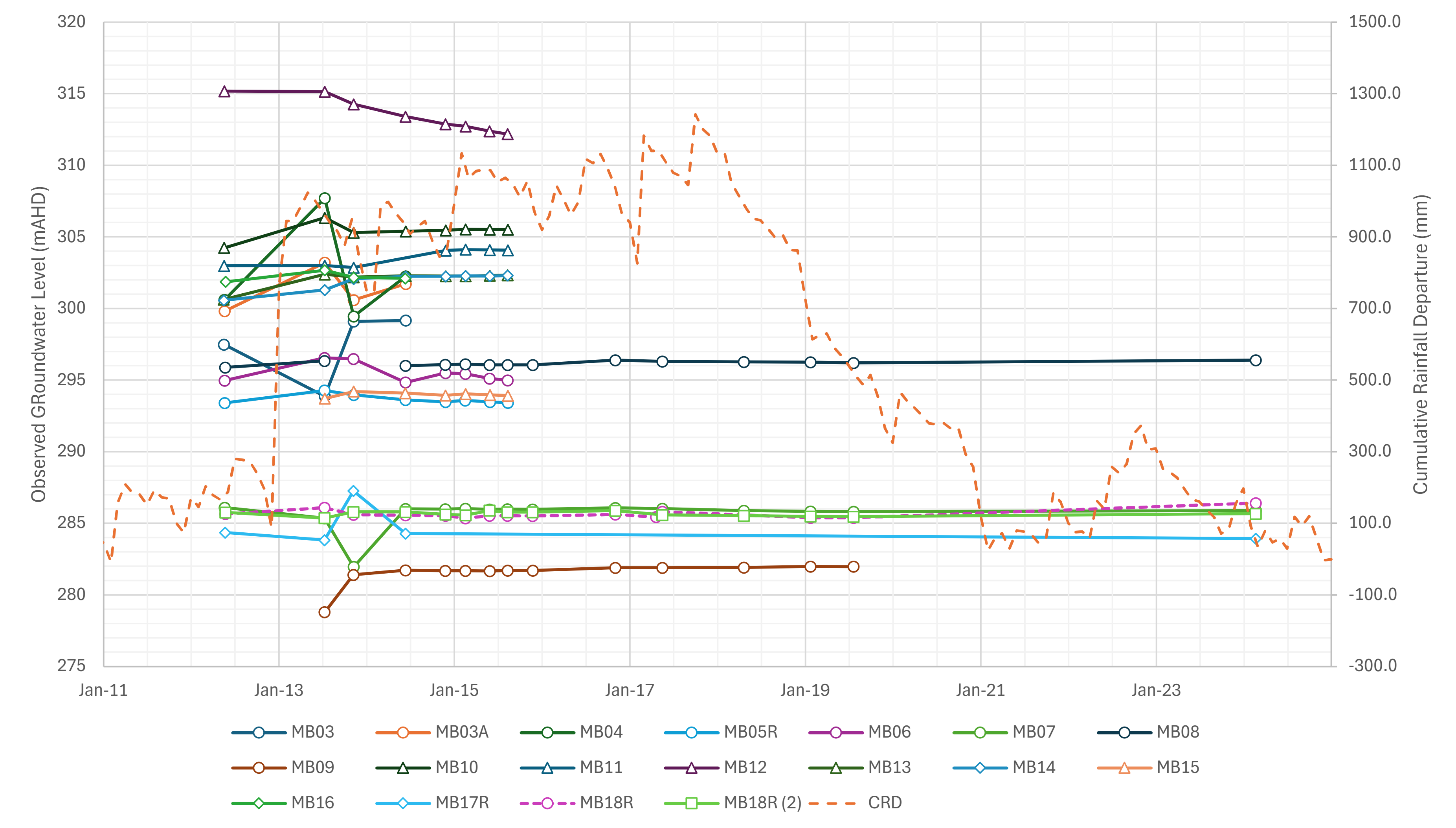
CND_PB2	PB	596812	7613655	312.4	262.4	250.9	Basalt
CND_PB3	PB	597739	7616110	316.5	202.2	196.5	Sand
CND_VWP01_S1	VWP	597740	7616110	316.5			Overburden - sandstone
CND_VWP01_S2							GU Seam
CND_VWP01_S3							Interburden - siltstone
CND_VWP01_S4							P Seam
CND_VWP01_S5							GM Seam
CND_VWP02_S1	VWP	599594	7608749	327.3			Overburden - mudstone
CND_VWP02_S2							GUA Seam
CND_VWP02_S3							Interburden - sandstone
CND_VWP02_S4							P Seam
CND_VWP02_S5							Interburden - tuff
CND_VWP02_S6							Interburden - siltstone
CND_VWP03_S1	VWP	597736	7616119	337.0			Overburden - siltstone
CND_VWP03_S2							Overburden - sandstone
CND_VWP03_S3							GUA Seam
CND_VWP03_S4							Interburden - siltstone
CND_VWP03_S5							P Seam
CND_VWP03_S6							Interburden - siltstone

2.3.2 Water Level

Hydrographs for historical water level monitoring on site are provided in **Figure 2-6**. Most of these bores are screened in the basalt aquifer, and are located over 7 km north of the proposed disturbance area. Groundwater levels within the basalt generally decline from the northeast to the southwest, following the mapped paleochannels in this unit (**Section 2.2.1**). They are generally stable, with fluctuations associated primarily with climatic influence, albeit a subdued reaction in most cases.

No groundwater level monitoring is available in shallow sediments to confirm whether groundwater is present or not, or how it responds in relation to the other monitored aquifers.

Figure 2-6 Hydrographs for groundwater monitoring network at Centurion North



Located in the central northern area of the Project, MB08 is screened in the basalt aquifer between 264.9 and 267.9 mAHD and gives the best indication of groundwater conditions in this aquifer within the proposed disturbance area. **Figure 2-7** shows a hydrograph for MB08 with Cumulative Rainfall Departure included to assess the impact of longer term rainfall variations.

Groundwater levels at MB08 show a very mild recovery trend that is counter to the general climatic trend from 2013-2015. Based on groundwater levels at MB08, Tertiary basalt groundwater levels are expected to be relatively insulated from meteoric influence.

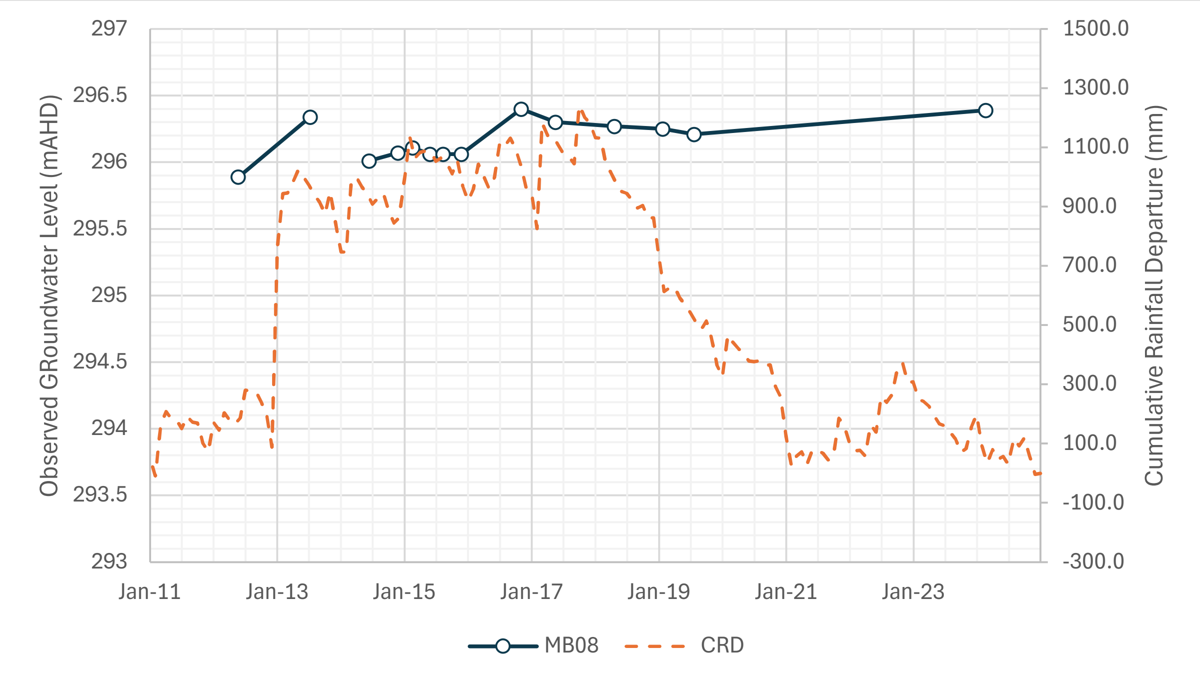


Figure 2-7 Groundwater level monitoring bore MB08 hydrograph

Also located in the immediate area of the Project, MB09 is screened in basalt at the level of 271-274 mAHD (**Figure 2-8**). This bore shows lower water level, though a similar recovering trend to MB08.

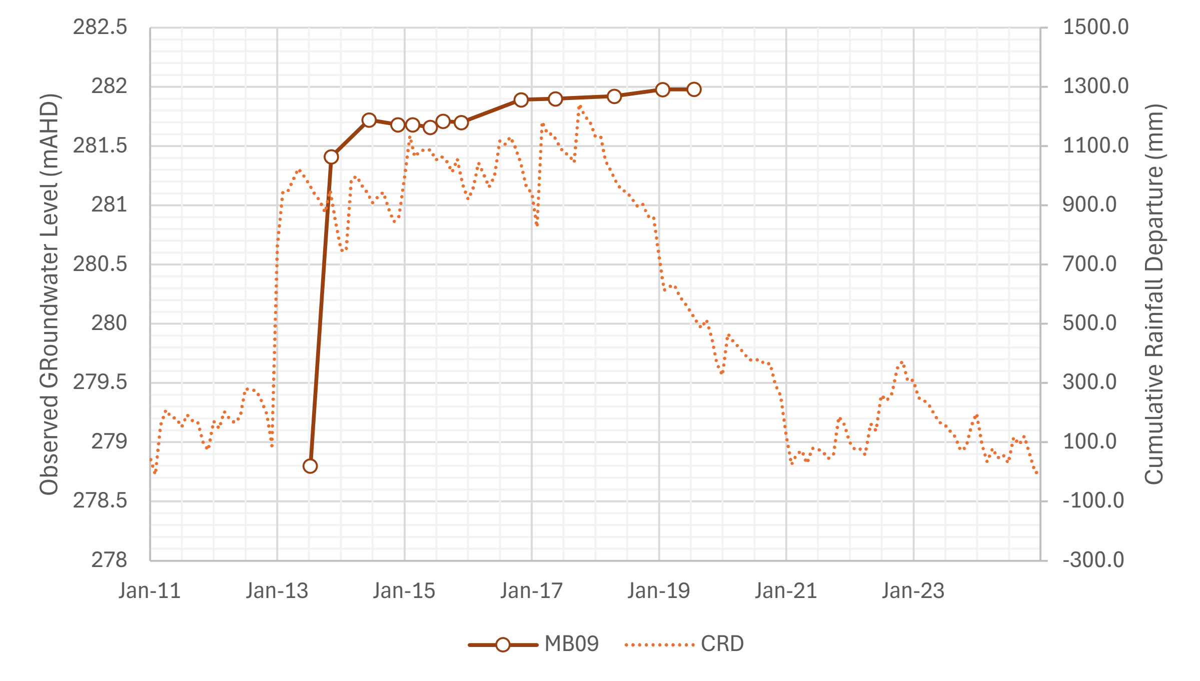


Figure 2-8 Groundwater level monitoring bore MB09 hydrograph

The nearest groundwater level monitoring in the Permian coal seams is VWP03, approximately 2.7 km northwest of the proposed production bore field. Hydrograph of this data is provided in **Figure 2-9**.

Sensor lithology corresponds to

- Sensor 4: Interburden
- Sensor 3: Goonyella Middle 0
- Sensor 2: Goonyella Lower 3
- Sensor 1: Goonyella Lower 8

Groundwater level and flow direction in the Permian was additionally investigated by developing groundwater level contours from exploration drilling bores that were cased to below 150 metres below ground level (mbGL) i.e. reflecting groundwater conditions in the Permian (**Figure 2-10**). These are considered to be low reliability water level estimates as they are likely to present as averaged piezometric level Permian strata that are exposed in the borehole (including coal and overburden). Based on these localised contours for data collected in 2011, the interpreted groundwater flow direction is to the south and west.

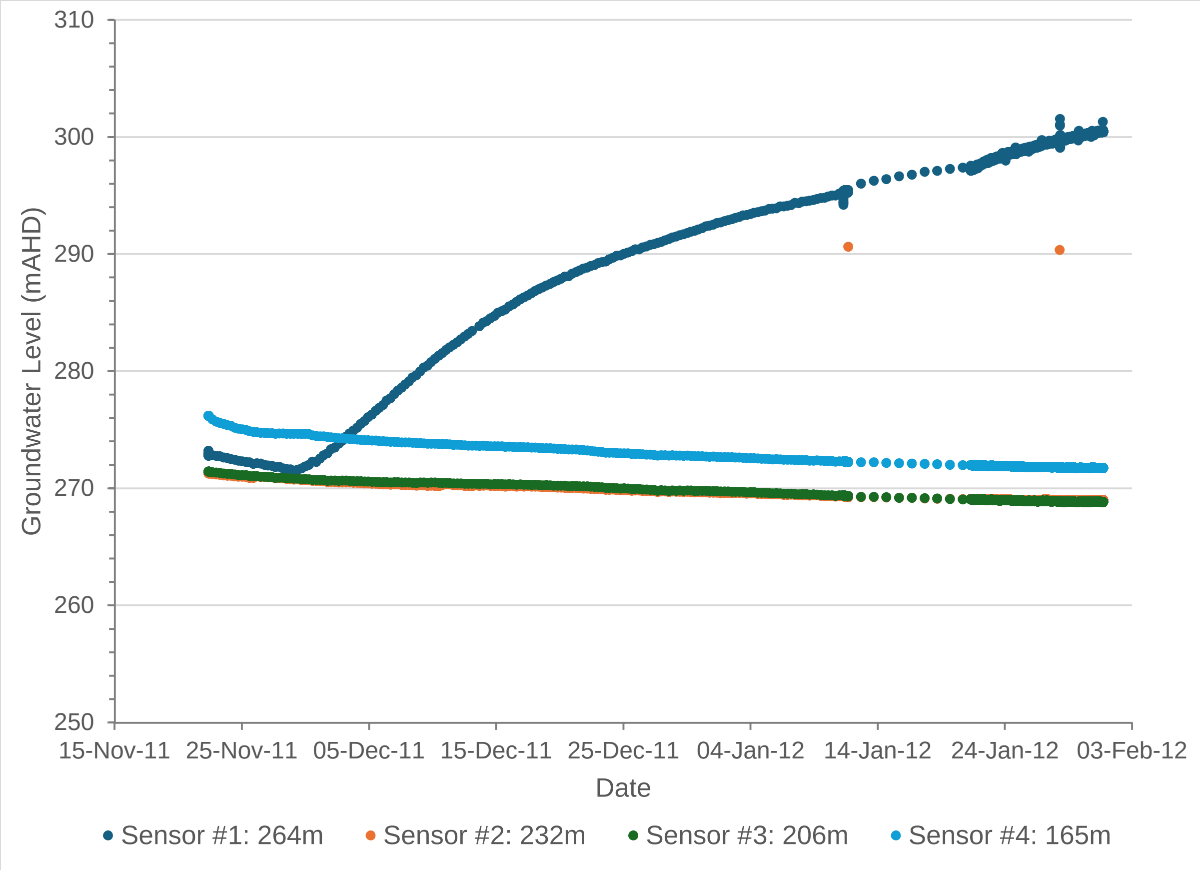
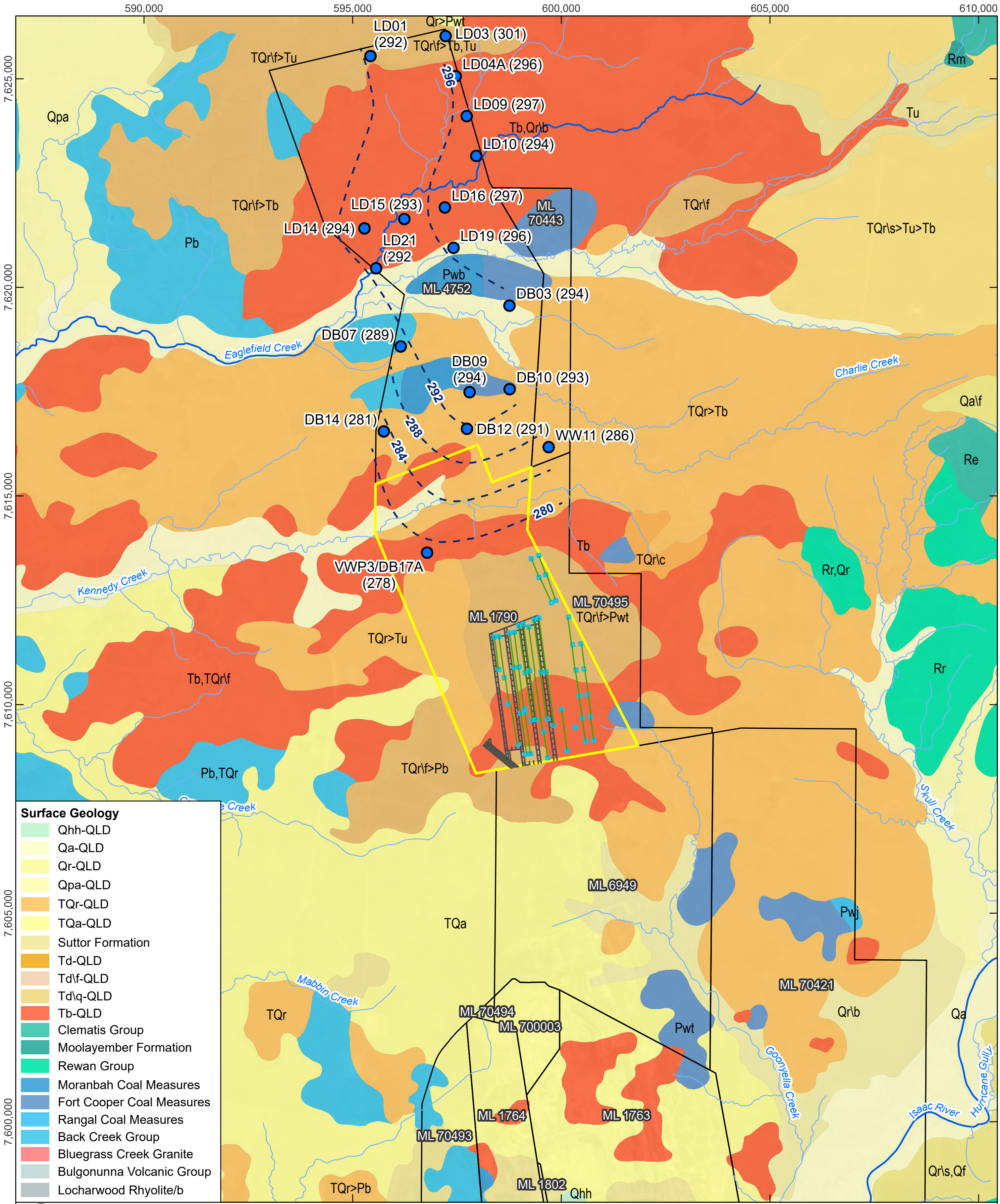


Figure 2-9 VWP03 hydrograph

Groundwater levels in the Project Area from 310 mAHD (Basalt - MB12) to approximately 270 mAHD (Permian – VWP1), with a downwards vertical hydraulic gradient. Though there are rheological differences at lithology contacts identified in the geological data (AGE, 2012a) that may increase the likelihood of compartmentalisation within groundwater systems and flow anisotropy. There is no data on the nature of interaction between Quaternary Alluvium and the underlying sediments and it is assumed that there is a degree of connection between these units as a conservative assumption for the groundwater risk assessment.

The depth of key Permian horizons such as the coals seams in the Moranbah Coal Measures, and the underburden and overburden of the back Creek Group and Fort Cooper Coal Measures, complicate the data collection and baseline definition of these units. Installation of vibrating wire piezometers provides some evidence for groundwater pressures and interaction between horizons, which may not otherwise be possible considering the challenges of proper installation of bore screens at extreme depth. Work is currently occurring on site to address data gaps with regard to Permian horizon groundwater level. This is discussed in **Section 2.3.4**.



0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:120,000 at A4
Project Number:	620.042575
Date Drawn:	31-Oct-2025
Drawn by:	RB

CENTURION

LEGEND

- Exploration and Monitoring Bore Water levels (2011)
- Permian Contour
- Major Watercourse
- Minor Watercourse
- Project Area
- Mining Lease
- CSG Well Trace
- Underground Gate Road
- SIS Well Pad

CENTURION NORTH DEVELOPMENT

PERMIAN COAL MEASURES GROUNDWATER CONTOURS (2011)

FIGURE 2-8

2.3.3 Water Chemistry

Groundwater quality data collected for the Project Area indicates the following:

- Tertiary Sediments (MB18R and PB03): Variable salinity, but generally brackish to saline (up to 6,600 µS/cm, with an average of ~3,700 µS/cm), slightly alkaline pH (7.32 to 7.61) and sodium chloride dominated;
- Basalt: Moderate salinity, ranging from slightly brackish to saline (893 µS/cm to 4,670 µS/cm), very slightly alkaline to moderately alkaline pH (7.16 to 8.97), and sodium chloride dominated; and
- Permian Coal Measures: Limited data exists for monitoring bores screened within the coal measures outside of two rounds of grab samples in late 2011. Chemistry results from these sampling rounds indicated that groundwater in the coal measures is of significantly higher in salinity, and more alkaline compared to samples from the basalt and alluvium.

Major ion data for the Centurion North monitoring locations that are presented in **Table 2-3** shows relatively consistent water type, with sodium-chloride chemistry dominating. Areas of relatively higher Bicarbonate content in the fresh and weathered basalt may indicate water chemistry mixing in locations closer to areas where meteoric recharge is occurring.

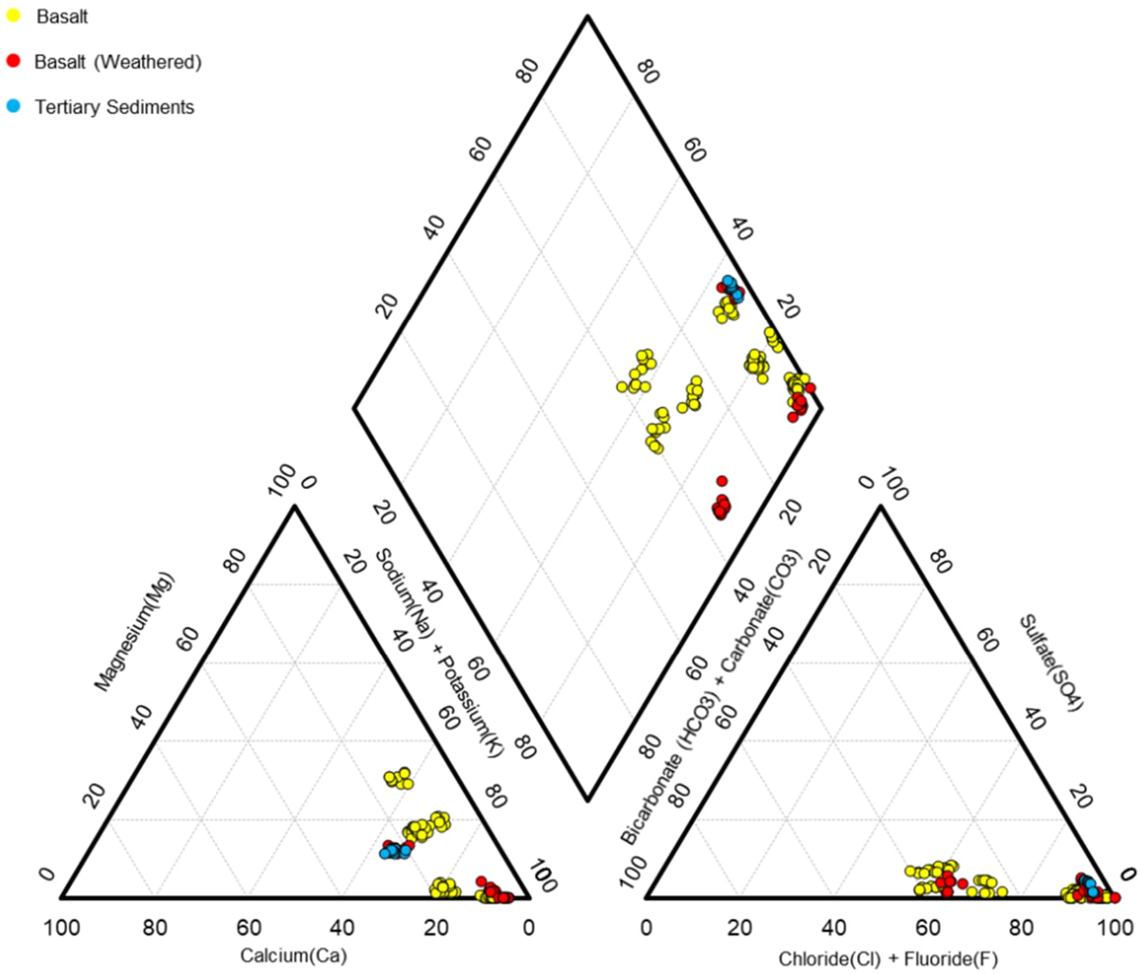


Figure 2-11 Piper plot of water chemistry data at the Project (Golder, 2020)

2.3.4 Addressing Water Level and Quality Data Gaps

We understand that Umwelt are currently developing / implementing a groundwater monitoring network / program for the full Centurion North project. The currently available details of this program are summarised below.

Monitoring locations installed in 2025 (**Table 2-5**) address gaps in the current monitoring network around the proposed development, including key potential flow pathways including to the west, south and southeast of the proposed development. Nested bores have been installed to establish the vertical gradients between hydrostratigraphic units. Automatic water level loggers will be installed at all of the open piezometer locations.

Ongoing groundwater quality monitoring will be conducted in accordance with AS/NZS 5667.11-1998 Water quality – Sampling. Analytes are to include:

- Physical parameters
  - Temperature (field), pH (field and laboratory), EC (field and laboratory), total dissolved solids (TDS), DO and ORP
- Major ions
  - Calcium, chloride, fluoride, manganese, potassium, sodium, sulfate as SO4 – turbidimetric
- Alkalinity
  - Bicarbonate alkalinity as CaCO3, carbonate alkalinity as CaCO3, hydroxide alkalinity as CaCO3, and total alkalinity as CaCO3
- Hardness
  - Total hardness as CaCO3
- Total Organic Carbon
- Metals (dissolved (field filtered) and total)
  - Aluminium, arsenic, barium, beryllium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, uranium, vanadium, and zinc
- Total recoverable hydrocarbons (TRH) with silica gel clean-up
  - C6-C10, C6-C10 (minus BTEX), C10-C16 (minus naphthalene), >C10-C16, C16-C34 and C34-C40 and C10-C40 (sum)
- BTEX
  - Benzene, toluene, ethylbenzene, meta- Xylene, para-Xylene, ortho-Xylene and naphthalene
- Hydrocarbons - Ethylene Glycol
- Nutrients
  - Ammonia, nitrate as N, nitrite as N, nitrate + nitrite as N, total nitrogen as N, and total phosphorus
- Dissolved gases

Three new pumping test bores have also been installed and Umwelt indicate that this testing will evaluate further the appropriate hydraulic property ranges and the degree of hydraulic connection between the key units.

2.3.5 Recharge and Discharge

2.3.5.1 Diffuse Recharge

Diffuse recharge occurs as direct rainfall infiltration to aquifers in the study area. Climatic conditions such as rainfall patterns and seasonality, evaporation and potential evapotranspiration observed in a region will drive the estimation of diffuse recharge. Diffuse recharge from rainfall was estimated using the Chloride Mass Balance (CMB) method, one of Australia's most widely used methods (Moeck et al., 2020; Crosbie and Rachakonda, 2021). The latest chloride deposition rate map from Wilkins et al. (2022) and chloride records across 21 bores in the Centurion sites were used to estimate groundwater recharge. CMB recharge estimates were calculated as follows:

$$R = \frac{D}{Cl_{GW}} * 100$$

Where:

R is recharge rate (mm/yr),

D is the chloride deposition rate (kg/ha/yr), and

Cl_{GW} is the chloride concentration in groundwater (mg/L).

The area's median recharge rate was calculated as 1.731 mm/y and ranges between 0.80 and 5.47 mm/yr. **Figure 2-12** shows the annual recharge rates for bores located in the different aquifers across Centurion. Nearly 90% of the bores with chloride measurements are observed in Basalt and Basalt (weathered) aquifer, with lower confidence in estimates for the other hydrostratigraphic units. No groundwater sample data was available for the Permian coal, overburden or interburden formation.

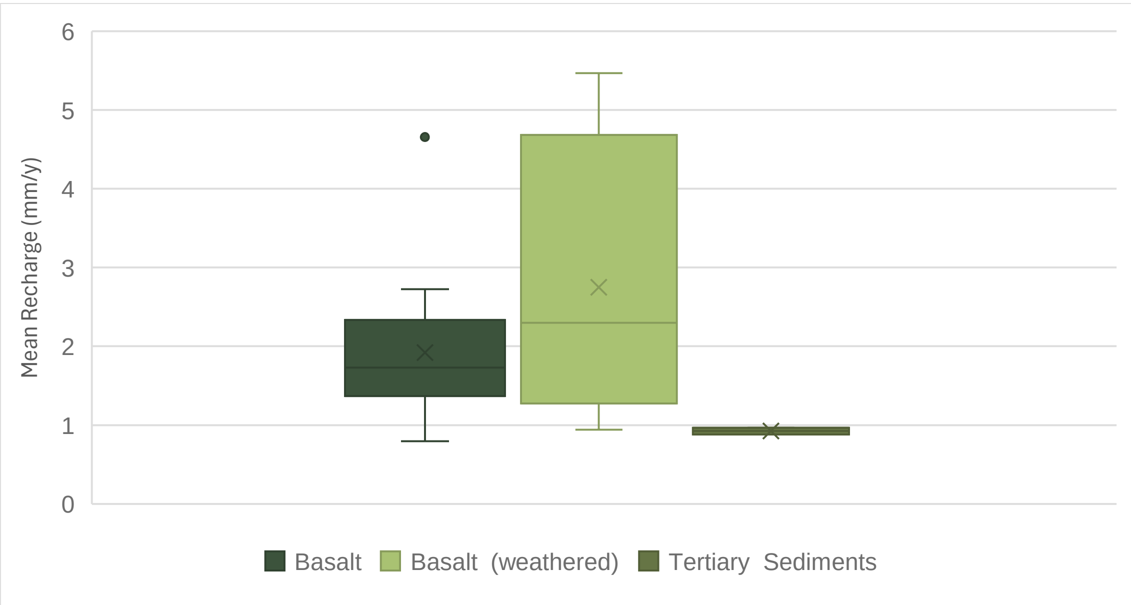


Figure 2-12 Chloride Mass Balance calculated recharge

2.3.5.2 Discharge

Discharge from the Basalt and Permian hydrostratigraphic units is understood to be primarily through inflow to mining operations, with the Centurion Underground Mine, and the Goonyella Riverside Mine voids located immediately to the south of the Project. Discharge from Alluvium and Tertiary sedimentary aquifers is primarily through evapotranspiration and leakage to underlying aquifers. No specific study has been carried out to date to establish the vertical gradient local to surface water features at the Project (i.e. Kennedy Creek), however it is understood that these features are likely to be ephemeral, with only very small-scale, brief connection with groundwater through bank storage.

2.4 Environmental Values

2.4.1 Groundwater Management Areas

The south-eastern corner of ML 1790 and the southern half of the adjoining ML 70495 lie within the Isaac-Conners Rivers catchment of the Fitzroy Basin and the Isaac Connors GMA. The rest of the Centurion Project Area to the north-west lies within the Suttor River catchment of the Burdekin Basin. The south-western area of ML 1790 which lies within the Suttor River catchment also lies within the Highlands Underground Water Area (**Figure 2-13**).

Groundwaters in the portion of the Project intersecting the Isaac Connors GMA are scheduled under the Queensland Environmental Protection Policy (Water and Wetland Biodiversity) 2019 (under the Environmental Protection Act 1994) as Isaac Groundwaters of the Isaac River Sub-basin of the Fitzroy Basin water plan (WQ1310). The legislated Environmental Values (EVs) for these groundwaters are:

- Biological integrity of aquatic ecosystems – these occur where groundwater baseflow supports streams and water holes to some extent (e.g. seasonally or permanently).
- Human use EVs:
  - Suitability of water supply for irrigation – where groundwater is used to grow crops and pastures for commercial purposes.
  - Farm water supply/use – where groundwater is used to provide domestic supply and support growing domestic produce.
  - Stock watering – where groundwater is used to provide stock water.
  - Drinking water supply – where groundwater is used for potable water supply.
  - Primary recreation – where groundwater supports recreational use that involves direct contact ad a high probability of being swallowed, e.g. diving, swimming, water skiing.
  - Cultural and spiritual values – where groundwater supports both indigenous and non-indigenous values, e.g. recreational fishing, heritage, ecology.

The majority of ML1790 is located within the Suttor River Catchment which is not a defined water management zone within the Burdekin Basin and no legislated EVs for groundwaters are currently defined. However, within this catchment the south western portion of ML 1790 lies within the Highlands Underground Water Area. The Water Act states that declared underground water areas may be subject to the following regulations:

- The taking of, or interfering with, underground water; and
- The types of works for taking or interfering with underground water that are assessable development or accepted development of the Planning Act.

The Water Regulation 2016, which describes the relevant legislation surrounding declared underground water areas, states that the Highlands Underground Water Area does not require water entitlement, water permit or seasonal water assignment notice for stock or domestic purposes or a prescribed activity. Prescribed activities in the context of mining operations include:

- Washing down equipment plant or vehicles;
- Supplying water for temporary camps or living quarters for staff, for example, for operating toilets, showers, kitchens, or laundries;
- Construction works, infrastructure or plant that are temporary and reasonably necessary for, or incidental to, carrying on mining under a mining lease granted under the Mineral Resources Act;
- Constructing, but not maintaining, roads with the area of a mineral development licence, or mining lease, granted under the Mineral Resources Act;
- Rehabilitation of riparian land;
- The following activities in relation to pumps, wells, or bores:
  - Constructing or drilling;
  - Proving supply;
  - Testing water quality; and
  - Flushing out.

Any dewatering requirements occurring within the bounds of the Highlands Underground Water Area will be subject to obtainment of a water entitlement, water permit or seasonal water assignment notice.

2.4.2 Water Supply Bores

A search of the Queensland Government's Registered Groundwater Bore Database (GWDB) (DRDMW, 2024) was undertaken to identify registered bores within the 10 km of the Project Area. The search returned 45 bores with the following uses:

- Mine monitoring (28 bores);
- Petroleum exploration (1 bores);
- Water supply (7 bores);
- Sub-artesian monitoring (5 bores);
- Unknown use (10 bores); and
- Decommissioned (1 bores).

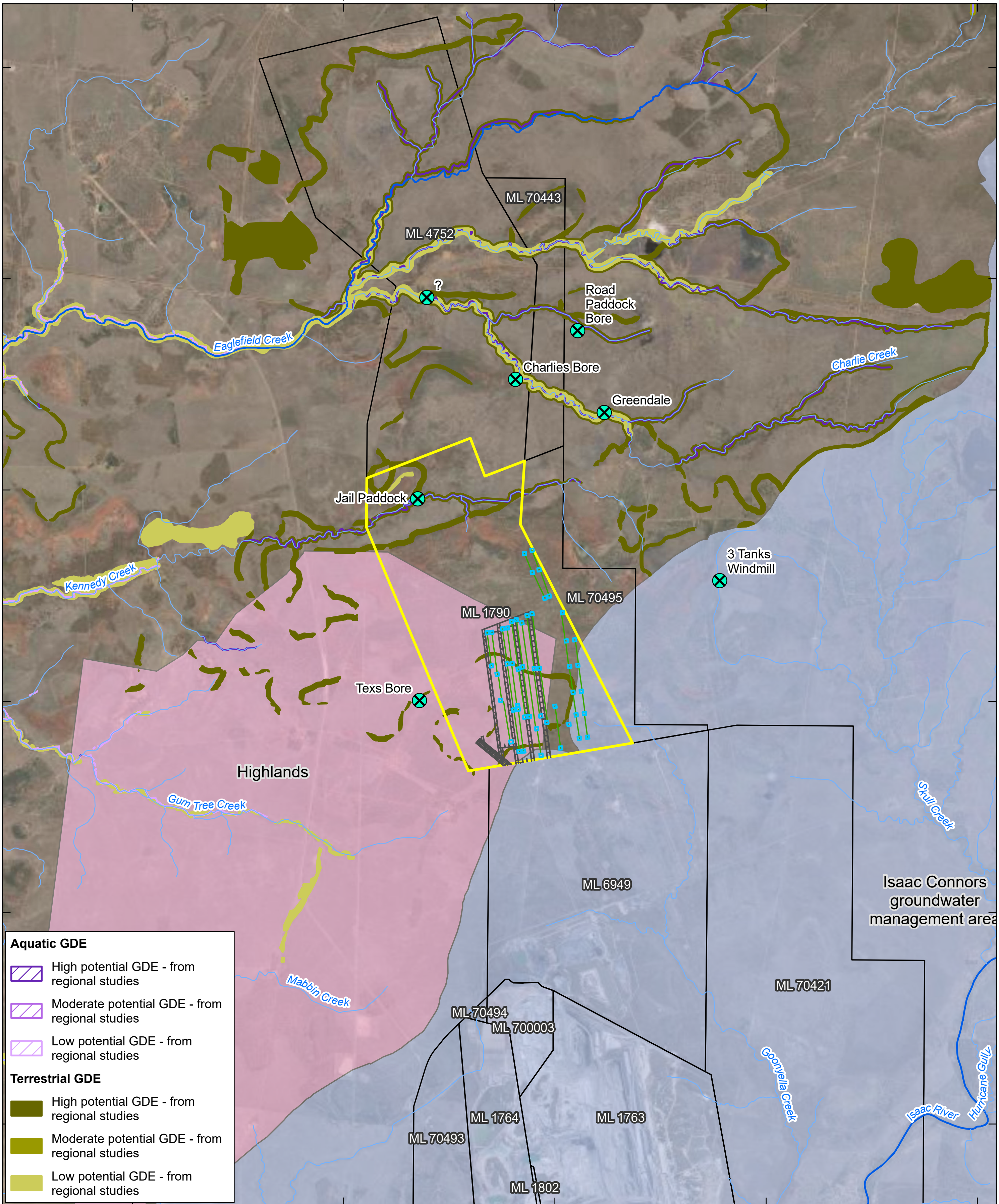
Monitoring bores, exploration, and decommissioned or abandoned bores were excluded, which left no existing registered water supply bores within the search area. A landholder bore census was conducted for the Wards Well EIS by AGE (2012b). The census included a total of 21 bores and identified five unregistered bores. The results of the survey indicated that these bores are used for stock watering. The locations of the five unregistered bores identified are included on **Figure 2-13**. Also included on **Figure 2-13** is Tex's Bore, a probable water supply location from the registered bore database. This bore is 118 m deep, likely drawing from groundwater in the basalt aquifer.

Table 2-6 Identified water supply bores in the area (AGE 2012b, DNRMMRRD 2025)

Easting (GDA2020z55)	Northing (GDA2020z55)	GIS name	Total Drilled Depth (m)	Water Depth Below Ref. (m)	Date of Measurement	Pumping Rate	pH	Electrical Conductivity (uS/cm)
596752	7614792	Jail Paddock	-	nm	nm	variable / 24 /7	nm	nm
603901	7612857	3 Tanks Windmill	-	nm	nm	variable / 24 /7	7.23	1410
600539	7618772	Road Paddock Bore	30	nm	nm	variable / 24 /7	nm	nm
599069	7617620	Charlies Bore	24.6	nm	nm	variable / 24 /7	7.15	1819
601167	7616836	Greendale	30	nm	nm	variable / 24 /7	7.56	2679
596795	7610020	Texas Bore	118.9	34.13	2013	4.5 L/sec	nm	nm

nm = not measured

- = no data



0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:120,000 at A4
Project Number:	620.042575
Date Drawn:	31-Oct-2025
Drawn by:	RB

CENTURION

LEGEND

- Bore Census Water Supply Bore (AGE 2012)
- Major Watercourse
- Minor Watercourse
- Project Area
- Mining Lease
- CSG Well Trace
- Underground Gate Road
- SIS Well Pad

Water Management Area

- Highlands
- Isaac Connors groundwater management area

CENTURION NORTH DEVELOPMENT

GROUNDWATER DEPENDENT ECOSYSTEM MAPPING AND GROUNDWATER USERS

FIGURE 2-11

Path: \\au.slr.local\Corporate\Projects-SLR\620-BNE\620-BNE\620.042575.00001 Centurion North Extension Proj\06 SLR Data\01 GIS\GIS\CNEP Major Amendment\CNEP Major Amendment.aprx\620042575_EA_GW_F02-11_GDE Mapping and Groundwater Users

2.4.3 Groundwater Dependent Ecosystems

Groundwater dependant ecosystems (GDEs) are terrestrial or aquatic ecosystems likely to require "access to groundwater to meet all or some of their water requirements on a permanent or intermittent basis, so as to maintain their communities of plants and animals, ecosystem processes and ecosystem services" (Richardson, et al., 2011).

A full investigation into the potential groundwater dependent ecosystems and subterranean fauna within the Project Area is outlined in Hydrobiology (2025). This investigation is understood to include assessment of potential GDEs that are mapped in BoM's National Atlas of Groundwater Dependent Ecosystems (GDE Atlas) (BoM, 2017) (**Figure 2-13)**. The GDE Atlas classifies ecosystems based on the potential for dependence on groundwater through multiple lines of scientific evidence. This regional mapping indicates that areas with possible high, moderate, and low potential for groundwater interaction occur in the vicinity of the Project. The mapping also identifies "high potential" for aquatic GDEs along Kennedy Creek (**Figure 2-14)**, approximately 8 km from the proposed disturbance area.

The BoM GDE Atlas does not show any known springs within 10 km of the Project Area, and there were no subterranean fauna detected during sampling (Hydrobiology, 2025).

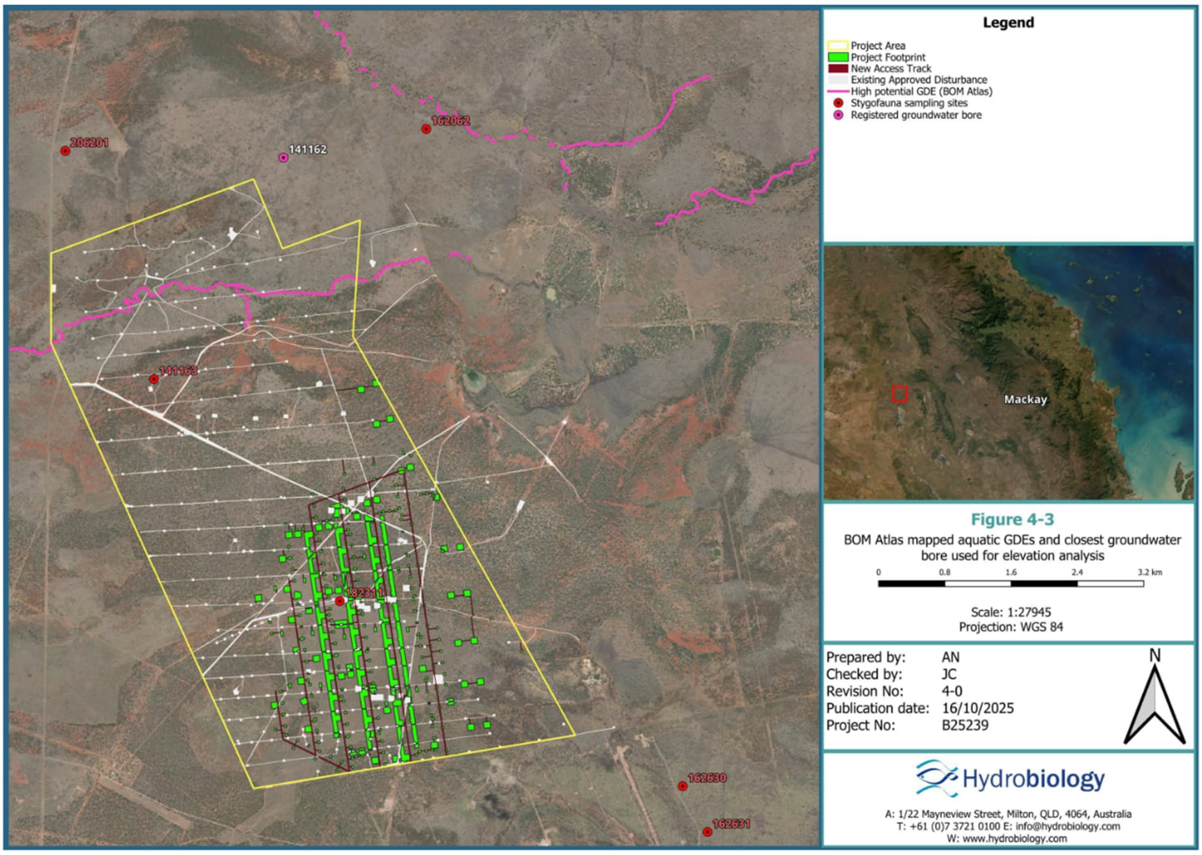


Figure 2-14 Stygofauna sample sites and potential groundwater receptor areas as per Hydrobiology (2025)

3.0 Numerical Model Construction

Numerical groundwater modelling was undertaken in support of the hydrogeological assessment for the proposed CSG extraction and underground gate road excavation to evaluate the potential impacts of these proposed disturbances on the groundwater regime. This section provides a summary of the design and development of the numerical groundwater model.

The objectives of the groundwater modelling were to:

- Assess the groundwater levels in all relevant hydrogeologic units, identify the time period of maximum hydraulic influence, and evaluate associated impacts on current and potential future receptors (drawdown, water quality and groundwater flow direction);
- Assess impacts to alluvial and Tertiary hosted groundwater and any identified potential receptors; and
- Assess the influence on potential groundwater receptors associated with surface drainage lines.

3.1 Model Code

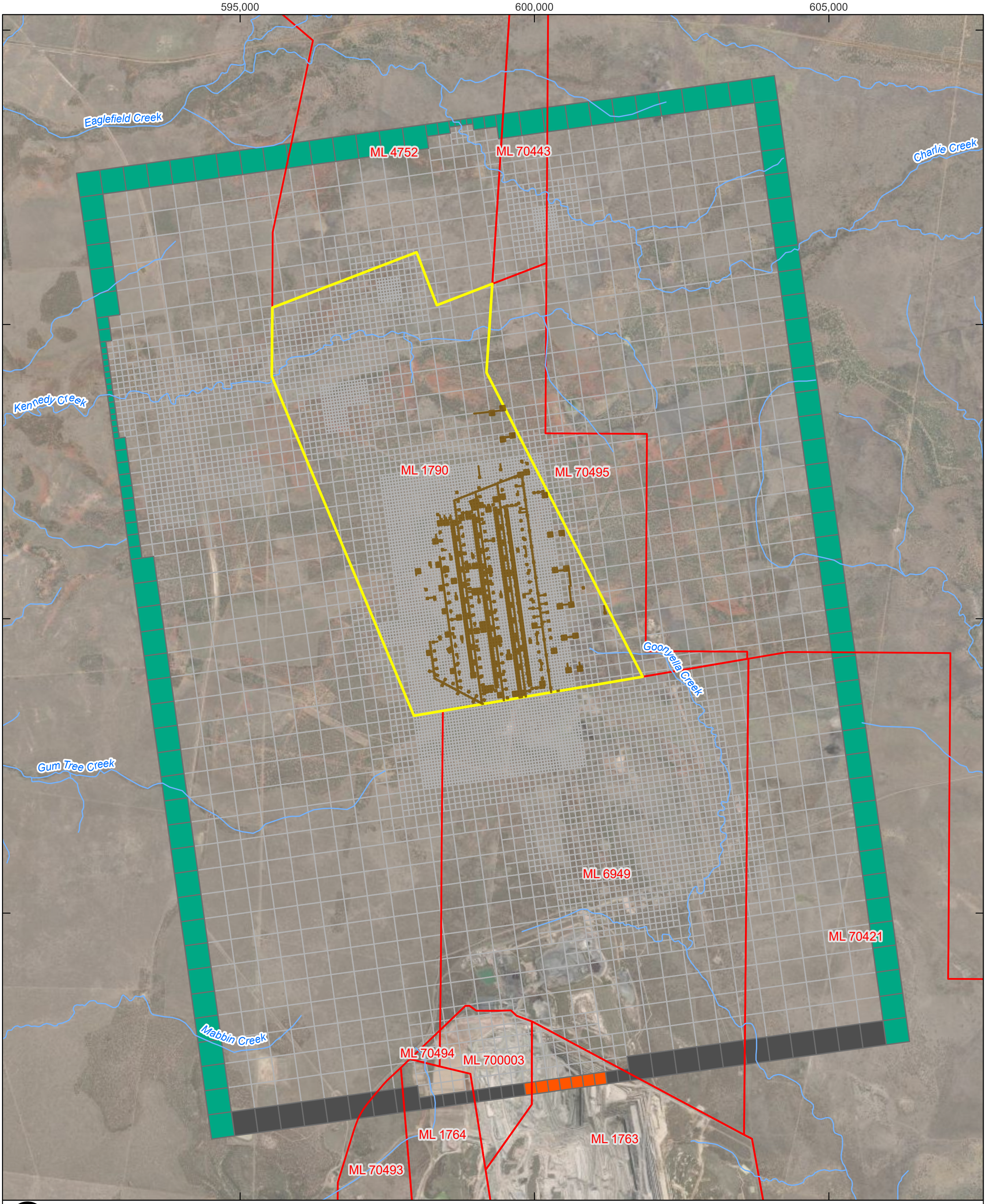
A numerical groundwater model has been developed using MODFLOW-USG (Panday et al. 2013, 2017), a version of the widely recognized MODFLOW code developed by the United States Geological Survey (USGS). MODFLOW-USG builds on the original version of MODFLOW (McDonald and Harbaugh, 1988). This code is considered an industry standard for groundwater modelling. For this project, a graphical user interface for the MODFLOW code named Groundwater Vistas was employed to construct the model, and to simulate the proposed disturbance.

3.2 Model Extent and Mesh Design

The model domain is shown in **Figure 3-1.** The model extent was designed to be large enough to incorporate the entire project site with boundaries at a distance sufficient to prevent boundary conditions from unduly influencing the model results. The model domain was selected based on the following considerations:

- The eastern and western boundary of the model was located 5.2 km and 4.6 km away from, and orientated parallel to, the easternmost and westernmost SIS wells, respectively.
- The northern and southern boundaries were extended based on being the maximum orientation of geological continuity in the Permian and hence informed the shape of the disturbance features. The objective of this elongation was to include the adjacent Centurion Underground Mine and Goonyella Riverside Mine voids in the assessment of cumulative impacts. In the north, the model boundary was extended to include Kennedy Creek and monitoring bores present in that area.

An unstructured grid with variable quadrilateral cell sizes was developed in Groundwater Vistas. Quadrilateral cell dimensions were selected to preserve numerical stability and simplicity of cell interactions. The grid was progressively refined from 400 m to 200 m around the Goonyella Riverside Mine (GRM), 100 m near the existing Centurion underground mining site, and 50 m at the proposed Centurion North Extension Project site.



0 1 2 km

Coordinate System: GDA2020 MGA Zone 55
Scale: 1:85,000 at A4
Project Number: 620.042334
Date Drawn: 22-Jan-2026
Drawn by: RB

LEGEND

- Watercourse
- Mining Lease
- Project Area
- Surface Activity
- Model Grid
- Drain Boundary
- General Head Boundary
- No Flow

CENTURION NORTH DEVELOPMENT

MODEL MESH AND BOUNDARY CONDITIONS

CENTURION

FIGURE 3.1

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F03-01_Model Mesh and Boundary Conditions

3.3 Layers and Features

The model domain was vertically discretised into 25 layers, shown in **Table 3-2**. Each layer comprising a cell count, up to 11,700. The total number of active cells in the model is 237,962.

The top of layer 1 (representing topography) has been developed based on LiDAR elevation data for the Project site provided by the client. Outside of these areas the Digital Elevation Model (DEM) from Geoscience Australia (2021) was used.

Figure 2-2 provides the hydrostratigraphic layering that has been implemented in the numerical model. In order to investigate the possible influences on groundwater flow behaviour by lenses of basal sands / sediment zones, the basalt unit has been vertically discretised into layers of alternating 5 m and 20 m thicknesses, with the 5 m thick layers allowing for zones of higher conductivity. The FCCM have been modelled as an amalgamation of overburden, interburden and FCCM coal seams, divided into three layers of equal thickness and with pinch-out occurring where the target coal seams or interburden units come into direct contact with higher units (alluvium, regolith / weathered material, basal sands). The individual seams within the FCCM have not been explicitly represented as they are not the target seams. **Table 3-1** shows the stratigraphy and the equivalent model layer.

Table 3-1 Stratigraphy and model layer equivalency

Stratigraphy	Detail	Model Layer	Typical Thickness (m)
Quaternary Alluvium	Alluvium	1	10
Tertiary Cover	Regolith	2	10
	Basalt, regolith and interbed sands (zoned)	3	5
		4	5
		5	20
		6	5
		7	20
		8	5
		9	20
		10	5
		11	20
		12	5
		13	20
		14	5
Fort Cooper Coal Measures	FCCM Overburden and coal seams	15	100
		16	100
		17	100
Moranbah Coal Measures	RQ Seam	18	2
	MCM Interburden	19	50
	Goonyella Upper	20	4

	MCM Interburden	21	100
	Goonyella Middle	22	5
	MCM Interburden	23	57
	Goonyella Lower	24	5
Back Creek Group	Siltstone	25	80

These layers were further divided into zones within all layers above the target seam (Goonyella Middle seam, layer 22) to allow for representation of subsidence and other hydrogeologic features via changes in hydraulic properties. A summary of the model zonation is presented in **Table 3-2**. This approach allows the model to represent the high degree of heterogeneity that is likely to be present in the stratified fractured basalt unit, where weathering horizons, interflow sands, fracturing and impermeable barriers are likely to complicate flow connections. These were based on mapping presented in Golder (2017) and Umwelt (2025) and discussed in **Section 2.2.1**. Zones in all consolidated units allowed the model to represent mining subsidence present south of the proposed disturbance area, increasing vertical conductivity in the units above the Permian coal seams.

In the zonation and model construction, particular attention was paid to Layer 22 areas where the Goonyella Middle seam was interpreted to contact the overlying basalt. This zone represents the primary potential connection point between mine disturbance and the regional surface aquifer. Horizontal and vertical conductivity were made isotropic in this zone to avoid issues with cell orientations preventing flow calculations that might otherwise exist based on hydraulic heads.

Table 3-2 Model layers and zones

Zone numbers	Layer	Zone	Typical Thickness (m)
1	1	Alluvium	
2		Colluvium & weathered sedimentary	
3		Weathered basalt	
4	2	Weathered zone	
5		Weathered zone (subsidence zone, higher Kz)	
6	3	Regolith	
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	4	Regolith	5
7		Basalt	
9 to 14		Interbed basalt sands	
6	5	Regolith	20
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	6	Regolith	5

Zone numbers	Layer	Zone	Typical Thickness (m)
7		Basalt	
15 to 20		Interbed basalt sands	
6	7	Regolith	20
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	8	Regolith	5
7		Basalt	
21 to 26		Interbed basalt sands	
6	9	Regolith	20
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	10	Regolith	5
7		Basalt	
27 to 32		Interbed basalt sands	
6	11	Regolith	20
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	12	Regolith	5
7		Basalt	
33 to 38		Interbed basalt sands	
6	13	Regolith	20
7		Basalt	
8		Basalt (subsidence zone, higher Kz)	
6	14	Regolith	5
7		Basalt	
39		Basal sands	
40	15	Permian overburden 1 (FCCM)	100
41		Permian overburden (FCCM subsidence zone, higher Kz)	
40	16	Permian overburden 2 (FCCM)	100
41		Permian overburden (FCCM subsidence zone, higher Kz)	
40	17	Permian overburden 3 (FCCM)	100
41		Permian overburden (FCCM subsidence zone, higher Kz)	

Zone numbers	Layer	Zone	Typical Thickness (m)
42	18	RQ seam	2
43	19	MCM[1] interburden upper	50
44		MCM interburden (subsidence zone, higher Kz)	
45	20	GU[4] seam	4
46	21	MCM interburden mid	100
47		MCM interburden mid (subsidence zone, higher Kz)	
48	22	GM[2] seam	5
49		GM[2] seam pinch Kv connection	
50		GM[2] seam UG mine area (subsidence zone, higher Kz)	
51	23	MCM interburden lower	57
52	24	GL[3] seam	5
53	25	Basement (blenheim/back creek)	80

[1]Moranbah Coal Measures
[2]GM = Goonyella Middle
[3]GL = Goonyella Lower
[4]GU = Goonyella Upper

Further to the zonation described above, the areas where Tertiary sediments (interflow and basal lenses) were inferred to be present were divided into a series of zones, reflecting lenses of connectivity within the flow areas (**Figure 2-5**). Hydraulic parameterisation is discussed below.

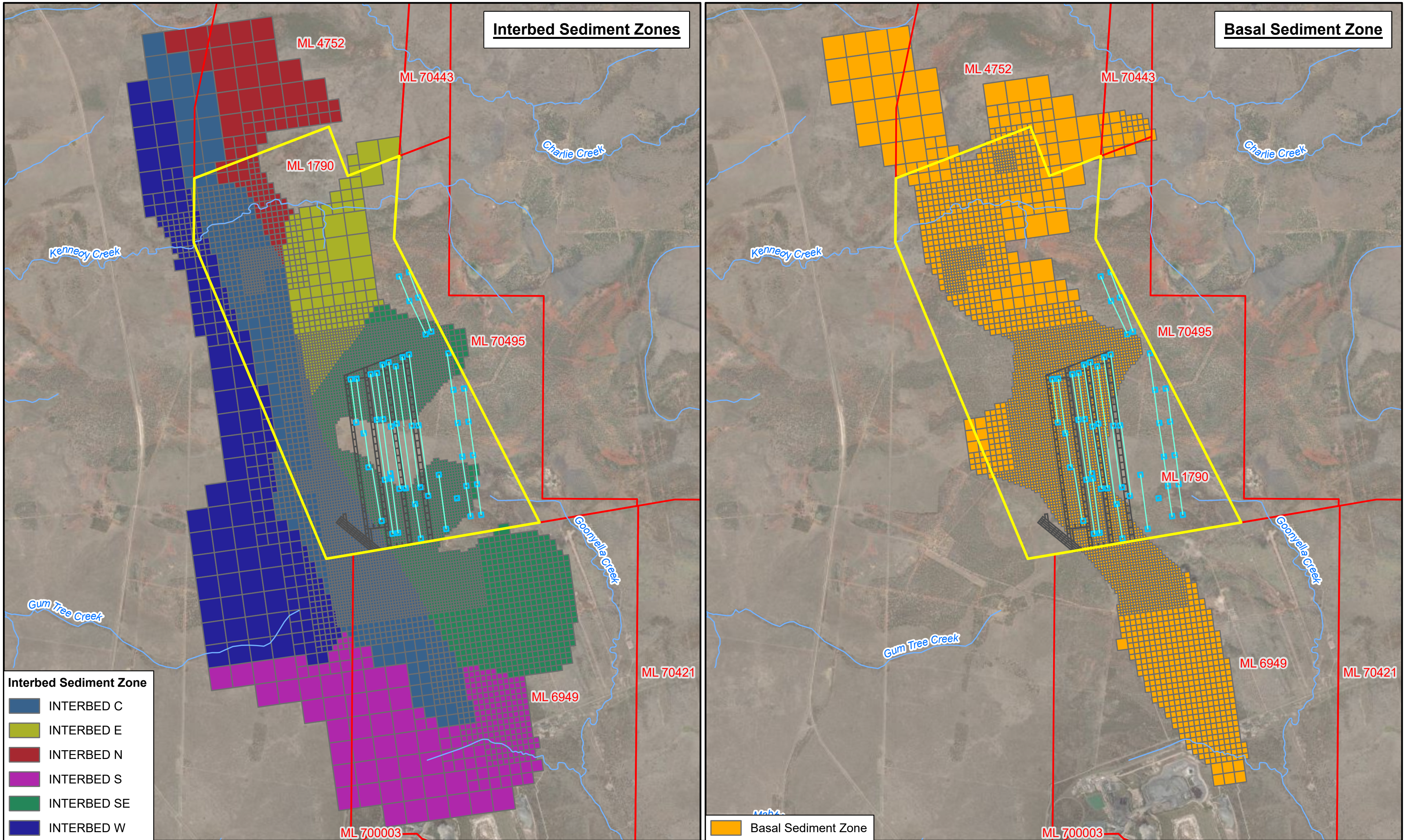
3.4 Timing

A combined steady-state and transient model was developed as follows:

- A steady-state stress period, followed by a 10-year transient warm up stress period, to represent the groundwater conditions before the commencement of the proposed extension; and
- 96 monthly stress periods to simulate the proposed extension project from January 2026 to December 2033.

To assist numerical convergence, MODFLOW-USG Adaptive Time-Stepping (ATS) option was used. The ATS option of MODFLOW automatically decreases time-step size when the simulation becomes numerically difficult and increases it when the difficulty passes. The minimum time step size used in the simulations was 0.1 day.

To solve the flow equations, the MODFLOW-USG Sparse Matrix Solver (SMS) package was used. The SMS package uses a combination of strategies including preconditioning, acceleration, linear and non-linear methods, ordering, and term dropping to solve the simultaneous equations produced by the model. The Head Change Criterion for Convergence (HICLOSE) criteria was set to 0.001 m.



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Scale: 1:90,000 at A4
Coordinate System: GDA2020 MGA Zone 55

Date Drawn: 22-Jan-2026
Project Number: 620.042334

Service Layer Credits:
Earthstar Geographics, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS

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CENTURION

- Watercourse
- Mining Lease
- Project Area
- Proposed Underground Acitivity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

ZONATION FOR THE INTERBED AND BASAL SEDIMENTS WITHIN THE BASALT FEATURE

FIGURE 3.2

3.5 Boundary Conditions

3.5.1 General Head Boundaries

The model boundary conditions are presented in **Figure 3-1**. The general head boundary (GHB) condition was used primarily to represent the regional flow into and out of the model area. GHB cells have been assigned in all model layers along the general head boundaries indicated in **Figure 3-1**. Groundwater enters the model where the water level set in the GHB is higher than the modelled water level in the adjacent cell and leaves the model when the GHB water level is lower than the adjacent model cell. The GHB water levels were assigned based on the topographic gradients beyond the model boundaries, most recently recorded water levels at monitoring bores and aligned with conceptualised regional flow behaviour (**Section 2.3.2**).

3.5.2 Drains

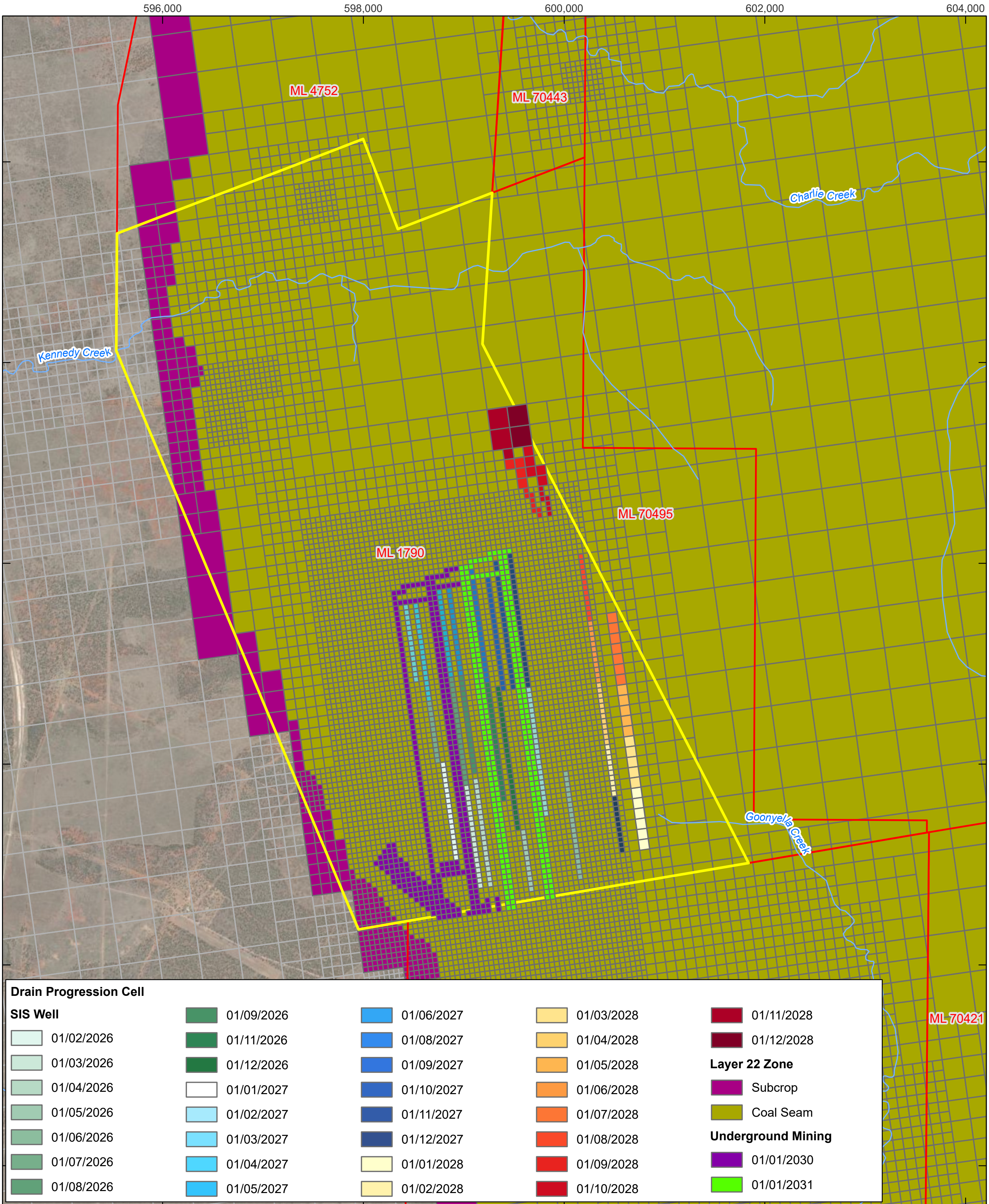
Drain boundary (DRN) conditions were applied at the southern boundary in the vicinity of Goonyella Riverside Mine (GRM) to represent the lowered groundwater levels (150m AHD, approximate base of pit from available LiDAR data) due to the dewatered pit at GRM. No-flow conditions were imposed along the remainder of the southern boundary to represent the zone of groundwater drawdown centred on GRM dewatering activities. Through applying this head gradient in the form of a boundary condition, the mine disturbance located south of the Project was applied to the pre-disturbance (or base case) and the prediction regional flow regime. The pre-drained aquifer area at Centurion Underground Mine was not represented explicitly.

For predictive simulations of the proposed mining, drain cells for both underground mining and CSG well traces were implemented in layer 22, corresponding to the target GM seam within the proposed site, shown in **Figure 3-3**. The SIS wells have been represented as lines of drain cells in the target seam layer, with hydraulic characteristics designed to lower groundwater levels by approximately 4 m per day for 90 days. Based on the production profile provided, active dewatering at these locations will occur for a total of 21 months. As the stress periods are monthly during the predictive simulation, the drain elevation is decreased by 120 m each stress period, for 3 consecutive stress periods, with the minimum drain elevation limited to the base of the target seam. The drain cells remain active for the 21-month period at each SIS well. The drain lines of SIS wells were set to activate between February 2026 (SP 3) and the December 2028 (SP 37) sequentially. Drain cells representing the gate road excavations were set to activate progressively from 2029 to 2031, as per schedule provided by Centurion Coal Pty Ltd (**Figure 1-2**). Drain elevations were set to base of the target GM seam (layer 22). The conductance of all drain cells was set to 1,000 m^2/day to simulate efficient water removal by the SIS wells and UG mining and avoid any artificial bottlenecks.

3.5.3 Recharge and Evapotranspiration

Based on the surface geology mapping indicating continuous units of weathered tertiary basalt, tertiary sediments and limited areas of alluvium, no distinct recharge zones were defined. A recharge rate of 0.95 mm/year (2.6×10^{-6}m/day) which is equivalent to approximately 0.23% of annual rainfall, was applied across the entire model domain.

Similarly, vegetation coverage throughout the Project is relatively uniform, with low density bushland and cleared paddocks throughout the model domain. Based on the lack of distinguished heavily vegetated areas, a consistent evapotranspiration rate of 3.19×10^{-3} m/day (1,166 mm/year) was applied. The exception to this was in the southern area of the model domain where mine waste features and water handling features are present. At these locations, no EVT was applied. This was done to represent the effect of emplaced features protecting the in-situ surface from EVT and potentially contributing small amounts of water to the shallow subsurface.



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Date Drawn:	22-Jan-2026
Drawn by:	RB

LEGEND

- Watercourse
- Mining Lease
- Project Area
- Model Grid

CENTURION

CENTURION NORTH DEVELOPMENT

MODEL MESH AND DRAIN CELLS

FIGURE 3.3

3.6 Initial Conditions

Initial heads applied in the model were informed by topography and contour mapping of observed groundwater elevations, interpreted by AGE (2012), and adjusted based on the converged steady-state condition (defined through manual calibration of hydraulic parameters as described in the following sections). Boundary conditions, including GHB, recharge and evapotranspiration introduced in **Section 3.5** were applied during this steady-state period.

3.7 Hydraulic Parameterisation

To optimise the match between the measurements and the model simulated levels, the hydraulic properties (i.e., horizontal and vertical conductivity) for each hydraulic parameter zone were adjusted during an initial calibration phase. With multiple zones within each layer, the model comprises a total of 53 different zones, with hydraulic parameters adjusted for each to reflect:

- Lithology;
- Degree of weathering;
- Subsidence effects; and
- Location within the basalt flow complex (for layers 4, 6, 8, 10 and 12).

The full table of base case hydraulic parameters are provided in **Appendix B**. Key features of this parameterisation included:

- Where possible, the range of values from site-based testing was used to constrain the selected hydraulic conductivity. Relatively high K was selected in most instances as a conservative approach to assessing potential influence on groundwater flow regimes.
- Interbed tertiary sediment zones were assigned either the higher conductivity tertiary sediment parameter set (Kh = 1.5 m/day, Kh/Kz = 1, Storage = 0.001) or the parameter set for the undifferentiated basalt aquifer (Kh = 0.9 m/day, Kh/Kz = 0.1, Storage = 0.001).
- Vertical conductivity one order of magnitude lower than horizontal conductivity was selected for most units. Notable exceptions to this included:
    - o Areas impacted by subsidence, located above the Centurion Underground Mine, where vertical conductivity was set to 80% of horizontal conductivity
    - o Layer 22 – GM seam subcrop zone where vertical conductivity needed to be set at 100% of horizontal conductivity to allow for free movement of water between units and avoid problems with cell adjacency.
    - o Within tertiary sediments including interbed and basal sediment layers where vertical conductivity was set at 100% of horizontal conductivity.
- Storage coefficients were based on the range of values from pump testing discussed in **Section 2.2.2**. While specific yield was not relevant for most parts of the model, Groundwater Vistas requires all values to be provided, so this was set to one order of magnitude lower than specific storage.

The objective of this design was to reflect geological heterogeneity and structure in the flow regime without using discrete features such as no-flow boundaries. The paucity of data prevents a stricter approach to parameterisation and model design. This approach is considered appropriate for this high level early-works program, with subsequent, more detailed technical studies to be carried out.

Sensitivity analysis was carried out on the hydraulic conductivity, storage and recharge values used for this model construction. This sensitivity analysis is discussed in **Section 4.4**.

3.8 Model Performance and Limitations

The Australian Government’s Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) Information Guidelines Explanatory Note: Uncertainty analysis for groundwater modelling (Peeters and Middlemis, 2023) identifies four key sources of scientific uncertainty affecting groundwater model simulations:

- Structural/conceptual;
- Parameterisation;
- Measurement error; and
- Scenario uncertainties.

Peeters and Middlemis (2023) state that simulation models are developed as simplified representations of ‘real world’ systems that are usually history-matched to measured data, albeit affected to some degree by the various sources of uncertainty outlined above. Peeters and Middlemis (2023) further describe that models are continuously refined with new data, conceptualisations and processes, to investigate the effects of management options on future eventualities.

The four sources of scientific uncertainty identified by Peeters and Middlemis (2023) have been qualitatively assessed with regards to key aspects of the numerical model adopted for this groundwater assessment, as presented in **Table 3-3.**

Modelled heads for the base-case scenario are displayed with groundwater level observations at a set of bores within the model domain in **Figure 3-4**. Bores used for this exercise included:

- MB06, MB07, MB08, MB09, MB12, MB17R, MB18R and MB18R2

Water levels from Aug to Sep 2015 were used as this was the time period where most of the network was monitored and the monitoring showed heads that were representative of long term values at these bores. Modelled data is based on water level shown in the model before the drains associated with proposed extraction activities are activated. VWP03 data was not included as the data was only available for a short time period at this bore. CCM monitoring network bores were not included as there was no screen data available for those locations to constrain the appropriate Layer definition. This image shows that there is reasonable prediction for the majority of points, within the ±5 metres (dashed lines) margins for four points. MB12 was the bore furthest from prediction, showing 17.92 m difference from modelled values. Based on this model evaluation, heads were generally underpredicted, with underrepresentation of water level highs specifically. This may be a function of the conservative approach to model architecture and parameterisation where strong connection between units is represented to provide impact assessment with adequate confidence that potential drawdown extents are represented.

Confidence in model predictions is primarily based on the spatial (horizontal and vertical) and temporal extent of the observational dataset (including data type) to which the model is calibrated. Ideally, calibration would be to a transient dataset comprising observations in all units of interest and that was subjected to historic stresses of similar magnitude as those stresses applied in the predictive simulations. The available water level dataset is somewhat limited, with minimal groundwater level data available for key hydraulic units, and no ability to constrain vertical gradients within the Project Area. As such, hydraulic parameter values from the upper end of test data are applied in the model in order to provide conservative estimates of potential influences on groundwater, i.e., model predictions are very likely to overestimate the extent of groundwater drawdown. However, overall, the model reproduces regional groundwater flow directions in the base case steady state run, providing confidence in the model structure and parameterisation commensurate with this scope of work. The model is numerically stable with little mass balance error. The model shows a reasonable fit between observed and modelled groundwater levels. Conservatively high hydraulic conductivity values are selected based on site-specific, long-term testing data. Overall, the model is considered fit for purpose based on the data provided and the project timeframe.

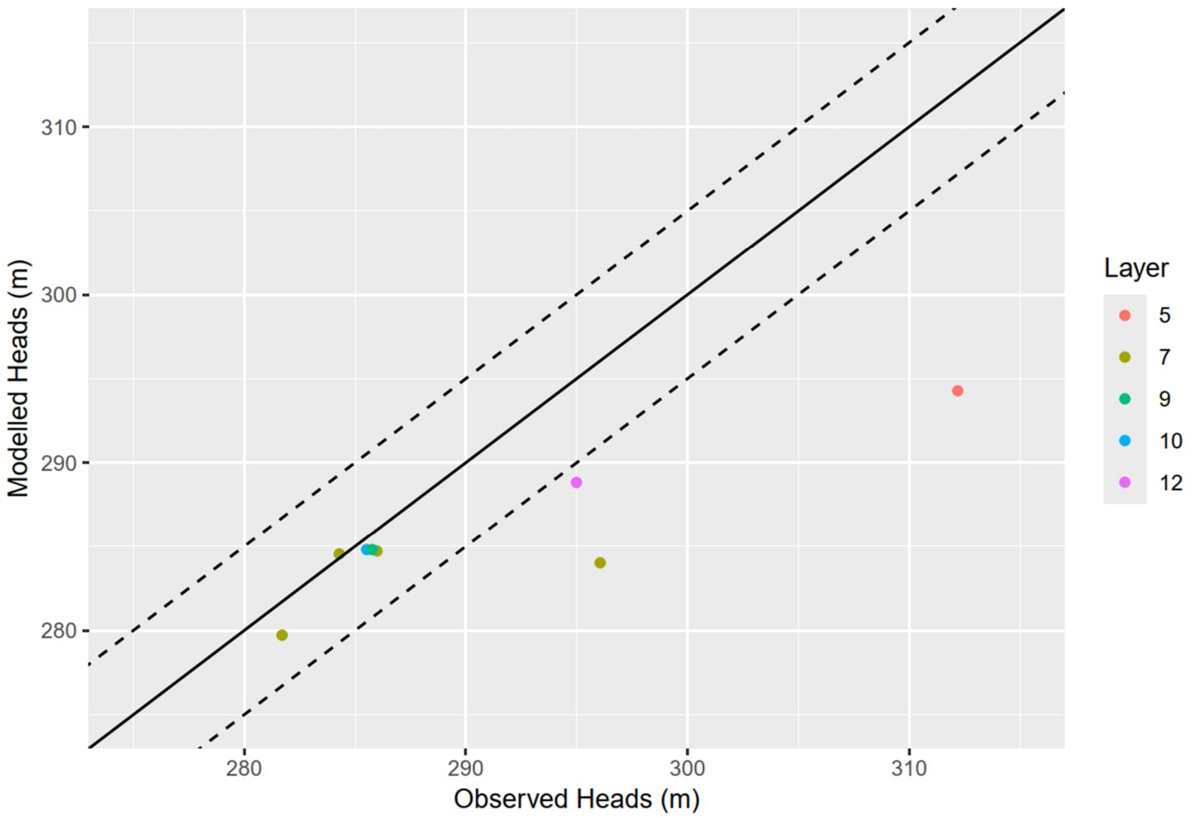


Figure 3-4 Scatter plot of modelled and observed heads for available groundwater level measurements within the model domain

The modelling approach documented here is scaled to the relatively limited nature of proposed underground disturbance. It is considered appropriate that subsequent groundwater assessments further refine aspects of the quantitative assessment of potential groundwater impacts, however for the purposes of this limited early-works disturbance activities, the current model is deemed fit for purpose for this assessment.

Table 3-3 Groundwater model and data limitations

Type	Part	Status	Comment
Structural/ Conceptual	Grid and Model Extent	Fit for purpose	The model has an unstructured grid that includes detailed cell refinement around the Project site, subsidence, monitoring and along drainage features.
	Layers	Fit for purpose	Representation of geological units based on provided geology model and extensive previous investigation into surficial aquifers. Base of weathering from site specific data checked CSIRO depth to regolith surface (Wilford et, al., 2016).
	Conceptualisation – Geological Structure	Fit for purpose, improvements possible	The local structure of the geology is based on detailed data at the Project where available, including a site geology model. Specific structural features such as subcrop contacts are represented in the model explicitly. There was no data available for faulting within the Project Area, however the model represents known structural heterogeneity in material changes between basaltic flows.
	Conceptualisation – Surface Water Groundwater Interactions	Fit for purpose, improvements possible	Mine voids on the southern model boundary are represented as drain cells. There are no data on specific groundwater-surface water interactions along drainage channels, however model construction includes the conservative assumption that the surface alluvium is hydraulically connected with regional basalt aquifer and some interaction may occur.
	Conceptualisation – Saturated Extent of Alluvium and Regolith	Fit for purpose, improvements possible	For the extent and thickness of alluvium and regolith within the model domain, a combination of the site geological model, regional geological mapping and the CSIRO depth of regolith surface (Wilford et, al., 2016) was used. Investigations into the thickness, extent and saturation of the alluvium will yield additional certainty in assumptions made regarding this aspect of the model. Any additional data or study on alluvium extent and thickness in the area should be reviewed and captured (where relevant) in future updates or iterations of the Project groundwater model.

Type	Part	Status	Comment
Parameterisation	Hydraulic Conductivity – Depth Dependence	Fit for purpose, future improvements possible	Extensive field testing of hydraulic conductivity has been conducted in the Project Area and the nearby analogous areas. Hydraulic conductivity test results from the wider Bowen Basin were also considered. Further hydraulic conductivity tests on the individual units, focusing on the subcrop areas and constraining of storage properties can improve model calibration and refine model predictions but are not deemed required for the current impact assessment.
	Subsidence	Fit for purpose, future improvements possible	No site-specific data on subsidence impacts to vertical conductivity. Parameter selection was estimated based on previous studies at other sites.
	Rivers	Fit for purpose, future improvements possible	All watercourses within the model domain are minor ephemeral creeks. A refinement along the riverbeds was performed to capture the variation in the evapotranspiration surface along the watercourses. There are no data on specific groundwater-surface water interactions along drainage channels, however the model makes conservative assumptions that there are no inhibitors between the shallow aquifer and regional systems.
	Recharge	Fit for purpose, future improvements possible	Chloride Mass Balance was carried out to constrain recharge estimates, and a conservatively low distributed recharge was selected. Sensitivity analysis of this parameter was carried out. No specific recharge zones were selected, based on the minimal surface geology variation and lack of data on drainage channel interaction with shallow groundwater.
Measurement Error	Observation Data Quality	Fit for purpose	Bore logs and construction details available for most site bores, and long-term site water level data available for various units. Installation of additional monitoring is currently planned for the Project and this data should be incorporated into subsequent groundwater conceptualisation and modelling assessments.
	Temporal Spread	Fit for purpose, future improvements possible	Data is available from 2011 through to 2024. Most data located within Basalt aquifer, little data available for Permian and no data available for Alluvium. No transient calibration was carried out for this model, with approach taken to select conservative parameter ranges and assess risk with a conceptual representation of potential groundwater interactions.
Scenario Uncertainties	Calibration	Fit for purpose, improvements possible	A combined steady state and transient (extended transient period in which boundary conditions do not change) calibration to initial heads was performed. Heads reproduced in this period were a reasonable match for observed values, however no transient calibration was carried out to validate further.

Type	Part	Status	Comment
Future stresses/ conditions			Additional data sufficient to support a transient calibration may address this limitation. Lack of data at model bounds complicated assignment of boundary head conditions that contribute to calibration performance. However, as the parametrisation section notes, parameter values guided by this calibration process were applied such that potential impacts would unlikely be underestimated (i.e., model predictions are conservative and likely to overestimate impacts to groundwater).
	Predictive	Fit for purpose	Model prediction period covers all proposed disturbance activities.
	Sensitivity Analysis	Fit for purpose	Based on the sensitivity analysis, the model is relatively insensitive to hydraulic conductivity, and recharge, and is highly sensitive to the selected storage coefficient. A moderate value was used for all hydraulic units, based on pumping test data for the immediate area.

4.0 Predictive Modelling

4.1 Timing and Mining

A transient predictive model was used to simulate the drainage by proposed SIS wells and UG mining at Centurion North as discussed in **Section 3.5.2**. The proposed activities were simulated by MODFLOW Drain package with high conductance to avoid any artificial bottlenecks of the transfer of water.

4.2 Water Balance

Table 4-1 provides average flow rates for water transfer into and out of the predictive base case (pre-disturbance) model for both the steady-state and transient elements of the model run. A mass balance error <0.01 % indicates that the model was stable and achieved an accurate numerical solution (Barnett et al., 2012).

Table 4-1 Simulated Water Balance – Base Case

Flow Component	Steady-state Water balance Summary	Transient Water Balance Summary (%)
Storage IN (%)	0.0	37.1
Recharge IN (%)	37.8	11.4
General Head IN (%)	62.2	51.5
Storage OUT (%)	0	0.4
Constant Head OUT (%)	27.7	89.5
Evapotranspiration OUT (%)	1.3	0.2
General Head OUT (%)	71.0	9.9

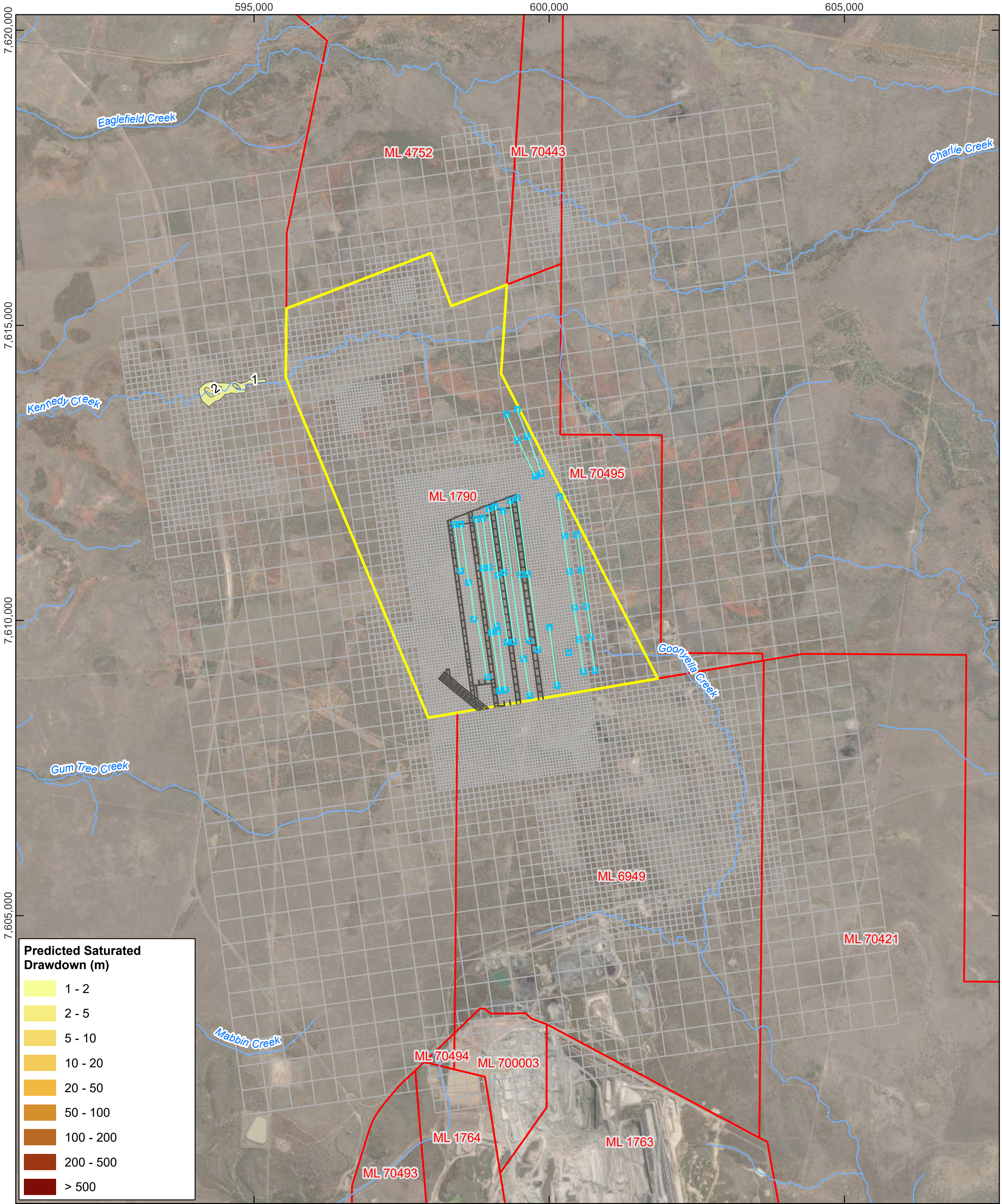
4.3 Predicted Drawdown

The key Quantity of Interest for the groundwater assessment is drawdown induced by mining activities. In the plots below, groundwater level difference between the base case scenario (no disturbance activities) and the prediction run with proposed mine disturbance is presented as predicted drawdown at conclusion of the underground gate road construction (2032), within Layer 1 (alluvium), Layer 14 (basalt), Lay 16 (Fort Cooper Coal Measures) , Layer 22 (target seam), and Layer 25 (Back Creek Group).

- Layer 1 – Alluvium (**Figure 4-1**): The extent of this layer is limited to areas where surface geology mapping shows Quaternary Alluvium, with the key area being around Kennedy Creek where predicted drawdown ranges up to 2 m. Groundwater bores have recently been installed in this area to evaluate the persistence of saturation in this unit.

- Layer 14 – Basalt (**Figure 4-2**): Up to 22 metres of drawdown is predicted in the basalt aquifer, located primarily to the west where Layer 22 subcrops into the basal sand and basalt aquifer. Drawdown mapping follows basal sands and is generally most developed along the paleochannel lines. Extensive drawdown propagation is likely to be due to the relatively high hydraulic conductivities used, and the representation of subcrop explicitly with increased vertical conductivity. These are all conservative assumptions. Higher drawdowns are located in the south where subsidence-induced enhanced vertical conductivity increases drawdown propagation vertically.
- Layer 16 – Fort Cooper Coal Measures (**Figure 4-3**). Up to 59 metres of drawdown is predicted, located predominantly in the central area of the proposed disturbance. This represents vertical propagation of drawdown through the Permian stratigraphy. Contours show that recharge is occurring to this unit at the sub-crop contact to the west, and flowing into the model through the general head boundaries. Conservatively high values for vertical continuity of the interburden and overburden separating the Fort Cooper Coal Measures from the Goonyella Middle seam where the extraction is occurring is likely to be contributing to this response.
- Layer 22 – GM Seam (**Figure 4-4**): Significant drawdown is simulated in Layer 22, as is consistent with the scale of groundwater extraction from this unit. Superposition of the coal seam extraction, followed by underground excavations which require voids to be maintained dry with mine water handling system, results in hydraulic levels up to 500 metres lower than the base-case scenario. Drawdown in this aquifer does extend to the boundary to the east.
- Layer 25 – Back Creek Group (**Figure 4-5**). Up to 245 metres of drawdown is predicted in this unit, representing a hydraulic response to depressurisation in the overlying seams. These undifferentiated sedimentary units are understood to be low capacity aquifers and even aquitards, hence the propagation of drawdown through this unit is considered a conservative representation of impacts and not likely to have significant impact on other hydrostratigraphic features.

The lateral extent of drawdowns that reach the model boundaries suggest that future iterations of the model would expand the spatial domain of the model so that boundary conditions do not potentially influence drawdown predictions. General head boundary conditions were chosen to be applied at the model boundaries in order to permit groundwater levels at the model boundaries to increase or decline in response to groundwater behaviour within the model domain, thus minimising the potential for boundary conditions to influence drawdown (constant head boundary conditions would enforce a spatial limit to drawdown calculations). Furthermore, the drawdown hitting boundary to the south is likely to be a reflection of cumulative impacts, with depressurisation occurring due to mining abstraction.



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Project Number: 620.042334
Date Drawn: 22-Jan-2026
Drawn by: RB

CENTURION

LEGEND

- Saturated Drawdown Contour (m)
- Watercourse
- Mining Lease
- Project Area
- Model Grid
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

CENTURION NORTH DEVELOPMENT

PREDICTED SATURATED DRAWDOWN IN ALLUVIUM AND SURFICIAL AQUIFER JAN 2032

FIGURE 4.1

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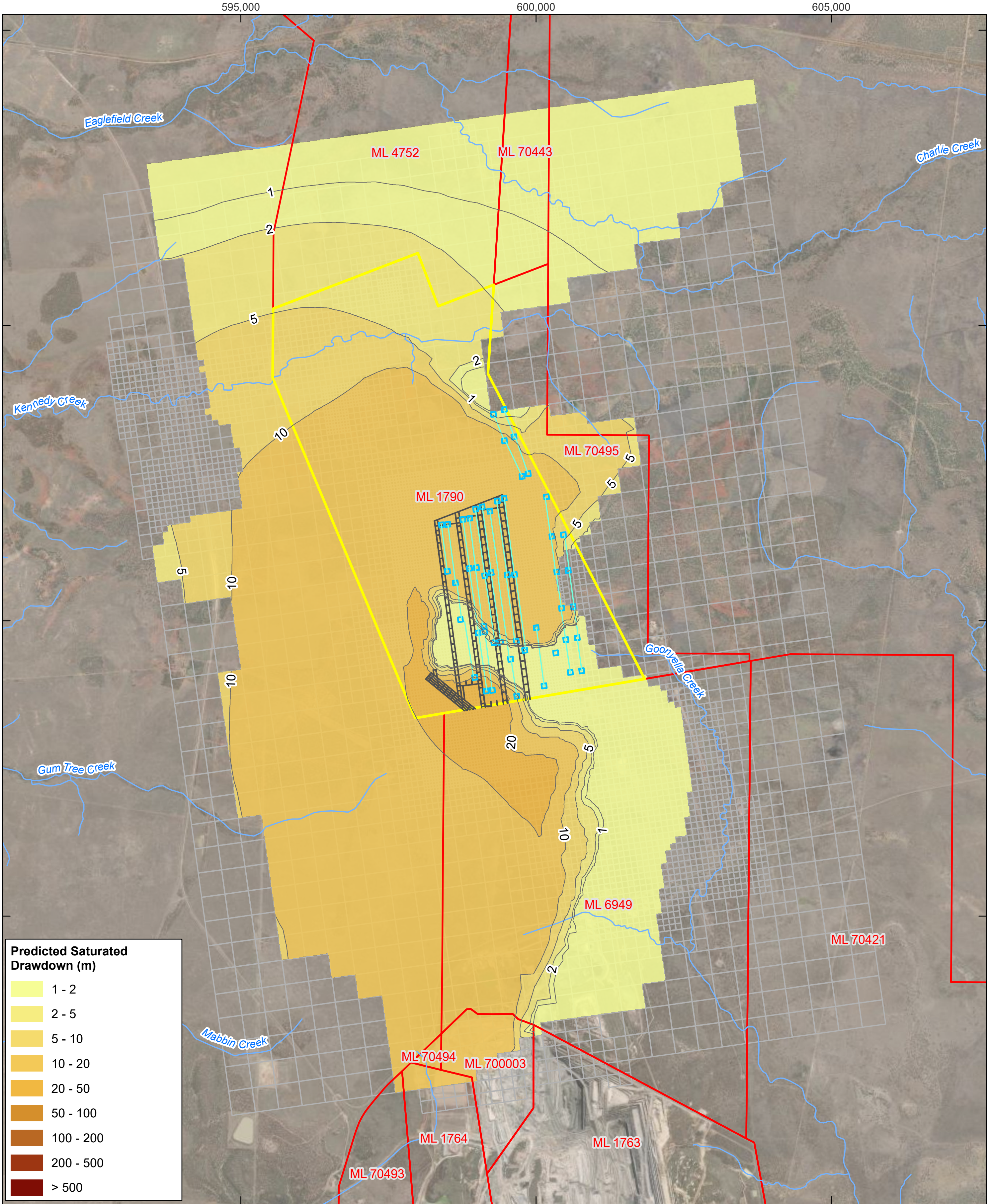

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Scale: 1:85,000 at A4
Project Number: 620.042334
Date Drawn: 22-Jan-2026
Drawn by: RB

LEGEND

- Saturated Drawdown Contour (m)
- Watercourse
- Mining Lease
- Project Area
- Model Grid
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

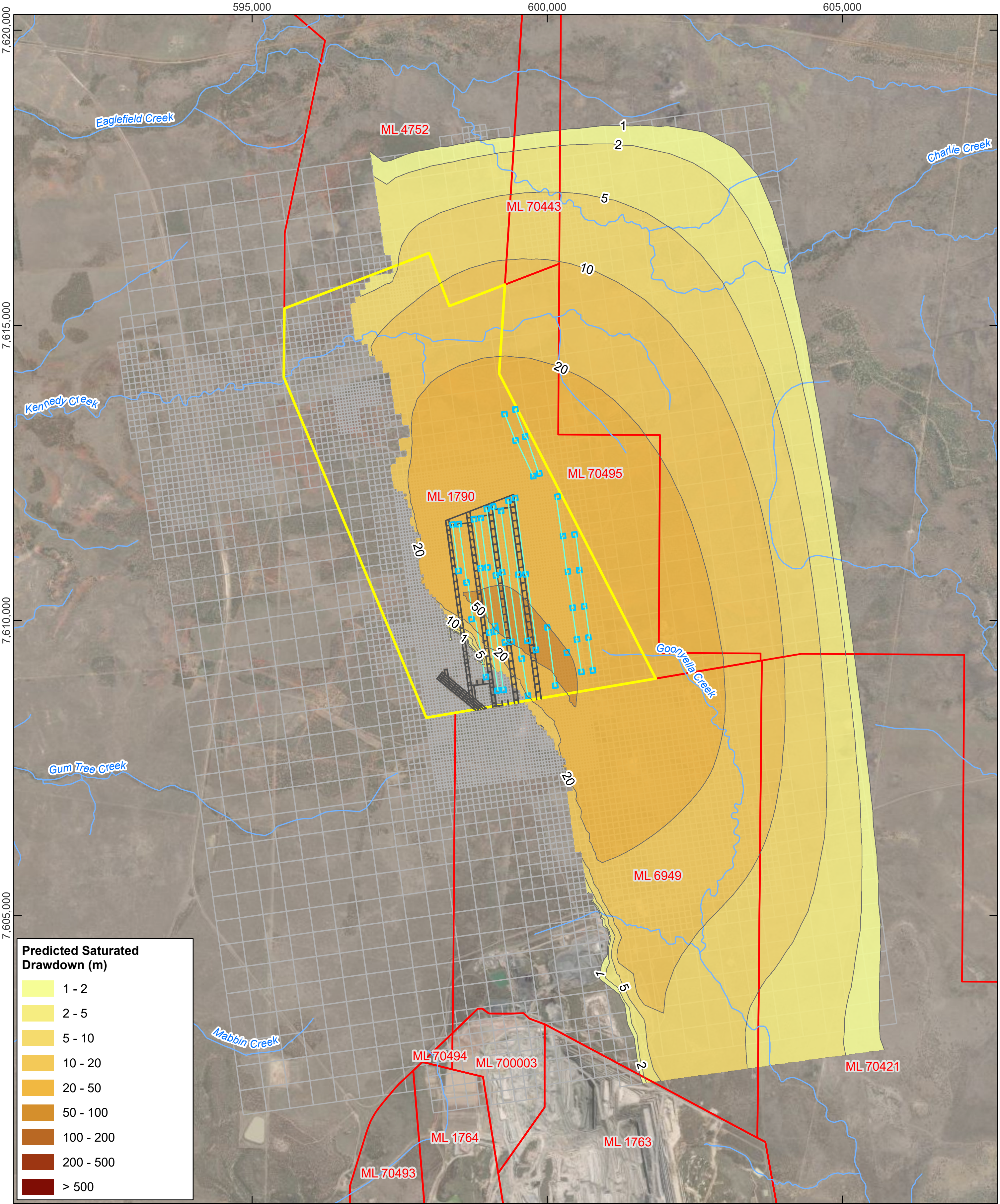
CENTURION NORTH DEVELOPMENT

PREDICTED SATURATED DRAWDOWN IN BASALT AQUIFER IN JAN 2032

CENTURION

FIGURE 4.2

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F04-02_Predicted Saturated Drawdown in Basalt Aquifer in Jan 2032



0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:85,000 at A4
Project Number:	620.042334
Date Drawn:	22-Jan-2026
Drawn by:	RB

CENTURION

LEGEND

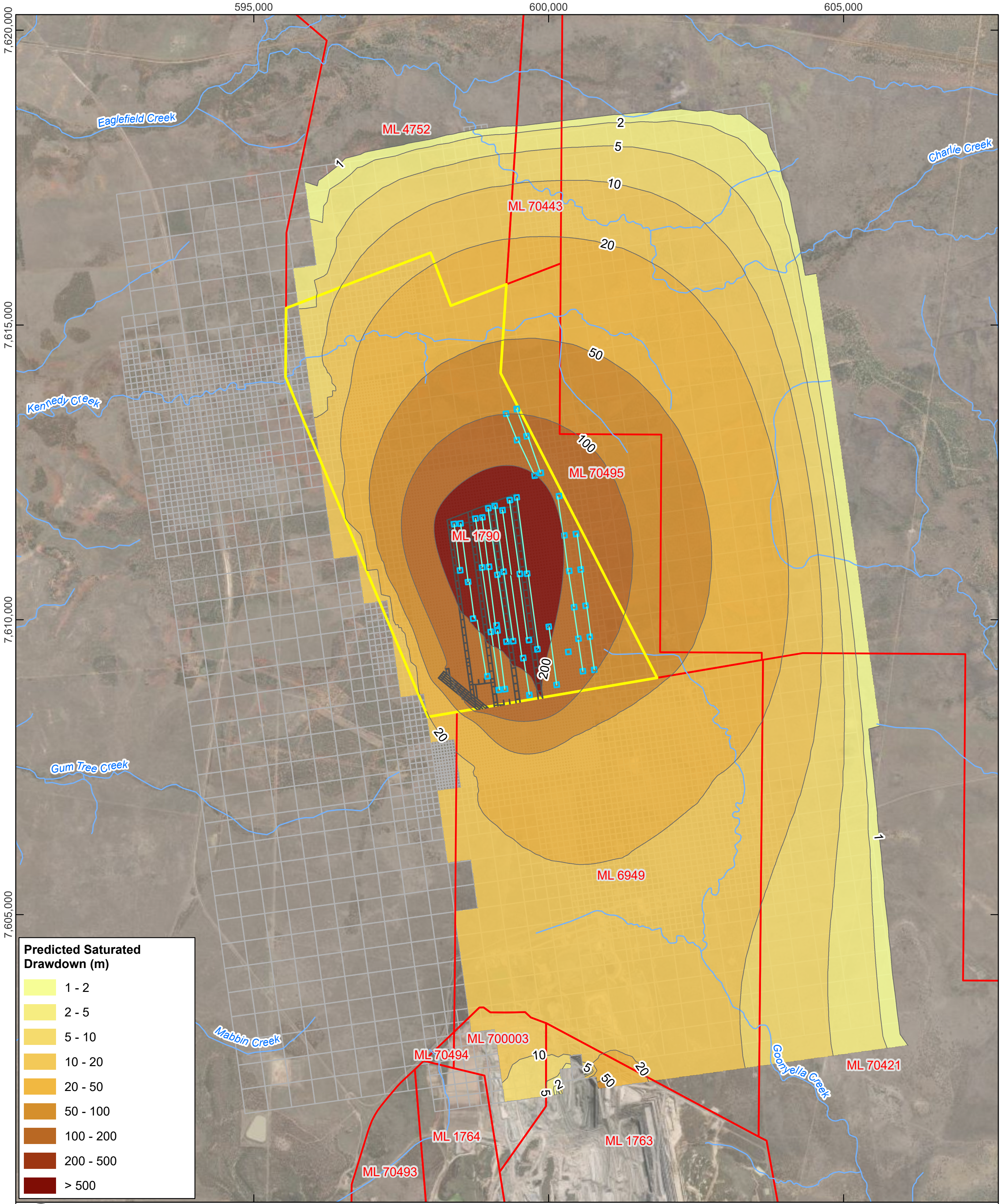
- Saturated Drawdown Contour (m)
- Watercourse
- Mining Lease
- Project Area
- Model Grid
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

CENTURION NORTH DEVELOPMENT

PREDICTED SATURATED DRAWDOWN IN FORT COOPER COAL MEASURES IN JAN 2032

FIGURE 4.3

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F04-03_Predicted Saturated Drawdown in Fort Cooper Coal Measures in Jan 2032



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Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:85,000 at A4
Project Number:	620.042334
Date Drawn:	22-Jan-2026
Drawn by:	RB

CENTURION

LEGEND

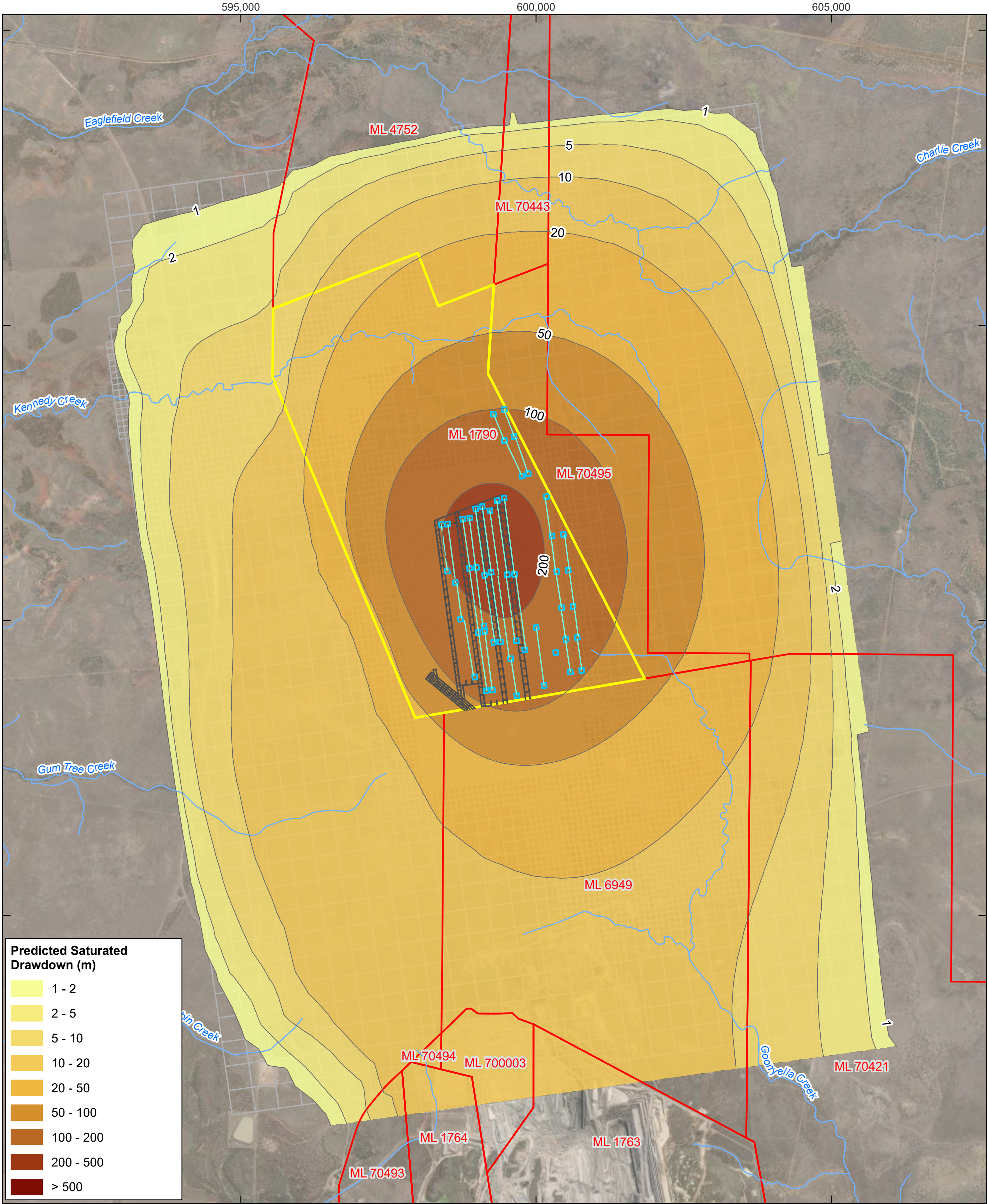
- Saturated Drawdown Contour (m)
- Watercourse
- Mining Lease
- Project Area
- Model Grid
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

CENTURION NORTH DEVELOPMENT

PREDICTED SATURATED DRAWDOWN IN COAL SEAM IN JAN 2032

FIGURE 4.4

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F04-04_Predicted Saturated Drawdown in Coal Seam in Jan 2032



0 1 2 km

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:85,000 at A4
Project Number:	620.042334
Date Drawn:	22-Jan-2026
Drawn by:	RB

LEGEND

- Saturated Drawdown Contour (m)
- Watercourse
- Mining Lease
- Project Area
- Model Grid
- Proposed Underground Activity
- Proposed SIS Drainage Line
- Proposed SIS Well Pad

CENTURION

CENTURION NORTH DEVELOPMENT

PREDICTED SATURATED DRAWDOWN IN BACK CREEK GROUP IN JAN 2032

FIGURE 4.5

Path: \\au.slr.local\corporate\Projects-SLR\620-BNE\620-BNE\620.042334.00001 Centurion Nth Early Works GW A\06 SLR Data\01 GIS\GIS\Centurion Nth Early Works GW\Centurion Nth Early Works GW.aprx\620042334_F04-05_Predicted Saturated Drawdown in Back Creek Group in Jan 2032

4.3.1 Groundwater Level Impacts to Potential Receptors

Predictive hydrographs have been derived from the groundwater model to understand the nature of likely groundwater level change in the interpreted source aquifer for identified potential natural and anthropogenic groundwater receptors in the vicinity of the SSM Area. The aim of the hydrographs is to assess the potential for additional impacts to these potential receptors in the period post-mining, i.e. identify additional potential impacts beyond those that have occurred during already approved mining operations that may be attributable to the PRC Plan's proposed final landform. **Figure 2-13** provides the locations of identified potential receptors, **Table 4-2** lists the locations and predicted drawdown from base case, and hydrographs are shown in **Appendix C**.

The hydrographs indicate that there is residual groundwater decline occurring throughout the area, in response to groundwater discharge in mining areas to the south of the Project. Note that there was no bore depth data available in the bore census for the Jail Paddock or 3 Tanks Windmill bores and therefore the layer assignment has not been verified. These bores may not be saturated, or may be subject to different hydraulic stressors.

Table 4-2 Predicted water level drawdown at potential receptor locations

Easting (GDA2020z55)	Northing (GDA2020z55)	Potential Receptor Name	Layer	Distance From Proposed Disturbance	Maximum Drawdown (m)
596752	7614792	Jail Paddock	Layer 7	3.2 km	7.1
603901	7612857	3 Tanks Windmill	Layer 13	4.0 km	3.8
600539	7618772	Road Paddock Bore	Layer 3	6.0 km	0.04
599069	7617620	Charlies Bore	Layer 3	4.5 km	0.6
601167	7616836	Greendale	Layer 4	4.5 km	0.7
596795	7610020	Texas Bore	Layer 13	1.6 km	16.8
595814	7614305	Kennedy Creek GDE	Layer 1	7.8 km	No predicted saturation in base-case

4.4 Sensitivity Analysis

The primary effect of groundwater extraction in this assessment is the upward propagation of depressurisation from the target coal seam into the overlying strata, particularly the basalt aquifer. Consequently, the sensitivity analysis focuses three main aspects of the groundwater model and how they may influence predictions of drawdown:

- The hydraulic conductivity of aquifer material. The storage coefficient for the aquifer material.
- Recharge assumptions.

Full sensitivity analysis hydrographs for monitoring network and potential receptor locations are presented in **Appendix C**. Results from the sensitivity simulations are presented via hydrographs to provide an easier comparison between simulations using differing hydraulic parameters. Hydrographs present a clearer illustration of how sensitive drawdown is in response to changes in parameter values (relative to the base case) because all sensitivity cases can be presented in a single figure. The below sections present MB09 hydrographs as reference point for the sensitivity analysis. Further sensitivity analysis was precluded by the timeline of the assessment.

4.4.1 Hydraulic Conductivity

Base-case hydraulic conductivity value selection was selected using a conservative approach to representing potential risk of drawdown propagation, as conductivity values in the upper quartile of observed values were used. Sensitivity analysis of this value involved decreasing horizontal (and thereby vertical conductivity) by between 50% and 1 order of magnitude. The primary objective of this was to validate that a conservative approach was not mis-representative and skewing the modelling to over-prediction. As demonstrated in the hydrograph below (**Figure 4-6**), drawdown predictions across the hydrostratigraphic units are greater than the parameter sets with more moderate hydraulic conductivity estimates. This supports the conservative approach to groundwater impact prediction.

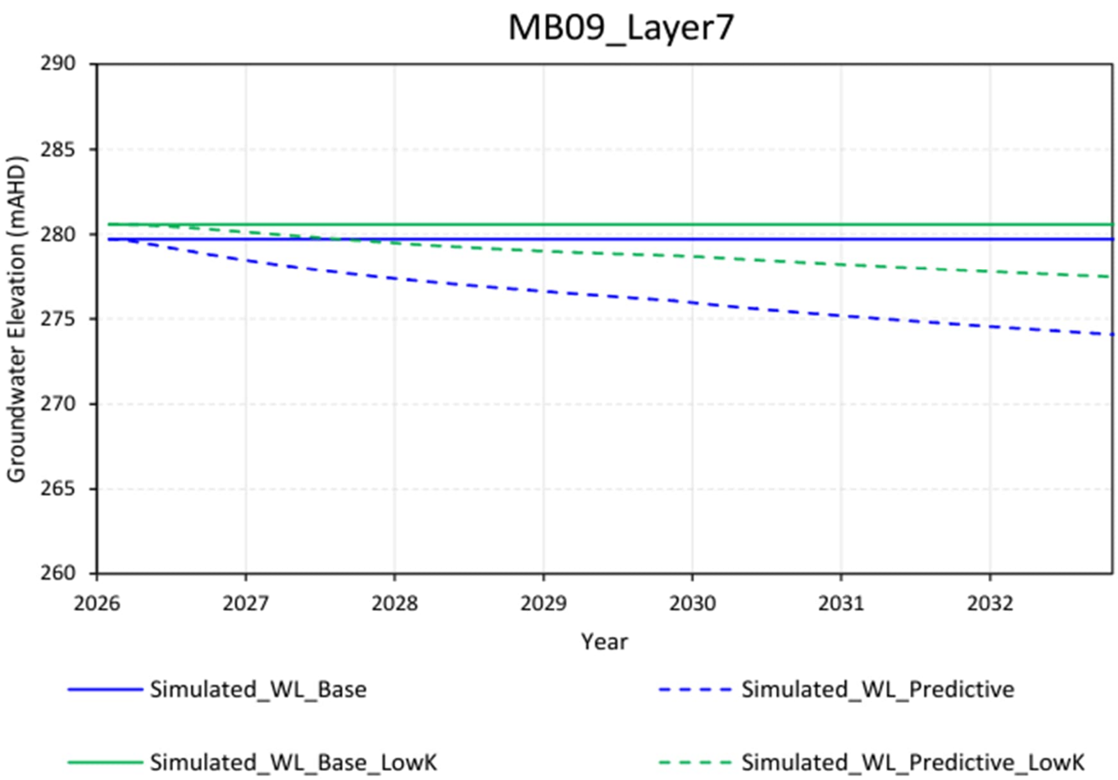


Figure 4-6 MB09 hydrograph showing hydraulic conductivity variability in sensitivity run

4.4.2 Storage

As discussed in **Section 2.2**, pumping tests carried out by AGE (2012a) included data on storage coefficient for the Tertiary sediments and Tertiary basalts. These ranged between 1×10^{-5} and 5×10^{-2}. Sensitivity analysis for this parameter involved increasing and reducing the selected median coefficient by one order of magnitude. As illustrated in **Figure 4-7**, the model is highly sensitive to storage change, with lower storage values resulting in a rapid depletion of hydraulic head as water is removed from the system quickly following drain cell activation. Additional pumping test assessments for the Permian aquifers and other hydrogeological features on site would be recommended to narrow the range of likely storage coefficients, however it is considered likely that the median value selected is a reasonable approach for this exercise.

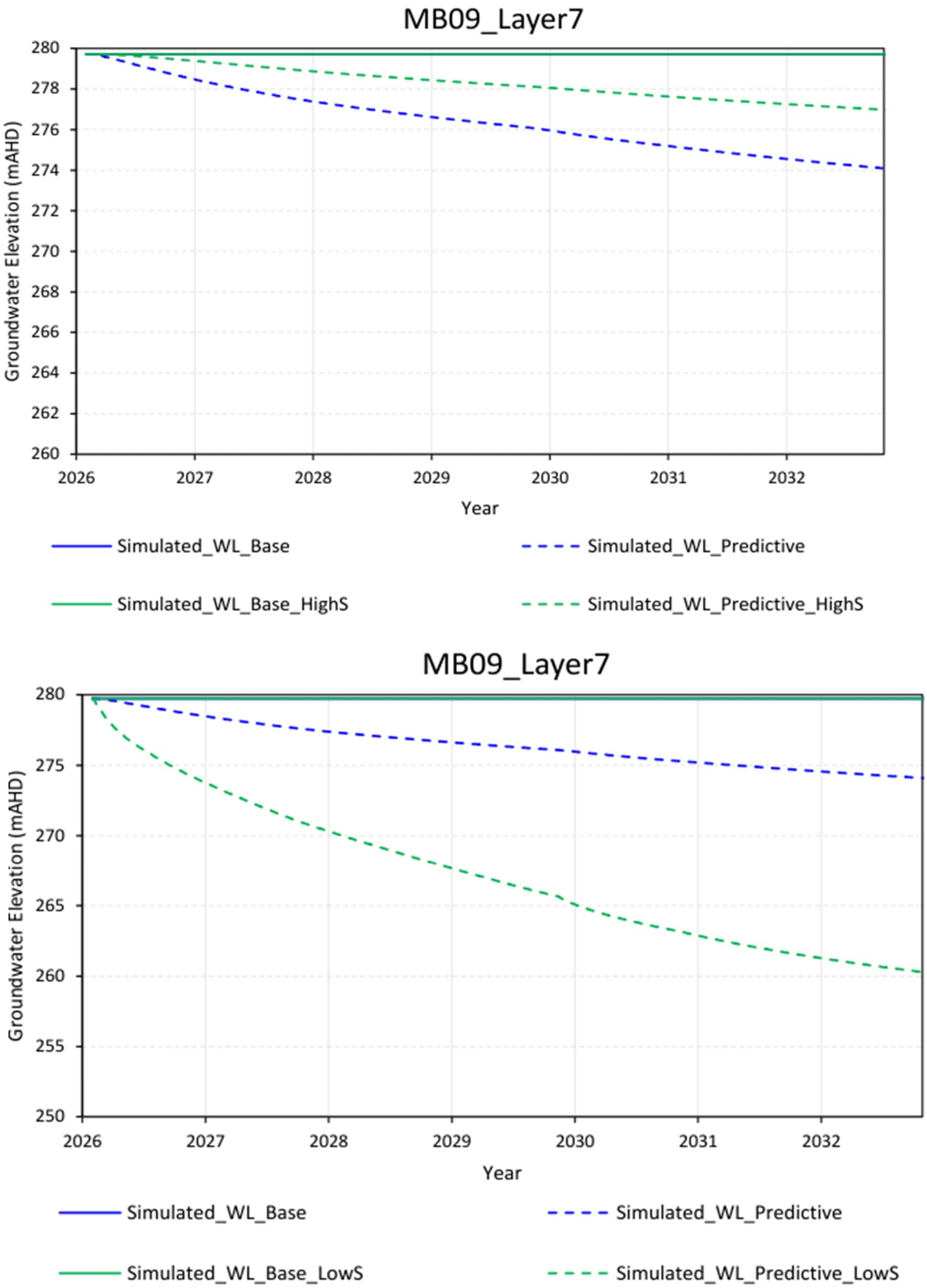


Figure 4-7 MB09 hydrographs showing storage coefficient variability in sensitivity run

4.4.3 Recharge

Following a brief manual calibration period where base-case heads were modified to attempt to match observed heads, distributed recharge was defined as 0.23% of annual rainfall, producing the best fit amongst reasonable values. This is a low proportion when compared with other groundwater models in the area, and sensitivity analysis sought to establish if this was a conservative figure by doubling the distributed recharge. As illustrated in **Figure 4-8**, there is moderate sensitivity to recharge, with additional recharge there should be less head reduction. However a reduction on coal seam hydraulic conductivity by 1 order of magnitude countered that influence, resulting in lower hydraulic heads. The lower recharge value was retained in line with the approach to present conservative potential impact predications. Further sensitivity analysis was precluded by the timeline of the assessment.

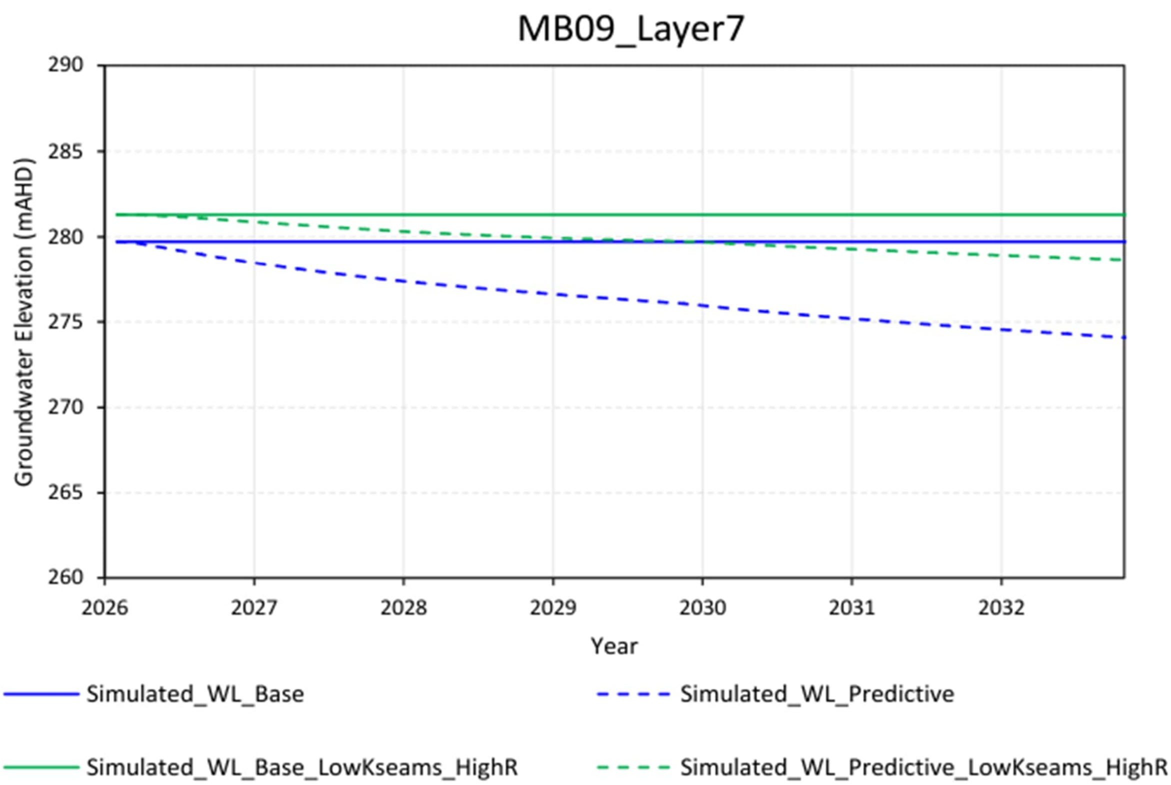


Figure 4-8 MB09 hydrograph showing recharge variability in sensitivity run

5.0 Risk Assessment

A risk assessment has been used to summarise the potential impacts on groundwater receptors arising from the proposed early works CSG extraction based on a consideration of likelihood and consequence of potential risks being realised. The following were considered as part of the risk assessment:

- Brief description of the potential issue in terms of source > pathway > receptor;
- Description of the potential impact;
- Potential likelihood of the risk being realised;
- Potential consequence of the impact; and
- Risk rating derived from likelihood vs consequence.

Descriptions of the categories that were used to rank the likelihood and consequence of potential risks being realised are provided in **Table 5-1** and **Table 5-2** respectively.

Table 5-1 Likelihood Categories

Likelihood	Basis of Rating
Highly Likely	Expected to occur
Likely	More likely to occur than not to occur
Possible	As likely to occur as not to occur
Unlikely	More likely to not occur than to occur
Highly Unlikely	Very unlikely to occur even in the long term

Table 5-2 Consequence Categories

Rating		Environmental	Reputational / Legal & Compliance
5	Severe	Widespread environmental damage or effect (permanent; >10 years)	Formal expression of significant dissatisfaction by government Sustained campaign by one or more international NGOs resulting in physical impact on the assets or loss of ability to operate Major litigation / prosecution at Glencore corporate level
4	High	Long term impact (2 to 10 years)	Broad societal concern and criticism Negative media coverage at international level resulting in a corporate statement within 24 hours Investigation from government and/ or international (or high-profile) NGOs Negative impact on share price Major litigation / prosecution at Department level
3	Moderate	Medium term impact (<2 years impact)	Negative media coverage at national level over more than one day Local Stakeholder action resulting in national societal scrutiny

Rating		Environmental	Reputational / Legal & Compliance
			Major litigation / prosecution at Operation level
2	Low	Short term impact (<1 year)	Negative local/ regional media coverage Complaint received from an internal or external stakeholder Regulation breaches resulting in fine or litigation
1	Negligible	No lasting environmental damage or effect	Negligible media interest Regulation breaches without fine or litigation

The risk rating for each potential impact was determined by combining the likelihood and consequence of a risk being realised. The modelling predictions allow quantification of the likelihood of drawdown impacts occurring. The likelihood vs consequence risk assessment matrix is presented in **Table 5-3**.

Table 5-3 Risk Ranking Matrix

		Likelihood				
		Highly Unlikely	Unlikely	Possible	Likely	Highly Likely
Consequence	5	Moderate	Moderate	High	High	High
	4	Low	Moderate	Moderate	High	High
	3	Low	Low	Moderate	Moderate	High
	2	Insignificant	Low	Low	Moderate	Moderate
	1	Insignificant	Insignificant	Low	Low	Low

The risk assessment summary is presented in **Table 5-4**.

The risk of significant impacts to groundwater receptors from the proposed limited CSG and underground mining development are considered to be low. Note that the conclusions discussed here are subject to the assumptions and exclusions outlined in **Section 3.8**.

Table 5-4 Risk assessment summary

Source	Pathway	Receptor	Potential Impact	Consequence	Likelihood	Risk
Depressurisation of the target coal seam at depth below the basalt aquifer for the purpose of CSG production and gate road excavation.	Upward propagation of drawdown from the depressurised coal seam through the overburden into the basalt aquifer with potential expression in surficial aquifers	Landholder bores	Drawdown impacts at landholder bores – loss of yield	**Low**: loss of water source for landholder, reputational risk for operator.	**Possible**: modelling predicts up to 3.7 meters of drawdown at 3 Tanks Windmill, Jail Paddock and up to 16.8 metres drawdown at Texs Bore known water supply bores	**Low**
		Terrestrial GDEs	Drawdown reaches potential terrestrial GDEs which are dependent on the saturated water table rather than shallow perched water tables. Decline in health or loss GDE	**Low** Potential Terrestrial GDEs are mapped along Kennedy Creek and other creek lines. The consequence of impacting GDE health could be considered high depending on the nature and sensitivity of the GDE.	**Unlikely**: Predicted potential drawdown in the basalt aquifer from the limited development is modelled to be moderate (<5m). Predicted drawdown at surficial aquifer along creek lines where potential Terrestrial GDEs have been mapped up to 2 m.	**Low**
		Watercourses	Drawdown impacts reach creek locations and reduce baseflow.	**Negligible**: The creeks are ephemeral and not supported by baseflow and so a reduction in basalt groundwater levels could not affect creek flows.	**Highly unlikely**: Based on available information, the local watercourses are ephemeral, flowing only in response to heavy rainfall and runoff events. There is no baseflow to the creeks and so a reduction in groundwater levels beneath isolated creek reaches can have no effect on creek flow.	**Insignificant**

Source	Pathway	Receptor	Potential Impact	Consequence	Likelihood	Risk
Contaminant release through drilling or water storage activities	Hydraulic gradient away from disturbance activities, either in deep aquifer through production bores, or shallow aquifers through surficial infiltration	Landholder bores	Unable to use water for domestic or stock purposes	**Low**: loss of water source for landholder, reputational risk for operator.	**Highly unlikely**: No fracking to be conducted, therefore hydraulic gradient will be towards production well. Appropriate post-production rehabilitation and decommissioning to be taken to mitigate long-term risk. Additionally, surface water controls are to mitigate contaminant release potential at surface.	**Low**
		Terrestrial GDEs	Harm to water reliant ecosystems	**Moderate** Potential Terrestrial GDEs are mapped along Kennedy Creek and other creek lines. The consequence of impacting GDE health could be considered high depending on the nature and sensitivity of the GDE.	**Highly unlikely**: No fracking to be conducted, therefore hydraulic gradient will be towards production well. Appropriate post-production rehabilitation and decommissioning to be taken to mitigate long-term risk. Additionally, surface water controls are to mitigate contaminant release potential at surface.	**Low**

Source	Pathway	Receptor	Potential Impact	Consequence	Likelihood	Risk
		Watercourses	Harm to water reliant ecosystems	**Negligible**: The creeks are ephemeral and not supported by baseflow and so a reduction in basalt groundwater levels could not affect creek flows	**Highly unlikely**: The local watercourses are ephemeral, flowing only in response to heavy rainfall and runoff events. There is no baseflow to the creeks and so a reduction in groundwater levels beneath isolated creek reaches can have no effect on creek flow. In addition, surface water controls are to mitigate contaminant release potential	**Negligible**

6.0 Recommendations

While the assessment herein is appropriate to support the EA Amendment Application, the following recommendations are a result of the groundwater technical studies, detailing areas of risk for management of the Project. These recommendations will facilitate further development of technical understanding, to provide clarity for management and compliance activities:

- Continued groundwater level monitoring and chemistry sampling is recommended at all groundwater bore locations, with a focus on the most recently installed positions to cover off on gaps. New groundwater monitoring points established in key features such as the alluvium, contact between the Permian coal seams and the Tertiary basalt, and in areas where they may provide regional head gradients for boundary condition definition.
- The modelling exercise carried out herein was a conceptual approach to simulating the interaction between hydraulic features with limitations on the data and timeframe available for the assessment., it is recommended that a more detailed numerical groundwater modelling exercise be carried out to include transient calibration of hydraulic parameters and uncertainty analysis of groundwater model results. These improvements will strengthen the technical foundation for future groundwater management decisions on site.
- Hydrogeological investigation into thickness, extent and nature of saturation within surficial aquifers should be carried out in collaboration with aquatic ecology assessments of potential groundwater dependent ecosystem communities.

7.0 References

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Appendix A Seam to Inseam Well Water Production Plots for ML6949

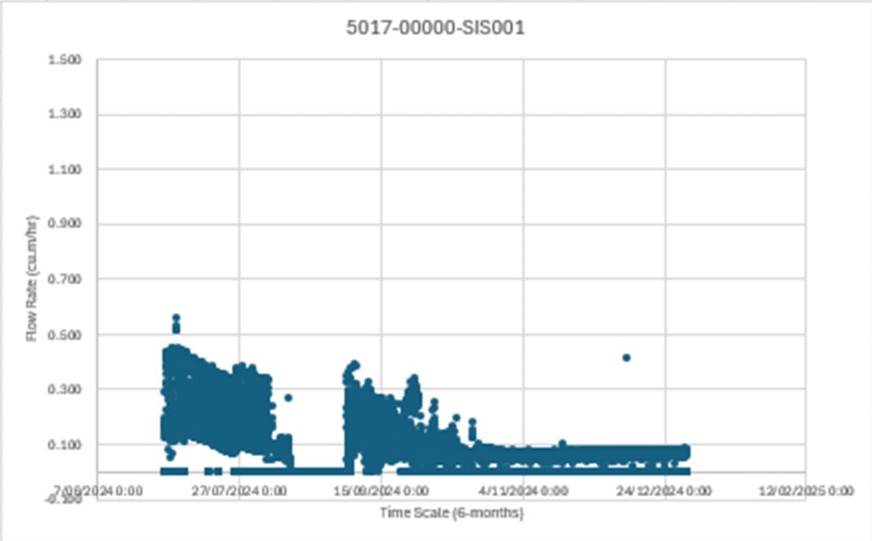
Centurion North Extension Project

Groundwater Assessment

Centurion Coal Mining Pty Ltd

SLR Project No.: 620.042334.00001

22 January 2026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27/07/2024 0:00
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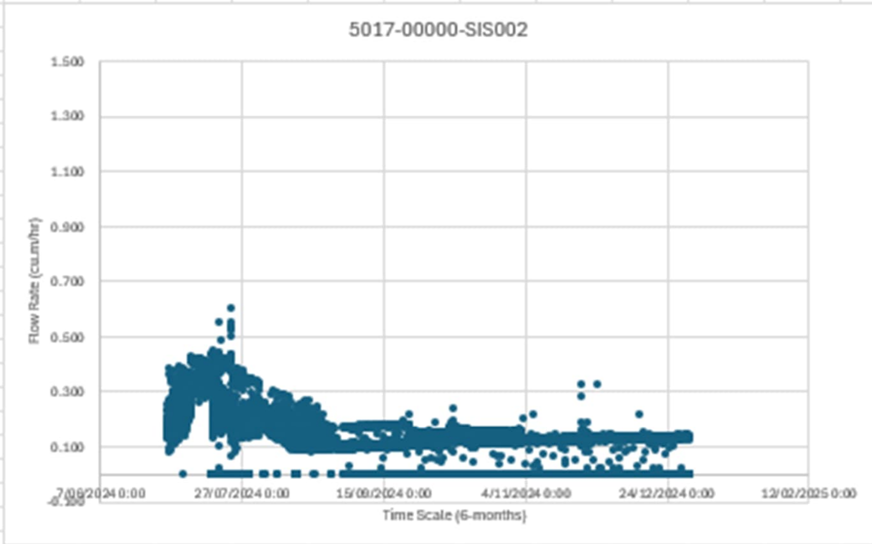
Time Scale (6-months)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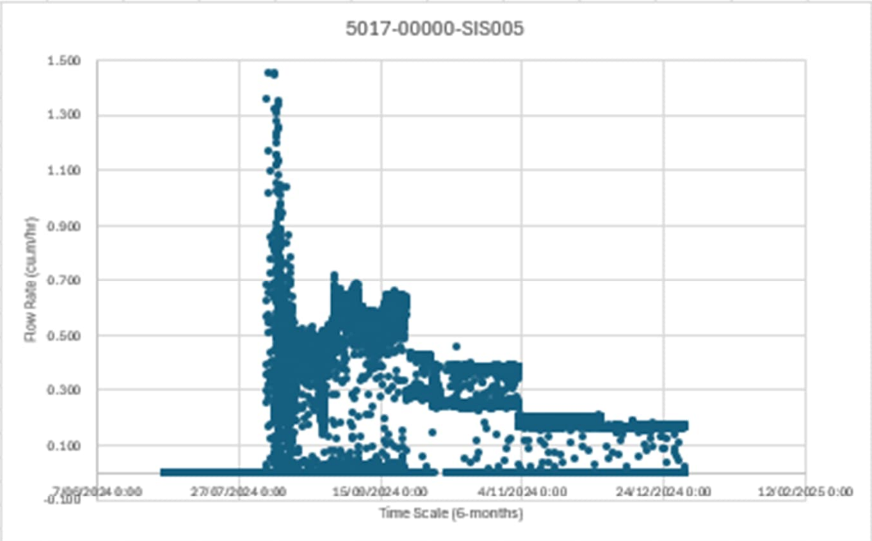
Time Scale (6-months)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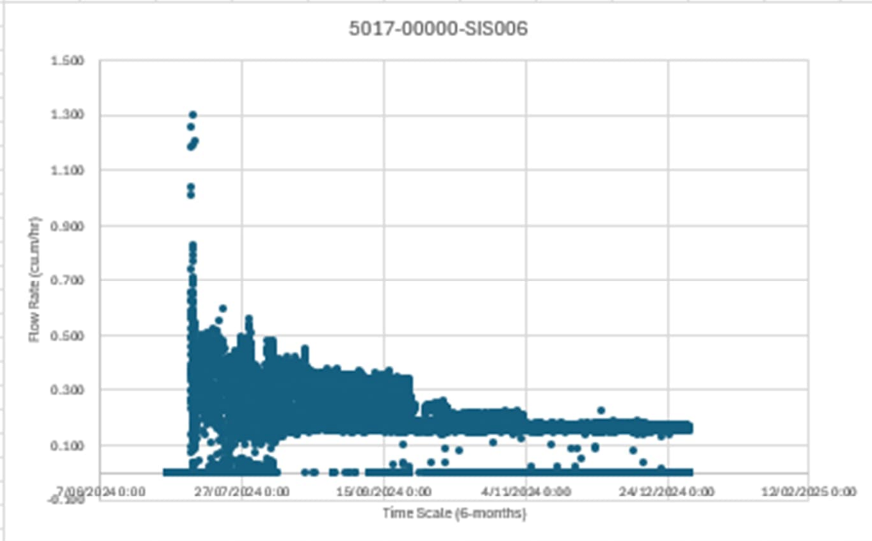
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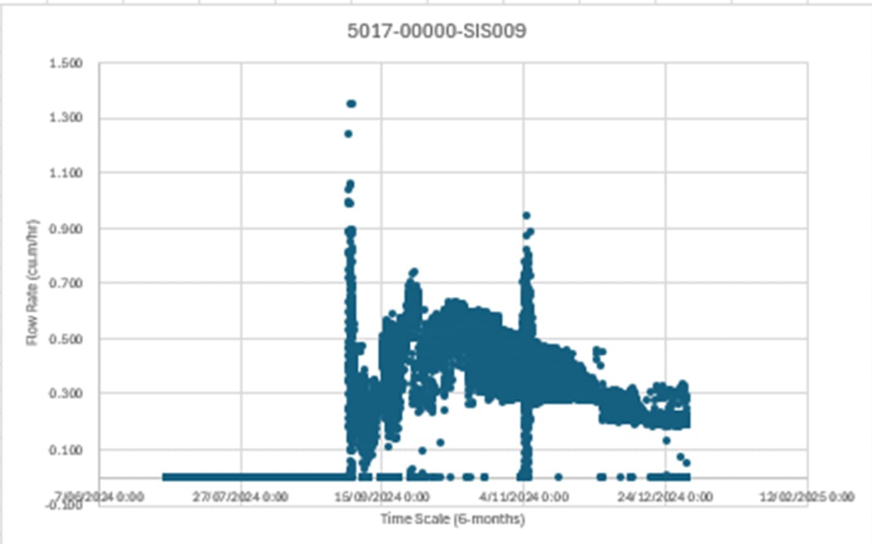
Time Scale (6-months)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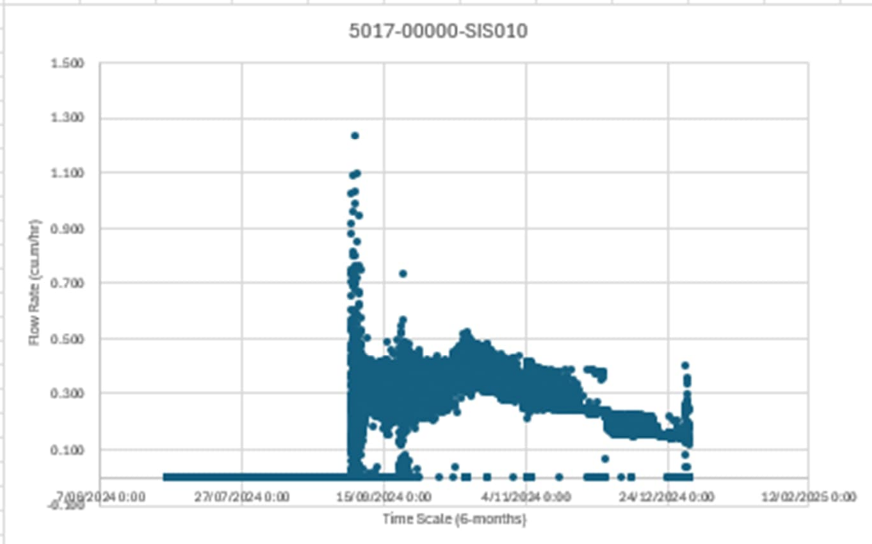
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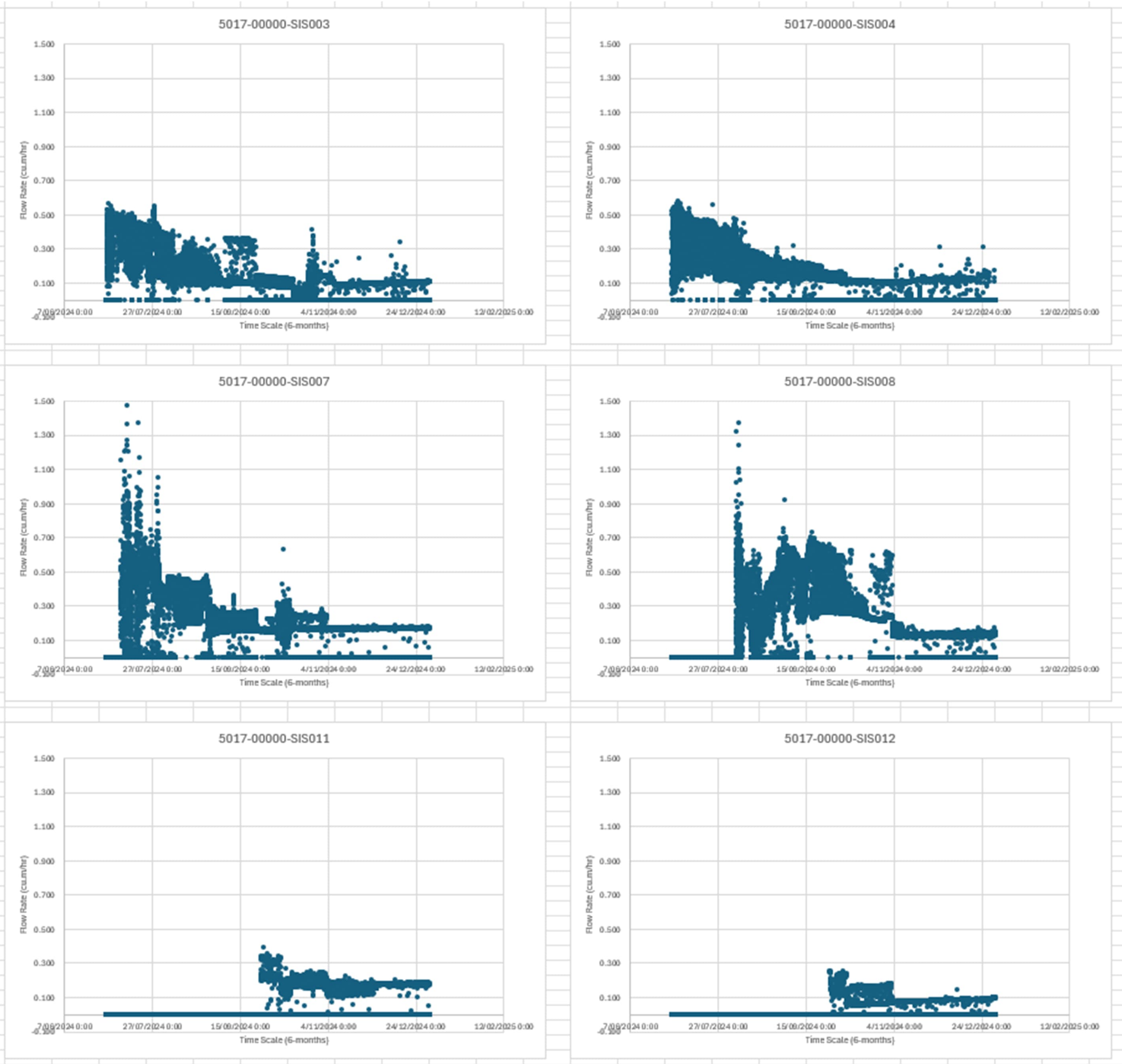
Time Scale (6-months)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Flow Rate (cu.m/hr)
Time Scale (6-months)
1.500
1.300
1.100
0.900
0.700
0.500
0.300
0.100
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15/09/2024 0:00
4/11/2024 0:00
24/12/2024 0:00
12/02/2025 0:00

Appendix B Hydraulic Parameterisation Table – Base & Sensitivity Parameters

Centurion North Extension Project

Groundwater Assessment

Centurion Coal Mining Pty Ltd

SLR Project No.: 620.042334.00001

22 January 2026

Table A-1: Hydraulic parameterisation table

					Horizontal Hydraulic Conductivity (m/d)			Vertical Hydraulic Conductivity (m/d)			Specific Storage (1/m)			Specific Yield		
Zone	Model Layer	Description	Lithology	Source Information / Comment	Low	Low (Coal Seams)	Base	Low	Low (Coal Seams)	Base	Low	Base	High	Low	Base	High
1	1	Alluvium	Quaternary Alluvium	Suttor Creek Alluvium Testing. Regional Studies indicate kh = 2-20 m/day (Arrow, 2012). No data on Storage	3.00E+00	3.00E+00	3.00E+00	1.50E+00	1.50E+00	1.50E+00	1.00E-03	1.00E-03	1.00E-03	1.00E-02	1.00E-02	1.00E-02
2	1	Colluvium & weathered sedimentary	Tertiary Sediment	Streamline Hydro Testing PB03 kh=0.3-0.8	5.00E-01	5.00E-01	5.00E-01	5.00E-02	5.00E-02	5.00E-02	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04
3	1	Weathered basalt	Tertiary Basalt	Streamline hydro testing of slightly weathered basalts at PB02 indicated lower K than fresh sequences tested in PB03. 0.01 to 0.4 m/day. Lower K than fresh basalt	1.00E-01	3.00E-01	3.00E-01	1.00E-02	3.00E-02	3.00E-02	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-04	1.00E-04
4	2	Layer 2 - weathered zone	Weathered Permian	Lower K than Fresh Permian Overburden	4.00E-01	6.00E-01	6.00E-01	4.00E-02	6.00E-02	6.00E-02	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-04	1.00E-04
5	2	Layer 2 - weathered zone (subsidence zone)	Tertiary Sediment	Streamline Hydro Testing PB03 kh=0.3-0.8. Upper end of range considering increased fracturing due to subsidence. Subsidence increasing vertical conductivity	5.00E-01	1.00E+00	1.00E+00	4.00E-01	8.00E-01	8.00E-01	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04
6	3 to 14	Regolith	Tertiary Sediment	Clay rich weathered sediments consistent with regional approach	5.00E-01	8.00E-01	8.00E-01	5.00E-02	8.00E-02	8.00E-02	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-04	1.00E-04
7	4 to 14	Basalt	Tertiary Basalt	Fresh basalt tested at PB01 Kh=0.5-2.4. Storage between 0.0001 and 0.05 in PB01	6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
8	5 to 14	Basalt (subsidence zone)	Tertiary Basalt	Subsidence increasing vertical conductivity	6.00E-01	6.00E-01	6.00E-01	4.80E-01	4.80E-01	4.80E-01	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
9	4	Interbed sands - central	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
10	4	Interbed sands - east	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
11	4	Interbed sands - north	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
12	4	Interbed sands - south	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
13	4	Interbed sands - southeast	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
14	4	Interbed sands - west	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
15	6	Interbed sands - central	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
16	6	Interbed sands - east	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
17	6	Interbed sands - north	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
18	6	Interbed sands - south	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02

19	6	Interbed sands - southeast	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
20	6	Interbed sands - west	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
21	8	Interbed sands - central	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
22	8	Interbed sands - east	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
23	8	Interbed sands - north	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
24	8	Interbed sands - south	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
25	8	Interbed sands - southeast	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
26	8	Interbed sands - west	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
27	10	Interbed sands - central	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
28	10	Interbed sands - east	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
29	10	Interbed sands - north	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
30	10	Interbed sands - south	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
31	10	Interbed sands - southeast	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
32	10	Interbed sands - west	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
33	12	Interbed sands - central	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
34	12	Interbed sands - east	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
35	12	Interbed sands - north	Tertiary Sediment (sands/silts)		6.00E-01	9.00E-01	9.00E-01	6.00E-02	9.00E-02	9.00E-02	6.00E-05	6.00E-04	1.90E-03	6.00E-04	6.00E-03	1.90E-02
36	12	Interbed sands - south	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
37	12	Interbed sands - southeast	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
38	12	Interbed sands - west	Tertiary Sediment (sands/silts)		1.00E+00	1.50E+00	1.50E+00	1.00E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
39	14	Basal Sands	Tertiary Sediment (sands/silts)	Upper range of tested Basalt	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.50E+00	1.00E-04	1.00E-03	3.16E-03	1.00E-03	1.00E-02	3.16E-02
40	15 to 17	Permian overburden	Permian Sediments	Golder, 2016 overburden at GBMC 8E-4	1.00E-02	1.00E-02	1.00E-02	1.00E-04	1.00E-04	1.00E-04	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
41	15 to 17	Permian overburden (subsidence zone)	Permian Sediments	Golder, 2016 overburden at GBMC 8E-4	1.00E-02	1.00E-02	1.00E-02	8.00E-03	8.00E-03	8.00E-03	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-03	3.16E-03
42	18	RQ seam	Permian Coal Seam	Packer testing conducted by SKM, reported in AGE, 2012. 0.001-0.000001. Low for Bowen Basin Coal. GL measurements from URS 2013 and Goulder 2016 at Goonyella used as conservative assumption	1.00E-02	1.00E-02	1.00E-01	1.00E-03	1.00E-03	1.00E-02	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
43	19	MCM interburden upper	Permian Sediments	URS, 2013 interburden packer tests 0.33 to 2E-5	1.00E-02	1.00E-02	1.00E-02	1.00E-04	1.00E-04	1.00E-04	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
44	19	MCM interburden (subsidence zone)	Permian Sediments	URS, 2013 interburden packer tests 0.33 to 2E-5. Subsidence increasing vertical conductivity	1.00E-02	1.00E-02	1.00E-02	8.00E-03	8.00E-03	8.00E-03	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-03	3.16E-03

45	20	GU seam	Permian Coal Seam	Packer testing conducted by SKM, reported in AGE, 2012. 0.001-0.000001. Low for Bowen Basin Coal. GL measurements from URS 2013 and Goulder 2016 at Goonyella used as conservative assumption	1.00E-02	1.00E-02	1.00E-01	1.00E-03	1.00E-03	1.00E-02	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
46	21	MCM interburden mid	Permian Sediments	URS, 2013 interburden packer tests 0.33 to 2E-5	1.00E-02	1.00E-02	1.00E-02	1.00E-04	1.00E-04	1.00E-04	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
47	21	MCM interburden mid (subsidence zone)	Permian Sediments	URS, 2013 interburden packer tests 0.33 to 2E-5. Subsidence increasing vertical conductivity	1.00E-02	1.00E-02	1.00E-02	8.00E-03	8.00E-03	8.00E-03	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-03	3.16E-03
48	22	GM seam	Permian Coal Seam	Packer testing conducted by SKM, reported in AGE, 2012. 0.001-0.000001. Low for Bowen Basin Coal. GL measurements from URS 2013 and Goulder 2016 at Goonyella used as conservative assumption	1.00E-02	1.00E-02	1.00E-01	1.00E-03	1.00E-03	1.00E-02	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
49	22	GM seam pinch Kv connection	Permian Coal Seam	Higher Kv to represent connection to basalt at subcrop	1.00E-02	1.00E-02	1.00E-01	1.00E-02	1.00E-02	1.00E-01	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
50	22	GM seam UG mine area (subsidence zone) - mined out!?	Permian Sediments	Collapsed zone hence higher Kh and Kv	2.00E-01	5.00E-01	5.00E-01	2.00E-01	5.00E-01	5.00E-01	1.00E-05	1.00E-04	3.16E-04	1.00E-04	1.00E-03	3.16E-03
51	23	MCM interburden lower	Permian Sediments	URS, 2013 interburden packer tests 0.33 to 2E-5	1.00E-02	1.00E-02	1.00E-02	1.00E-04	1.00E-04	1.00E-04	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
52	24	GL seam	Permian Coal Seam	Packer testing conducted by SKM, reported in AGE, 2012. 0.001-0.000001. Low for Bowen Basin Coal. GL measurements from URS 2013 and Goulder 2016 at Goonyella used as conservative assumption	1.00E-02	1.00E-02	1.00E-01	1.00E-03	1.00E-03	1.00E-02	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05
53	25	Basement (blenheim/back creek)	Permian Sediments	Permian overburden rocks in the range of 1 x 10-3 m/day and 1 x 10-4 m/day (Golder, 2017).	1.00E-03	1.00E-03	1.00E-03	1.00E-04	1.00E-04	1.00E-04	1.00E-07	1.00E-06	3.16E-06	1.00E-06	1.00E-05	3.16E-05

Appendix C Groundwater Level Hydrographs

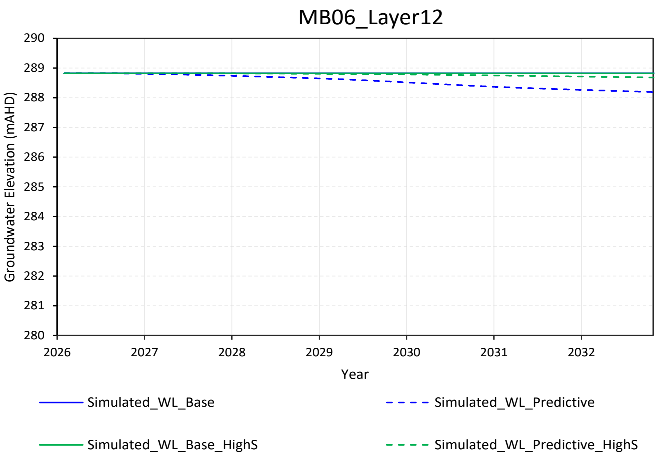
Centurion North Extension Project

Groundwater Assessment

Centurion Coal Mining Pty Ltd

SLR Project No.: 620.042334.00001

22 January 2026


MB06_Layer12
Groundwater Elevation (mAHD)
Year
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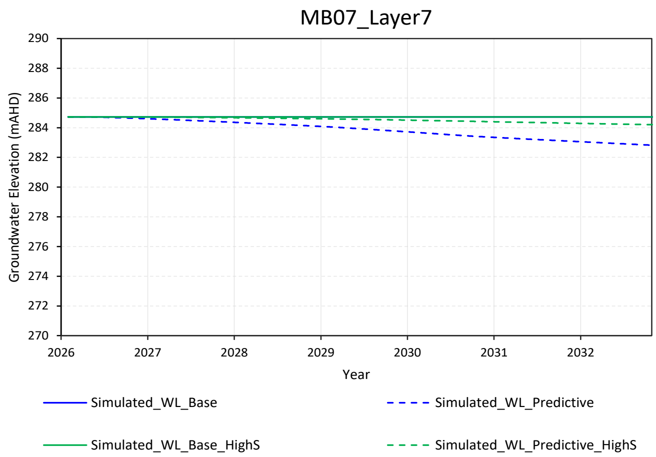
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS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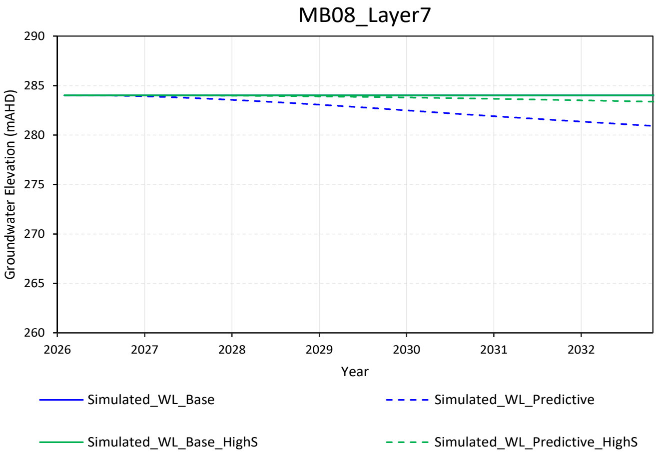
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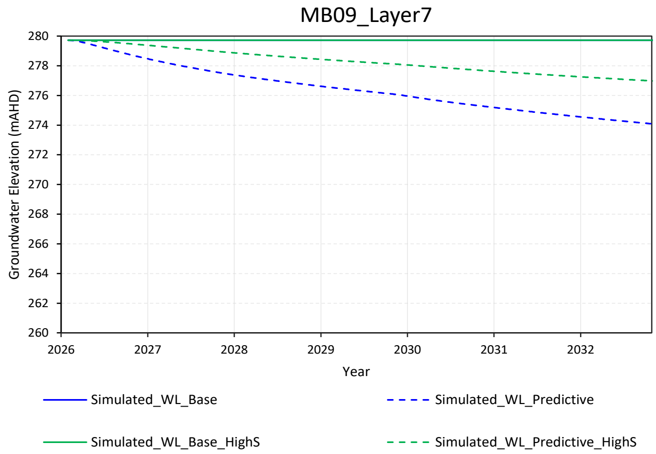
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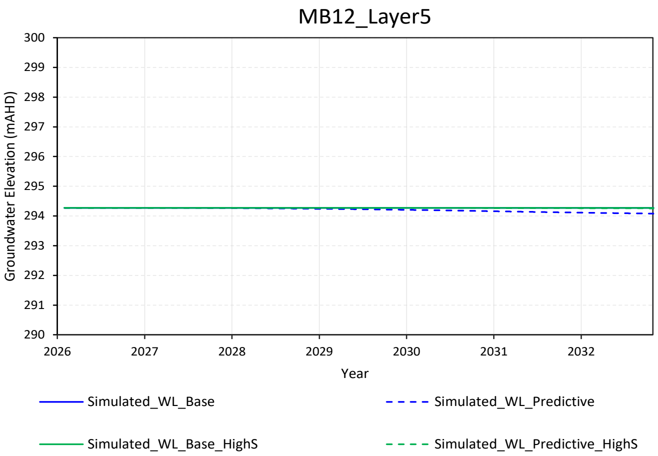
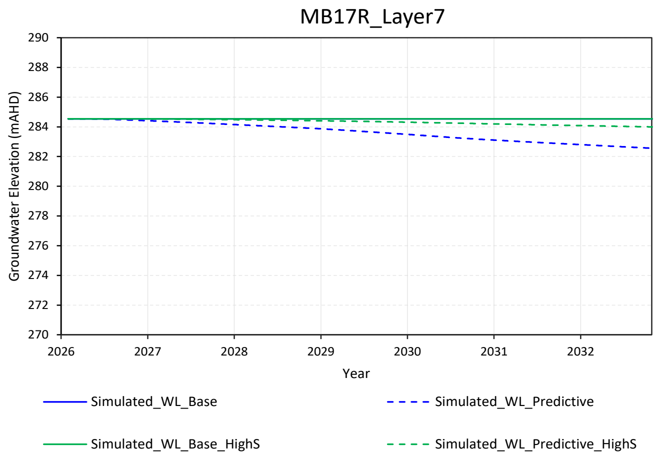

MB12_Layer5
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


MB17R_Layer7
Groundwater Elevation (mAHD)
Year
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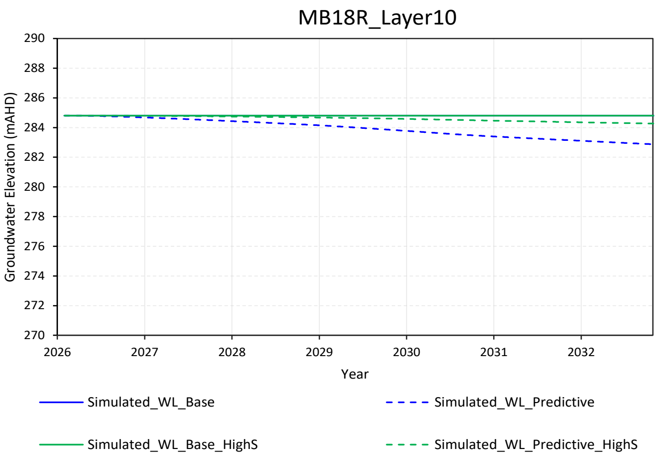
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


MB18R_Layer10
Groundwater Elevation (mAHD)
Year
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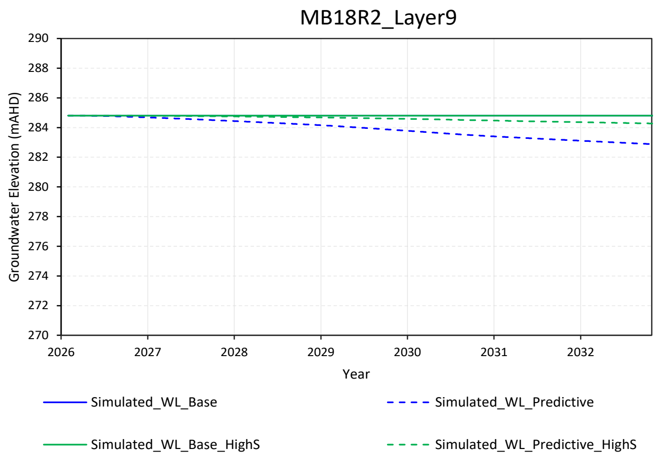
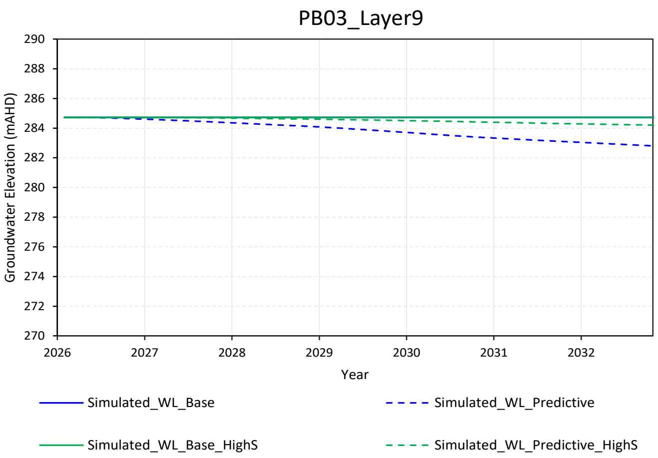
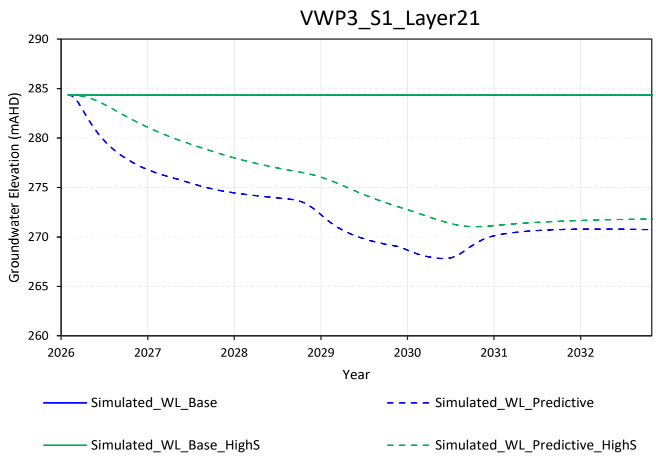
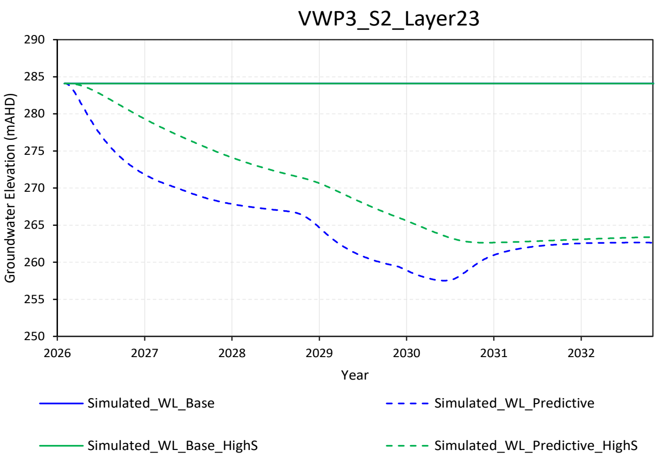
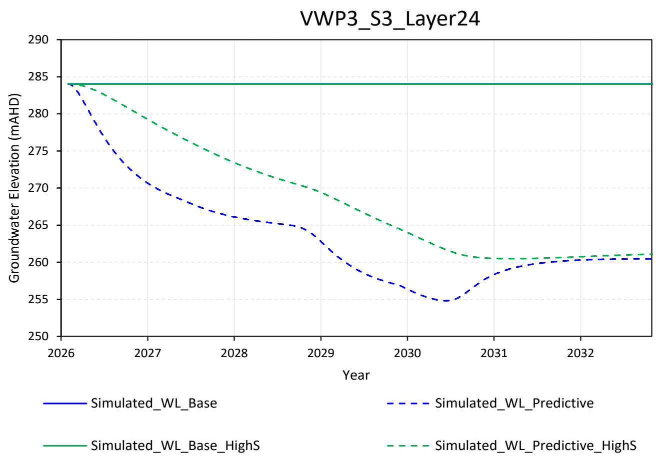

MB18R2_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


PB03_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


VWP3_S1_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


VWP3_S2_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


VWP3_S3_Layer24
Groundwater Elevation (mAHD)
Year
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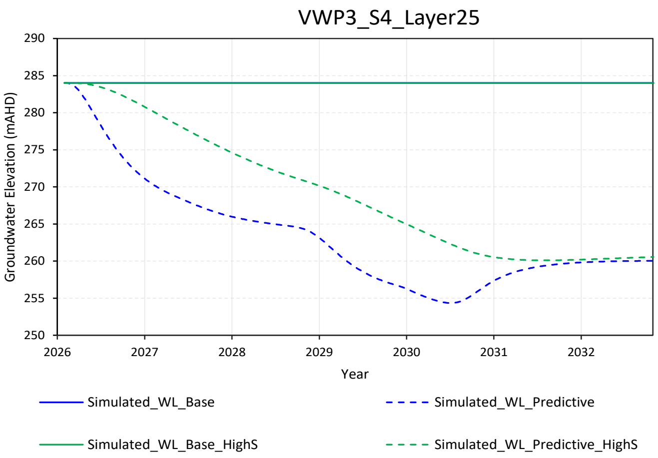
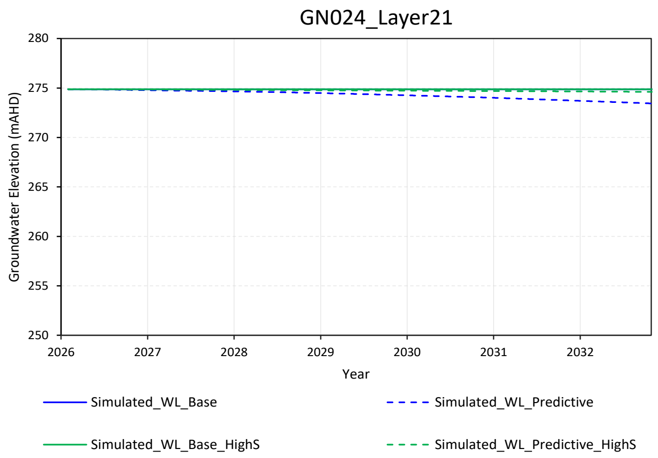
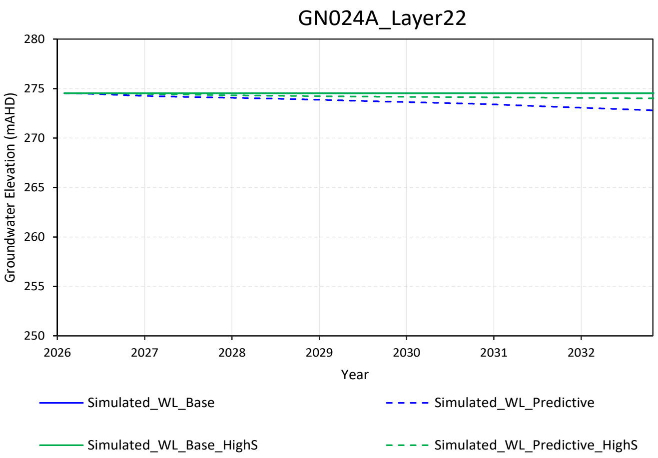
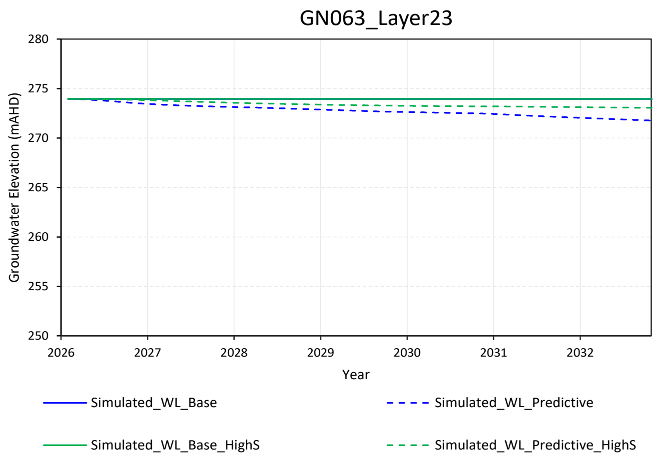
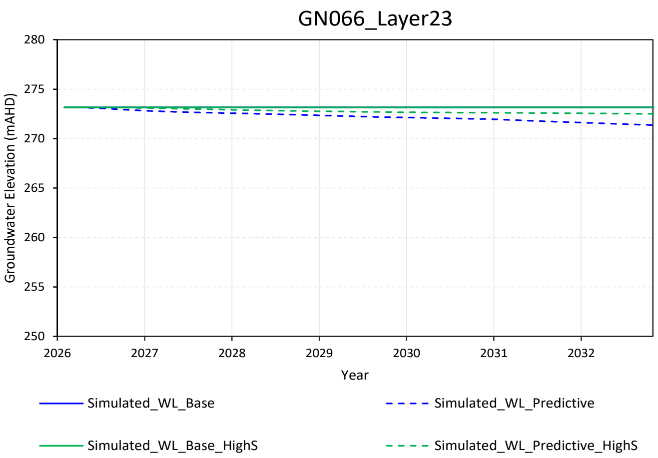
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS

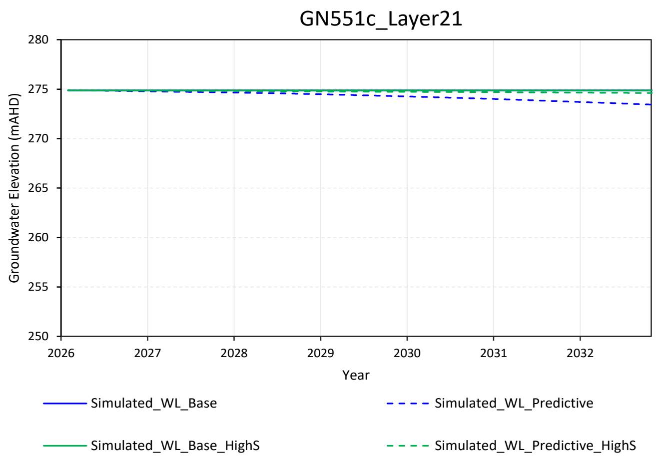

VWP3_S4_Layer25
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


GN024_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS

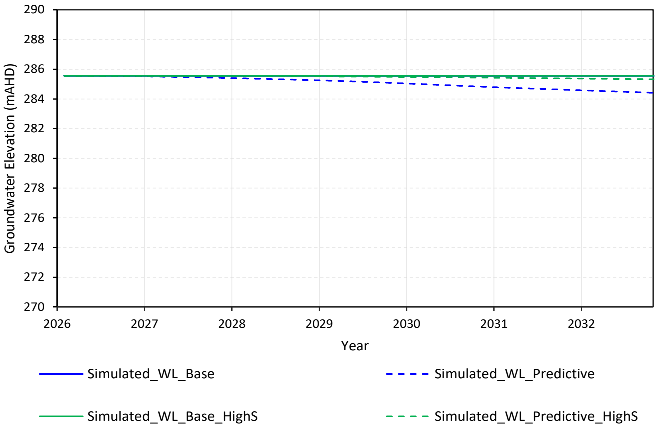

GN024A_Layer22
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


GN063_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS

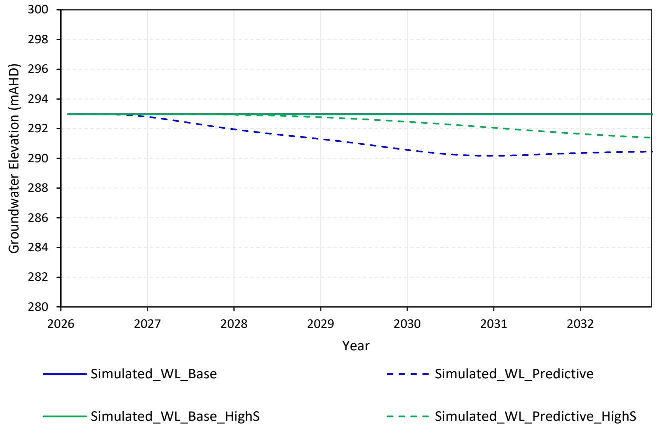

GN066_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS


GN551c_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS

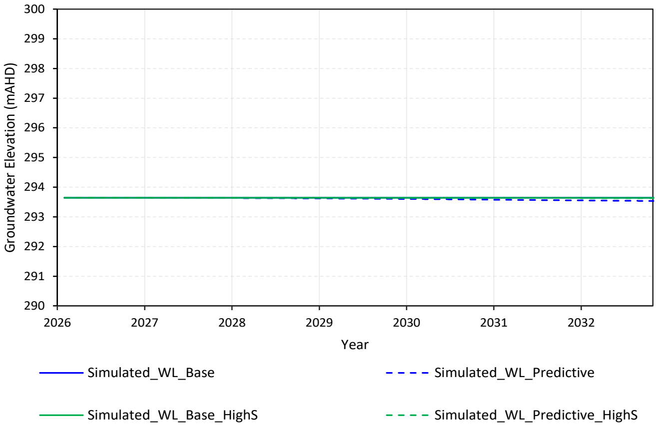
GDE_KDY_Layer1



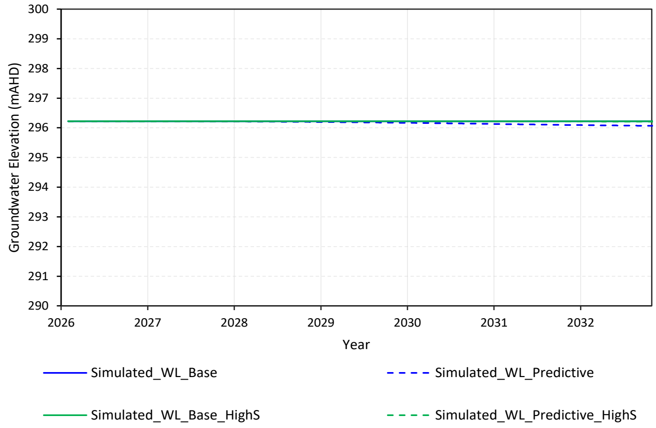
3_TANKS_W_Layer13



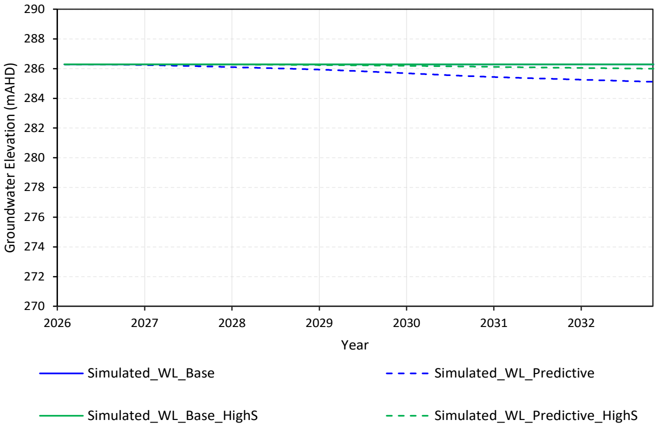
CHARLIES_Layer3



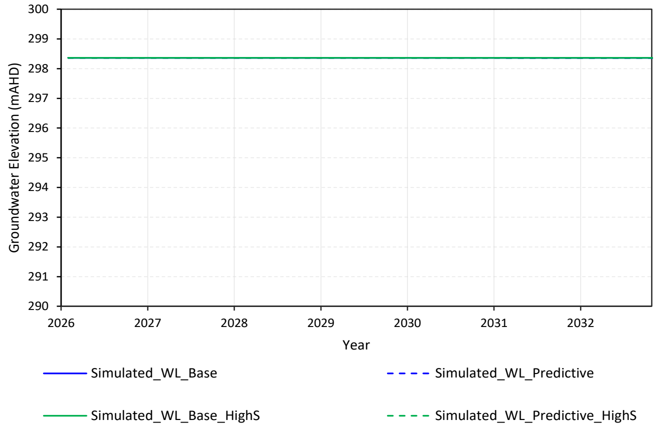
GREENDALE_Layer4

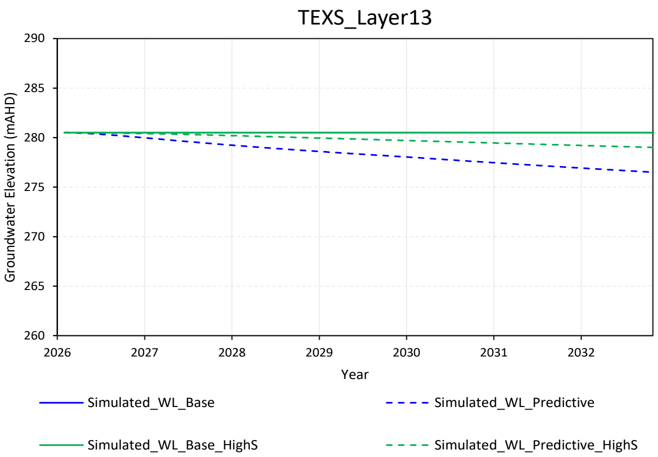


JAIL_P_Layer7

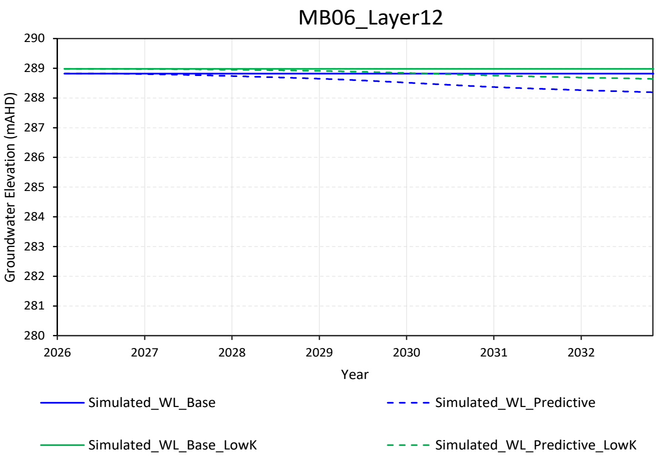


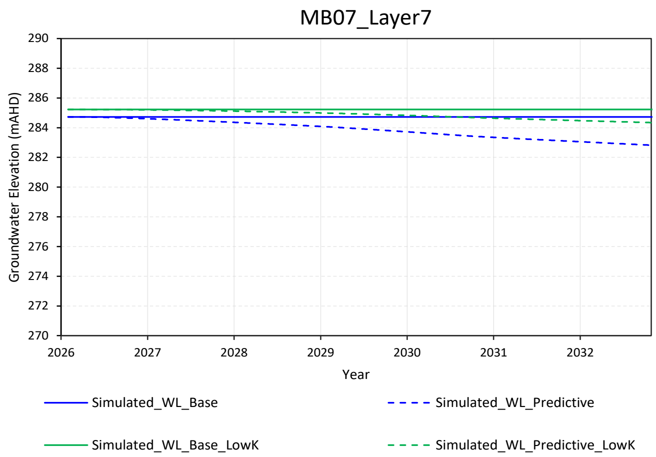
ROAD_PADD_Layer3

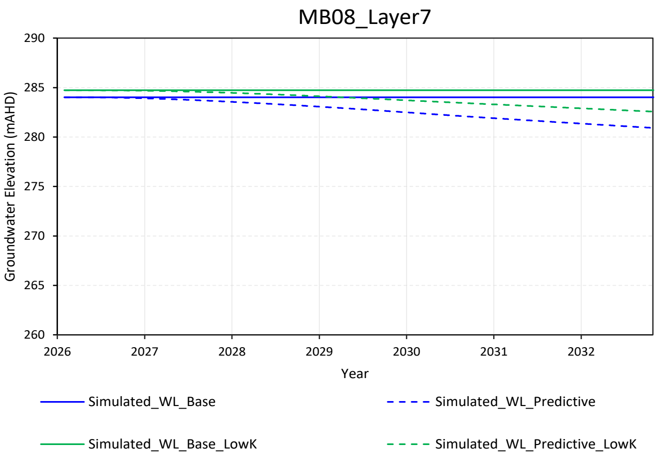


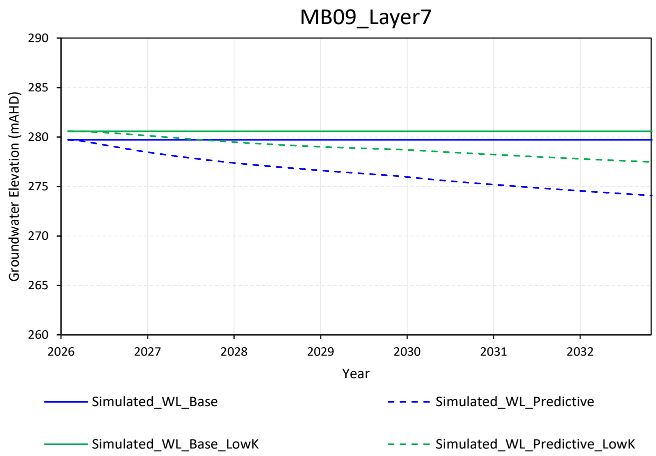


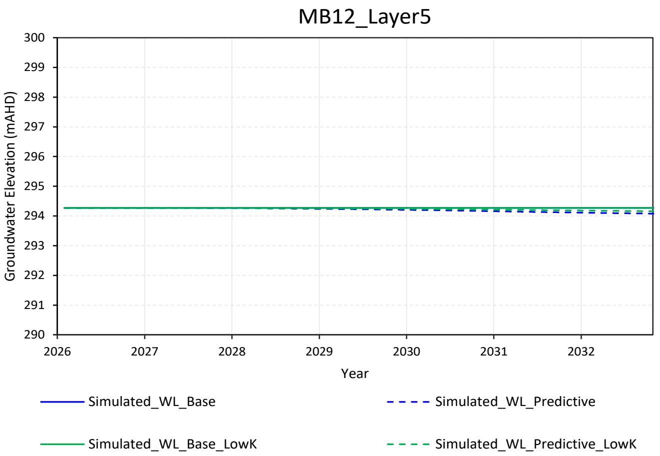
TEXS_Layer13
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_HighS
Simulated_WL_Predictive_HighS

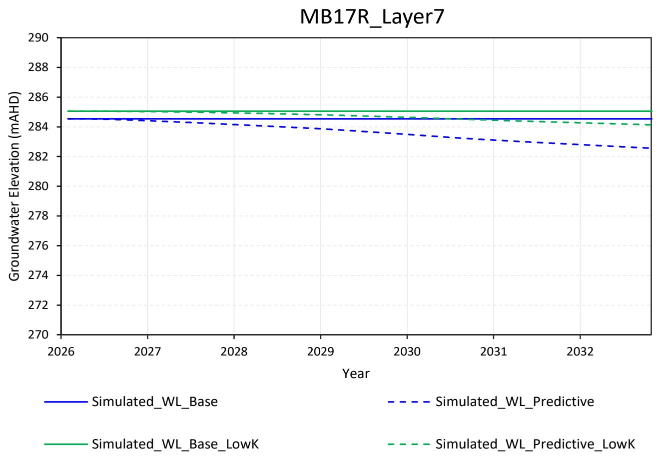

MB06_Layer12
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

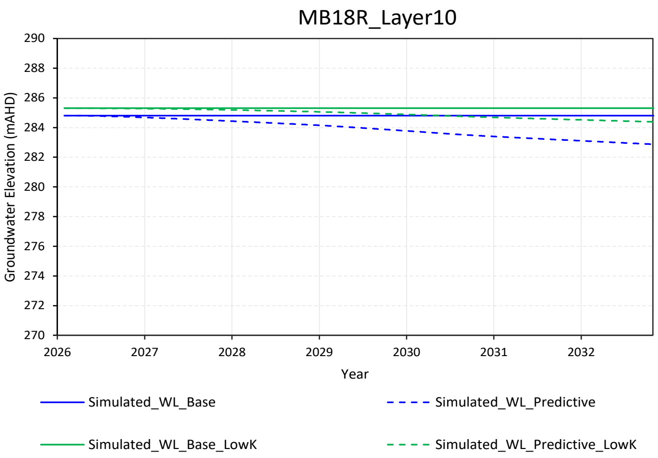

MB07_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

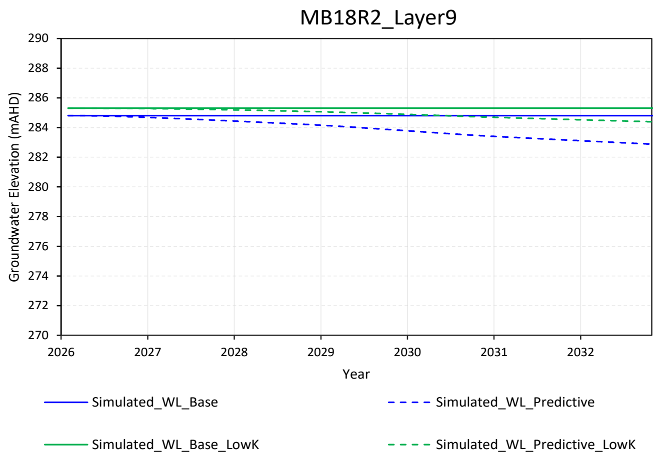

MB08_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

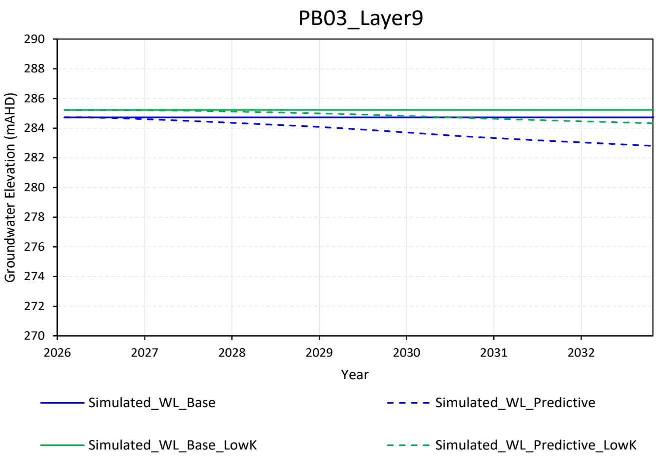

MB09_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

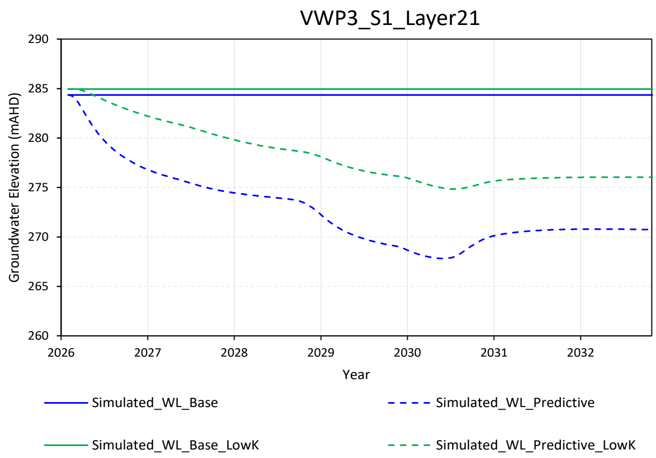

MB12_Layer5
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

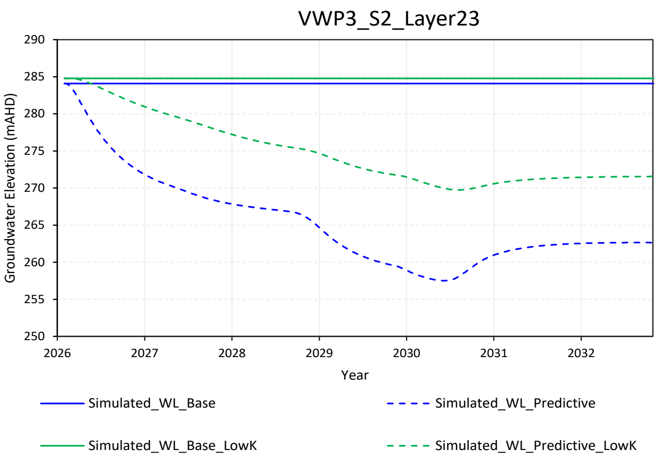

MB17R_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

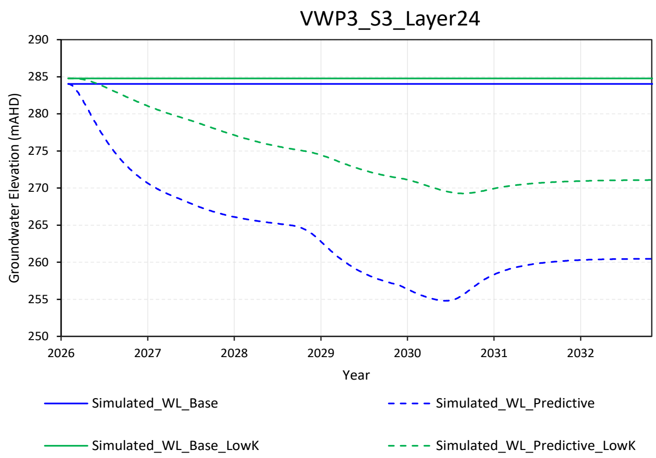

MB18R_Layer10
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

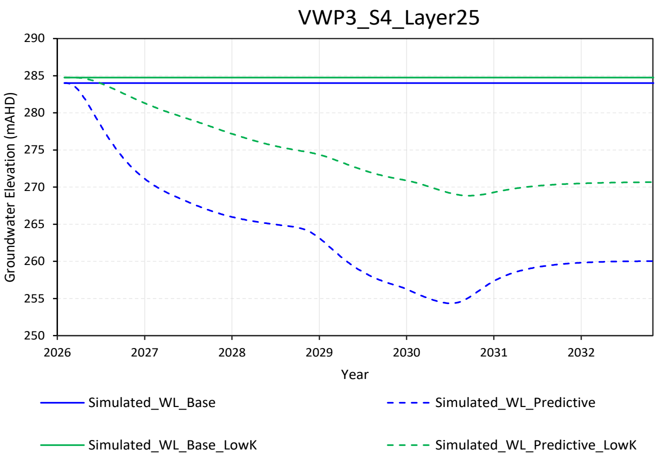

MB18R2_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

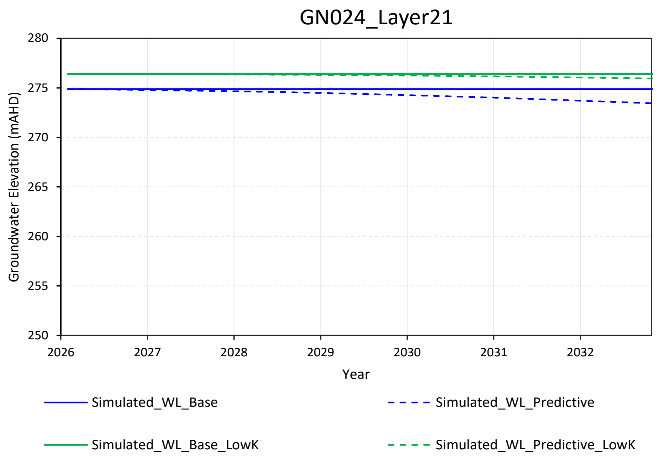

PB03_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

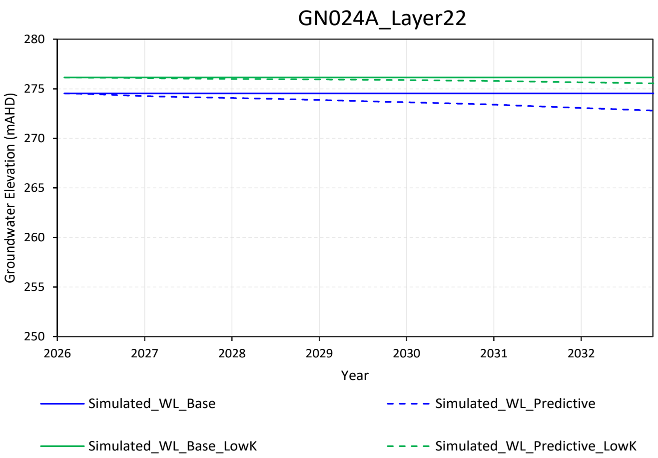

VWP3_S1_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

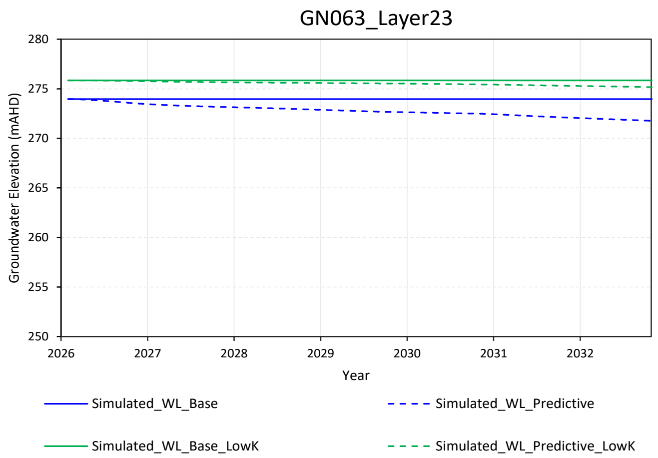

VWP3_S2_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

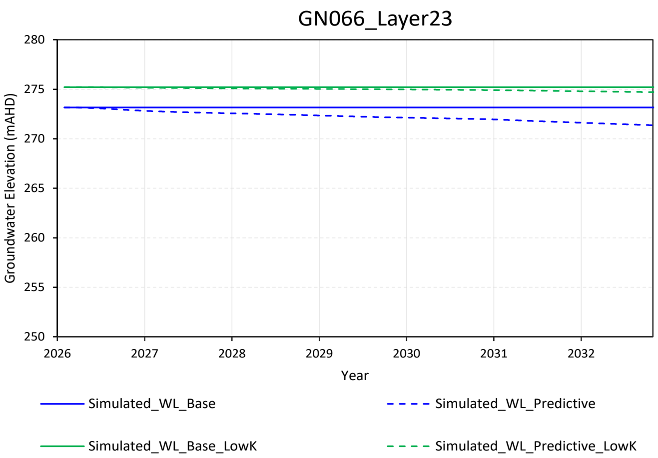

VWP3_S3_Layer24
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

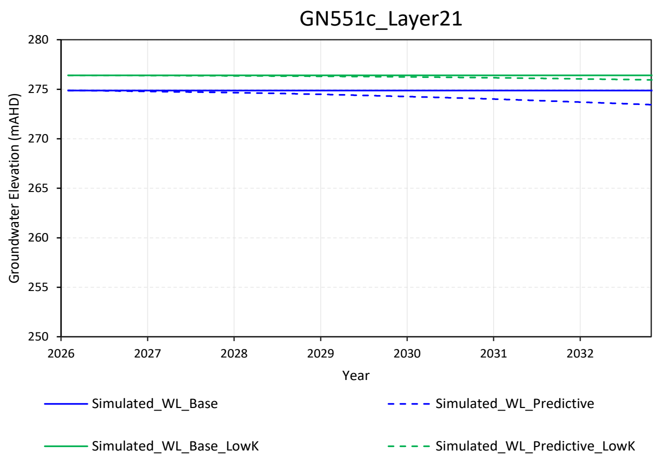

VWP3_S4_Layer25
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

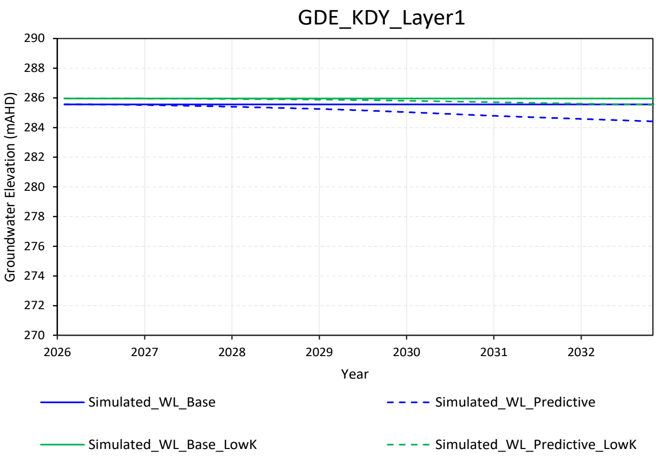

GN024_Layer21
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

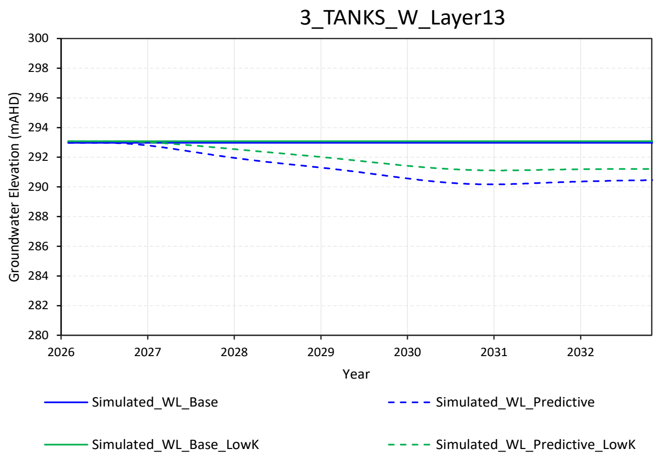

GN024A_Layer22
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

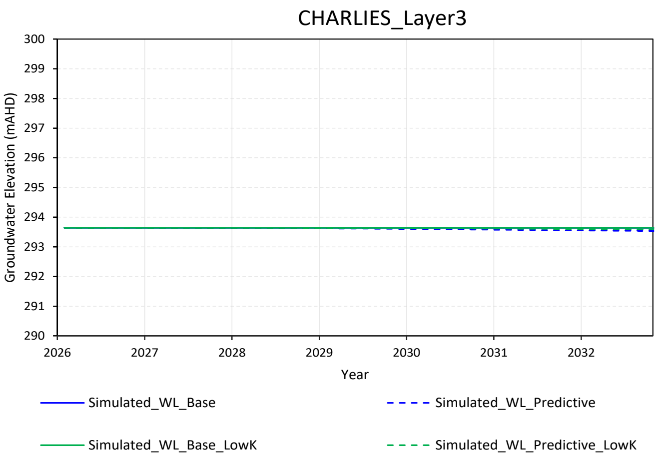

GN063_Layer23
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

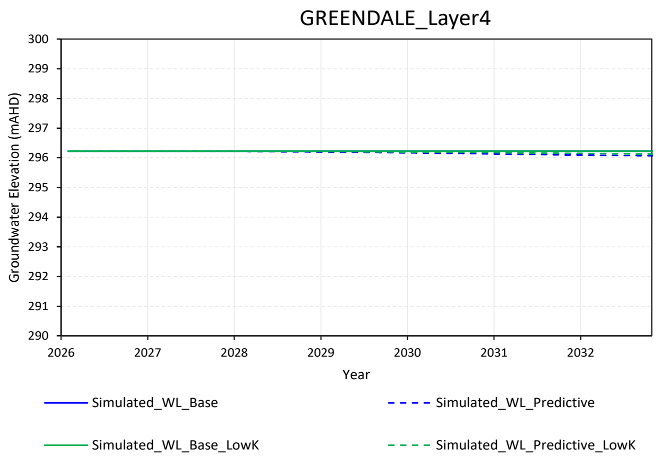

GN066_Layer23
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

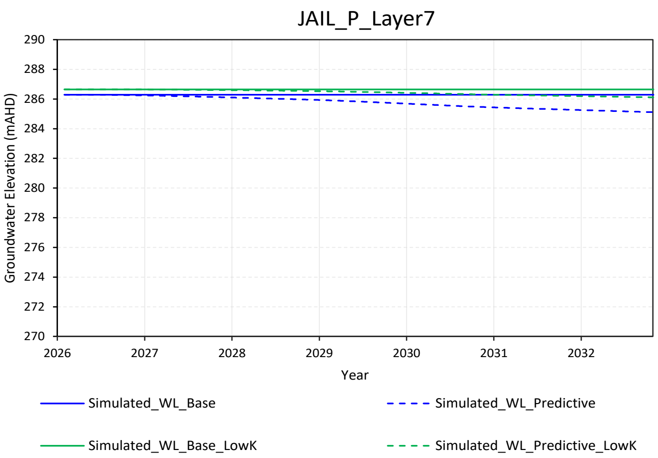

GN551c_Layer21
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

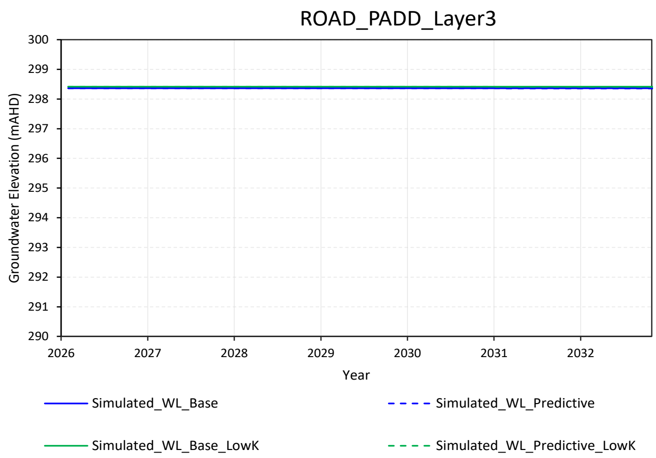

GDE_KDY_Layer1
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

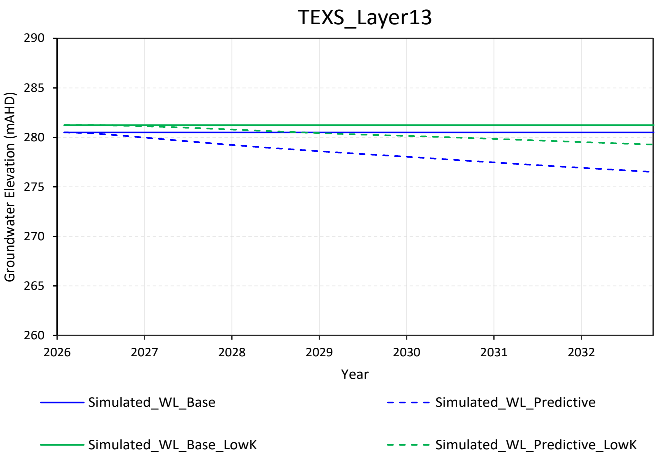

3_TANKS_W_Layer13
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK


CHARLIES_Layer3
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

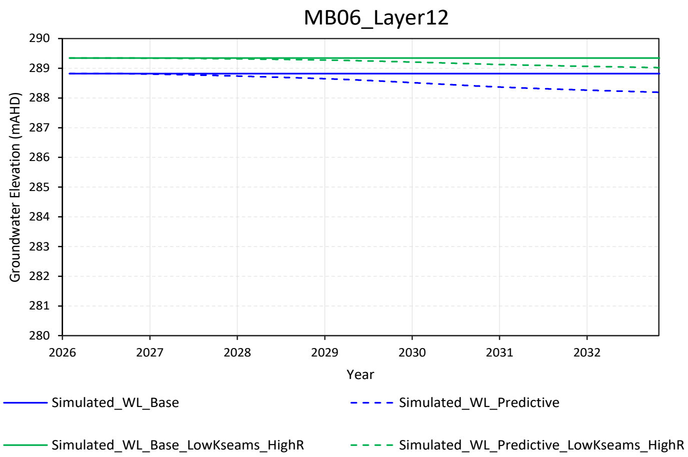

GREENDALE_Layer4
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

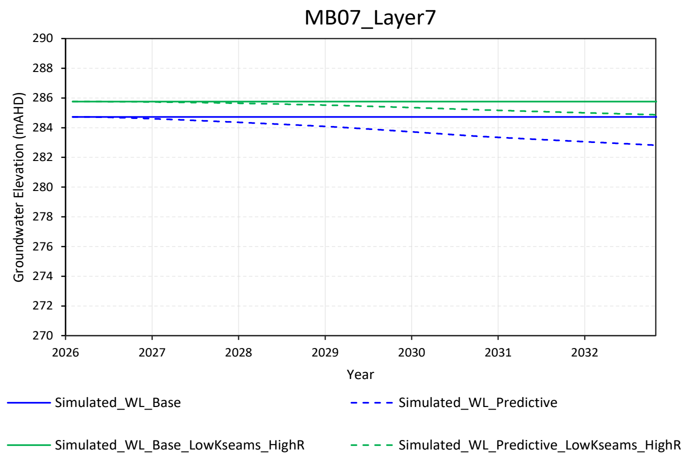

JAIL_P_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

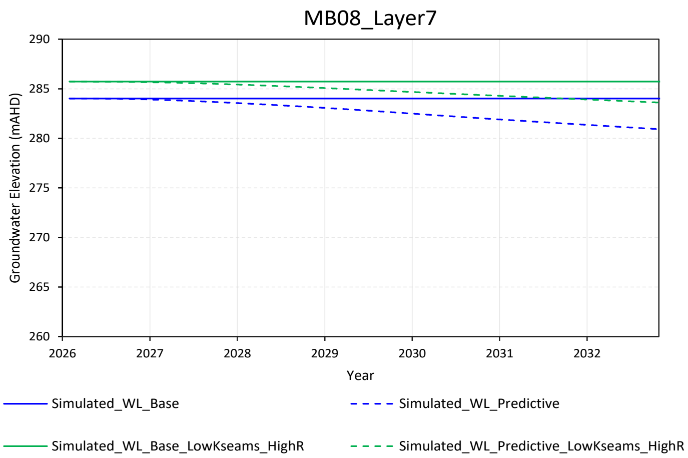

ROAD_PADD_Layer3
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

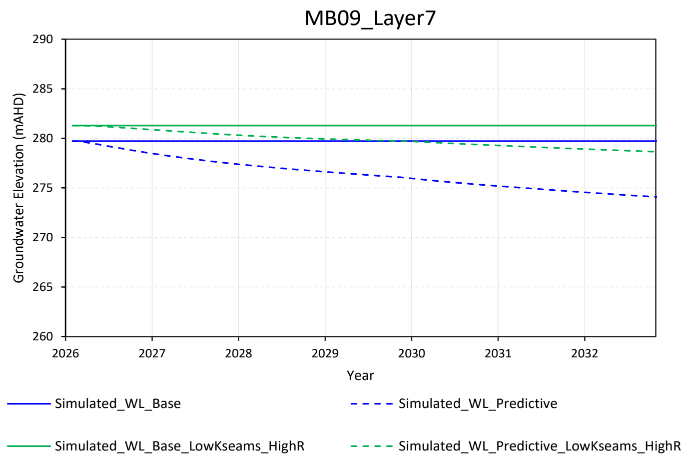


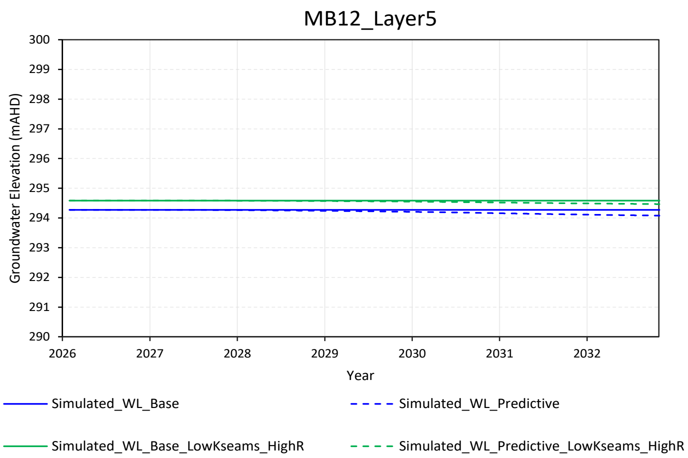
TEXS_Layer13
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowK
Simulated_WL_Predictive_LowK

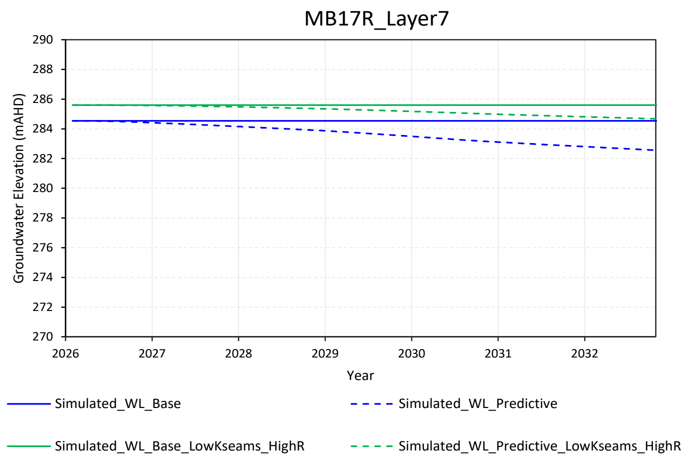

MB06_Layer12
Groundwater Elevation (mAHD)
290
289
288
287
286
285
284
283
282
281
280
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

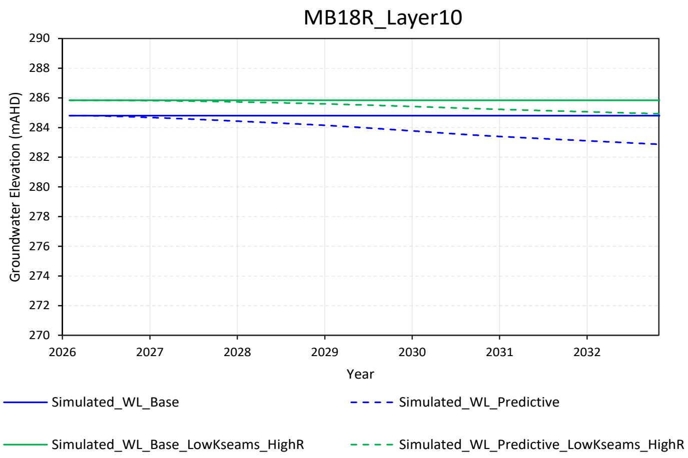

MB07_Layer7
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

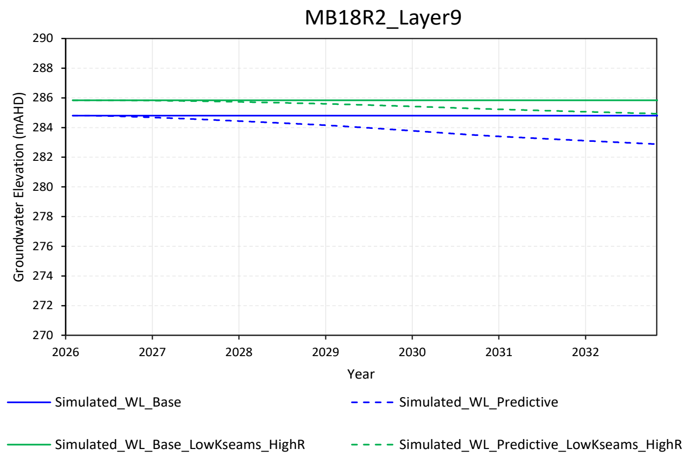

MB08_Layer7
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

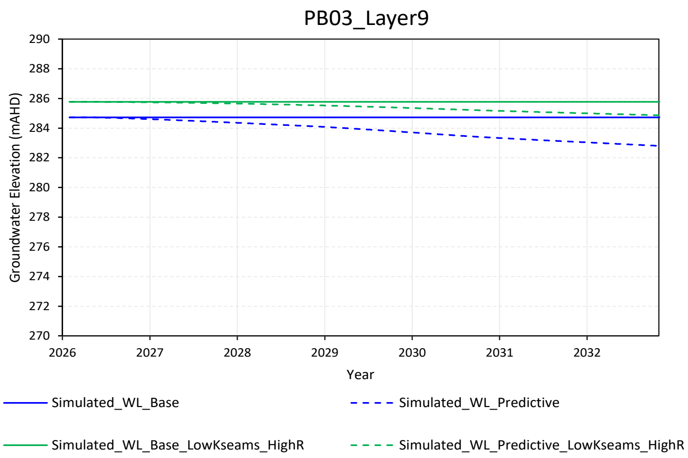

MB09_Layer7
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


MB12_Layer5
Groundwater Elevation (mAHD)
300
299
298
297
296
295
294
293
292
291
290
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


MB17R_Layer7
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


MB18R_Layer10
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


MB18R2_Layer9
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


PB03_Layer9
Groundwater Elevation (mAHD)
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288
286
284
282
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278
276
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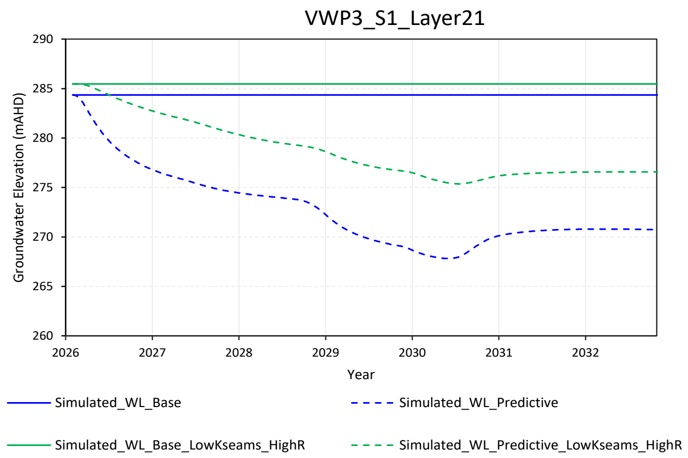
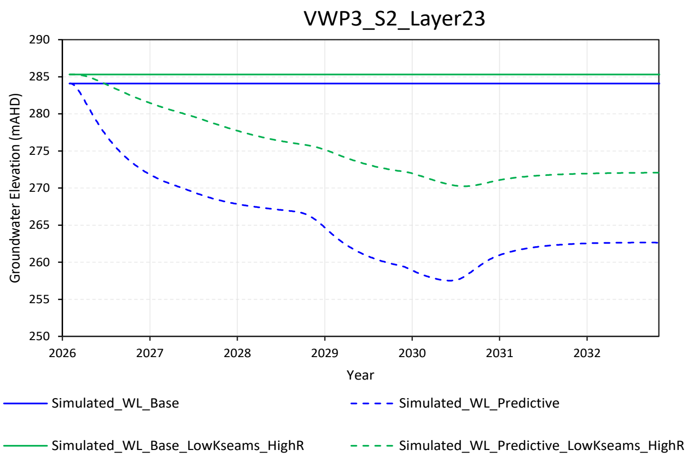
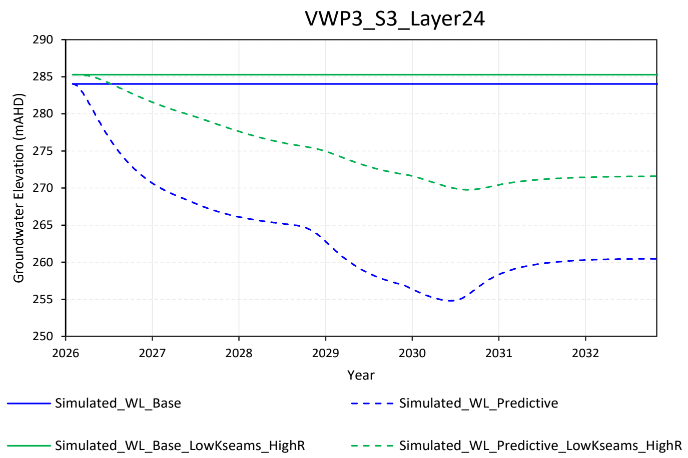
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


VWP3_S1_Layer21
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


VWP3_S2_Layer23
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


VWP3_S3_Layer24
Groundwater Elevation (mAHD)
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285
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275
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265
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255
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2026
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2028
2029
2030
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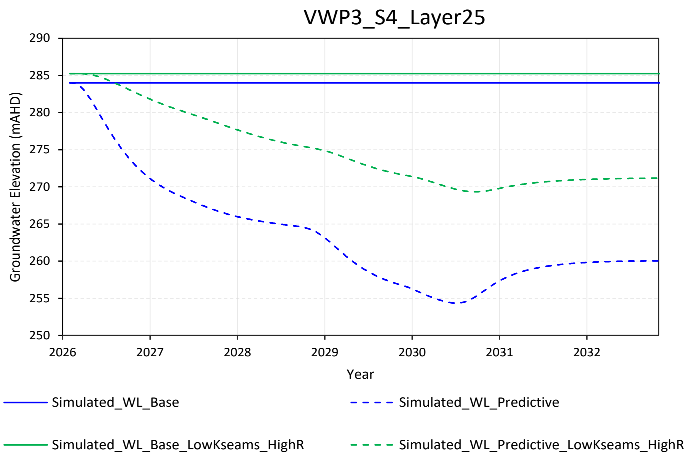
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


VWP3_S4_Layer25
Groundwater Elevation (mAHD)
290
285
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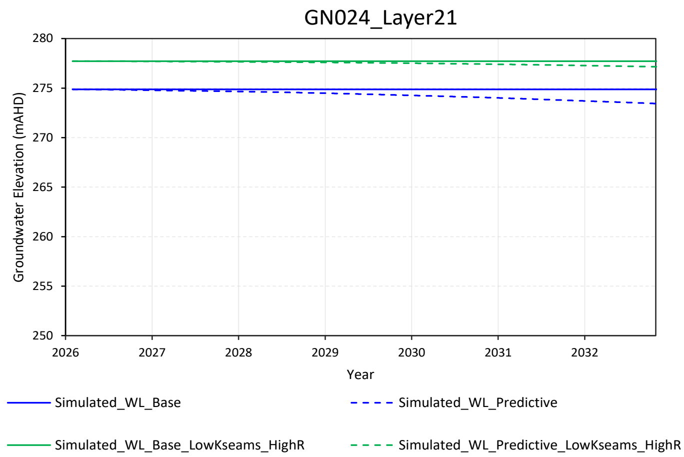
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


GN024_Layer21
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
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2028
2029
2030
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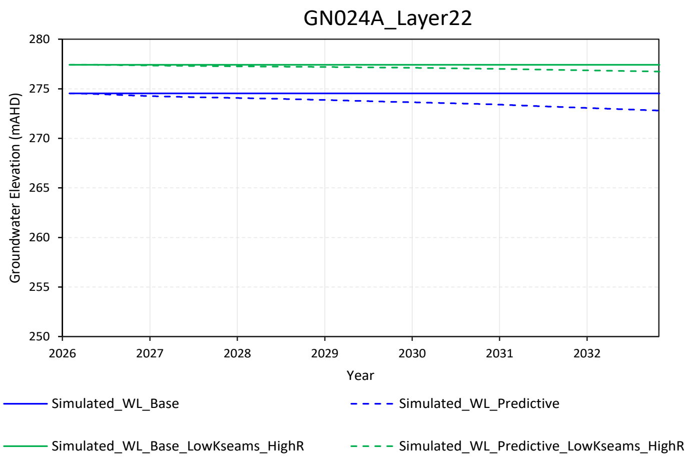
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


GN024A_Layer22
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
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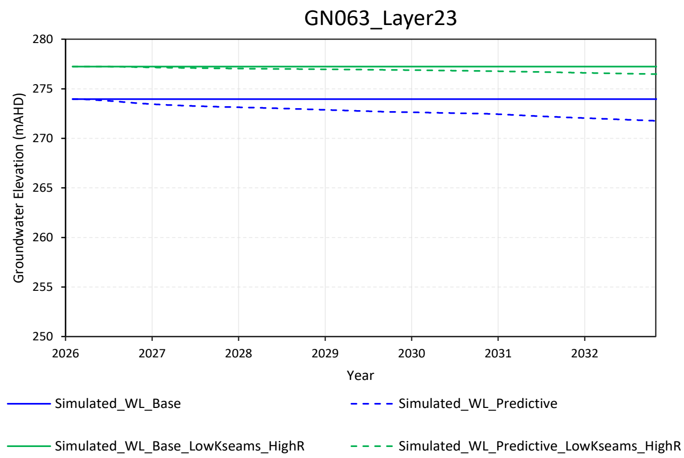
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


GN063_Layer23
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
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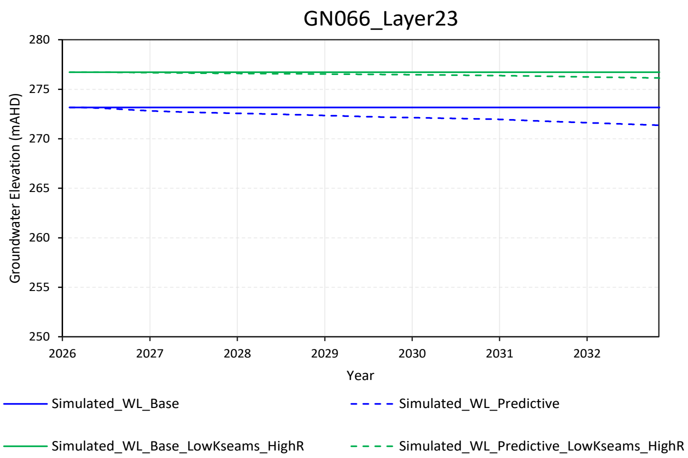
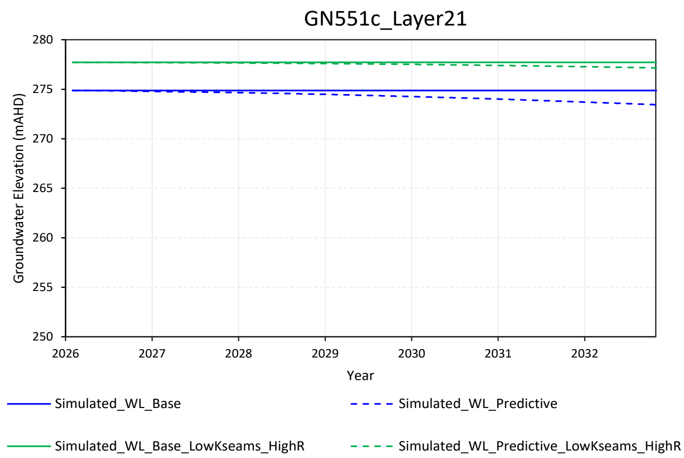
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


GN066_Layer23
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR


GN551c_Layer21
Groundwater Elevation (mAHD)
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
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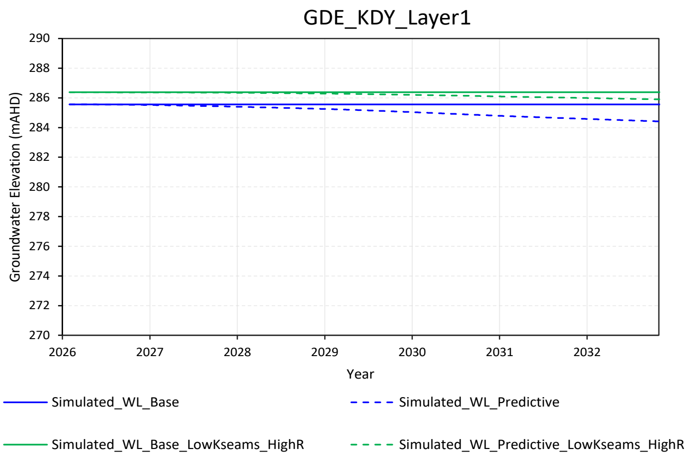
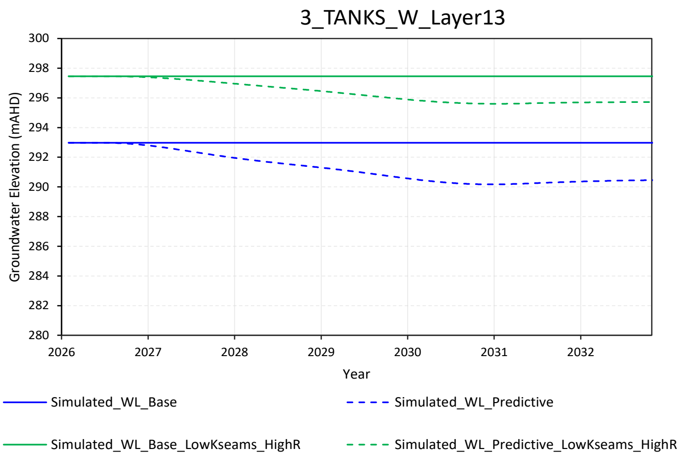
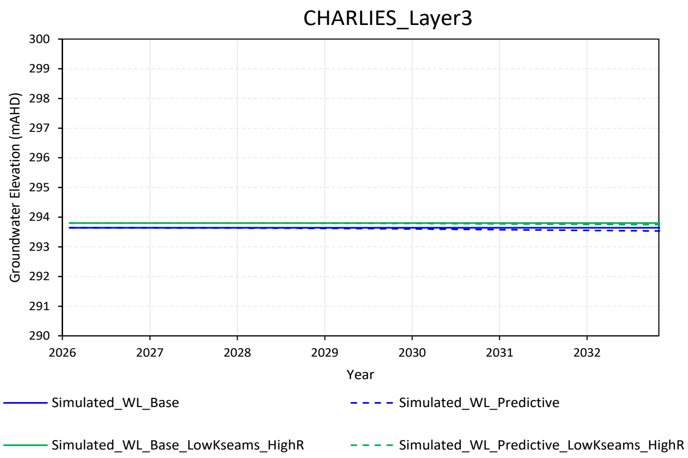
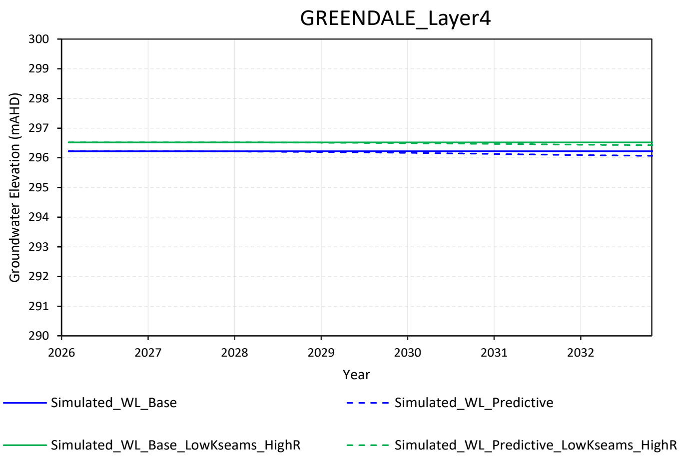
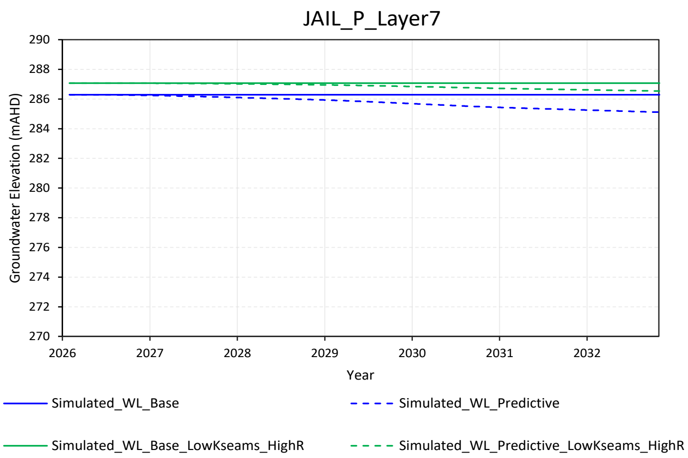
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

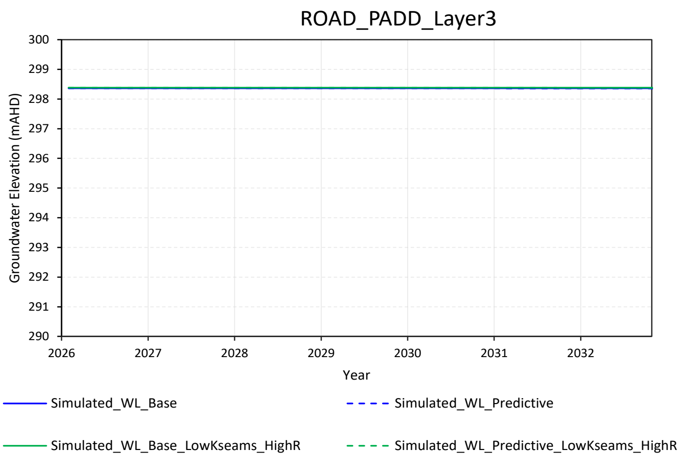

GDE_KDY_Layer1
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

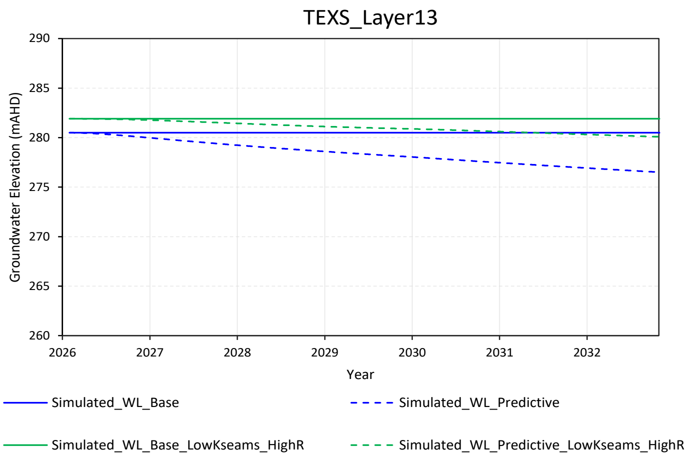

3_TANKS_W_Layer13
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

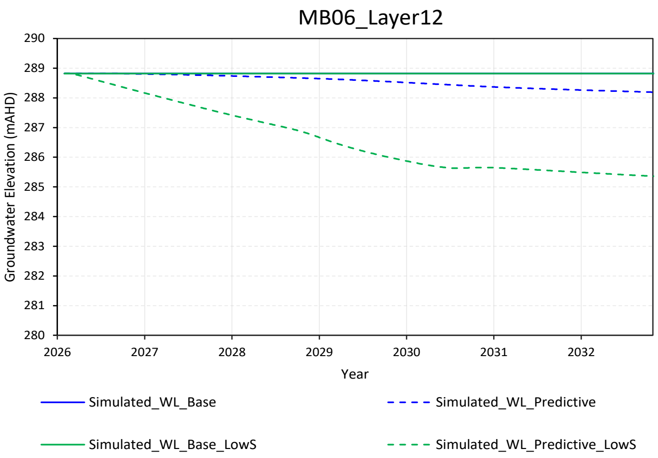

CHARLIES_Layer3
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

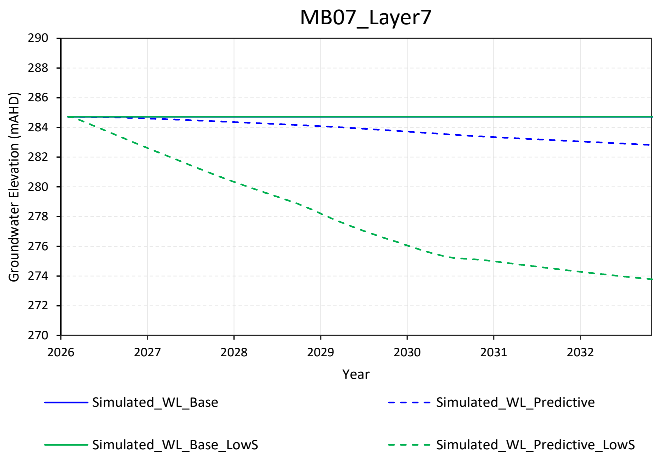

GREENDALE_Layer4
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

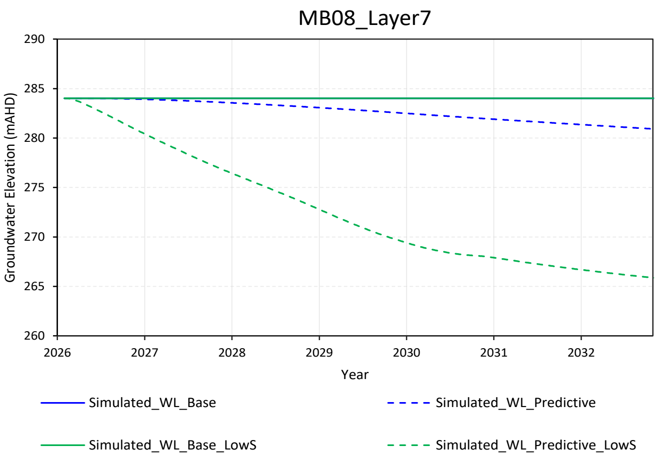

JAIL_P_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

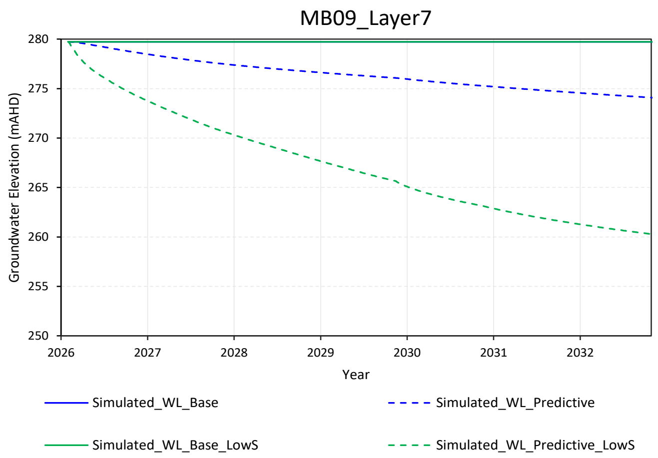

ROAD_PADD_Layer3
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

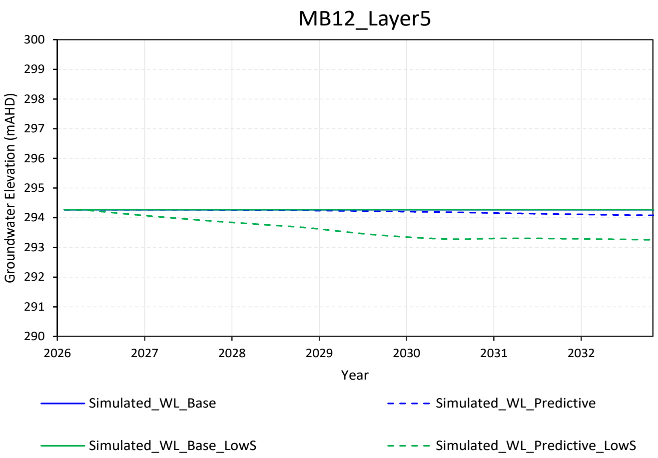

TEXS_Layer13
290
285
280
275
270
265
260
Groundwater Elevation (mAHD)
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowKseams_HighR
Simulated_WL_Predictive_LowKseams_HighR

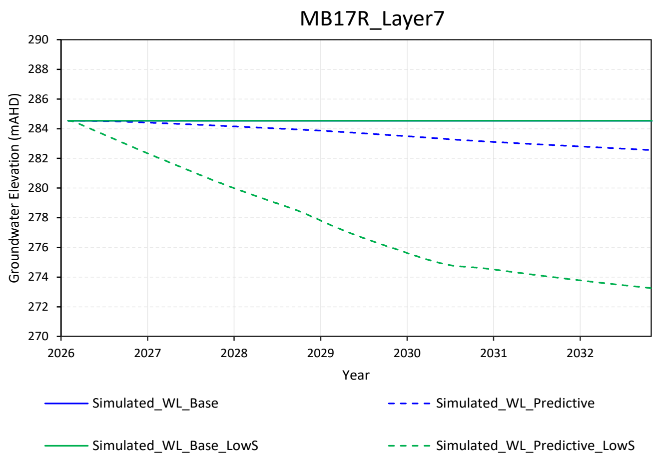

MB06_Layer12
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

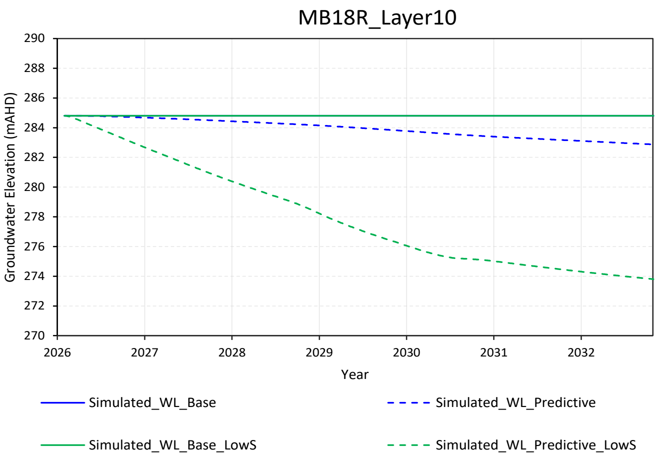

MB07_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

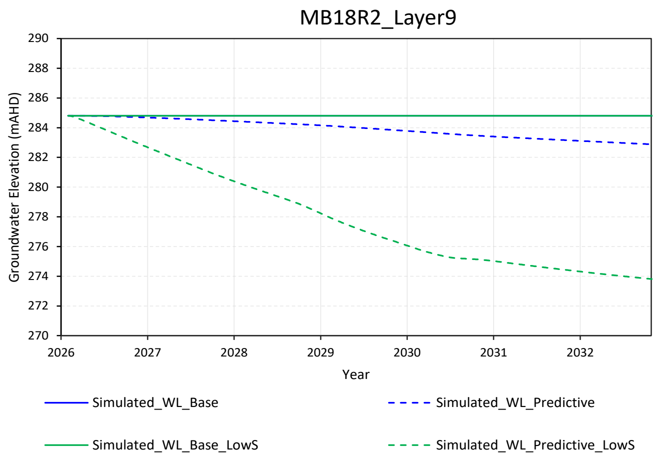

MB08_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

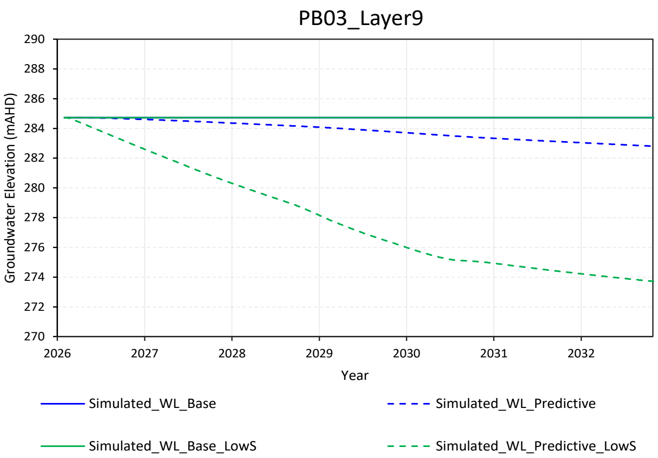

MB09_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

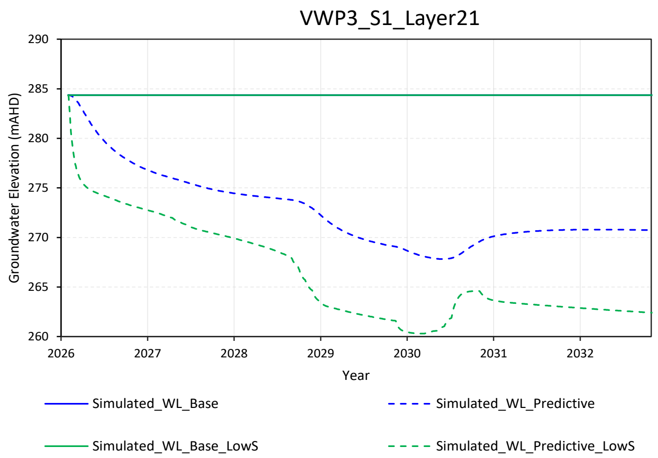

MB12_Layer5
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

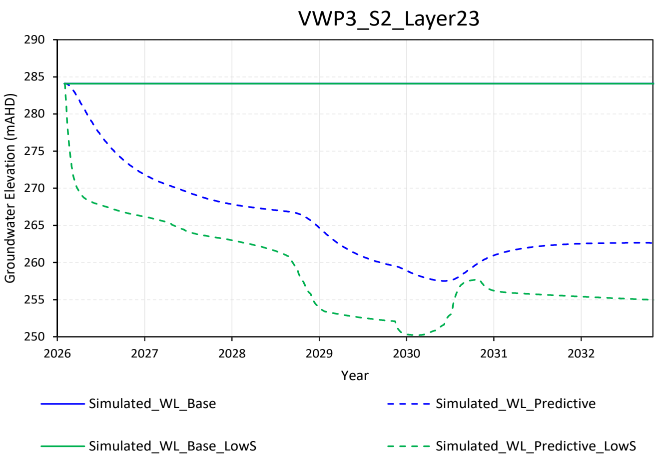

MB17R_Layer7
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

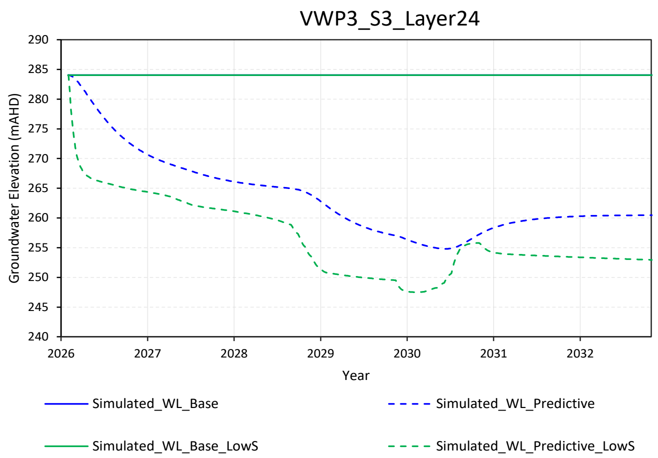

MB18R_Layer10
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

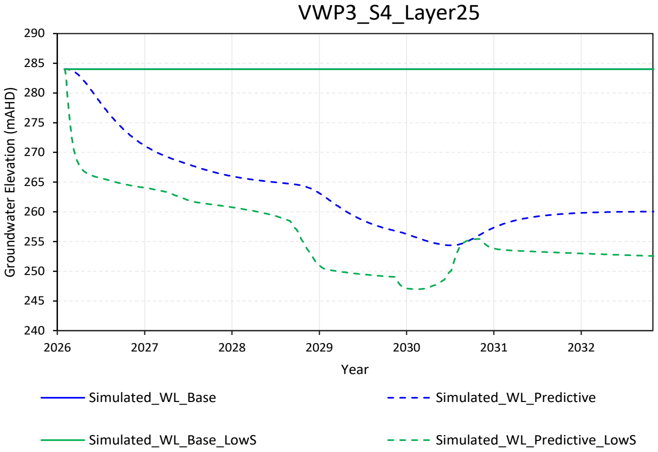

MB18R2_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

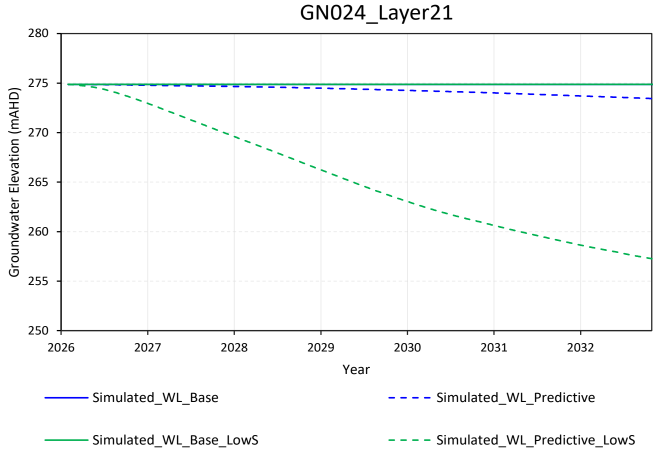

PB03_Layer9
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

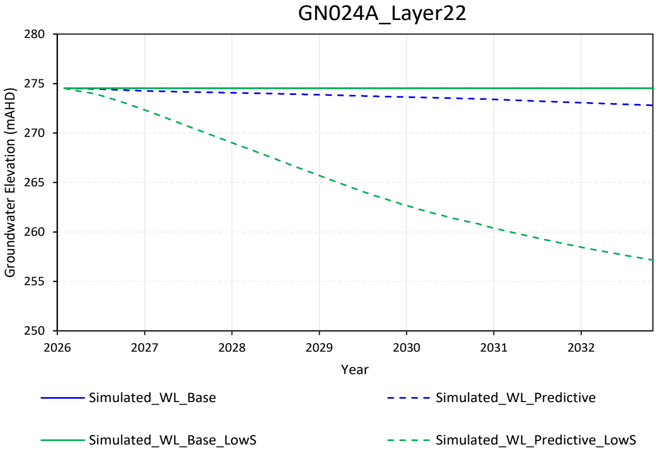

VWP3_S1_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

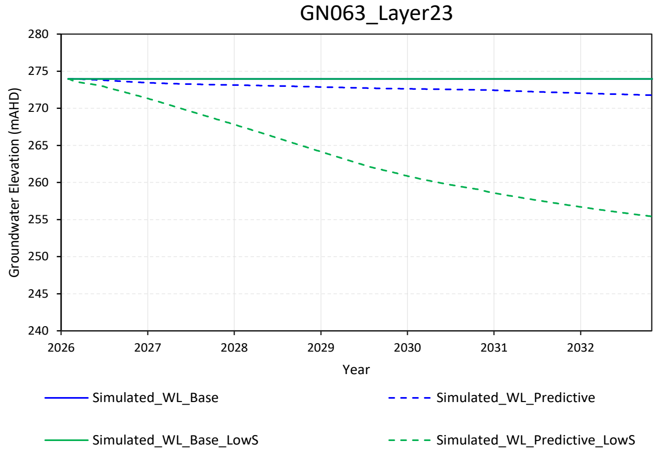

VWP3_S2_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

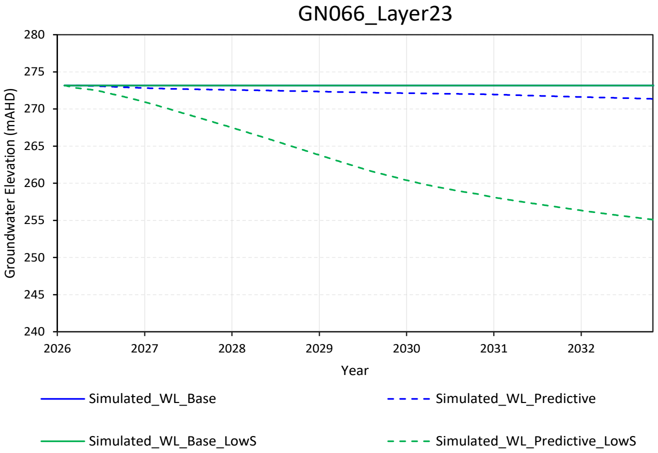

VWP3_S3_Layer24
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

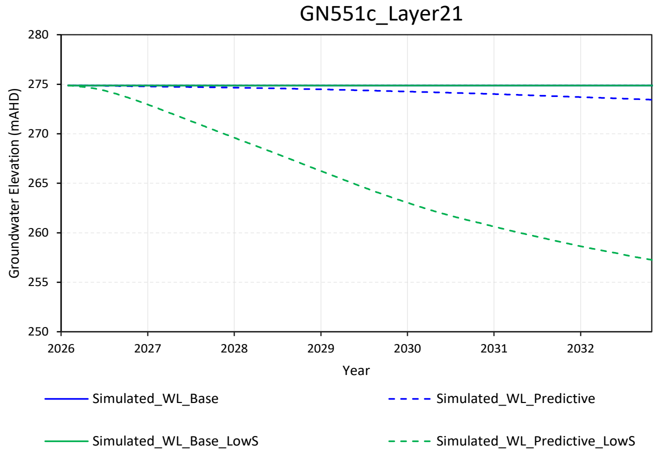

VWP3_S4_Layer25
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

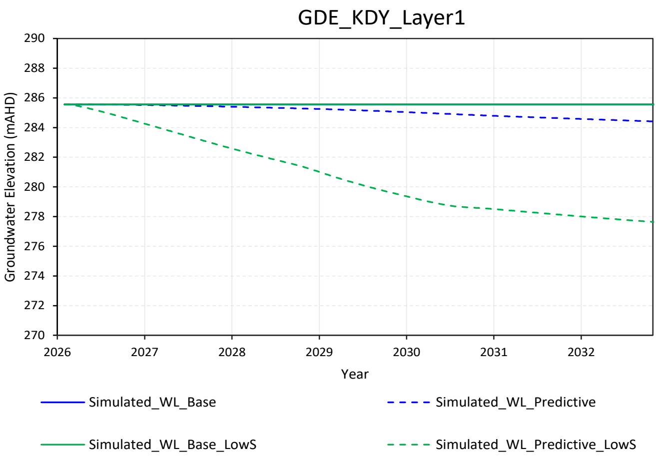

GN024_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

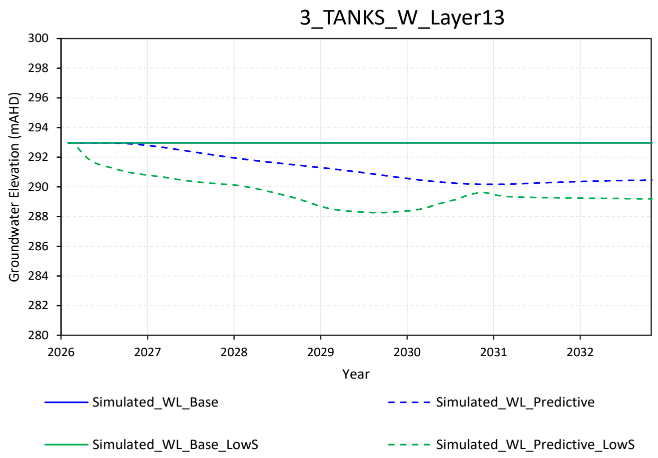

GN024A_Layer22
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

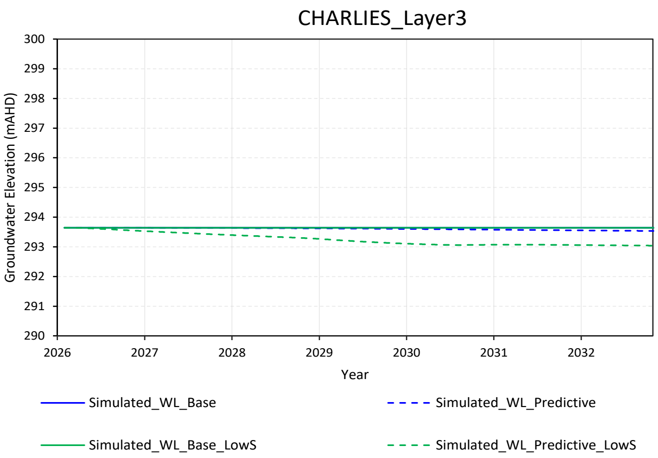

GN063_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

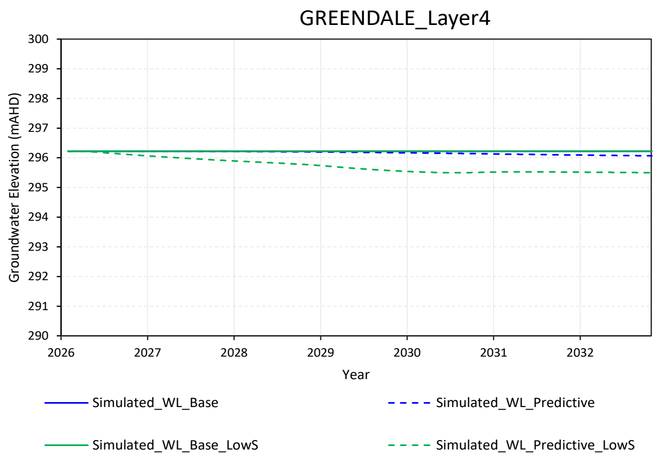

GN066_Layer23
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

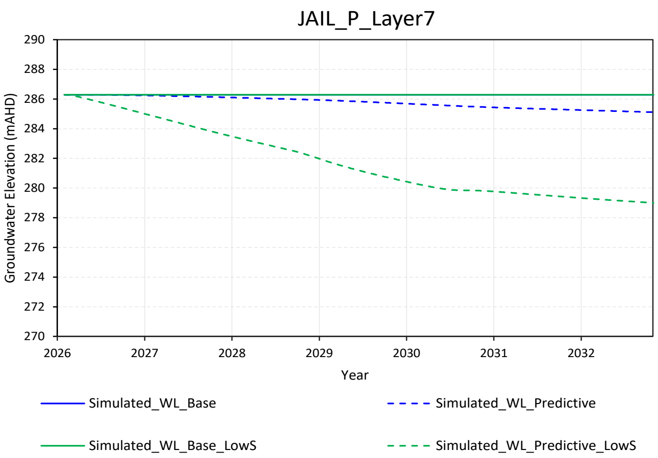

GN551c_Layer21
Groundwater Elevation (mAHD)
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

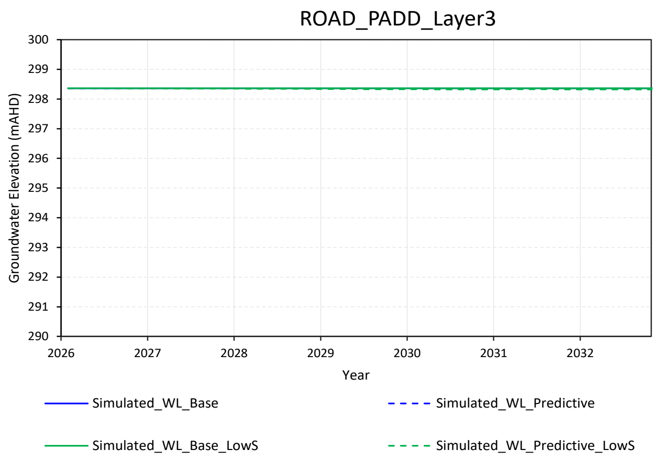

GDE_KDY_Layer1
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

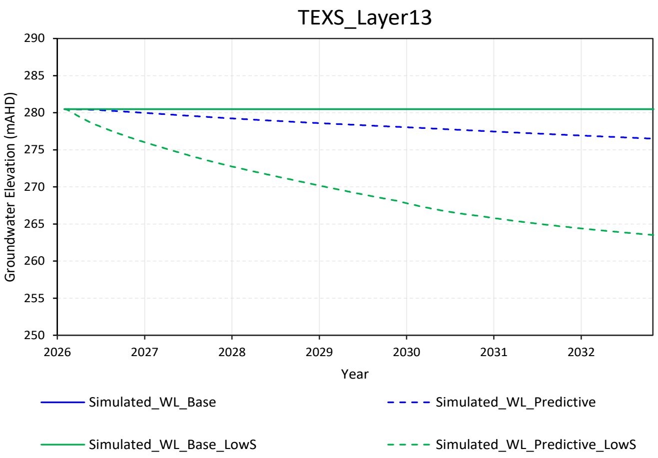

3_TANKS_W_Layer13
Groundwater Elevation (mAHD)
300
298
296
294
292
290
288
286
284
282
280
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS


CHARLIES_Layer3
Groundwater Elevation (mAHD)
300
299
298
297
296
295
294
293
292
291
290
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS


GREENDALE_Layer4
Groundwater Elevation (mAHD)
300
299
298
297
296
295
294
293
292
291
290
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS


JAIL_P_Layer7
Groundwater Elevation (mAHD)
290
288
286
284
282
280
278
276
274
272
270
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS


ROAD_PADD_Layer3
Groundwater Elevation (mAHD)
300
299
298
297
296
295
294
293
292
291
290
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS


TEXS_Layer13
Groundwater Elevation (mAHD)
290
285
280
275
270
265
260
255
250
2026
2027
2028
2029
2030
2031
2032
Year
Simulated_WL_Base
Simulated_WL_Predictive
Simulated_WL_Base_LowS
Simulated_WL_Predictive_LowS

Making Sustainability Happen