



Daunia West Infrastructure Project

Groundwater Modelling Calibration and Prediction Report

Whitehaven Daunia Pty Ltd

Millennium Poitrel Access Road via Peak Downs Highway, Moranbah, Qld, 4744

Prepared by: Louis Bouchet

SLR Consulting Australia

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Basis of Report

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Appendices

Appendix A Calibration Hydrographs

Appendix B Calibrated Parameters

Appendix C Predictive Hydrographs



Acronyms and Abbreviations

AMD	Acid and Metalliferous Drainage
Al	Aluminium
As	Arsenic
CHD	MODFLOW Constant Head Package
CHM	Conceptual Hydrogeological Model
DEM	Digital Elevation Model
DES	Department of Environment and Science
DNM	Daunia Mine
DRN	MODFLOW Drain Package
EA	Environmental Authority
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act
EVT	MODFLOW Evapotranspiration Package
EVT	Evapotranspiration
GDE	Groundwater Dependent Ecosystem
GHB	MODFLOW General Head Boundary Package
GIS	Geographic Information System
HCO ₃	Bicarbonate
Kh	Hydraulic Conductivity (Horizontal)
Kv	Hydraulic Conductivity (Vertical)
MIA	Mine Infrastructure Area
ML	Mining Lease
ML/day	Megalitres per day
MLE	Most Likely Estimate
Mo	Molybdenum
OOPD	Out of Pit Dump
pH	Potential of Hydrogen
PRC Plan	Progressive Rehabilitation and Closure Plan
QoI	Quantities of Interest
RCH	MODFLOW Recharge Package
RIV	MODFLOW River Package
RMS	Root Mean Squared error
Se	Selenium
SLR	SLR Consulting Limited



AMD	Acid and Metalliferous Drainage
SMC	Sequential Monte Carlo
SPR	Source-Pathway-Receptor
SRMS	Scaled Root Mean Squared error
Ss	Specific Storage
Sy	Specific Yield
TDS	Total Dissolved Solids
TIB	MODFLOW Transient IBound Package
TVM	MODFLOW Time Variant Material Package
USGS	United States Geological Survey
WHC	Whitehaven Coal Limited
WQOs	Water Quality Objectives
Zn	Zinc



1.0 Introduction

Daunia Mine (DNM) is located approximately 25 kilometres (km) southeast of Moranbah in Central Queensland, on mining leases (ML) 1781, ML70115, and ML70116. Whitehaven Coal Limited (WHC) owns and operates DNM, which was approved in 2009 and operates under the Environmental Authority (EA) EPML00561913 and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval 2008/4418.

A change to the mine plan across the southern mining area of DNM (Pandora Pit) has resulted in the need for several mine infrastructure changes including an out of pit waste rock dump. WHC proposes to construct this off-lease and immediately adjacent to the west of Pandora Pit (ML 1781). A new MLA will be submitted for the area proposed for the out of pit dump (OOPD).

SLR Consulting Australia Pty Ltd (SLR) was engaged by WHC to support the environmental approval process for the Daunia West Infrastructure Project (the Project). This report presents the groundwater modelling conducted for the Project.

1.1 Project Overview

Current operations at DNM are carried out under the conditions of EA EPML00561913 and EPBC approval 2008/4418. The location and layout of DNM is presented in **Figure 1-1**.

The Project is required to support ongoing open cut mining in the Pandora Pit, which contains the 'Pandora' resource, one of the remaining undeveloped resources within the DNM. The Pandora resource is located within ML1781 at the southern extent of the ML. The proximity of this resource to the ML boundary, along with limited available space within the existing MLs, necessitates the development of supporting infrastructure outside the current MLs. Considering this, the Project will require the construction of additional haul roads to transport material to facilitate and support ongoing mining operations at DNM. The layout of the Project is presented in **Figure 1-2**.

The Project does not include any change to the currently permitted extent or depth of mining at DNM.

1.2 Modelling Objectives

One of the potential environmental risks identified for the Project is the potential impact on groundwater from the OOPD on and adjacent to the alluvial flood plain of the Issac River. To assess the risks, predictive modelling was undertaken with the following objectives:

- Predict changes in water levels and hydraulic gradients due to the OOPD, with consideration of nearby operations.
- Predict changes in fluxes to environmental receptors, with consideration of nearby operations.
- Predict potential contaminant migration pathways, with consideration of nearby operations.



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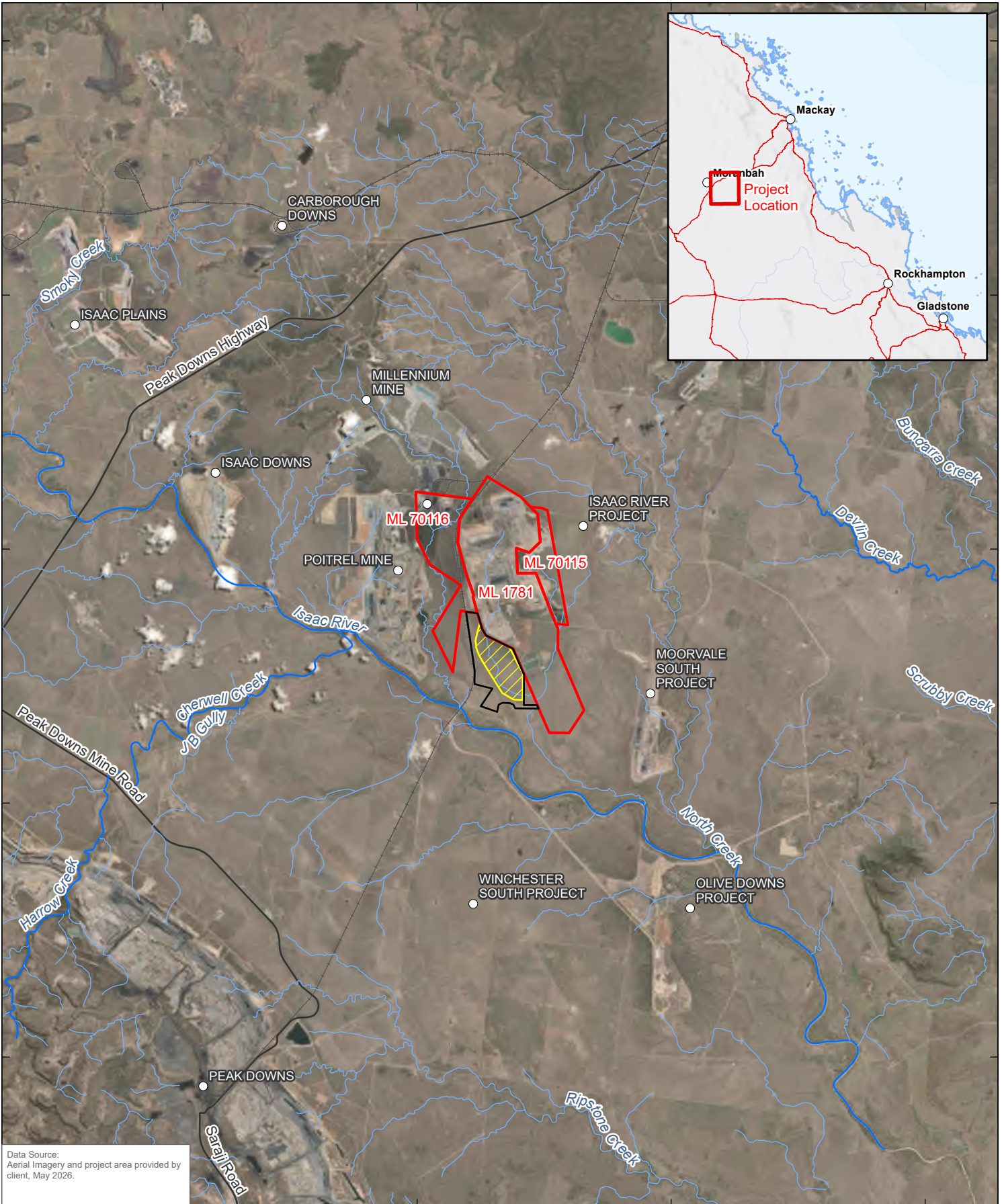
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





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Data Source:
Aerial Imagery and project area provided by client, May 2026.

 0 2.5 5 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:200,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Road
 -  Railway
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)

**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**

PROJECT LOCATION



DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

FIGURE 1-1



Data Source:
 Aerial imagery: ESRI Basemaps
 Project area provided by client, May 2026.



Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:60,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
- Road
 - +— Railway
 - Major Watercourse
 - Minor Watercourse
 - ▭ Mining Lease
 - ▭ Mining Lease Application Area / Project Area
 - ▨ Proposed Operational Out-of-Pit Dump
 - ▭ Mining Pit

**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**

OOPD LAYOUT



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FIGURE 1-2

2.0 Conceptual Model Summary

A summary conceptual hydrogeological model (CHM) of the groundwater regime at DNM in the vicinity of Pandora Pit and the OOPD is presented below based on the information in the preceding sections. A more detailed CHM is presented in the groundwater assessment report (SLR, 2025a).

2.1 Site Setting and Hydrogeology

DNM is located within the northern part of the Bowen Basin, which comprises Permian-aged coal measures that have been subject to regional deformation, including folding and faulting. DNM is affected by numerous normal and reverse faults, with some major northwest-southeast trending faults associated with the Jellinbah Fault Zone, and minor southwest-northeast trending faults. Pandora Pit in the south of DNM will target the Leichhardt and Upper Vermont seams of the Rangal Coal Measures, whilst the Project's OOPD will overly Quaternary to Tertiary unconsolidated deposits including a small area of Isaac River alluvium, older alluvium and colluvium as well as weathered Permian strata. The main hydrogeological units of significance to the Project include:

- Cainozoic sediments:
 - Quaternary alluvium – unconfined aquifer (sporadically water-bearing strata of permeable unconsolidated sand or gravel) localised in close proximity to the south-west of Pandora Pit and the OOPD and regionally along the Isaac River, and to the east along North Creek.
 - Quaternary to Tertiary older alluvium, colluvium and weathered bedrock (regolith) – unconfined and largely unsaturated unit at DNM and in the Pandora Pit area.
- Permian coal measures with:
 - Low permeability interburden units comprising mudstone, siltstone and fine sandstone.
 - Coal seams which are more permeable units within the coal measures due to secondary porosity (cleats and fissures).

Along the ephemeral Isaac River immediately adjacent to the south-west of the Project, the alluvium comprises a heterogeneous distribution of fine to coarse sand, silt clay and gravel with correspondingly variable hydraulic properties.

Based on the limited available data in the vicinity of the Project the Isaac River alluvium appears to be largely dry although it will occasionally partially saturate from occasional river flow and flood events. The alluvium is underlain by older Tertiary sediments as well as weathered Permian mudstone, siltstone and sandstone, which act as a partial barrier to vertical groundwater seepage. Local DNM alluvial bores have always been dry and a nearby Poitrel alluvial monitoring bore was abandoned after it was found to be dry after installation.

Unconsolidated Tertiary-Quaternary sediments are also mapped at surface within the southern portion of the DNM mine lease (where not overlain by alluvium) and comprise unsaturated sands and clays. Tertiary-Quaternary aged sediments present across the Project area form the base of the unconfined shallow groundwater system and have been found to be consistently unsaturated.



2.2 Groundwater Flow, Recharge and Discharge

2.2.1 Shallow Groundwater System

Shallow groundwater is variably present in Quaternary alluvium and/or older unconsolidated Tertiary sediments and weathered Permian bedrock. Hydrogeologically, where saturated, these unconsolidated units are considered to function as a single aquifer (SLR,2024).

Alluvium associated with the minor creek lines in the vicinity of DNM is poorly developed and only sporadically saturated. Along the ephemeral Isaac River which drains south-east approximately 1.5 km to the south-west of the proposed OOPD, the Isaac River Alluvium extends over a 1.5 to 2 km wide tract along its course. Where it occurs, groundwater within the alluvium is recorded at depths of between 10 mbgl to 17 mbgl, typically significantly below the riverbed elevation. Groundwater flow within the alluvium and underlying hydraulically connected Tertiary sediments / weathered bedrock is to the south-east consistent with the flow direction of the Isaac River. There are currently no DNM alluvium monitoring bores but the limited available information indicates that the alluvium is generally dry in the vicinity of DNM.

Recharge to the alluvium is considered to be primarily from river flow loss or flooding, with direct infiltration of rainfall also occurring where there are no substantial clay barriers in the shallow sub surface. Discharge is via evapotranspiration from vegetation growing along creek beds and possibly limited duration baseflow to the Isaac River following significant alluvial recharge from flow events and flooding. In addition, in areas where the Isaac River Alluvium is saturated there will be discharge in the form groundwater flow along the alluvial channel in the downstream (east-southeast) direction.

The flow events in the Isaac River and associated tributaries, and occasional inundation of the flood plain result in enhanced recharge to the Isaac River Alluvium. This generates a low hydraulic gradient away from the river to adjacent areas (including the area of Pandora Pit) where the topography is still relatively low lying and recharge is limited to rainfall infiltration through lower permeability surface geology. The regional groundwater flow direction however is towards the south-east.

Groundwater recharge across the broader region is very low with just a small proportion of rainfall reaching the water table. Most rainfall events are unlikely to result in any recharge to groundwater with high evaporation rates preventing the soil reaching field capacity and thereby inhibiting deep drainage of rainfall recharge to groundwater. Significant groundwater recharge may only occur after prolonged rainfall events that saturate the soil profile and allow deep drainage. Recharge estimates for the Tertiary-Quaternary sediments vary between approximately 3mm/yr for the Isaac River alluvium and 0.1mm/yr for Tertiary sediments.

2.2.2 Deep Groundwater System

Groundwater within the Permian coal measures is typically confined although at shallower depths and in the regolith, where many of the monitoring bores are screened, groundwater may be relatively unconfined depending on the surface geology. The coal seams are typically the most permeable horizons within the coal measures with permeabilities an order of magnitude or so higher than the bulk hydraulic conductivity of the interburden (mudstone, siltstone, fine sandstone).

Infiltration to the Permian is limited by the predominantly low hydraulic conductivity of the units although sub-cropping coal seams may receive recharge via leakage from the alluvium when it becomes partially saturated. Regionally, discharge from the Permian coal measures



will be via mine dewatering and regional flow with some limited exploitation of groundwater where salinity is sufficiently low for uses such as stock watering.

In the vicinity of DNM groundwater flow within the Permian coal measures is to the south-east.

A review of fault behaviour within the wider Bowen Basin has identified that faults in the Permian strata can increase vertical hydraulic conductivity parallel to the fault trace and reduce it perpendicular to the fault trace. However, any increase in vertical hydraulic conductivity is limited and variable between faults depending on mineralisation and in-filling along the fault plane. Hydraulic testing of faults within the area indicate that faulting zones are not pathways for preferential flow, but instead act as hydraulic barriers and lead to compartmentalisation of the groundwater system with the more permeable coal seams juxtaposed against low permeability interburden which prevents the coal seams from acting as continuous pathways for groundwater migration.

Hydrographs for the Permian coal measures monitoring bores at DNM show limited to no groundwater level drawdown impact from mining, even in close proximity to active mining, reflecting the very low permeability of the coal measures interburden and/or structural compartmentalisation of groundwater within the Permian strata. The RCM coal seams will be entirely mined out across Pandora Pit (and DNM immediately to the north). As the RCM target coal seams do not locally extend beyond the ML, this will limit the extent of groundwater level impacts which propagate more extensively along coal seams which have higher hydraulic conductivity than interburden.

2.3 Groundwater Quality

There are no alluvial groundwater monitoring bores at DNM as limited historical monitoring indicates it is unsaturated. However, groundwater quality data for the alluvium within the broader study area indicates it is fresh to saline and highly spatially and temporally variable. Where groundwater is present within the alluvium beyond the DNM study area it is of a quality mostly suitable for stock water supply and irrigation but exceeds guidelines for drinking water and protection of freshwater aquatic ecosystems.

Groundwater quality data for the older Tertiary sediments at DNM is limited to one bore, again largely due to this unit being largely dry at DNM. However, the available data (one bore) shows it is brackish and exceeds the drinking water guidelines for iron, and the WQ1310 shallow Water Quality Objectives (WQOs) for calcium and iron.

Groundwater in the Permian coal measures at DNM is brackish to moderately saline with median TDS values at the very upper end of the acceptable range for beef cattle and sheep. Permian groundwater quality also exceeds some drinking water guidelines and the Isaac River Groundwater Management Area objectives for EC, calcium, iron, magnesium, and HCO at most percentile concentrations, for shallow and/or deep aquifers.

Leachability tests on samples of interburden at DNM i.e. waste rock material that might be considered similar in nature to that in the proposed OOPD, identified a number of exceedances of guideline values for drinking water (pH, As, Mo and Se); WQ1310 WQOs (pH only); and the ANZ guidelines for protecting freshwater ecosystems (Al, Mo, Se, Zn, and As). It should be noted that the testing suite for the leachate samples was more extensive than that for the Permian coal measures samples which partly explains the greater number of exceedances by leachate samples. In addition, the leachate test method of pulverising the sample before mixing with water (1 part spoil to 5 parts water) is not representative of waste rock / water interactions within the proposed OOPD due to the very high rock surface area generated by the test method. The leachability data is a poor proxy for a source term



for the OOPD but does provide a conservative assessment of the potential for the waste rock to affect the quality of infiltrating water.

In comparison to the Permian groundwater samples the leachability test samples contained higher concentrations of Al, As, Mo at the 50th and 80th percentiles; Se at the 80th percentile; and pH at all percentiles. The leachate samples were all much lower in EC/TDS than the Permian groundwater.

The waste rock material tested is expected to generate pH-alkaline to highly alkaline contact water with very low potential to generate acid and metalliferous drainage (AMD).

2.4 Groundwater Receptors

The Isaac River Alluvium is considered a significant regional aquifer from a natural environmental receptor perspective, where there is evidence that it supports both landholder extractive use and deep rooted facultative Groundwater Dependant Ecosystems (GDEs) immediately fringing the River channel. Where it occurs, groundwater within the alluvium is recorded at depths of between 10 mbgl to 17 mbgl, typically significantly below the riverbed elevation.

Review of the Queensland GWDB and a landholder census indicates alluvial groundwater associated with the Isaac River is used by local landholders, predominantly for stock water supply. A number of alluvium bores were identified to the south and south-west of the OOPD, the nearest being an “active” domestic supply bore adjacent to the Isaac River approximately 1 km south of the proposed OOPD.

2.5 Summary Conceptual Hydrogeological Model of the Proposed Pandora Pit Development

A conceptual cross-section through Pandora Pit and the proposed OOPD is presented in **Figure 2-1**.

When mining commences at the southern end of Pandora Pit, mining below the water table will result in a local reversal of the hydraulic gradient south of Pandora Pit with groundwater flowing back towards the mine void. When mining has ceased and groundwater levels partially recover, a lake will form in the residual void of Pandora Pit. A low lake level will be maintained by low rates of groundwater inflow and high evaporation from the void lake which will result in the void continuing to act as a groundwater sink.

The presence of the proposed OOPD will result in higher rates of recharge over the area of the OOPD due to the more permeable and unstructured nature of spoil. The recharge infiltrating the OOPD is considered likely to exit the OOPD in the following ways:

- Evaporation transport from vegetation as the OOPD is landscaped to its final form and vegetated.
- Possible localised seepage from the toe of the OOPD where the underlying soil permeability does not permit infiltration at the rate water is percolating through the OOPD. This seepage may be captured in a toe drain around the OOPD.
- Seepage through the base of the OOPD to the underlying Tertiary/Quaternary sediments and weathered Permian coal measures.

It is anticipated that the higher rate of recharge to the OOPD will result in seepage / recharge to the underlying strata at a rate higher than would occur in the absence of the OOPD due to a greater volume of water infiltrating and being retained by the spoil. This higher rate of recharge to the underlying strata will result in a local mounding of



groundwater. Groundwater mounding beneath the OOPD will migrate outwards towards the Pandora Pit void and west and south towards the Isaac River.

Rainfall infiltration through the OOPD may leach substances from the waste rock, although leachability data indicates that the waste rock has a very low acid forming potential and the risk of acidic metalliferous drainage is very low. The waste rock leachability test data is a poor proxy for a “source term” and considered to be a very conservative guide to leachate quality arising from the OOPD. Whilst the leachate test water quality does exceed concentrations of some analytes in the RCM groundwater samples it does not exceed any of the local Groundwater Quality Objectives (Isaac Groundwaters, Zone 34 (DEHP, 2011)).

Seepage from the OOPD reaching the underlying saturated water table will migrate west and south towards the Isaac River and east into the Pandora Pit Void.



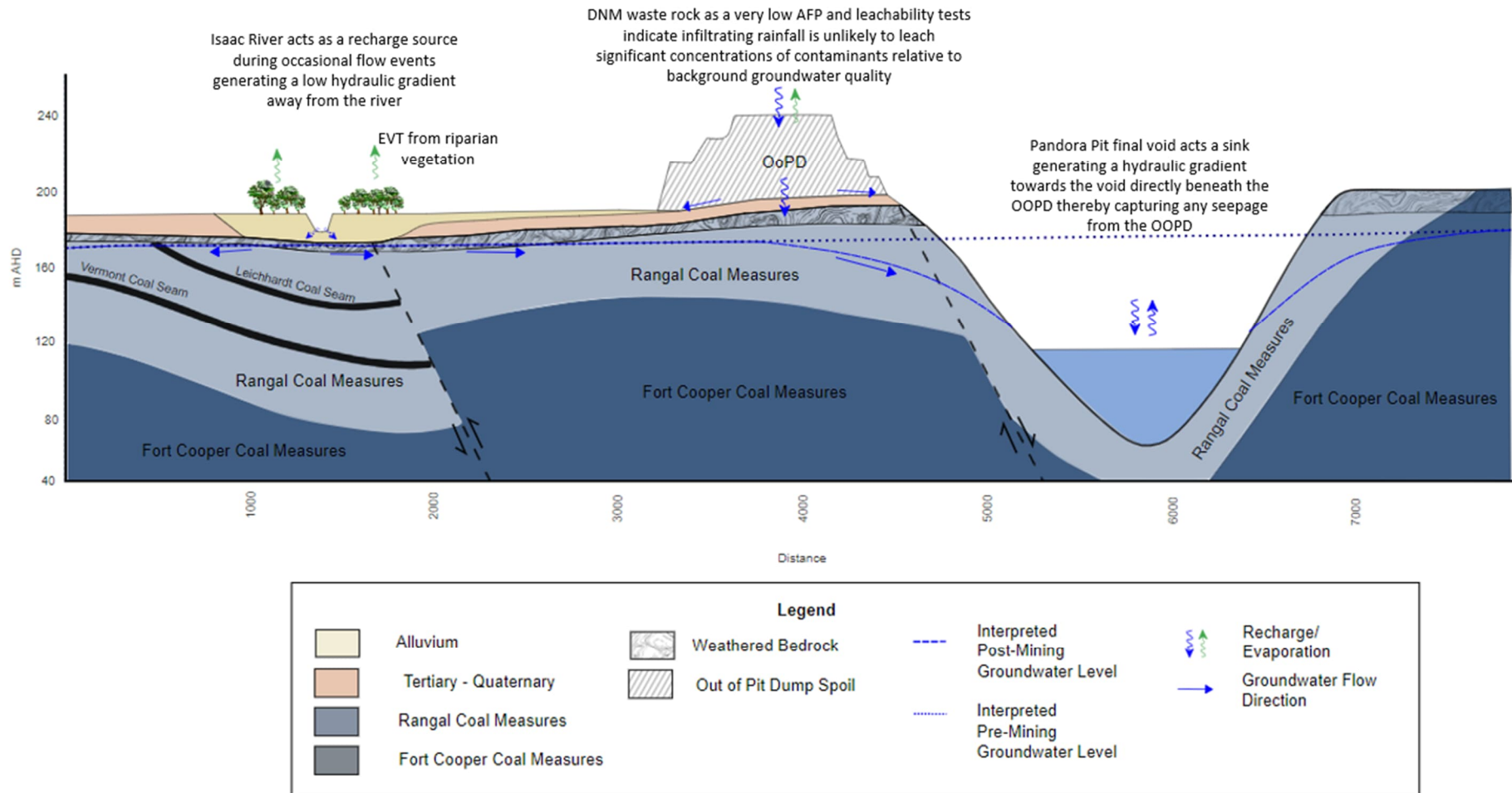


Figure 2-1 Conceptual Hydrogeological Cross Section



3.0 Groundwater Flow Model Calibration

3.1 Calibration Model

DNM sits within the Central Bowen Basin regional groundwater model domain, a regional scale model using MODFLOW-USG code developed by SLR. Details of the model build and calibration method are presented in the technical groundwater modelling report (SLR, 2025b).

3.2 Calibration Methodology

Model calibration was performed using a Sequential Monte Carlo (SMC) approach, which incrementally refines parameter distributions through a series of resampling and adjustment steps. This method begins with an ensemble of parameter realisations sampled from the prior distribution for each parameter, which is established on the basis of conceptual hydrogeological bounds. At each stage of calibration, the ensemble is updated by weighting realisations according to their likelihood that they result in acceptable calibration statistics with respect to the groundwater level observation dataset, followed by resampling and slight modification of parameter values to maintain diversity. To enhance the accuracy of the posterior parameter estimates, Laplace approximations to the likelihood function were employed, allowing for more precise characterisation of parameter uncertainty around high-likelihood regions. This approach enables a more flexible and robust assimilation of groundwater level data, particularly in the presence of nonlinearity and multimodality in the parameter space.

A detailed description of the calibration procedure for the most recent version of the model is provided in SLR (2025b).

3.2.1 Calibration parameters

The updated groundwater model variables for calibration included:

- **Hydraulic Properties:** Horizontal and vertical hydraulic conductivity, storage properties (specific storage and specific yield), and maximum depth for depth dependence correction were allowed to vary between minimum and maximum ranges consistent with the available data and conceptualisation.
- **Evapotranspiration Extinction Depths:** Extinction depths were allowed to vary for each modelled evapotranspiration zone, and for spoil rock created during mining activities.
- **Recharge:** Transient recharge is based on the AWRA-L climate model's simulated deep drainage values. Multipliers are applied to this transient recharge rate for each geologic recharge zone. These multipliers were allowed to vary during calibration. Spoil is also given its own recharge rate multiplier in calibration.
- **General Head Boundaries:** Both the water level of the general head boundaries in each layer and the conductance of the boundary in each layer were subject to variation during calibration.
- **River Conductance:** River conductance was allowed to vary for each modelled river reach.



3.2.2 Calibration Dataset

Transient calibration was for the period 2008 to 2024 and includes representation of historical mining at DNM, CVM, Peak Downs, Saraji, Lake Vermont, Poitrel, Millennium, Isaac Plains, Olive Downs, Eagle Downs, Winchester South, Isaac Downs, Moorvale South, and Meadowbrook mines.

For DNM specifically, calibration targets were selected from the regional dataset on the basis of monitoring locations that are within or proximal to the DNM. The resulting calibration target locations included all monitoring locations in the DNM monitoring network. In all, calibration used 580 target heads for 13 monitoring locations across DNM with available groundwater level data.

The selected datasets were separated into two separate target datasets: (i) initial water level elevations (13 targets), and (ii) change in water level elevations (567 targets). The initial water level elevations are the first (i.e. earliest) groundwater level readings at each selected calibration location. The change in water level elevations are all subsequent water levels readings minus the initial water level elevation, this providing a dataset on the variability of the water levels with time. By calibrating to both datasets, the objective of calibration is to provide a balanced approach to calibration whereby the model is calibrated to both water level elevations, and the magnitude and timing of changes in water levels.

3.3 Calibration Performance

3.3.1 Evaluation Process

Calibration performance is assessed throughout the calibration process by tracking the following statistics for each of the calibration datasets:

- Mean (average) residual
- Median residual
- Standard deviation residual
- Lower Quartile Range (LQR)

A likelihood value is calculated for each of the realisation using each of the above-mentioned statistics for each of the calibration target datasets, resulting in 8 different likelihood values for each realisation. These eight likelihood values for each realisation are then combined (i.e. multiplied by each other) to establish an overall likelihood for the realisation based upon the combined calibration performance.

3.3.2 Calibration Statistics

3.3.2.1 Initial Water Level Elevations

Calibration statistics for the MLE using the initial water level elevation dataset are provided in **Table 3-1**. The four statistics used for the selection of the MLE are provided in **BOLD**, with other commonly reported calibration statistics provided for transparency.



Table 3-1 Initial Water Level Elevation Calibration Statistics

Statistics	Value
Mean Residual (m)	0.04
Median Residual (m)	1.4
Standard Deviation (m)	6.1
Lower Quartile Range (m)	-4.2
Mean Absolute Residual (m)	5.1
Sum of Squares (m ²)	451.8
Root Mean Square Error (RMS) (m)	5.9
Minimum Residual (m)	-11.3
Maximum Residual (m)	8.6
Number of Observations	13
Range in Observations (m)	30.8
Scaled Standard Deviation (%)	19.9
Scaled Absolute Mean (%)	16.5
Scaled RMS (SRMS) (%)	19.1

Figure 3-1 presents the observed and simulated groundwater levels graphically as a scattergram for the initial water level elevations dataset for the DNM bores included in the calibration. **Figure 3-1** shows that the majority of data points fall close to the line of equality, with most lying within the expected confidence interval, indicating that the model generally performs well in reproducing observed groundwater levels.



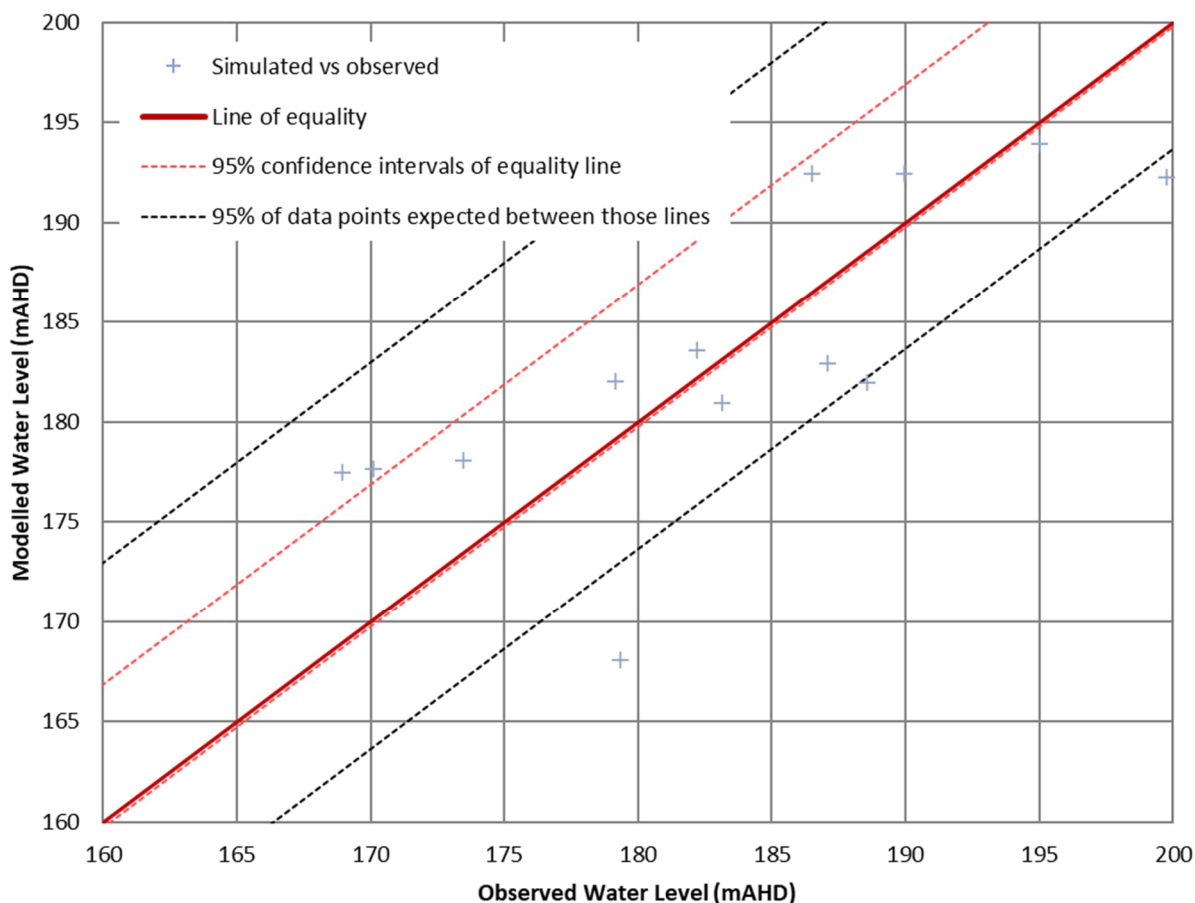


Figure 3-1 Calibration Scattergram – Modelled vs Observed Groundwater Levels (Initial Water Levels)

Figure 3-2 shows the distribution of calibration residuals for the initial groundwater level elevation dataset at the DNM bores included in the calibration. The histogram shows that the residuals are generally well centred around zero, indicating a balanced model performance with no strong bias toward either overprediction or underprediction of groundwater levels. Most residuals fall within the ± 5 m range, suggesting a good overall fit to the measured data.

Figure 3-3 is a map depicting the spatial distribution of residuals for the initial water level elevations target dataset.



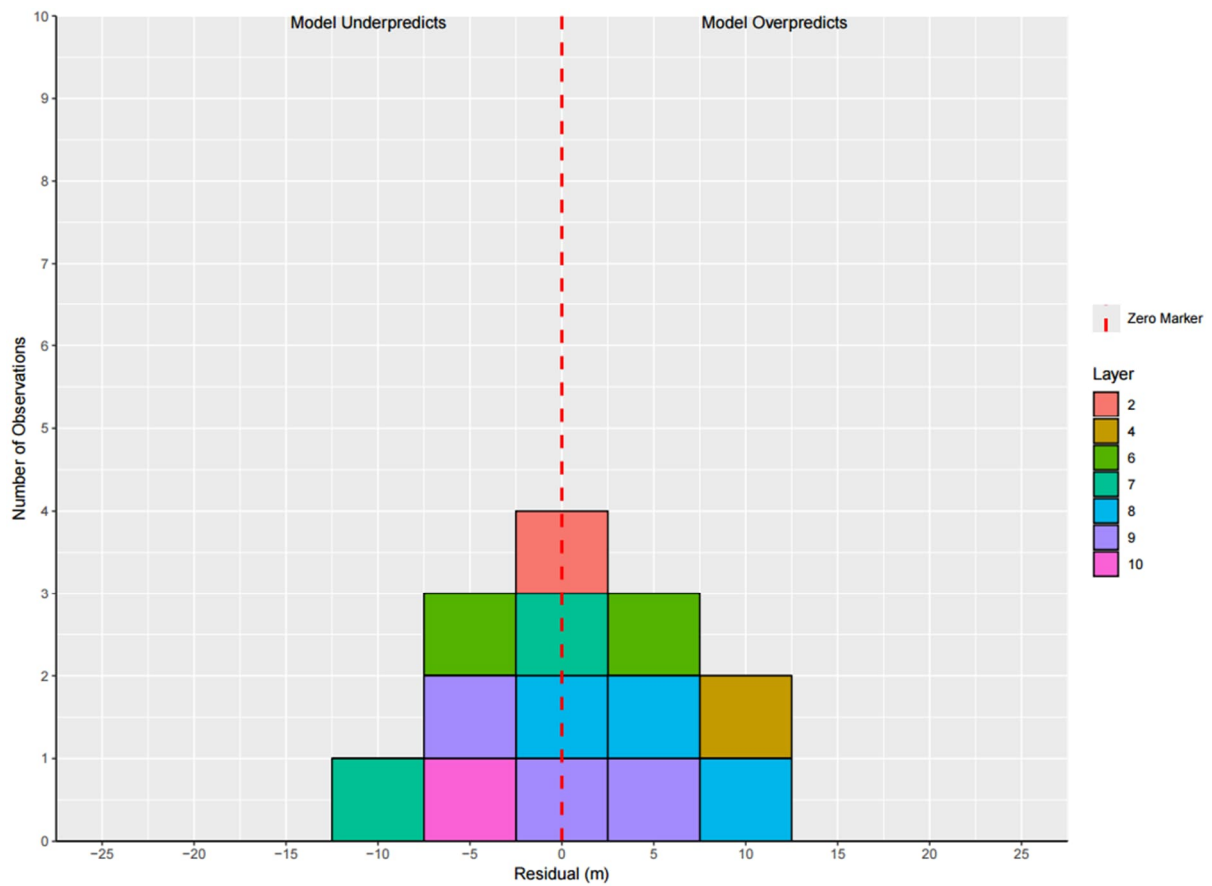
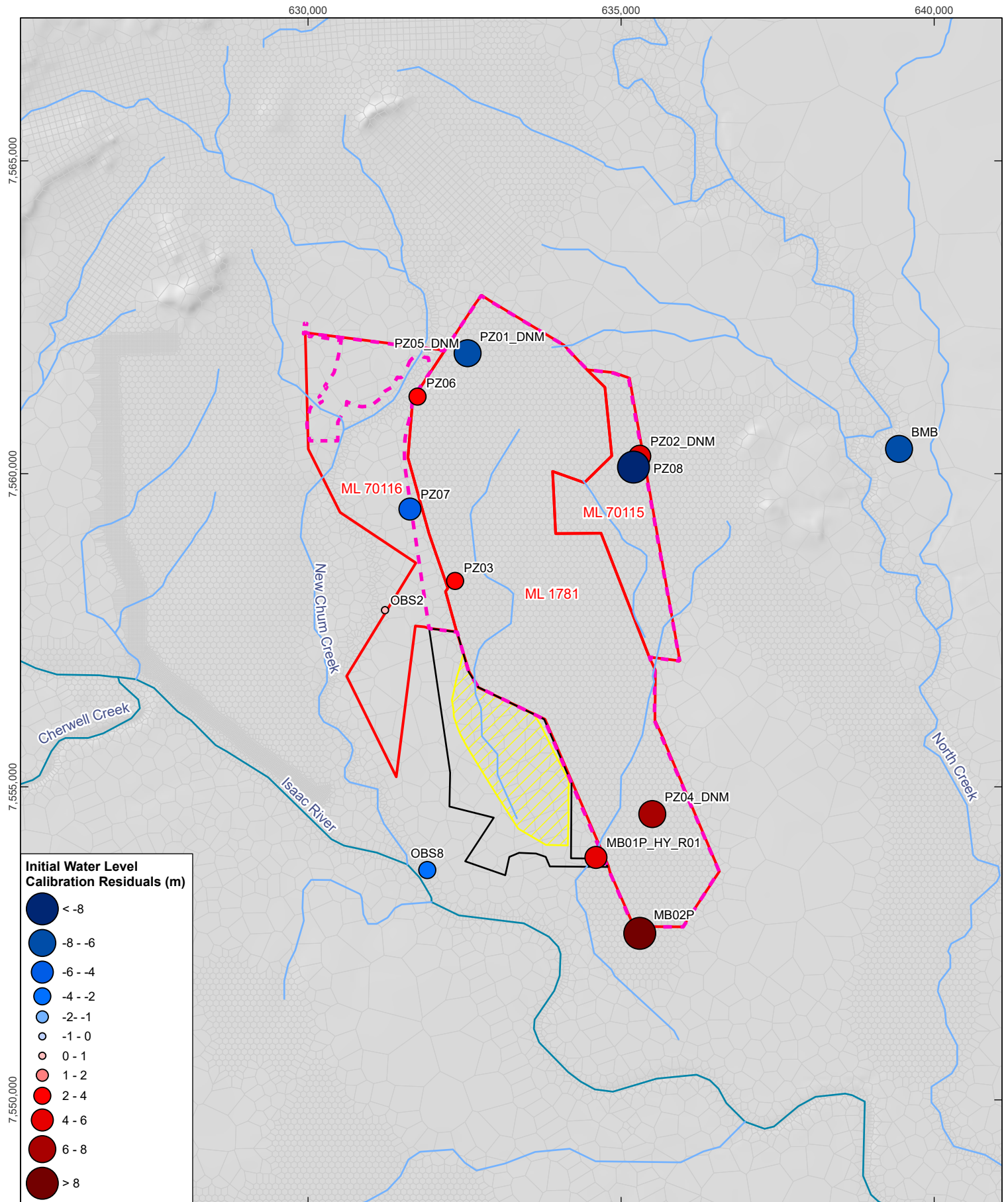











Figure 3-2 Calibration Residual Histogram (Initial Water Levels)





 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:80,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Major Watercourse
 -  Minor Watercourse
 -  DNM EA Boundary
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Model Grid
 -  Model Boundary

**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**

**INITIAL WATER LEVEL
 CALIBRATION RESIDUALS (M)**

3.3.2.2 Change in Water Level Elevations

Calibration statistics for the change in water level elevation dataset used in selecting the MLE are provided in **Table 3-2**. The statistics used to select the MLE are calculated on the average residual at each bore.

Additional commonly reported calibration statistics are shown on **Table 3-3**. The statistics provided on **Table 3-3**. are calculated based on all measurements (i.e. using all datapoints rather than the average at each bore).

Table 3-2 Change in Water Level Elevation Calibration Statistics - MLE Selection

Statistics	Value
Mean Residual (m)	-1.1
Median Residual (m)	0.4
Standard Deviation (m)	-13.9
Lower Quartile Range (m)	-1.8

Table 3-3 Change in Water Level Elevation Calibration Statistics - Unweighted

Statistics	Value
Mean Residual (m)	-2.0
Mean Absolute Residual (m)	2.9
Standard Deviation (m)	4.5
Sum of Squares (m ²)	13626.2
Root Mean Square Error (RMS) (m)	4.9
Minimum Residual (m)	-25.1
Maximum Residual (m)	8.8
Number of Observations	565
Range in Observations (m)	23.1
Scaled Standard Deviation (%)	19.4
Scaled Absolute Mean (%)	12.4
Scaled RMS (SRMS) (%)	21.3

Figure 3-4 presents the observed and simulated change in water level elevations graphically as a scattergram for the DNM bores included in the calibration. **Figure 3-4** shows that the majority of data points fall close to the line of equality, with most lying within the expected confidence interval, indicating that the model generally performs well in reproducing observed changes in groundwater levels. Bore PZ06 stands out as the model performed poorly in reproducing change in water levels at this bore, with a bias toward overestimating declines in water level.



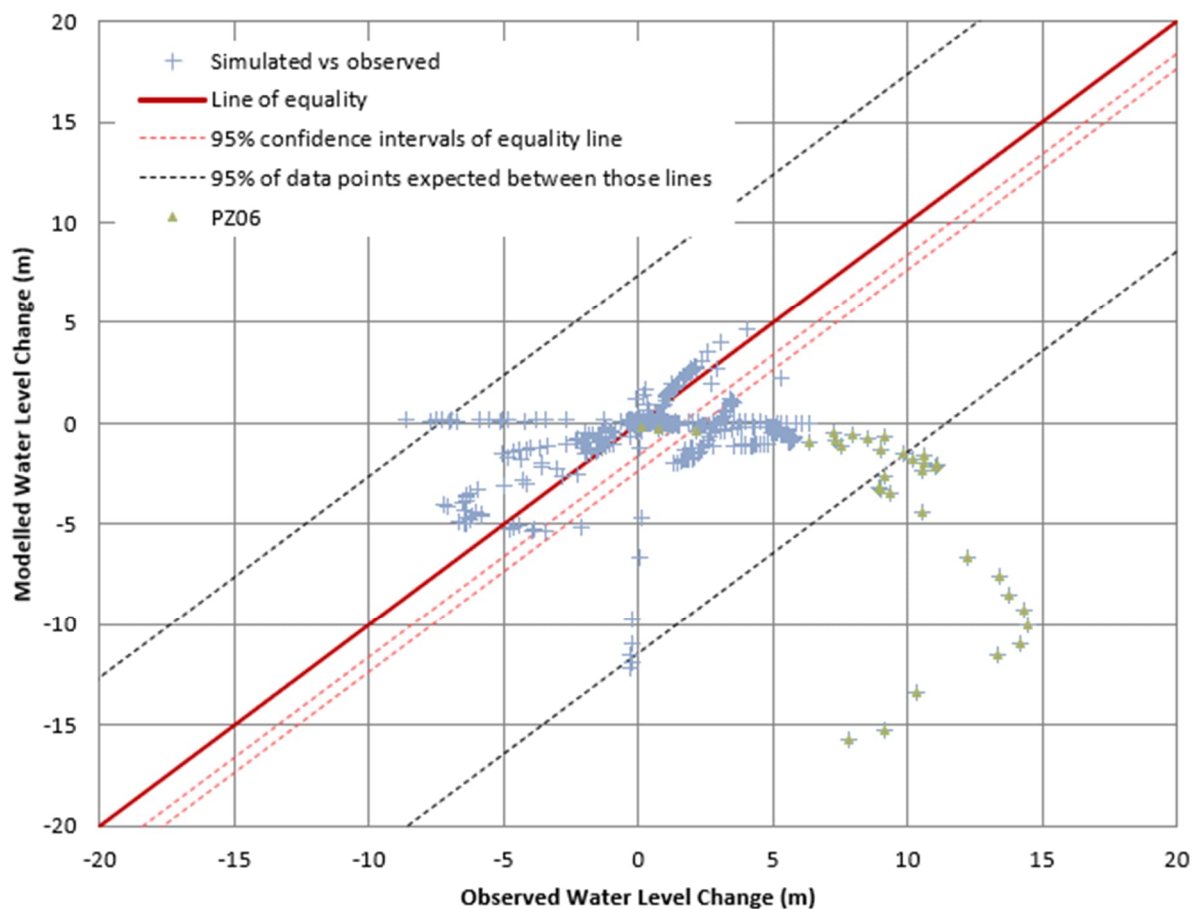


Figure 3-4 Calibration Scattergram – Modelled vs Observed Groundwater Levels (Change in Water Levels)

Figure 3-5 shows the distribution of calibration residuals for the change in groundwater level elevation dataset at the DNM bores included in the calibration. The histogram shows that the residuals are generally well centred around zero, indicating a balanced model performance. There is a small bias toward underprediction of change in groundwater levels. However, most residuals fall within the ± 5 m range (except for PZ06), suggesting a good overall fit to the measured data.



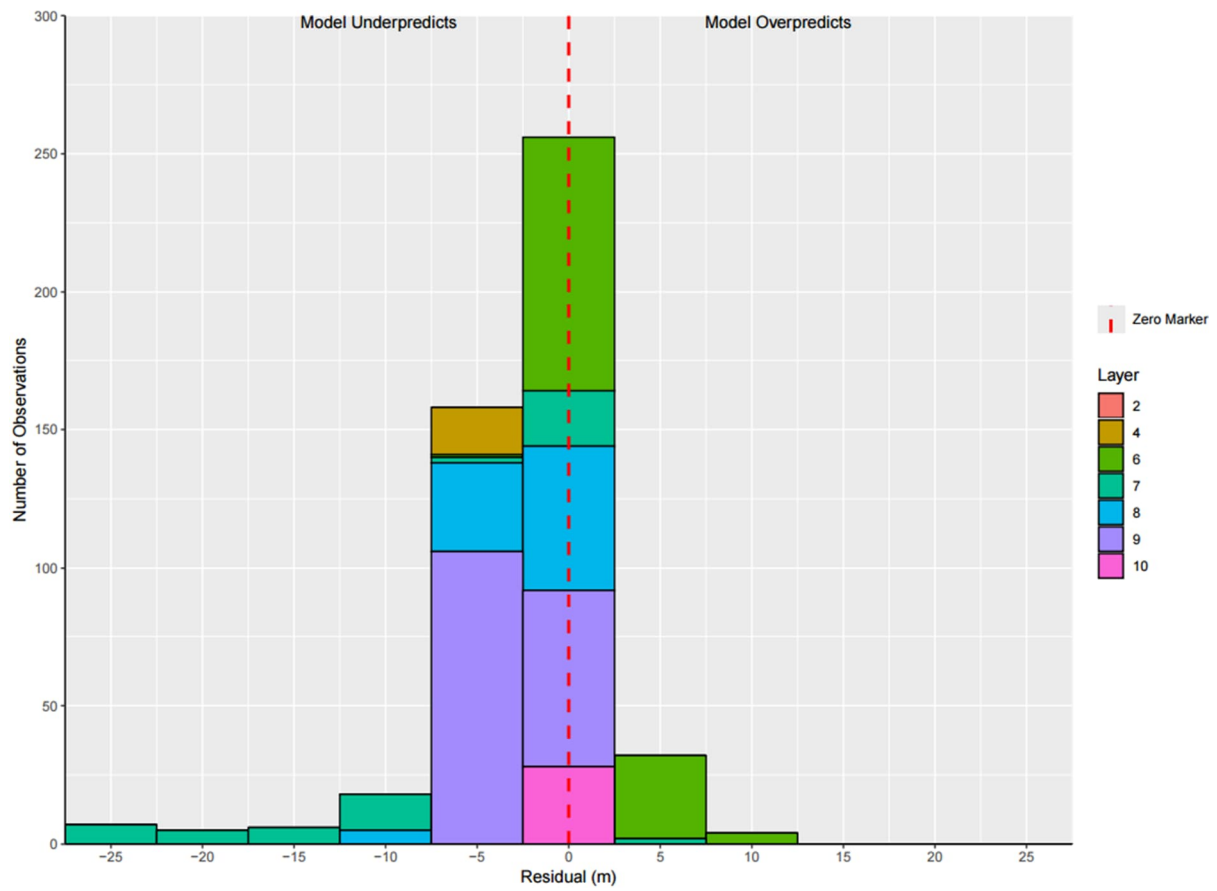
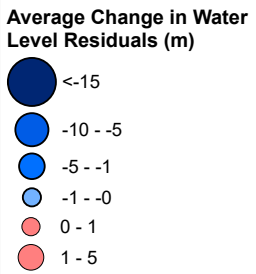
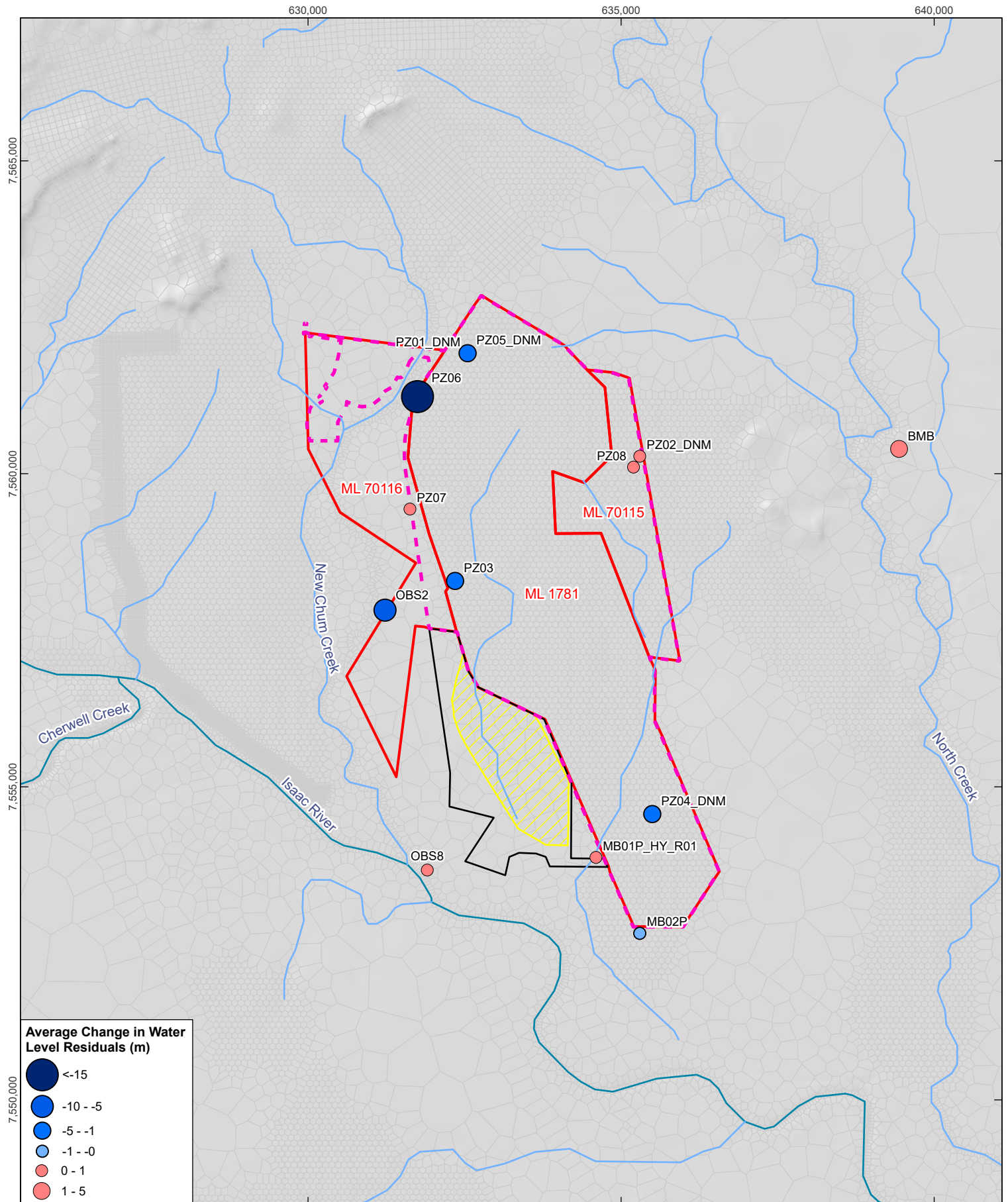


Figure 3-5 Calibration Residual Histogram (Change in Water Levels)

Figure 3-6 is a map depicting the spatial distribution of average residuals at each location for the change in water level elevations target dataset.





0 1 2 km

Coordinate System: GDA2020 MGA Zone 55

Scale: 1:80,000 at A4

Project Number: 620.042120.00001

Date Drawn: 01-Jun-2026

Drawn by: RB

- LEGEND**
- Major Watercourse
 - Minor Watercourse
 - - - DNM EA Boundary
 - ▭ Mining Lease
 - ▭ Mining Lease Application Area / Project Area
 - ▭ Proposed Operational Out-of-Pit Dump (DWIP)
 - ▭ Model Grid
 - ▭ Model Boundary

**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**

**AVERAGE CHANGE IN WATER
LEVEL CALIBRATION
RESIDUALS (M)**



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FIGURE 3-6

3.3.3 Calibration Hydrographs

This section discusses the model to measurement fit at the DNM observation sites, for the MLE realisation. Example calibration hydrographs for a selection of monitoring bores at DNM are provided in **Figure 3-7** to **Figure 3-9**. The hydrographs for the full calibration data set (13 locations), comparing the observed data with simulated outputs from 500 modelled ensemble realisations are shown, including the MLE realisation, labelled as 'Best Calibrated'. Overall, the model demonstrates reasonable performance across the range of hydrographs, with areas of both relatively strong and relatively weak agreement as is typical in modelling. All calibration hydrographs are presented on **Appendix A**.

3.3.3.1 Layer 2 (Tertiary-Quaternary alluvium, Tertiary sediments, weathered Permian, and Tertiary basalt)

Figure 3-7 shows the calibration hydrographs for DNM bore OBS8. As seen in the hydrographs for OBS8, there is generally a good match between the observed and simulated groundwater levels, with simulated level 2 m lower than observed on average.

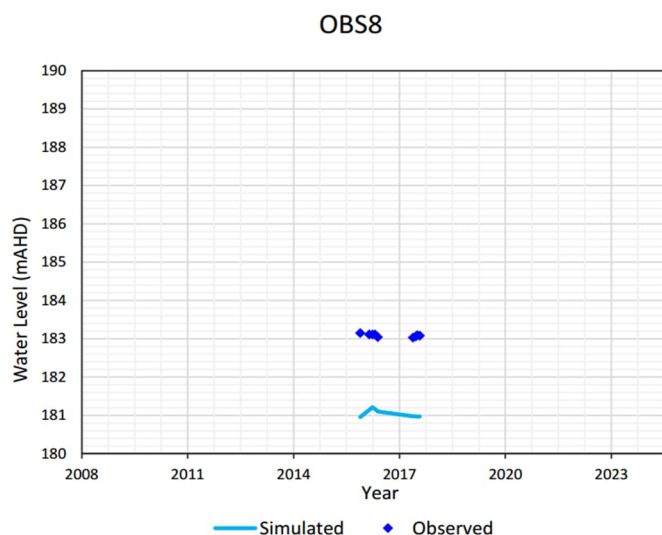


Figure 3-7 Calibration Fit – Layer 2 – Bore OBS8 (MLE Realisation)

3.3.3.2 Layers 4, 6, 8 and 9 (Rangal Coal Measures and Fort Cooper Coal Measures Interburden)

Example hydrographs for selected Interburden bores (PZ05-DNM and PZ02-DNM) are shown in **Figure 3-8**. Generally, trends are well reproduced in the interburden, as illustrated with bores PZ05-DNM and PZ02-DNM. Average absolute water levels difference between modelled and measured water levels are approximately 4 m for bore PZ05-DNM and 5 m for bore PZ02-DNM.



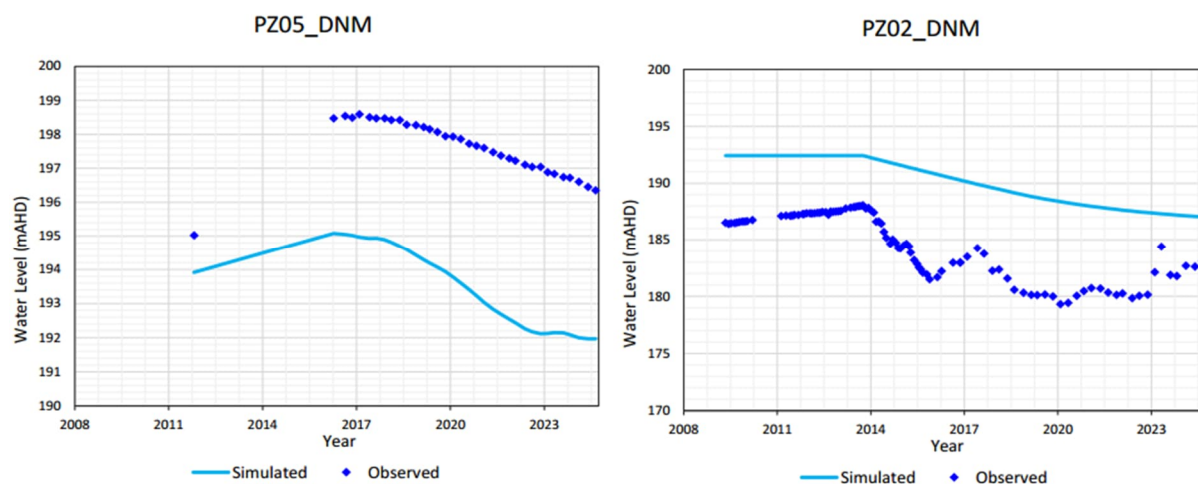


Figure 3-8 Example Calibration Fit – Interburden Bores (MLE Realisation)

3.3.3.3 Layers 7 and 10 (Rangal Coal Measures and Fort Cooper Coal Measures Coal Seams)

Example hydrographs for observation sites PZ06 (Vermont seam), PZ07 (Fort Cooper seams) and PZ08 (Vermont seam) within the coal seam layers are presented in **Figure 3-9**. The model effectively captures the overall trends in water level changes at these sites, except for PZ06, where an initial increase in water level is not simulated. Generally, the model tends to underestimate water levels in the coal seams, with average discrepancies of approximately 15 meters at PZ06, 10 meters at PZ08 and 4 meters at PZ07 when compared to measured data.



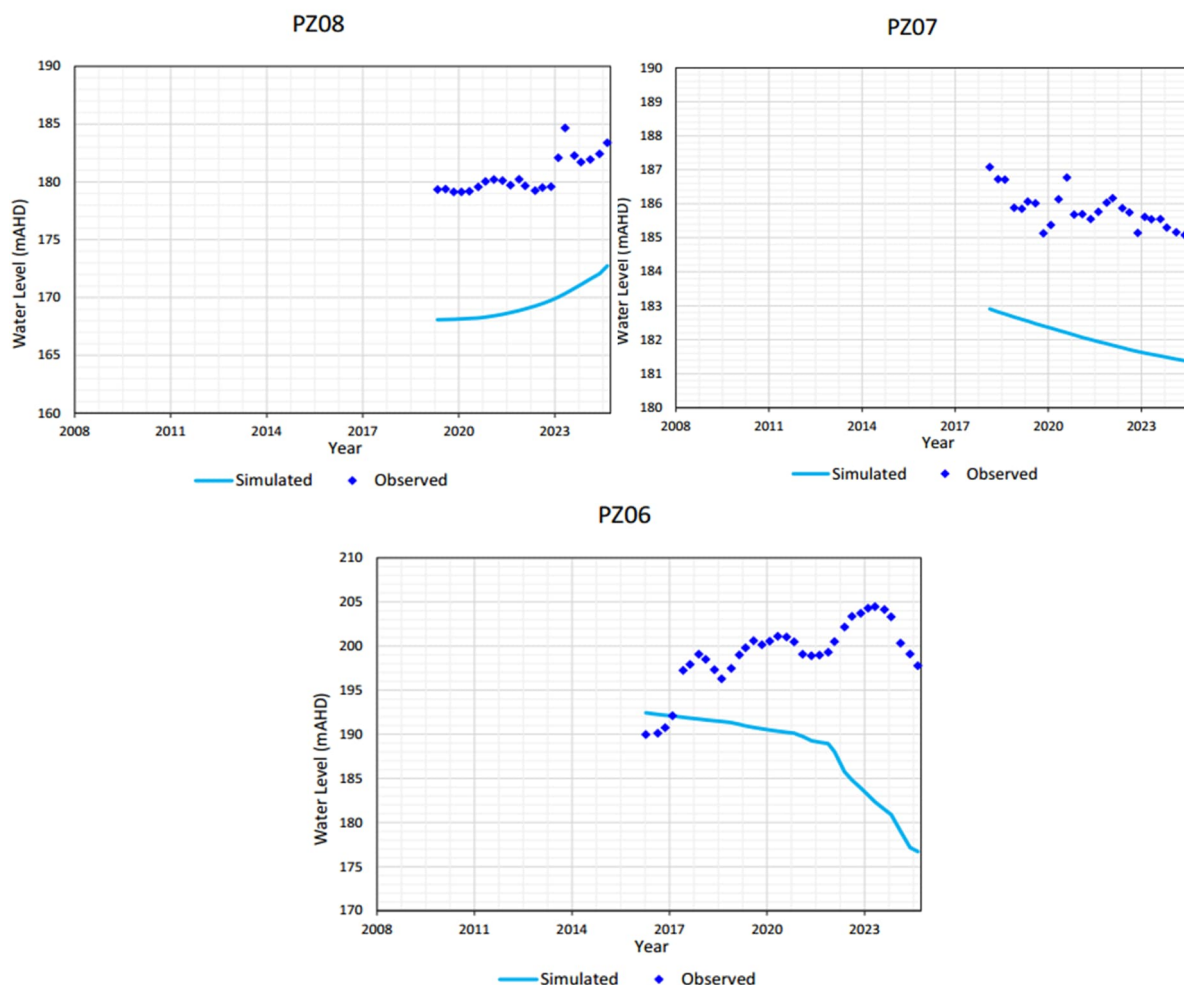


Figure 3-9 Calibration Fit – MCM Coal Seam Bores (MLE Realisation)

3.4 Calibrated Results

3.4.1 Water Balance

3.4.1.1 Steady State

The steady state water balance for the MLE realisation of the model is shown in **Table 3-4**. The water balance for the steady-state model indicates that regional groundwater inflow was the largest net inflow contributor to the steady state model (13.8 ML/d), followed by recharge (11.9 ML/d). Groundwater outflow is dominated by regional groundwater outflow (15.1 ML/d) and evapotranspiration (10.1 ML/d outflow) where the water table is within a few metres of the land surface. The mass balance error for the steady state calibration is less than 0.1%, within the error threshold recommended by the Australian Groundwater Modelling Guidelines (Barnett et al., 2012).



Table 3-4 Steady State Water Balance – MLE Model

Component	Inflow (ML/d)	Percent of Total Inflow (%)	Outflow (ML/d)	Percent of Total Outflow (%)
Recharge (RCH)	11.9	46%	-	-
ET (from GW) (EVT)	-	-	10.1	39%
Rivers (RIV)	-	-	0.5	2%
Regional GW Flow (GHB)	13.8	54%	15.1	59%
Total	25.7	100%	25.7	100%

3.4.1.2 Transient Calibration Period

The model water balance for the MLE realisation in the transient calibration, averaged over the duration of the calibration period, is presented in **Table 3-5**.

The water balance for the MLE realisation in the transient calibration period indicates that recharge to the groundwater system within the model averages 14.2 ML/day. Approximately 10.2 ML/day is lost to evapotranspiration in areas where the water table is within a few metres of the land surface.

The net flux from the general head boundary (GHB) component is -1.2 ML/day, indicating that groundwater leaves the model domain through this boundary. 6.2 ML/day is removed from the model by the Drain boundary condition that represents mining in the model. River inflow and outflow are 0.9 and 0.5 ML/d, respectively, indicating a net inflow of approximately 0.4 ML/d. The mass balance error for the transient calibration is less than 0.1%, within the error threshold recommended by the Australian Groundwater Modelling Guidelines (Barnett et al., 2012).

Table 3-5 Transient Calibration Period Water Balance – MLE Model

Component	Inflow (ML/d)	Percent of Total Inflow (%)	Outflow (ML/d)	Percent of Total Outflow (%)
Recharge (RCH)	14.2	40%	-	-
ET (from GW) (EVT)	-	-	10.2	28%
River (RIV)	0.9	3%	0.5	1%
Regional GW Flow (GHB)	13.8	38%	15.0	42%
Drains (DRN)	-	-	6.2	17%
Storage	7	19%	4.0	11%
Total	35.9	100%	35.9	100%

The transient water balance is presented on **Figure 3-10**. Recharge (Recharge In) stands out as the largest components of inflow. Water going into storage (Storage Out) shows peaks associated with large recharge events. Evapotranspiration (ET Out) also respond to sustained recharge events.

Water coming out of storage (Storage In) shows peaks associated with mine dewatering (Drains Out).



Contributions from regional boundary flow (head dep bounds In and Out) are relatively constant, highlighting that near steady state conditions exist at the model boundaries.

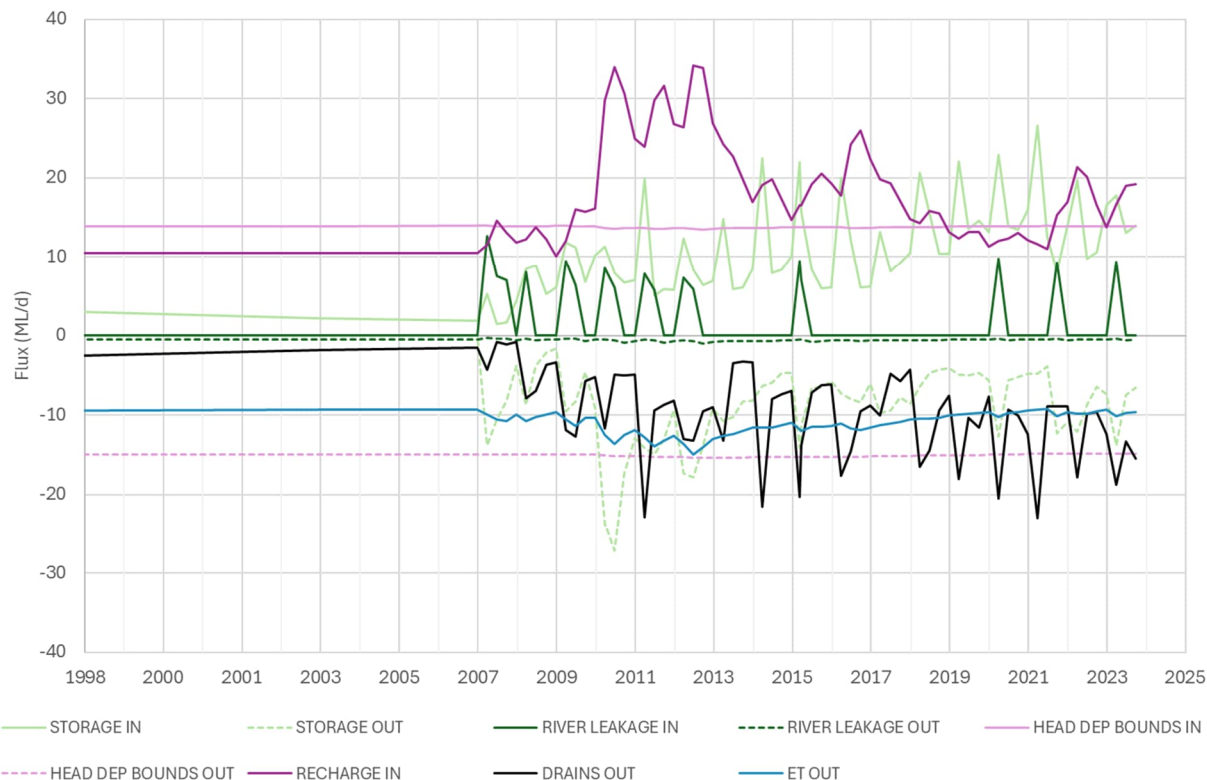


Figure 3-10 Transient Calibration Period Water Balance – MLE Model

3.4.2 Calibrated Parameters

Calibrated parameter values for the MLE realisation, including horizontal hydraulic conductivity (K_x) and vertical to horizontal hydraulic conductivity ratio (K_z/K_x), Specific Storage (S_s) and Specific Yield (S_y) are presented in **Appendix B**. A depth dependence equation for the coal measures was used in the numerical groundwater model as described in detail in SLR (2025b), and therefore the calibrated hydraulic conductivity values vary across the model domain. Maximum depths used for the depth dependence equation for each unit as well as hydraulic parameters for the fault zones are shown on **Appendix B**.

Calibrated parameters for recharge, evapotranspiration, general head boundary and riverbed vertical conductivity are provided for each zone on **Appendix B**.

Pilot points were used to model the spatial variability of horizontal and vertical hydraulic conductivity parameters (and specific yield, in the case of the Isaac River Alluvium) in some modelled geologic units, as described in detail in SLR (2025b). Pilot points were placed in the Isaac Alluvium and weathered formations, as well as any coal bearing formation, or formation with at least ten observation bores in the calibration observation database.



4.0 Groundwater Flow Model Prediction

4.1.1 Predictive Modelling Setup

4.1.1.1 Predictive Mining

Mining activities are simulated in the predictive model as an extension of the calibration period (i.e. same setup but different area being mined). A detailed description of how mining is simulated in the model for the calibration period is provided in SLR (2025b).

4.1.1.2 Predictive Post Mining

Model setup for the post mining period includes:

Climate related boundary conditions (i.e. recharge and ET) are set constant for the duration of the post mining period, using long term average values. Recharge and ET are not applied to the final voids themselves in the groundwater model, since the WRM (2025) water balance model used iteratively with the groundwater model (see **Section 4.1.4**) accounts for these boundary conditions.

The properties of the residual void cells are converted to values representative of void values. That is, the void cells are assigned high horizontal and vertical hydraulic conductivities (1,000 m/day) and storage parameters based on the compressibility of water (specific yield of 1.0, storage coefficient of $5.0 \times 10^{-6} \text{ m}^{-1}$), to simulate free water movement within the residual void. This approach is often referred to as a 'high-K' lake.

The simulation of mines adjacent to DNM (refer to SLR (2025b) for more information) in the groundwater model, such as Poitrel to the west of the DNM, Millennium to the northwest of the DNM, and Moorvale South to the southeast of the DNM, has the potential to influence the model results. The simulation of Poitrel and Millennium within the groundwater model is unchanged from the latest version of the regional groundwater model (SLR, 2025c), i.e. mining at both Poitrel and Millennium ceases in the model in the year 2027 (i.e. prior to the DNM post mining simulation) and the mined-out pits are parameterised as being wholly backfilled with spoil. The simulation of Moorvale South within the groundwater model is consistent with the PRC Plan being developed for that site concurrently with the DNM PRC Plan, i.e. using the same numerical model and incorporating the Moorvale South final landform (including its residual voids) available at the time of the DNM PRC Plan hydrogeology assessment development.

4.1.2 Model Scenarios

Two predictive scenarios were setup to assess the impact of the Project:

- Approved model: This setup is the same as per the PRC Plan's model (SLR, 2025c) and includes all approved mining at Daunia and neighbouring mines. It also includes post mining void lakes at Daunia (and neighbouring mines where available).
- Project model: The Project landform differs from the approved model as it includes the spoil emplacement adjacent to the Daunia mine pit. The emplacement results in the topography of the predictive scenario to be different from the approved case wherein the emplacement forms an accumulation of spoil material adjacent to the pit.

The Approved model was modified to setup the Project model as follows.

- The model top elevation was increased in the OOPD area to match the Project final landform design.



- The hydraulic properties of layer 1 were changed to “spoil” for OOPD area.
- The evapotranspiration was modified to adopt calibrated value for spoil (EVT rate and EVT extinction depth). The EVT surface was also adjusted to the modified top elevation for layer 1.
- The Recharge rate to the OOPD area was changed to “spoil” (3.7% of rainfall).

4.1.3 Model Timing

The predictive model has been set up to simulate mining activities from the end of calibration (2024) through to the end of 2041, after which the post mining period starts. The post mining stress periods of the overall model setup commence from the end of mining at DNM (end of the year 2041) and were run for 977 years over 125 model stress periods. The post mining stress period setup is shown in **Table 4-1**. Note the stress period setup also accounts for simulated post mining at other mine voids within the model domain (i.e. is not designed only for the post mining simulation at DNM).

Table 4-1 Stress Period Setup

Model Period	Date from	Date to	Min SP Length (year)	Max SP Length (year)
Calibration	1988	October 2024	0.3	0.3
Prediction - Mining	November 2024	2041	1	1
Prediction - Post Mining	2042	3019	1	50

4.1.4 Residual Void Lakes Recovery

The residual voids will accumulate water over time due to rainfall, surface water runoff and groundwater inflows from recovered groundwater levels. Void water levels were not predicted by the groundwater model but were estimated by the balance between groundwater inflow and the direct rainfall and rainfall runoff from the surrounding catchment against the evaporation loss from the lake surface through iterative surface water balance modelling (WRM, 2025).

4.1.4.1 Iterative Methodology

The iterative modelling approach was undertaken in a stepwise manner as described below. A first iterative process was carried out for the DNM PRC Plan’s model (SLR, 2025c) and the resulting void levels are used for the Approved scenario. Two additional iterations were carried out for the Project, leading to slightly higher void levels due to the OOPD.

- 1 Initial predicted groundwater inflows with time to the DNM residual voids were estimated by WRM (2025) using analytical inflow calculations that were incorporated in the WRM (2025) water balance model.
- 2 The pit lake levels with time were then predicted by the WRM (2025) water balance model, incorporating groundwater (Step 1) and surface water fluxes and processes.
- 3 To refine the Step 1 estimation of residual void groundwater inflows, the daily residual void water elevations derived from the WRM (2025) water balance modelling (Step 2) were then replicated by SLR within the numerical groundwater model for the final landform using the time variant constant head boundary (CHD) condition,



adopting a simplified average of the WRM (2025) daily results over the relevant groundwater model stress period length.

- 4 Refined predicted groundwater inflows with time to the residual voids from the numerical groundwater model (Step 3) were then incorporated into an update of the Step 2 water balance model prepared by WRM (2025).
- 5 To further refine the Step 3 estimation of residual void groundwater inflows, the daily residual void water elevations derived from the updated WRM (2025) water balance modelling (Step 4) were then replicated by SLR within the numerical groundwater post mining model for the final landform.
- 6 Since the refined groundwater model predictions for fluxes to the residual voids from Step 5 were still in agreement with what was used as input to the water balance modelling (i.e. the predicted groundwater inflows with time to the voids per Step 4), it was considered by WRM (2025) and Whitehaven that further iterations between the two models were not required and therefore the Step 5 groundwater model results were adopted for reporting in this hydrogeology assessment.

4.1.4.2 Final Void Lakes

Table 4-2 present the final simulated recovery of water levels in the residual voids, both for the approved and Project scenarios, based on the iterative groundwater and surface water balance modelling. In the Project scenario, the final lake levels are slightly higher for Titan East and Pandora.

Table 4-2 Approximate Equilibrium Conditions in the Residual Voids

Component	Residual Void					
	Titan North		Titan East		Pandora	
	Approved	Project	Approved	Project	Approved	Project
Equilibrium Void Water Level (mAHD)	140	140	120	121	92	95
Spill Elevation (mAHD)	210		220		190	
Freeboard ¹ (m)	70	70	100	99	98	95
Approximate Pre-mining Groundwater Level (mAHD)	198	198	192	192	180	180
Groundwater net inflow at equilibrium (ML/d)	-0.08	-0.08	0.20	0.20	0.93	0.83

¹ Freeboard is the remaining depth of void between the predicted equilibrium water body level and the void spill level

4.1.5 Predicted Water Balance

The water balance for the prediction period is shown for all components for the MLE model for the Approved scenario (**Table 4-3**) and the Project scenario (**Table 4-4**).

The Project scenario shows higher recharge (0.16 ML/d higher on average), consistent with the model setup. Other components are very similar for both scenarios, with variations less than 0.01 ML/d on average. The main sources of inflow in the model are recharge (56%) followed by regional groundwater flow (28%); while the main sources of outflows are final pit lakes (constant heads - 35%) followed by regional groundwater flow (30%) and evapotranspiration (20%).



The average mass balance error for all simulations is less than 1 %, within the error threshold recommended by the Australian Groundwater Modelling Guidelines (Barnett *et al.*, 2012).

Table 4-3 Transient Prediction Period Water Balance Approved

Component	Inflow (ML/d)	Percent of Total Inflow (%)	Outflow (ML/d)	Percent of Total Outflow (%)
Recharge (RCH)	28.28	56.3%	-	-
ET (from GW) (EVT)	-	-	9.84	19.6%
River (RIV)	0.20	0.4%	0.47	0.9%
Regional GW Flow (GHB)	13.85	27.6%	15.12	30.1%
Drains (DRN)	-	-	1.84	3.7%
Storage	4.46	8.9%	5.21	10.4%
Constant Head	3.44	6.8%	17.68	35.3%
Total	50.23	100%	50.17	100%

Table 4-4 Transient Prediction Period Water Balance Project

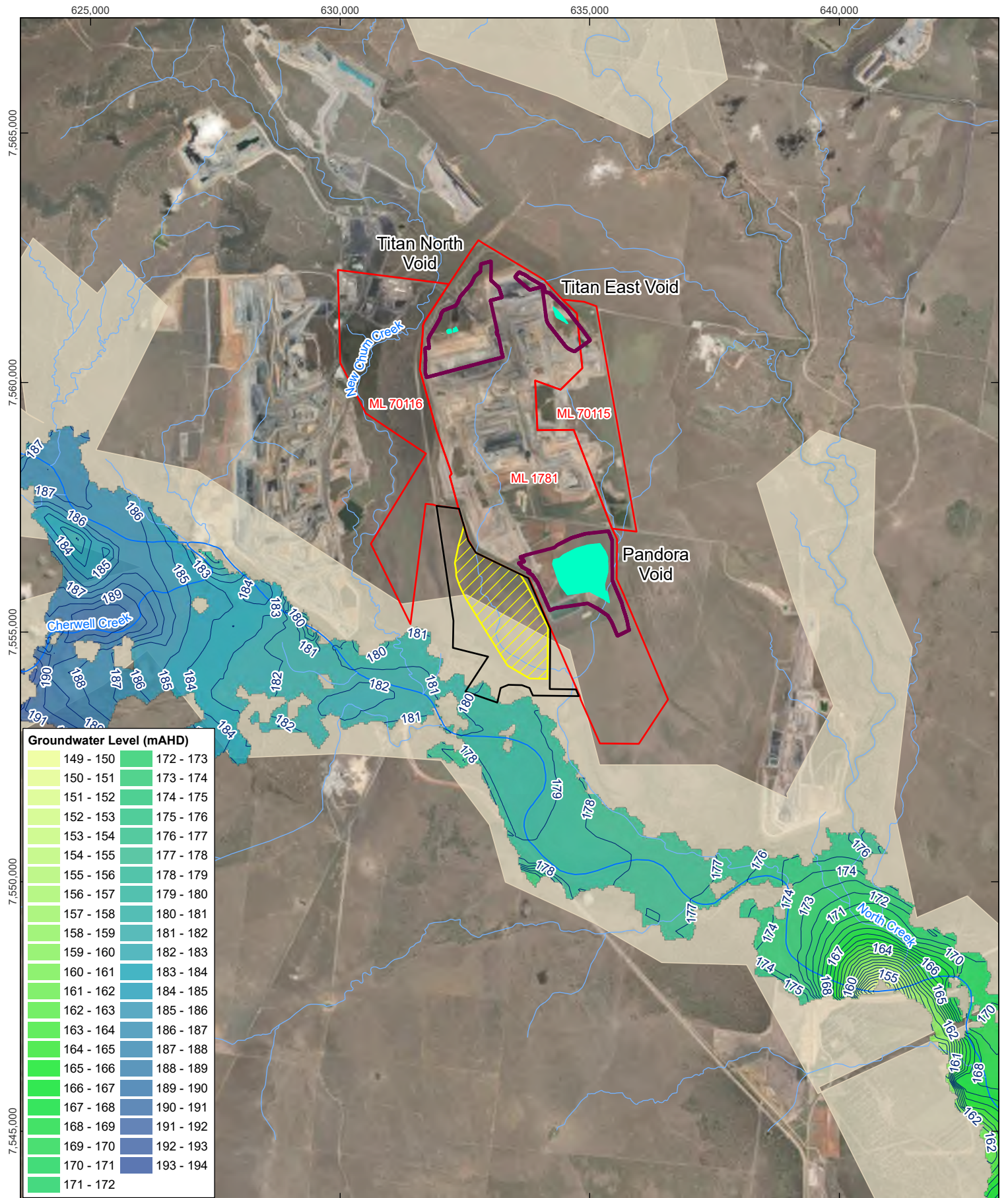
Component	Inflow (ML/d)	Percent of Total Inflow (%)	Outflow (ML/d)	Percent of Total Outflow (%)
Recharge (RCH)	28.44	56.4%	-	-
ET (from GW) (EVT)	-	-	9.86	19.6%
River (RIV)	0.20	0.4%	0.47	0.9%
Regional GW Flow (GHB)	13.86	27.5%	15.13	30.1%
Drains (DRN)	-	-	1.87	3.7%
Storage	4.47	8.9%	5.23	10.4%
Constant Head	3.45	6.8%	17.78	35.3%
Total	50.42	100%	50.34	100%


4.1.6 Predicted Water Levels










4.1.6.1 Alluvium and Quaternary Deposits

The predicted water level in the alluvium and regolith at the end of mining and at post mining equilibrium are presented on **Figure 4-1** and **Figure 4-2** respectively. At post mining equilibrium, a decrease can be observed in the alluvium saturation, showing a disconnected system. This is aligned with the conceptual model for the Isaac River Alluvium, which is conceptualised as a semi saturated system and not a fully saturated aquifer (**Section 2.2.1**). The end of mining water level shows greater saturation in the alluvium, which is due to the river set up in the model (see **Section 4.1.9.2** for more details). Small periods of flow are included in the calibration and mining predictive periods (not in post mining equilibrium due to long term average conditions being simulated), which allow for greater (albeit intermittent) saturation in the alluvium. It is noted that the alluvium is virtually always unsaturated below the OOPD (only one cell show saturation of the alluvium on the western edge of the OOPD at post mining equilibrium - **Figure 4-2**).





 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:100,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Groundwater Contour (mAHD)
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Void Extent
 -  Void Lake
 -  Alluvium Extent

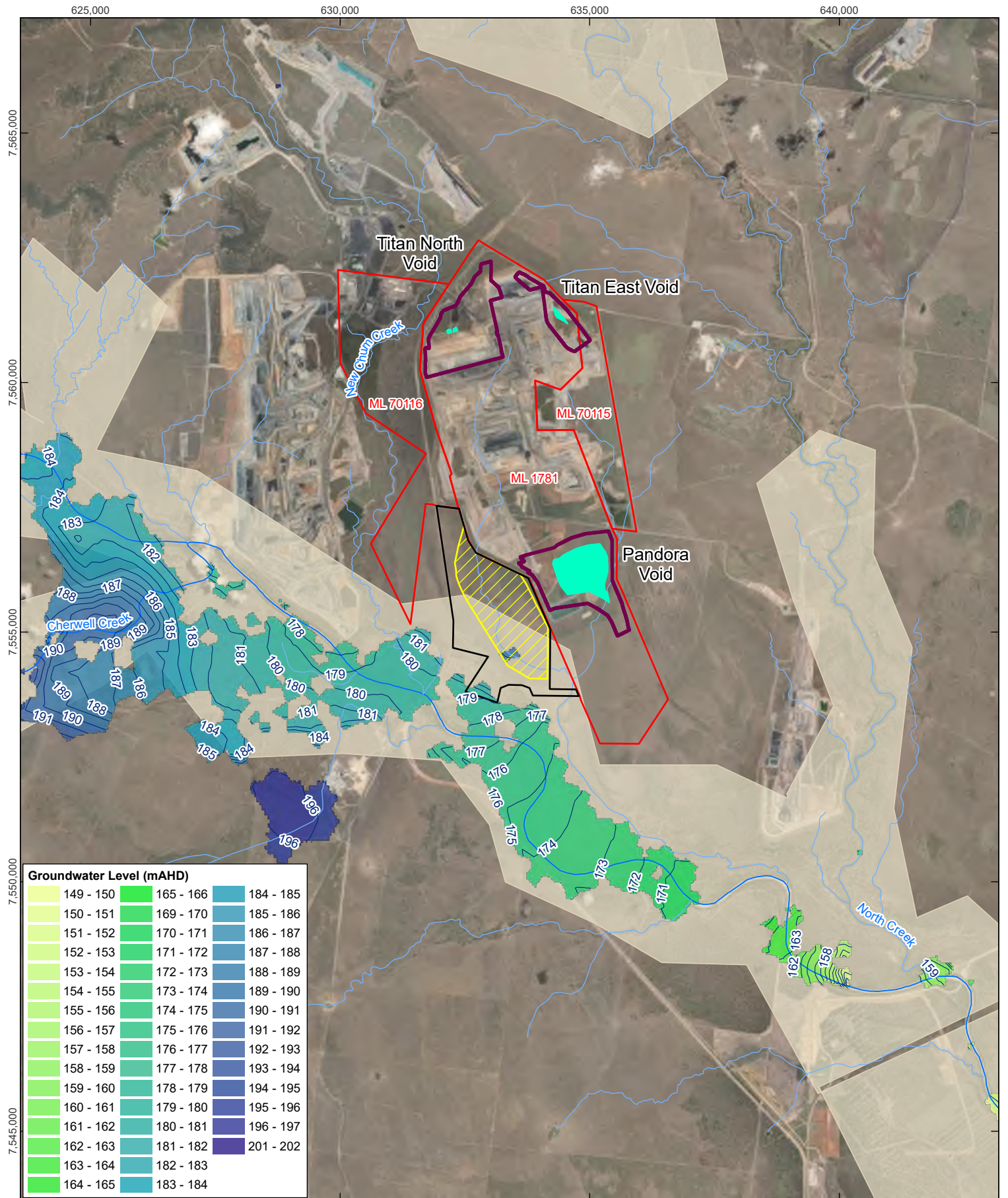
**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**


**WATER LEVEL - ALLUVIUM AND
 REGOLITH - END OF MINING -
 LAYER 1**












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FIGURE 4-1



 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:100,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Groundwater Contour (mAHd)
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Void Extent
 -  Void Lake
 -  Alluvium Extent

**DAUNIA WEST
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 TECHNICAL REPORT**
**WATER LEVEL - ALLUVIUM AND
 REGOLITH -
 POST MINING EQUILIBRIUM -
 LAYER 1**



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FIGURE 4-2

4.1.6.2 Water Table

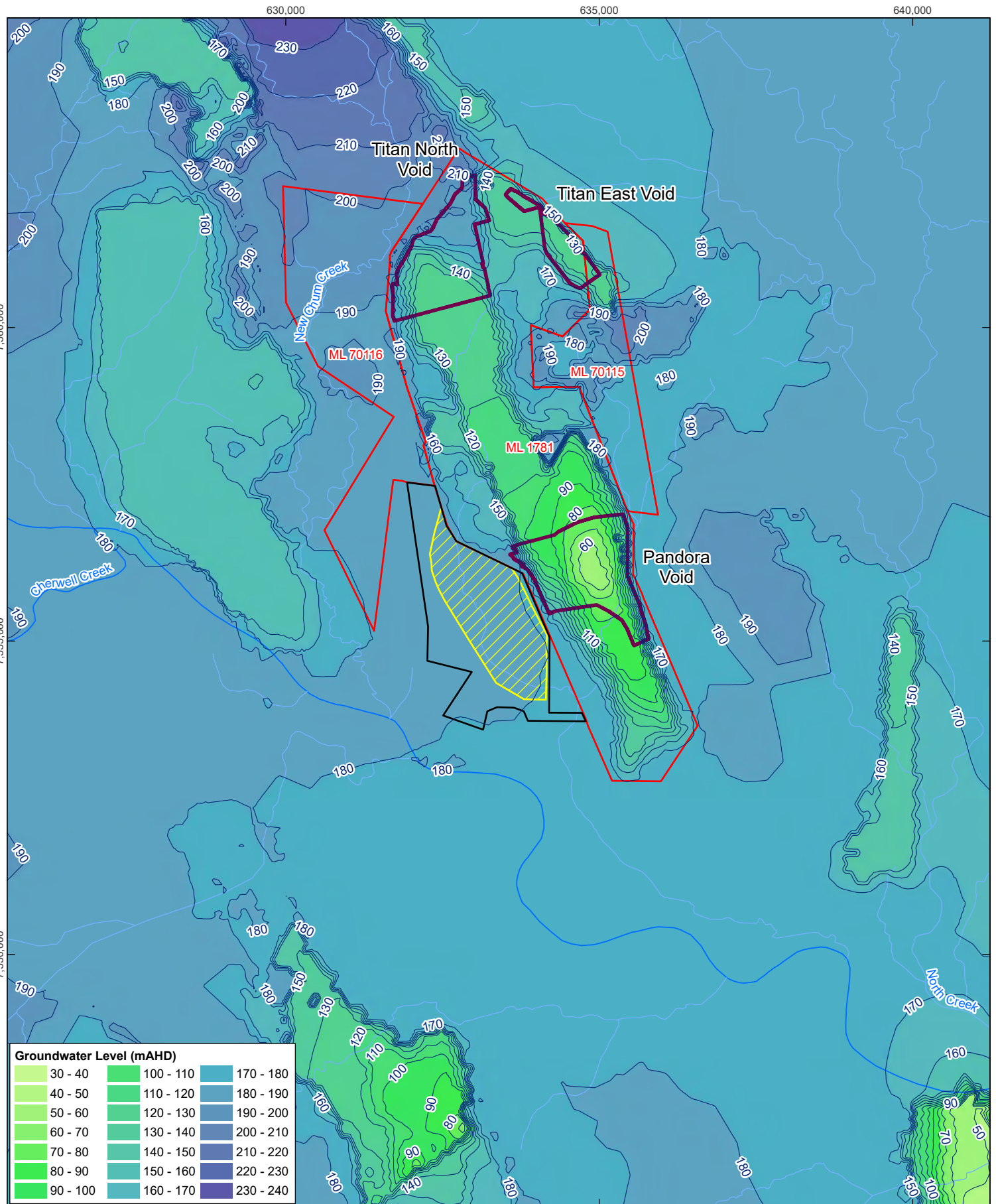
The predicted water table elevation at the end of mining and at post mining equilibrium are presented on **Figure 4-3** and **Figure 4-4** respectively. The formation of the Pandora pit lake is visible toward the east of the OOPD, rising to 95 mAHD at post mining equilibrium (**Figure 4-4**).

4.1.6.3 Depth to Water Table


The depth to water table at post mining equilibrium is show on **Figure 4-5**. A shallower water table can be observed directly west of and adjacent to the OOPD. In this area, the water table is located between 2 m and 10 m below the surface.








There are no areas of shallow (i.e. <2 m) water table within and surrounding the DNM mine leases, including underneath the Isaac River, highlighting the lack of hydraulic connection between the river and the water table (**Figure 4-5**).





Groundwater Level (mAHd)		
30 - 40	100 - 110	170 - 180
40 - 50	110 - 120	180 - 190
50 - 60	120 - 130	190 - 200
60 - 70	130 - 140	200 - 210
70 - 80	140 - 150	210 - 220
80 - 90	150 - 160	220 - 230
90 - 100	160 - 170	230 - 240

 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:80,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Groundwater Contour (mAHd)
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Void Extent

**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**
**WATER TABLE ELEVATION AT THE
 END OF MINING**



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FIGURE 4-3

630,000

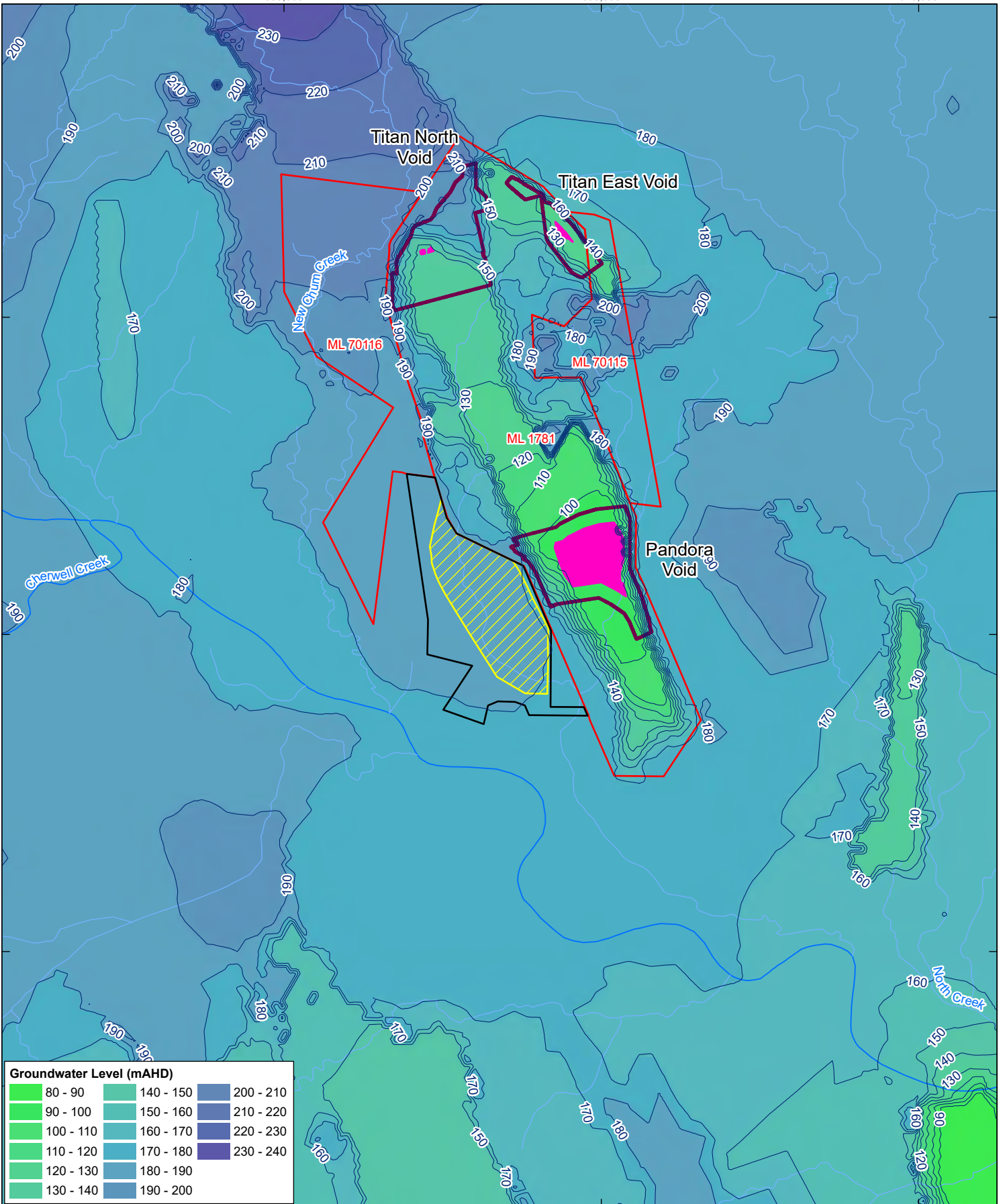
635,000

640,000


7,560,000









7,555,000

7,550,000



Groundwater Level (mAHd)		
80 - 90	140 - 150	200 - 210
90 - 100	150 - 160	210 - 220
100 - 110	160 - 170	220 - 230
110 - 120	170 - 180	230 - 240
120 - 130	180 - 190	
130 - 140	190 - 200	

 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:80,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Groundwater Contour (mAHd)
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Void Extent
 -  Void Lake

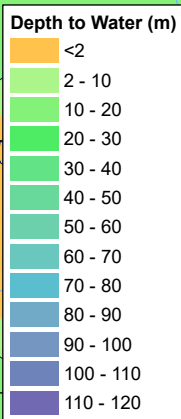
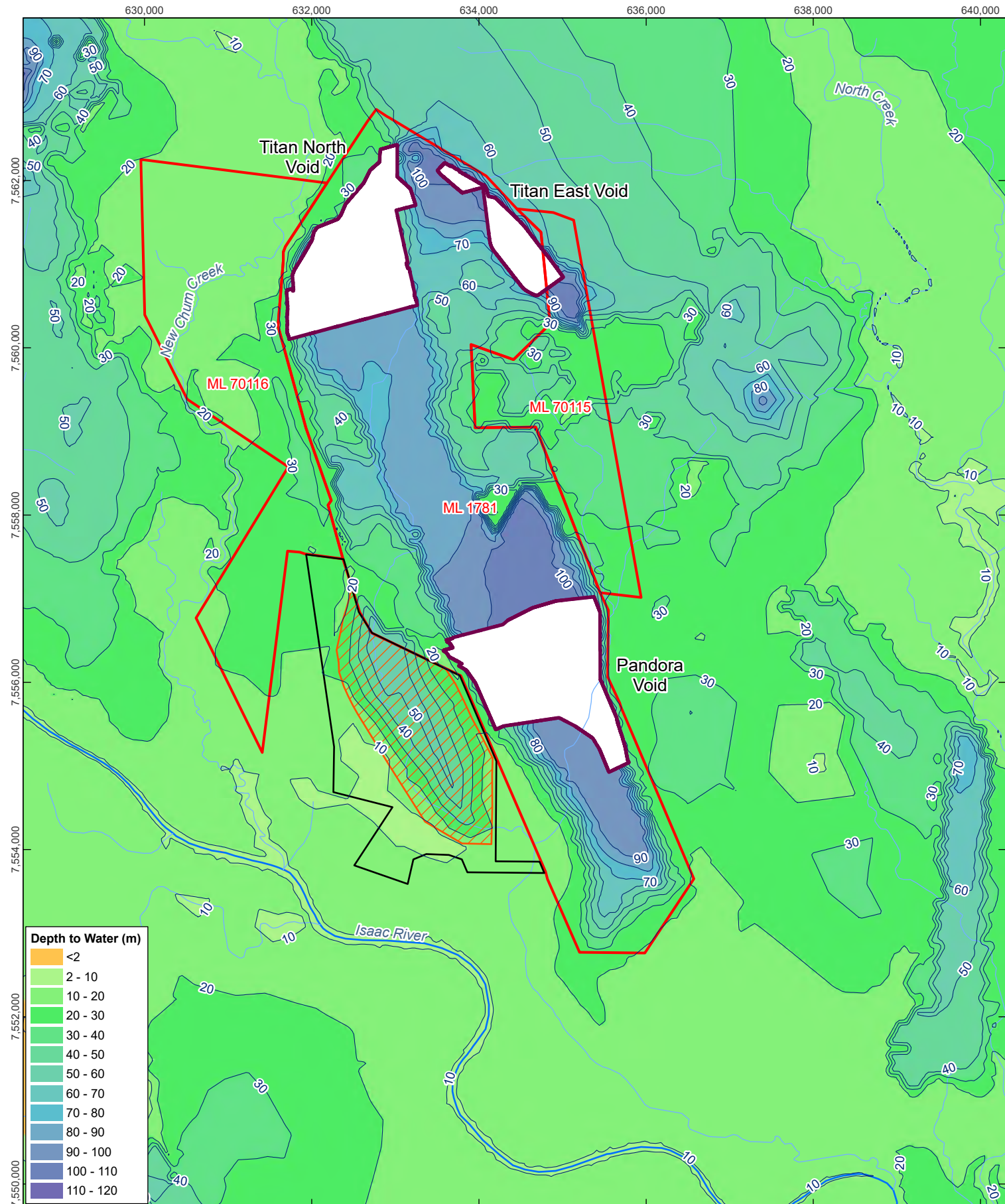
**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**


**WATER TABLE ELEVATION AT
POST-MINING EQUILIBRIUM**










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FIGURE 4-4



 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:60,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Depth to Water Contour (m)
 -  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)
 -  Void Extent

**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**

**DEPTH TO WATER TABLE -
POST MINING EQUILIBRIUM**



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FIGURE 4-5

4.1.7 Predicted Mounding

Mounding was calculated as the difference in water level between the Project scenario and the Approved scenario. Mounding was calculated in layer 1, to show increase in water level due to the Project in the Isaac River alluvium (**Figure 4-6**) and in layer 2, to show increase in water level due to the Project in the unconsolidated aquifer/regolith (**Figure 4-7**).

Mounding in the alluvium is generally less than 2 m with small, localised areas of mounding up to 5 m, where saturated (**Figure 4-6**)

Mounding in layer 2 extend 6 km west and 9 km southeast of the OOPD (**Figure 4-7**). Maximum mounding occurs under the OOPD (up to 16 m) while mounding in the vicinity of the Isaac River is below 5 m.

Overall, there is slight increase in water level to the unconsolidated shallow units.



630,000

635,000

640,000

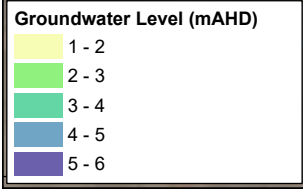
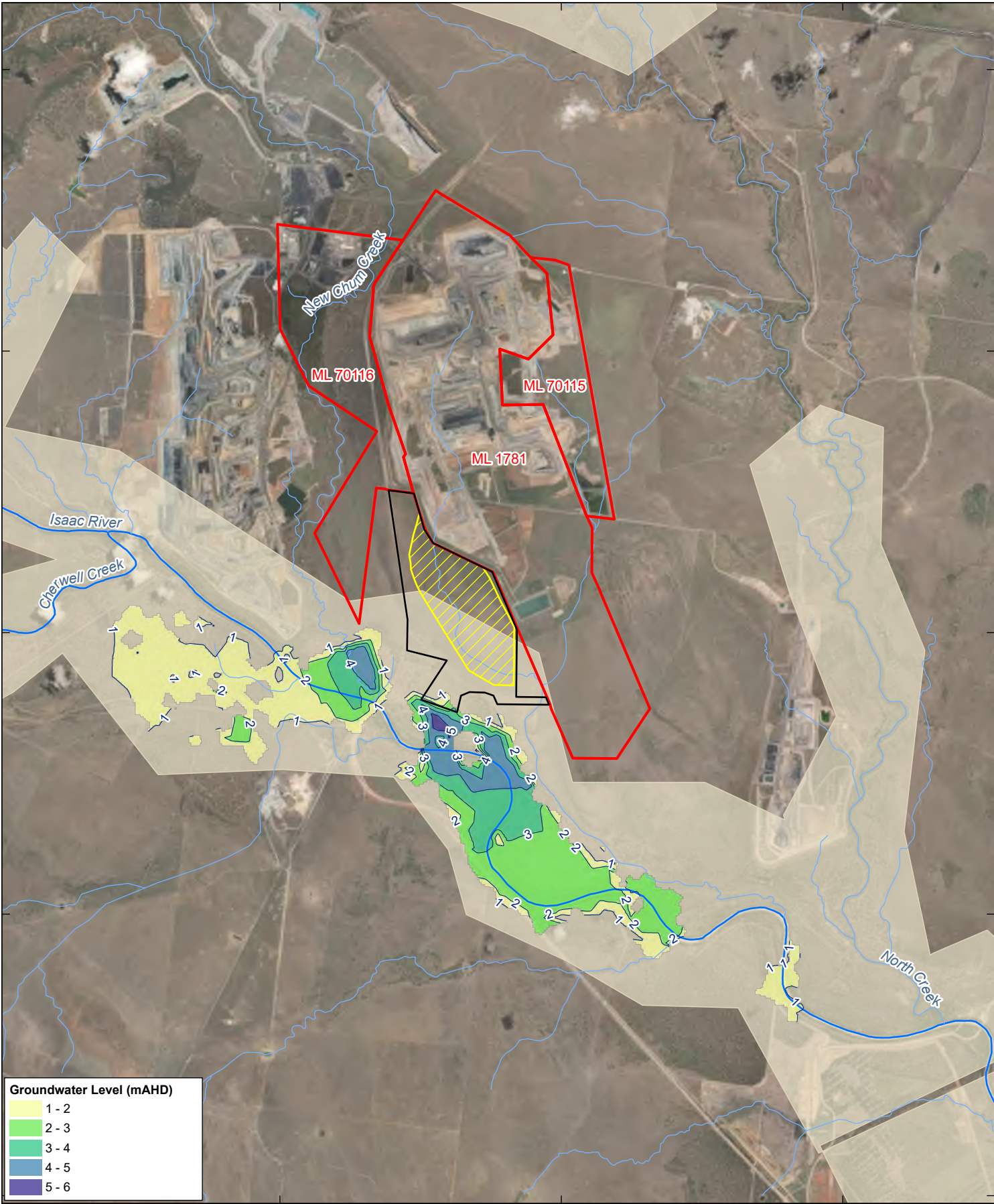
7,565,000


7,560,000

7,555,000

7,550,000

7,545,000



 0 1 2 km

Coordinate System: GDA2020 MGA Zone 55








Scale: 1:90,000 at A4

Project Number: 620.042120.00001

Date Drawn: 01-Jun-2026

Drawn by: RB

LEGEND

-  Groundwater Contour (mAHd)
-  Major Watercourse
-  Minor Watercourse
-  Mining Lease
-  Mining Lease Application Area / Project Area
-  Proposed Operational Out-of-Pit Dump (DWIP)
-  Alluvium Extent

**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**

**MOUNDING - POST MINING
EQUILIBRIUM - ALLUVIUM
AND QUATERNARY -
LAYER 1**



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FIGURE 4-6

630,000

635,000

640,000

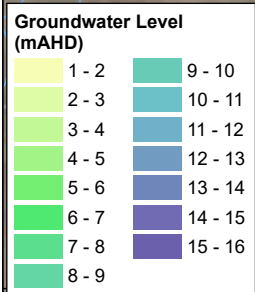
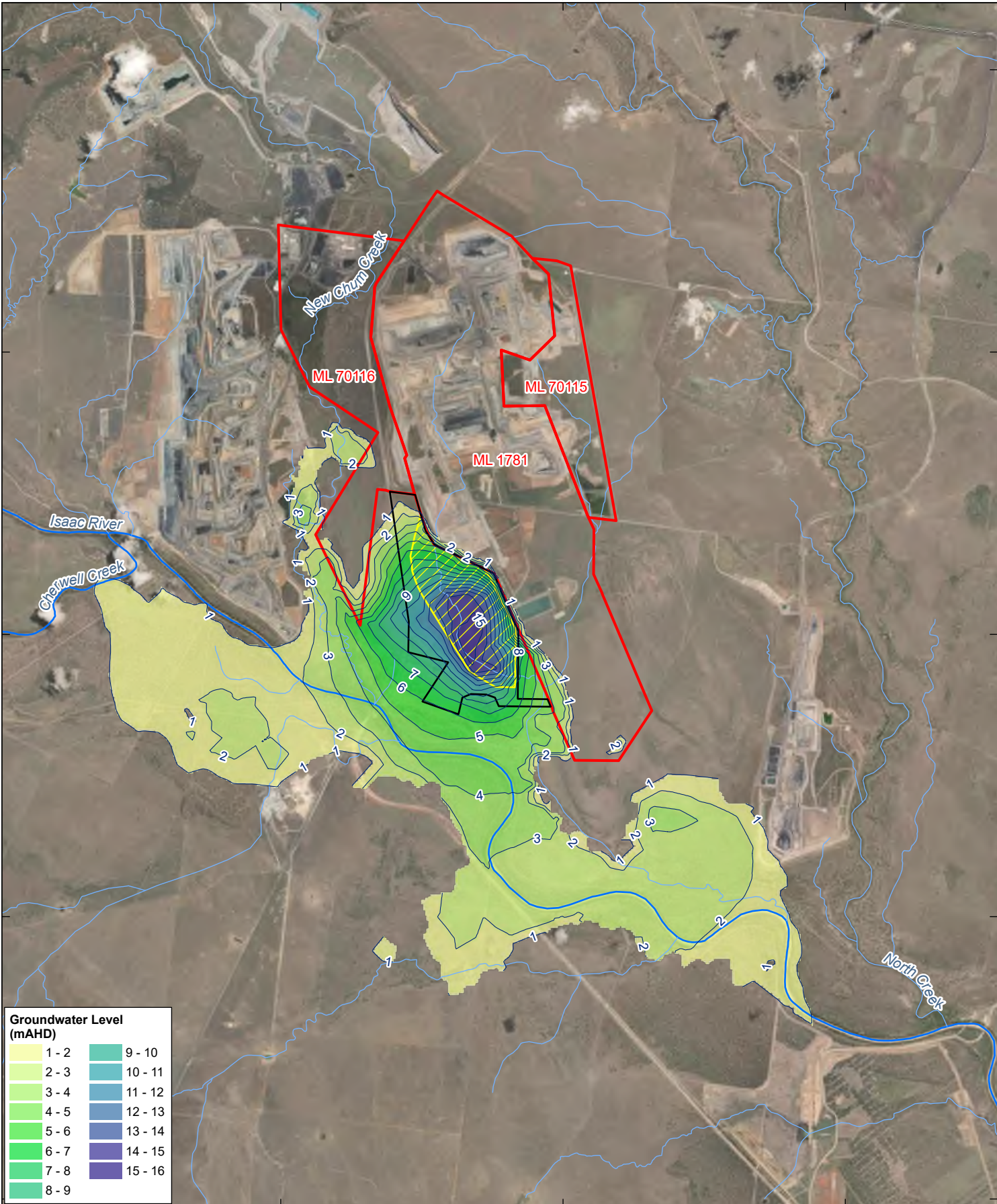
7,565,000


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7,550,000

7,545,000



 0 1 2 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:90,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

LEGEND

-  Groundwater Contour (mAHd)
-  Major Watercourse
-  Minor Watercourse
-  Mining Lease
-  Mining Lease Application Area / Project Area
-  Proposed Operational Out-of-Pit Dump (DWIP)

**DAUNIA WEST
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 TECHNICAL REPORT**

**MOUNDING - POST MINING
 EQUILIBRIUM - REGOLITH
 LAYER 2**



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FIGURE 4-7

4.1.8 Predicted Flow Direction and Travel Times

4.1.8.1 Particle Tracking Setup

An analysis of the water movement within the final landform was undertaken to simulate and assess the movement and fate of water particles through the groundwater system post-mining. A number of particles were placed on the final landform and within the residual voids in the post mining period of the groundwater model and the mod-PATH3DU code (Muffels, et, al., 2018) was used to simulate particle pathways along the groundwater flow field during post mining (i.e. 977 years)..

Figure 4-8 shows the initial location of particles on the final landform. The particles were placed at the surface of the model and released at the start of the post-mining simulation, with the movement of the particles then recorded during the post-mining simulation. It should be noted that the mod-PATH3DU code automatically moves the particle from the model surface to the shallowest saturated layer at the commencement of the simulation; as shown on **Figure 4-8** for many of the particles this represents the Permian layers (including areas of spoil backfill in model layers that represent Permian units pre-mining) as the shallow layers (Layers 1 and 2) are unsaturated across much of the DNM at the commencement of the post-mining simulation.

Particle tracking is limited to advection (i.e. no retardation or dispersion). Effective porosity was set at 0.1 (10%) for the unconsolidated sediments (Layer 1 and 2) and 0.01 (1%) for the consolidated units (Layer 3 to 19). Selected porosity values are further discussed in **Section Error! Reference source not found.**

4.1.8.2 Particle Tracking Results

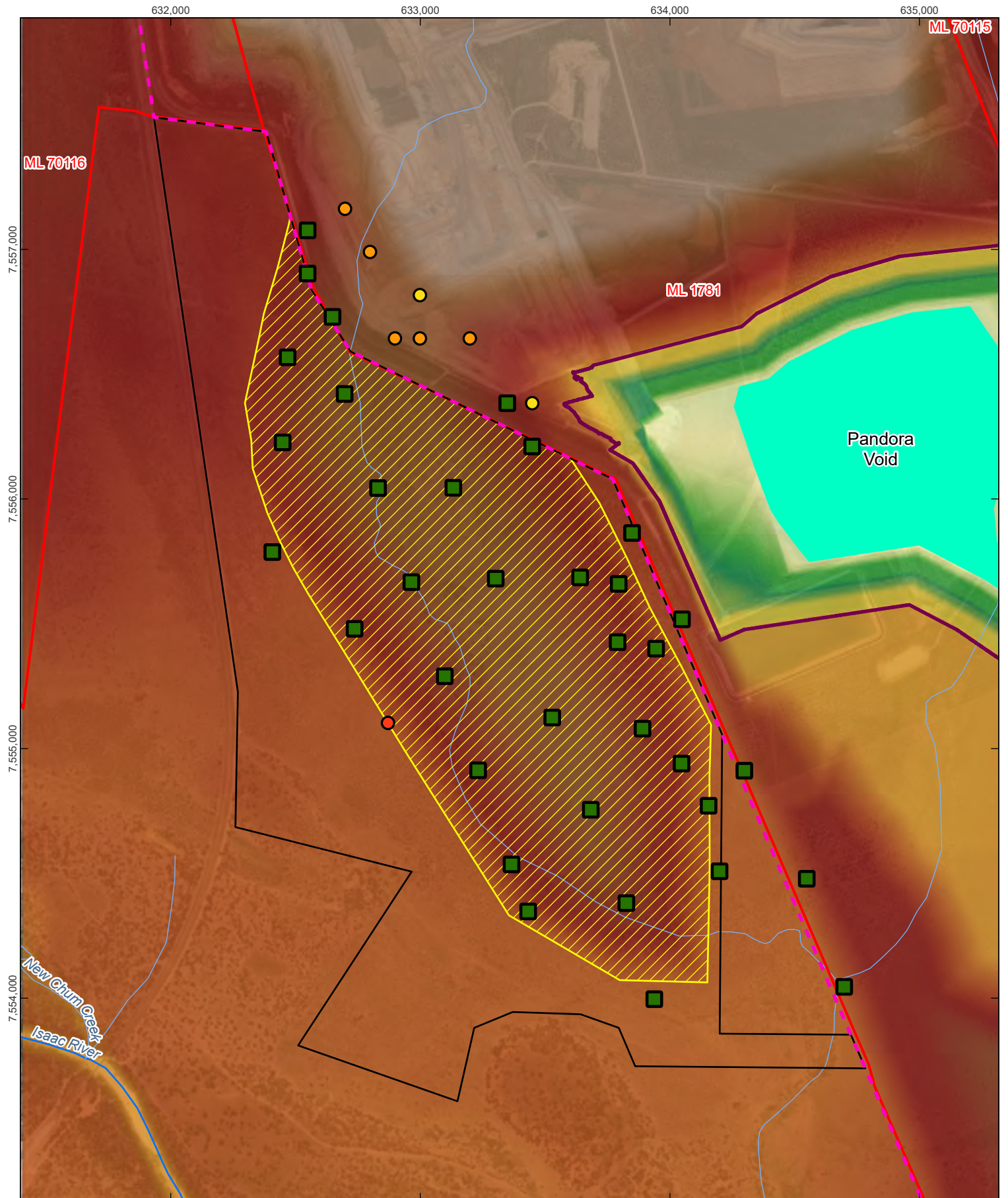
Figure 4-9 shows the predicted movement of water particles in the 977-year post mining simulation of the final landform. The colours along the predicted particle flow paths indicates the model layer the particle was simulated to be moving through, with the green to red scale classification representing particles moving from shallow to deep model layers.

The colour changes along the paths on **Figure 4-9** indicate that particles situated within the shallower saturated layers at the beginning of the post-mining simulation generally move progressively toward deeper layers representing the Permian coal measures (or backfilled spoil where the coal measures has been mined out) over the post-mining period. The flow path analysis indicates the particles generally move toward the void lakes.

Particles that have been placed in the northern, southern or eastern side of the OOPD move into the Pandora Pit void. Particles that have their starting locations on the western side of the spoil emplacement initially travel toward the west before moving south (**Figure 4-9**).

The particle tracking shows that a downward vertical hydraulic gradient exists toward the west and south of the OOPD. Particles moving south toward the Isaac River move down into layer 9 (Fort Cooper overburden) and are not predicted to remain near the water table located primarily in layer 2 or layer 1 where the alluvium is saturated (refer to **Figure 4-2**).





Coordinate System: GDA2020 MGA Zone 55

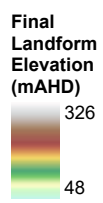
 Scale: 1:20,000 at A4

 Project Number: 620.042120.00001

 Date Drawn: 01-Jun-2026

 Drawn by: RB

- LEGEND**
- Major Watercourse
 - Minor Watercourse
 - DNM EA Boundary
 - Mining Lease
 - Mining Lease Application Area / Project Area
 - Proposed Operational Out-of-Pit Dump (DWIP)
 - Void Extent
 - Void Lake



- Starting Location and Layer of Particle Simulation**
- 2
 - 6
 - 7
 - 9

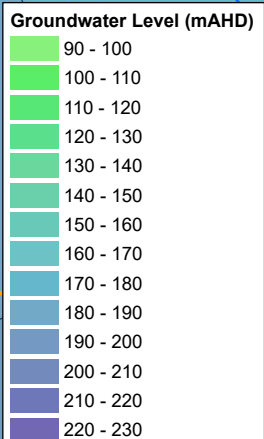
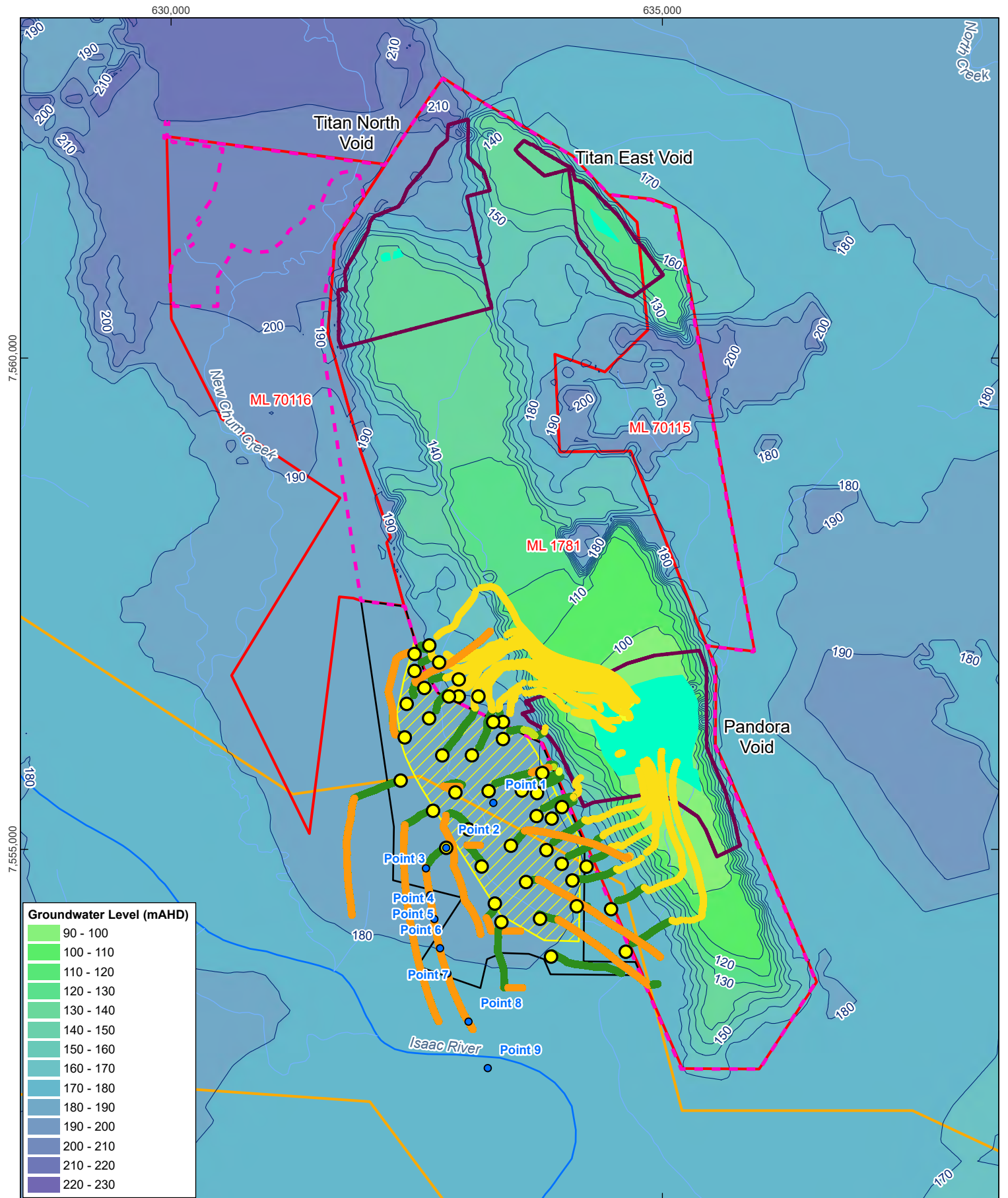
DAUNIA WEST INFRASTRUCTURE PROJECT
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STARTING LOCATION OF PARTICLES



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FIGURE 4-8



Coordinate System: GDA2020 MGA Zone 55

 Scale: 1:50,802 at A4

 Project Number: 620.042120.00001

 Date Drawn: 29-May-2026

 Drawn by: RB

- LEGEND**
- Hydrograph Location
 - Starting Location of Particle Simulation
 - Groundwater Contour (mAHD)
 - Major Watercourse
 - Minor Watercourse
 - DNM EA Boundary
 - Mining Lease
 - Mining Lease Application Area / Project Area
 - Proposed Operational Out-of-Pit Dump (DWIP)
 - Void Extent
 - Void Lake
 - Potential Impact Zone
- Model Layer Traversed**
- | | |
|---|---|
| 2 | 7 |
| 5 | 8 |
| 6 | 9 |

DAUNIA WEST INFRASTRUCTURE PROJECT GROUNDWATER MODELLING TECHNICAL REPORT

PREDICTED MOVEMENT OF PARTICLES



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FIGURE 4-9

4.1.8.3 Vertical Hydraulic Gradients

To confirm that a downward vertical gradient is predicted across the OOPD footprint and across the area to the west and south of the OOPD towards the Isaac River, hydrographs have been produced at regular interval along a groundwater flow path originating from the western side of the OOPD moving west and then south. The locations are shown on **Figure 4-9**.

The hydrographs (**Appendix C**) show that the Isaac River Alluvium (Layer 1) is absent or unsaturated (point 1 to 6) except in close proximity to the river (point 7 to 9). Therefore, there is no lateral connection between the OOPD and the alluvium. Point 9, which is located within the river cell (for layer 1) show the river stage (i.e. above the model surface) during the predictive mining period and water level declining and reaching an equilibrium level post mining (i.e. the river is modelled as being dry (average condition) over the long post-mining stress periods).

The hydrographs highlight that during the period where intermittent flow in the Isaac River is simulated (mining period in the model), there is a constant downward vertical gradient from the unconsolidated sediment layers (Layer 1 and 2) and layer 9. During the post mining period, where Isaac River flux is not simulated, the downward vertical gradient tends to weaken near the river, where the gradient becomes flat (point 9). However, no reversal of gradient is observed (i.e. no upward vertical gradient develops). This shows that upward migration of solutes arising from the OOPD is unlikely, whether the Isaac River is simulated as an intermittent flow system or dry through the long post mining period.

Furthermore, the hydrographs show that, in areas where the Isaac River Alluvium (layer 1) is saturated, there is either a slight vertical downward gradient or a flat gradient toward the older alluvium / regolith (layer 2).

4.1.9 Predicted Change in Fluxes to Receptors

Change in fluxes have been assessed for the Isaac River and Isaac River Alluvium. In order to visualise the magnitude of changes relative to the area of potential impact, a “potential impact zone” was defined based on the results of the particle tracking (ref to **Figure 4-9**).

The MODFLOW utility “Zone Budget” was used to extract the fluxes to the potential impact zone.

4.1.9.1 Isaac River Alluvium

Fluxes to the Isaac River Alluvium includes direct recharge to alluvium plus any lateral and vertical flow from cells adjacent to the potential impact zone.

There is a predicted increase in fluxes to the alluvium for the Project, due to the enhanced recharge to the OOPD. The model predicts an increase of about 0.09 ML per day at post mining equilibrium, from 0.31 ML per day for the Approved scenario to 0.4 ML per day for the Project scenario (**Figure 4-10**). This represents approximately 55% of the total increase in flux (recharge) simulated for the Project (refer to **Section 4.1.5**).



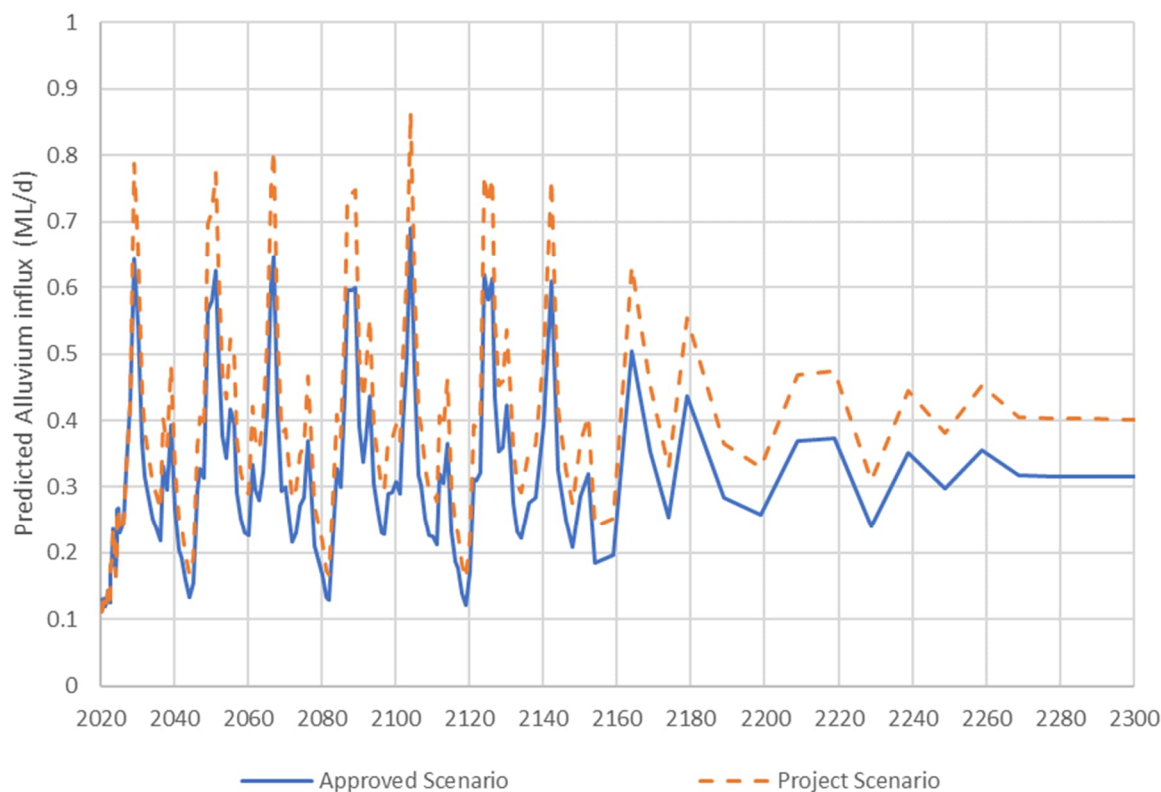


Figure 4-10 Predicted Isaac River Alluvium Inflow

4.1.9.2 Isaac River

Fluxes to the Isaac River are simulated by the model as fluxes out of the model via the river boundary condition cells within the potential impact zone.

In the model, the Isaac River is simulated as an ephemeral watercourse. As such, for the calibration period, a stage is provided as an input only for measured flow periods. For the prediction, the calibrated sequence is repeated as a pattern, with consideration for stress periods length (i.e. yearly). For the post mining period, where stress periods vary in length from 1-year to 50-year, it is assumed that the river is dry on average over these stress periods.

There is a predicted increase in fluxes to the Isaac River for the Project, due to the enhanced recharge to the OOPD (**Figure 4-11**). However, this increase is episodic and reflective of the river boundary condition setup in the model:

- Following periods of river flow (i.e. Stage input in the model > 0), there is an increase in water level in layer 1. In the following stress periods, a small amount of water (up to 0.02 ML per day or 0.2 L per second) is simulated leaving the model via the river cells where the water level in layer 1 is greater than the riverbed elevation.
- Post mining, the stage in the river is 0 m (i.e. dry river). As such the alluvium is no longer intermittently recharged by the river (i.e. assumed to be negligible contribution) and the river is hydraulically disconnected from the alluvium. There is thus no discharge from the alluvium to the river post mining, as the water level in the alluvium is consistently below the riverbed elevation (**Figure 4-11**).



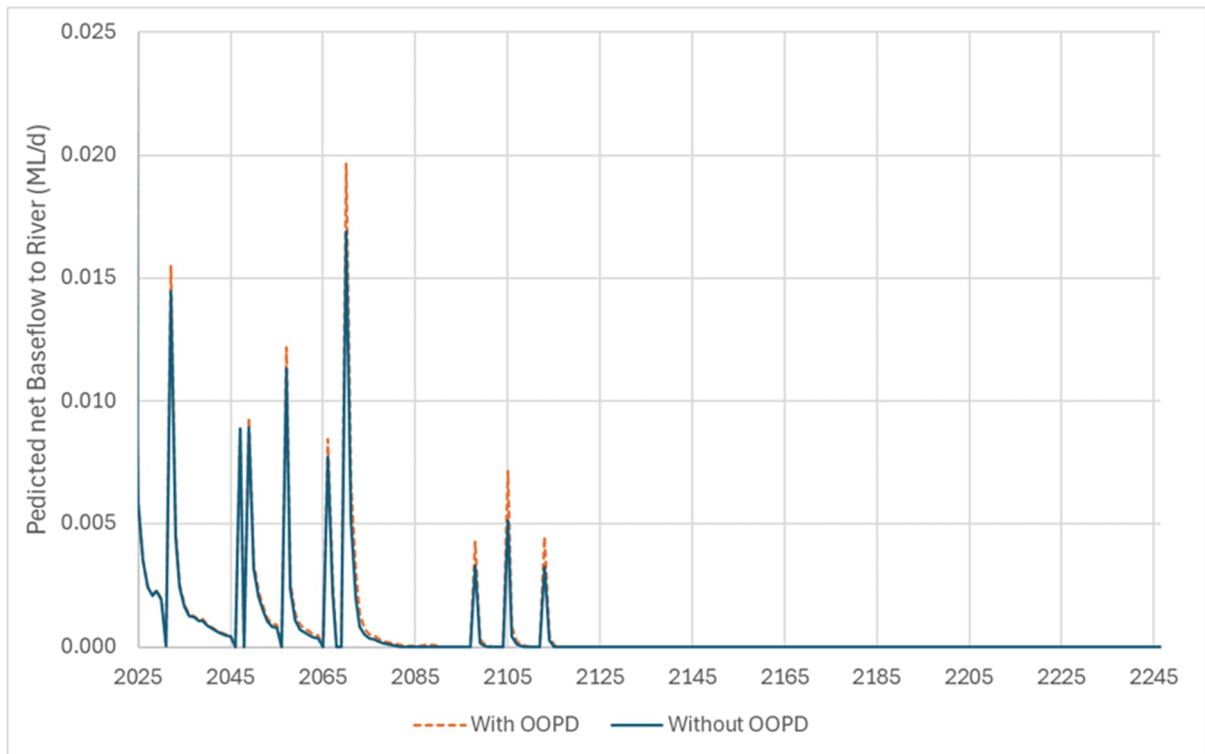


Figure 4-11 Predicted Isaac River Outflow



5.0 Groundwater Solute Transport Model Design

5.1 Solute Transport Model Methodology

The solute transport modelling methodology is summarised below:

- The transport model packages are added to the flow model. Additional parameters include dispersivity and effective porosity.
- The solute is released via the recharge (RCH) package over the entire footprint of the OOPD. A constant source concentration of 1 mg/L is used as a nominal concentration for all solutes.
- The model uses advection and dispersion transport only. This provides a linear solution which enables running a nominal concentration as a proxy.
- The linear solution also enables ignoring background and/or initial concentrations in the model. This way, the model outputs the additional concentration (as a reduction from the nominal source concentration of 1 mg/l) at each node for each species due to the release from the source and is incremental to background concentrations. To visualise the total concentration, the background / initial concentration at each node can be added to the results.

5.2 Solute Transport Modelling Constraint

Solute transport models are particularly sensitive to both the model grid resolution and the temporal resolution. Two criteria are routinely used to assess the robustness of the solute transport model and to reduce numerical errors and oscillations.

5.2.1 Peclet Number

The Peclet number is widely used to assess the appropriateness of a grid resolution for solute transport models. The Peclet number can be approximated as the characteristic cell length (Δx) divided by the dispersion coefficient (α_L).

$$Pe = \frac{\Delta x}{\alpha_L}$$

Barnett et. al. (2012) detailed that a Peclet number of less than 4 (but potentially up to 10) generally helps reducing numerical dispersion and artificial oscillations.

5.2.2 Courant Number

The Courant number represents the ratio of the distance travelled by a solute front during a single time step, $K_x i \Delta t / n$, to the characteristic cell length of the numerical grid, Δx .

$$Cr = \frac{K_x i \Delta t}{n \Delta x}$$

To minimise numerical dispersion and avoid instability associated with excessive advective transport within a single time step, the Courant number should be maintained below 1.



5.3 Model Setup

A solute transport simulation was performed using the transport functionality in MODFLOW USG - Transport. The version of MODFLOW USG – Transport V2.0.3. was used, which includes two packages to simulate mass contaminant transport: The Block Centred Transport (BCT) package, which defines the transport parameters for the model (e.g., dispersion and porosity) and the RCH package, which defines the location (i.e. node), mass concentration and flux of the contaminant infiltration.

5.3.1 Timing

Time-step size for the transport simulation was selected with reference to the Courant number, which provides a measure of numerical stability for advective transport processes. A maximum time step was set at 30 days for the entire simulation.

5.3.2 Recharge Package (RCH) – Flow and Transport

The recharge package (RCH) was modified from the updated flow model to simulate the release of solute to the groundwater table following recharge infiltration via the OOPD. The volume of injected contaminant is thus controlled by the recharge rate. For the transport model, a nominal concentration of 1mg/L was added to each node associated with the OOPD footprint, for each stress period following the end of mining at DNM.

5.3.3 Output Control (OC) – Flow and Transport

The output control was changed to limit the time step size to a maximum of 30 days for the stress period where transport is active.

5.3.4 Block Centred Transport (BCT) – Transport Only

Additional model parameters for the mass transport solution are provided through the BCT package. The BCF package includes longitudinal dispersivity, transverse dispersivity and effective porosity. A literature review was conducted to collate ranges of potential values for porosity and dispersivity.

5.3.4.1 Effective Porosity

Definition

Porosity is the total void space in the rock matrix. Effective porosity is the interconnected pore volume or void space in a rock that contributes to fluid flow. Thus, effective porosity excludes isolated pores and pore volume occupied by water adsorbed on clay minerals or other grains. Effective porosity is typically less than total porosity.

The effective porosity (nE) is equal to the sum of the specific yield (Sy) and the specific retention (Sr): $nE = Sy + Sr$. Thus, effective porosity $nE \geq Sy$. This condition must be met in MODFLOW-USG transport or the model run is automatically aborted.

Literature Review

The key lithologies associated with contaminant transport for the project are the three uppermost connected layers within the predicted impact area (see **Section 4.1.8.2**). These are: the Isaac River Alluvium (layer 1), Quaternary-Tertiary alluvium and regolith (layer 2) and Fort Cooper overburden (Layer 9).



Quaternary alluvium within the Bowen Basin comprises unconsolidated sand, clay and gravel deposits forming the primary shallow aquifers and exhibits high pore connectivity. Effective porosity values in the order of 10–30% are considered appropriate and consistent with standard hydrogeology references (Domenico & Schwartz, 1998, pp. 13–15).

Regolith units comprise variably weathered bedrock and Cenozoic cover sediments with moderate pore connectivity. Effective porosity values are lower than alluvium but significantly higher than bedrock units, typically ranging from approximately 5–20% depending on clay content and degree of weathering references (Domenico & Schwartz, 1998, pp. 13–15).

Groundwater flow within the Fort Cooper overburden is controlled by matrix-connected porosity within sandstone, siltstone and mudstone lithologies. Standard hydrogeological references indicate that effective porosity in cemented sedimentary rocks typically ranges from approximately 0.5% to 10%, depending on grain size distribution, clay content and degree of cementation (Domenico & Schwartz, 1998). Regional Queensland Government conceptual models for the Bowen Basin describe non-coal strata as low-storage, matrix-dominated groundwater systems, consistent with this range.

Selected Values

Fluid velocity is inversely proportional to effective porosity. Thus, using small values for effective porosity will tend to produce greater velocity and in turn increase the distance travelled by solutes within a given time frame. From a risk perspective, this is conservative as lower porosity increases the potential area affected by solute migration.

The porosity value must also support a Courant number less than 1 (See **Section 5.2.2**) Based on a minimum cell size of 50 m along the Isaac River and a maximum time step of 30 days (See **Section Error! Reference source not found.**), the smallest porosity values that lead to a Courant number of 1 or less were selected.

Values of 10% for the Isaac River Alluvium (layer 1) and Quaternary-Tertiary alluvium and regolith (layer 2) and 1% for all consolidated units were selected including the Fort Cooper overburden (Layer 9) which directly underlies Layer 2 across the area of interest (Refer to Error! Reference source not found.).

5.3.4.2 Dispersivity

Definition

Hydraulic dispersion is represented in numerical modelling through longitudinal and transverse dispersivity. Dispersivity is the proportionality factor between groundwater velocity and mechanical dispersion, controlling how rapidly a dissolved substance spreads longitudinally and transversely as it moves through an aquifer. Dispersivity is expressed in meters and represents a characteristic mixing length.

Literature Review

Various attempts at characterising dispersivity are available in the global literature. Although most approaches consider that dispersivity increases with scale, there is a large difference in estimates from various approaches. Based on a literature review, the Groundwater Modelling Guidelines suggests that the longitudinal dispersivity is 10% of the distance travelled by a solute from its source. However, this relationship is only valid for scale <1km (Barnet. et. al, 2012). Two approaches leading to significantly different results are presented below to provide a range of dispersivity values applicable to the project.

The characteristic scale for the Project was estimated as the approximate distance between the OOPD and the Isaac River (1 Km).



The first approach by Neumam (1995) is a regression (or best fit line) based on laboratory, field data and calibrated numerical models (Error! Reference source not found.). Neumam note that the maximum scale for which the regression is valid is 3.5 km. Thus, for the selected distance, the maximum measured data of 500 m was selected (Error! Reference source not found.).

The second approach by Schulze-Makuch (2005) is an empirical power law based on field data:

$$\alpha = c(L)^m$$

where: α is the longitudinal dispersivity; c is a parameter characteristic of a geological medium; L is the flow distance; and m is the scaling component.

Schulze-Makuch (2005) suggest a value for c of 0.01 for sandstones and 0.085 for unconsolidated sediments. The scaling component is 0.5 for all geologies. The values calculated using the Schulze-Makuch equation are 100 to 1000 times less than those estimated by Neumam. Longitudinal dispersivity values are summarised in Error! Reference source not found..

Table 5-1 Literature Values of Longitudinal Dispersivity (aL) for Geological Units Relevant to the Project

Rock Type	Min aL (m) ¹	Max aL (m) ²
Sedimentary Rock	0.3	500
Alluvium/Unconsolidated Sediments	2.7	500

¹Estimated using Schulze-Makuch (2005); ²Estimated using Neumam (1995);



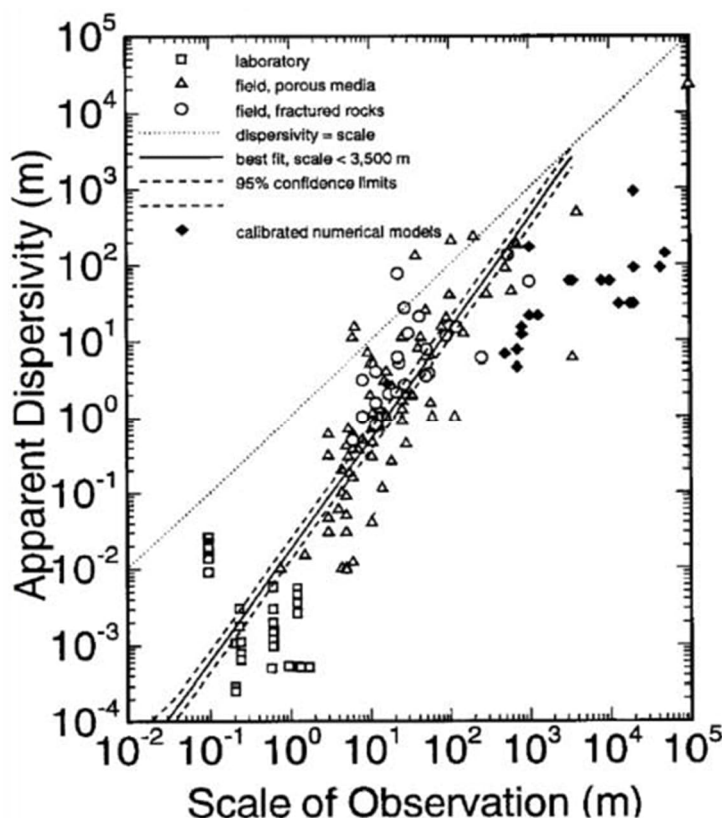


Figure 5-1 Longitudinal Dispersivity VS Scale (Neumam 1995)

Selected Values

For a finite mass concentration source, a smaller dispersivity value reduces the amount of mass diluted on the plume front and leads to greater (sharper) concentrations at the plume front. This is likely to be a preferable approach for a risk-based assessment.

However, solute transport models are particularly sensitive to the model grid resolution. The Peclet number is widely used to assess the appropriateness of a grid for solute transport models (see **Section 5.2.1**). Barnett et. al. (2012) detailed that a Peclet number of less than 4 (but potentially up to 10) generally helps reducing numerical dispersion and artificial oscillations. A minimum longitudinal dispersivity of 20 m was selected to satisfy a Peclet number of less than 10 at most cells. The values for all hydrogeological units are presented on Error! Reference source not found..

Table 5-2 Proposed Transport Model Parameters

Layer (HSU)	nE* (-)	Longitudinal dispersivity (m)	Transverse dispersivity (m)
L1 Alluvium	0.1	20	0.2
L1 Isaac River Alluvium	0.1	20	0.2
L1 & 2 Surface Cover	0.1	20	0.2
L1 & 2 Tertiary Basalt	0.1	20	0.2
L2 Surface Cover	0.1	20	0.2
L3 Triassic	0.01	20	0.2



Layer (HSU)	nE* (-)	Longitudinal dispersivity (m)	Transverse dispersivity (m)
L4 Interburden	0.01	20	0.2
L5 Leichhardt Seam	0.01	20	0.2
L6 Interburden	0.01	20	0.2
L7 Vermont Seam	0.01	20	0.2
L8 Interburden	0.01	20	0.2
L9 Interburden	0.01	20	0.2
L10 Fort Cooper Seams	0.01	20	0.2
L11 Interburden	0.01	20	0.2
L12 Q Seam	0.01	20	0.2
L13 Interburden	0.01	20	0.2
L14 P Seam	0.01	20	0.2
L15 Interburden	0.01	20	0.2
L16 H Seam	0.01	20	0.2
L17 Interburden	0.01	20	0.2
L18 D Seam	0.01	20	0.2
L19 Interburden	0.01	20	0.2
L3 to L18 Faults 1	0.01	20	0.2

5.3.5 Time-Variant Material (TVM) – Flow and Transport

The TVM package was updated to include porosity. The effective porosity was set to be equal to specific yield for all parameters in the TVM package.



6.0 Groundwater Solute Transport Model Results

6.1 Post Mining Equilibrium – Mass Balance

The mass balance for the surrogate species indicates that the total injected mass via recharge infiltration through the OOPD over the 977 years period is 62 tonnes, for an assumed leachate concentration of 1mg/L. Reference source not found..

At post closure equilibrium (SP 215), the only active components are mass storage and constant head. Mass storage and constant head have similar outputs: 0.09 kg/d of mass is exchanged within the model cells and 0.08 kg/d of mass is removed through constant head (i.e. captured by the final void).

Table 6-1 Surrogate Species Mass Balance – Post Mining (SP 215)

Package	Total in (kg)	Total out (kg)	SP 215 rate in (kg /d)	SP 215 rate out (kg/d)
Mass Storage	778	37,000	0.001	0.09
Constant Head Mass Flux	0	25,543	0	0.081
General Head Boundary Mass Flux	0	0	0	0
Drains Mass Flux	0	6.4	0	0
River Leakage Mass Flux	0	0	0	0
Evapotranspiration Mass Flux	0	0	0	0
Recharge Mass Flux	61,771	0	0.17	0
Total	62,549	62,549	0.171	0.171
% Error	<0.1%		<0.1%	

6.2 Post Mining Equilibrium – Solute Plume

A surrogate solute plume was simulated by running the solute transport model for 977 years post mining. As discussed in the model methodology section (Section Error! Reference source not found.), the linear transport solution enables:

- Running a proxy value for all solutes: A nominal concentration of 1 mg/L was used for the source. To visualise the plume for a specific solute, the output value can simply be multiplied by the actual solute value at the source (in mg/L)
- Omitting initial concentrations in the model: The model output the additional concentrations at each node for each solute due to the release (incremental to background concentrations). To derive the total concentration of a solute, the diluted source concentration of a particular solute at a given node can be added to the background concentration.

Contours for the generic plumes have been mapped for layer 1 (Isaac River Alluvium), layer 2 (older alluvium and regolith) and layer 9 (Fort Cooper overburden). As discussed in Section 4.0, these are the upper most 3 layers present within the predicted zone of impact (Isaac River and alluvium south of the OOPD). The concentration contours show the dilution from source concentration i.e. the diluted concentration based on a nominal source



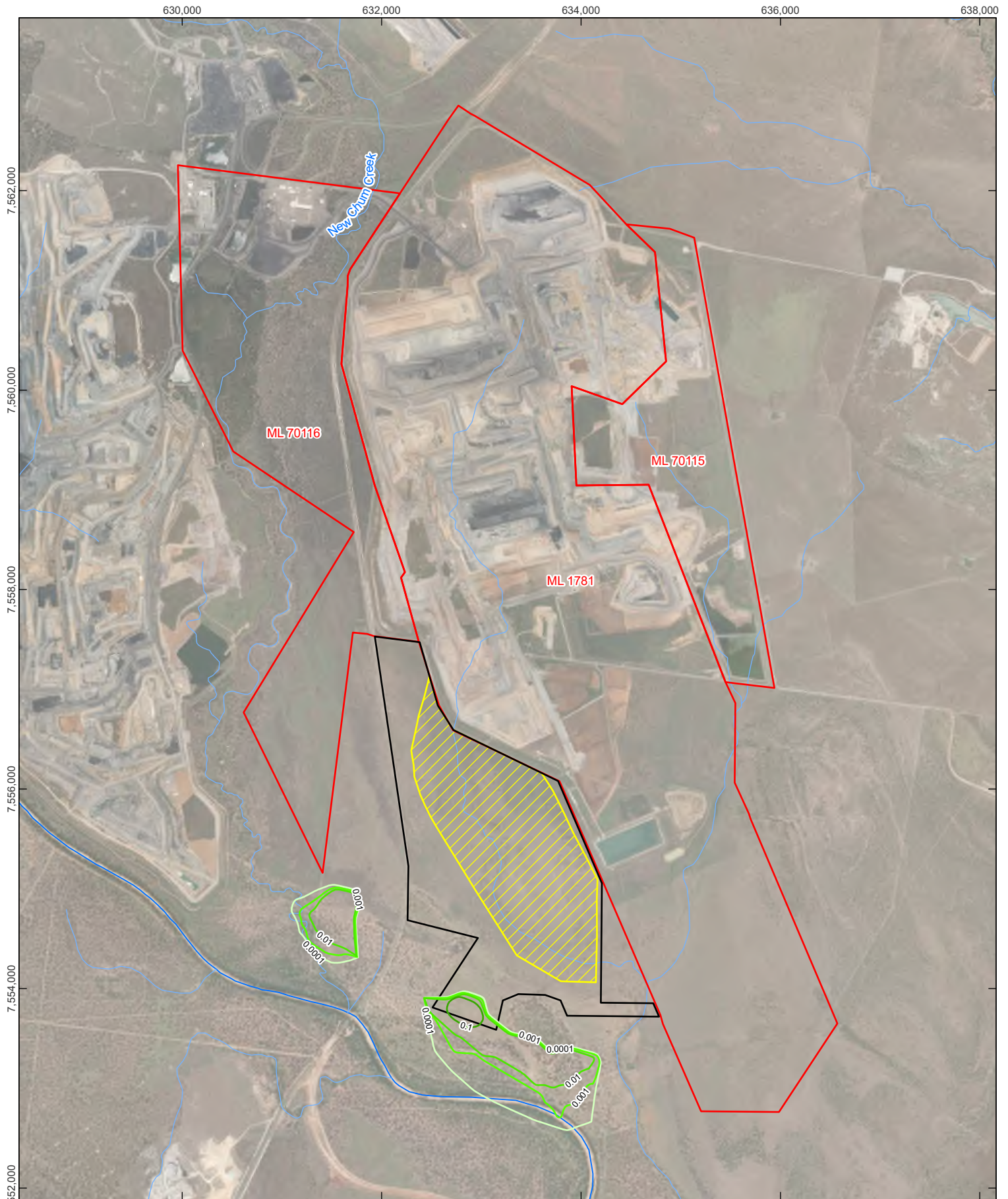
concentration of 1 mg/l. For example, the 0.1 contour line delineate the area where dilution has reduced the source concentration of 1 mg/l by a factor of 10.

Results show that in the partially saturated Isaac River Alluvium, a small area on the edge of the alluvium shows concentrations approximately ten times lower than at the source (0.1 contour line, Error! Reference source not found.). Generally, concentrations in the alluvium are 100 to 10,000 times lower than at the sourceError! Reference source not found..

In the older alluvium and regolith, concentrations are reduced by half approximately 700 m from the OOPD. The reduction factor increases to 10, 100 and 1000 at approximately 1 km, 1.2 km and 1.4 km respectively from the OOPDError! Reference source not found..

In the Fort Cooper overburden, the plume presents as a more oval shape. The lack of contaminant being present in the regolith to the east of the OOPD is due to mining and the final void keeping the regolith desaturated in this area. The reduction factor in the overburden increases from 2 to 10, 100 and 1000 at approximately 500 m, 1 km and 1.3 km and 1.6 km respectively from the OOPDError! Reference source not found..





Coordinate System: GDA2020 MGA Zone 55

 Scale: 1:50,000 at A4

 Project Number: 620.042120.00001

 Date Drawn: 01-Jun-2026

 Drawn by: RB

- LEGEND**
- Major Watercourse
 - Minor Watercourse
 - Mining Lease
 - Mining Lease Application Area / Project Area
 - Proposed Operational Out-of-Pit Dump (DWIP)

- Nominal Concentration Contour**
- 0.0001
 - 0.001
 - 0.01
 - 0.1

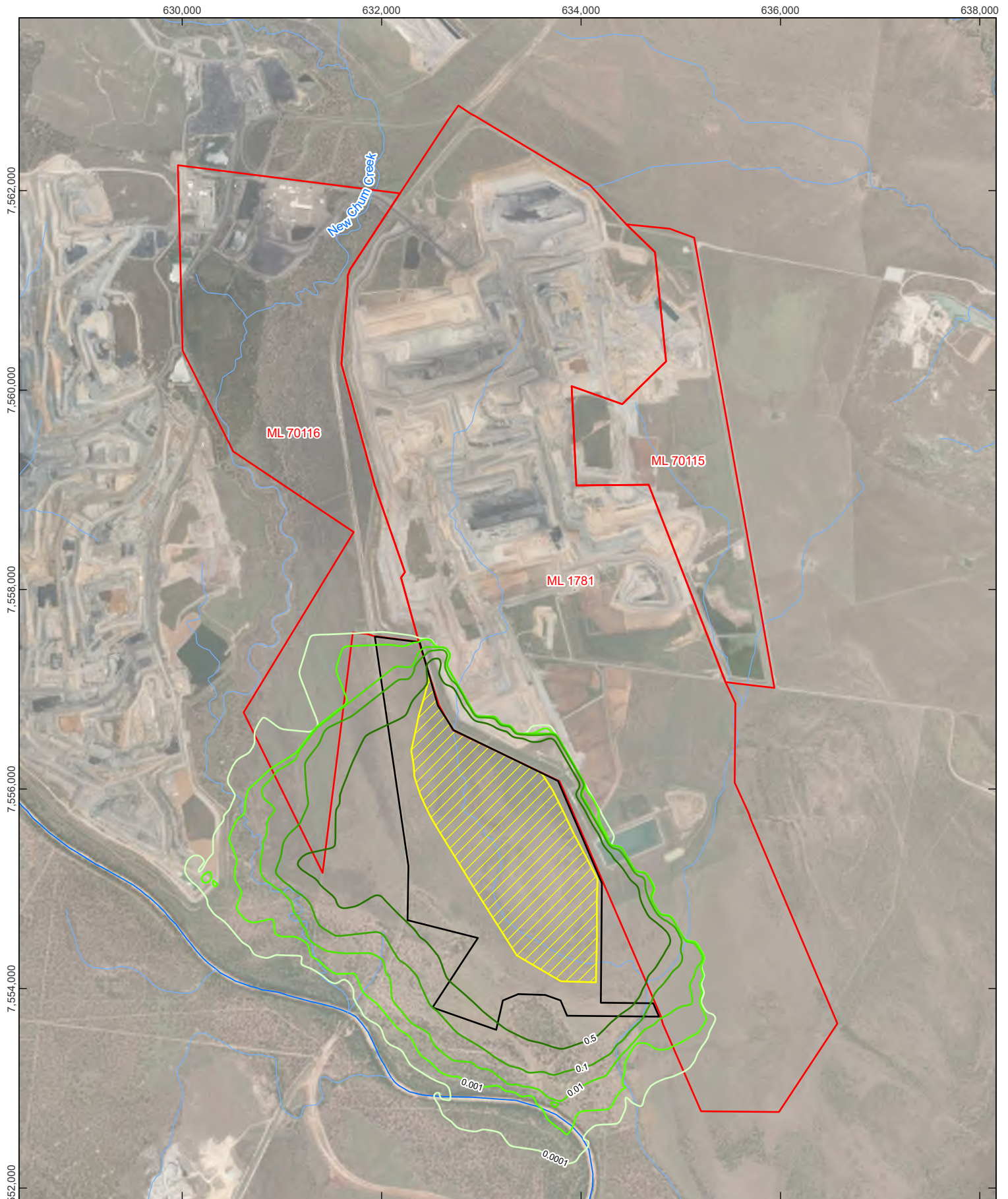
**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**


**REDUCTION FACTOR FROM
 SOURCE CONCENTRATION –
 ALLUVIUM (L1) –
 977 YEARS POST DNM MINING**













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FIGURE 6-1



 0 0.5 1 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:50,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)

- Nominal Concentration Contour**
-  0.0001
 -  0.001
 -  0.01
 -  0.1
 -  0.5

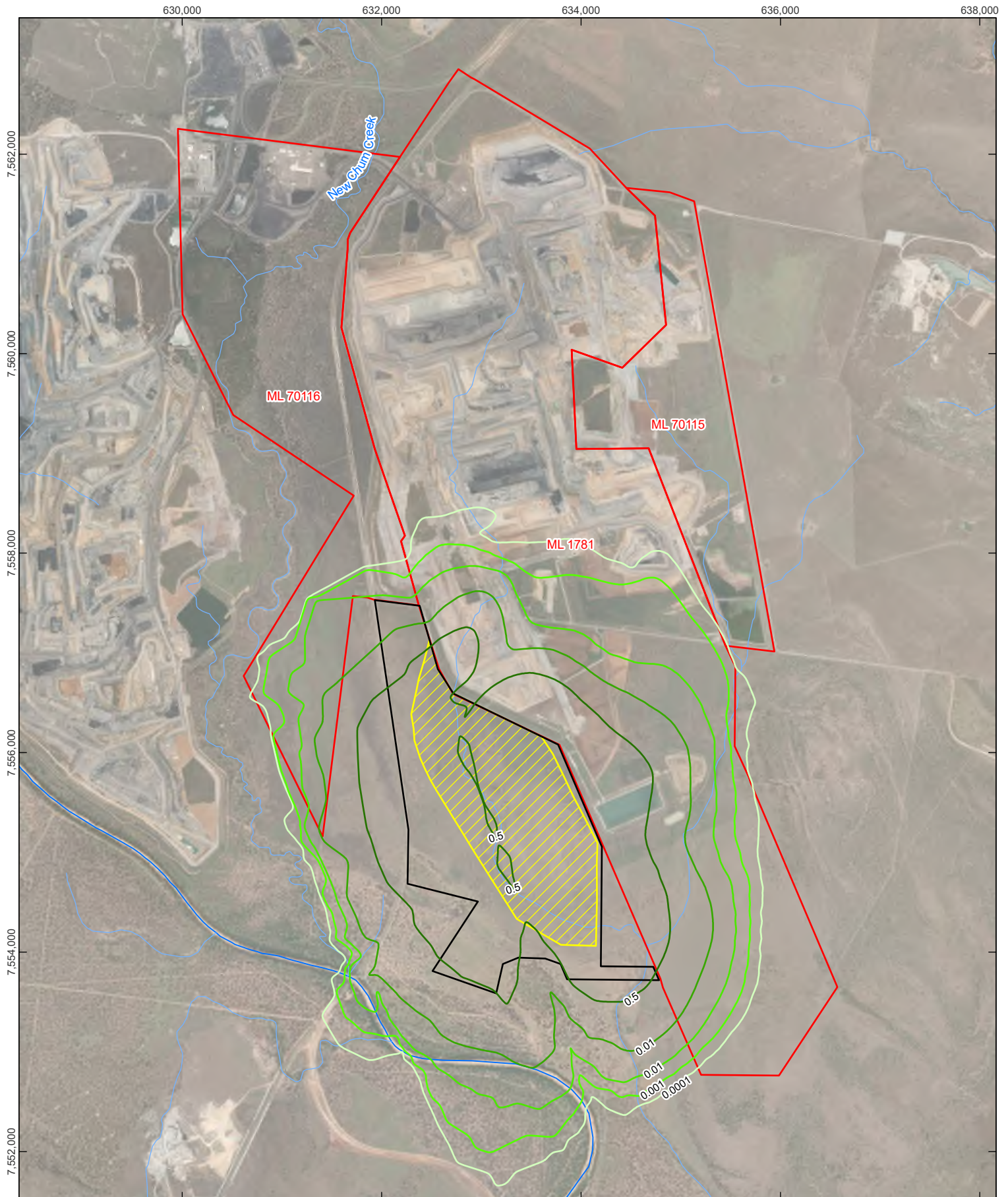
**DAUNIA WEST
INFRASTRUCTURE PROJECT
GROUNDWATER MODELLING
TECHNICAL REPORT**


**REDUCTION FACTOR FROM
SOURCE CONCENTRATION –
REGOLITH (L2) –
977 YEARS POST DNM MINING**













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FIGURE 6-2




 0 0.5 1 km
 Coordinate System: GDA2020 MGA Zone 55
 Scale: 1:50,000 at A4
 Project Number: 620.042120.00001
 Date Drawn: 01-Jun-2026
 Drawn by: RB

- LEGEND**
-  Major Watercourse
 -  Minor Watercourse
 -  Mining Lease
 -  Mining Lease Application Area / Project Area
 -  Proposed Operational Out-of-Pit Dump (DWIP)

- Nominal Concentration Contour**
-  0.0001
 -  0.001
 -  0.01
 -  0.1
 -  0.5

**DAUNIA WEST
 INFRASTRUCTURE PROJECT
 GROUNDWATER MODELLING
 TECHNICAL REPORT**

**REDUCTION FACTOR FROM
 SOURCE CONCENTRATION –
 FCCM INTERBURDEN (L9) –
 977 YEARS POST DNM MINING**



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FIGURE 6-3

7.0 Model Performance and Limitations

The groundwater modelling was conducted in accordance with the *Australian groundwater modelling guideline* (Barnett et al. 2012) and the MDBC Groundwater Flow Modelling Guideline (MDBC, 2001). These are mostly generic guides and do not include specific guidelines on special applications, such as open cut mine modelling.

The model confidence level (Class 1, Class 2 or Class 3 in order of increasing confidence) based on the Australian Groundwater Modelling Guidelines (Barnett et al. 2012) was previously widely used in the industry. The latest version of the IESC Explanatory Note for Uncertainty Analysis (Peeters and Middlemis, 2023) introduces a new concept on how model confidence can be assessed. The document also indicates that this change will follow in the next iteration of the Australian Modelling Guidelines and the new concept for assessing model confidence is hence applied for this groundwater model.

The latest version of the IESC Explanatory Note for Uncertainty Analysis defines a model fit for purpose when model results are:

- Usable – Relevant to the decision-making process, providing information about the uncertainty in conceptualisations and modelling simulations in a way that allows decision-makers to understand the effects of uncertainty on project objectives and the effects of potential bias. The relevant Quantities of Interests (QoI) in this context are change in groundwater levels, change in fluxes to receptors and reduction in concentration from source concentration.
- Reliable – Demonstrate that the range of model outcomes is consistent with the system knowledge and honours historical observations and provides objective evidence that uncertainties affecting decision-critical predictions are not underestimated.
- Feasible – Trade-offs due to budget, time and technical constraints are reasonable and justifiable within the risk context of the project.

To assess these three points above, the four sources of scientific uncertainty (structural, parametrisation, measurement error, predictions) have been qualitatively assessed with regards key aspects of the groundwater model, as presented **Table 7-1**.



Table 7-1 Groundwater Model and Data Limitations and Potential Recommended Updates

Type	Part	Status	Comment
Structural/ Conceptual	Grid and Model Extent	Fit for purpose	The groundwater model has an unstructured Voronoi grid that includes detailed cell refinement around the mining area, mapped geological structures and along drainage features. The groundwater model extent was designed to prevent boundary influence on modelled drawdown/mounding.
	Layers	Fit for purpose	Top of Layer 1 uses detailed Digital Elevation Model (DEM) data. Representation of alluvium and regolith based on publicly available mapped geology and Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2015) regolith mapping. Model vertical resolution is sufficient to represent relevant geological units and unstructured grid allows layer pinch out where units not present.
	Conceptualisation – Geological Structure	Fit for purpose Potential for further assessment	The structure of the geology within the mine area is based on mapped geology and existing ground investigation at the Mine, which is limited to bores drilled within different lithologies. Further ground investigation could improve the site conceptualisation, especially for the presence and thickness of alluvium associated with the Isaac River.
	Conceptualisation – GDEs	Fit for purpose Potential for further assessment	GDE data from national assessment was used to identify key receptor areas.
	Conceptualisation – Surface Water Groundwater Interactions	Fit for purpose.	Key groundwater–surface water interaction is related to drainage features and associated alluvium as well as pit lakes.
	Conceptualisation – Saturated Extent of Alluvium and Regolith	Fit for purpose. Potential for further assessment.	Several monitoring bores are present within the alluvium in the Isaac River and monitored regularly. Further investigations and monitoring could help assess flow dynamics along the Isaac River near the DNM.
Parameterisation	Hydraulic Conductivity	Fit for purpose. Future improvements could be made.	Limited site-specific hydraulic conductivity data (horizontal) was available.



Type	Part	Status	Comment
			If additional data becomes available it should be utilised to verify and update the model.
	Rivers	Fit for purpose. Improvements possible.	Major rivers and creeks were represented using the RIV package with smoothed riverbed elevations. Stage data from regional gauging stations were adjusted to reflect the seasonal nature of the Isaac River. Local stage data collection would improve future assessments.
	Recharge	Fit for purpose	Recharge zonation is based on mapped surface geology and regional site conceptualisation
Measurement Error	Observation Data Quality	Fit for purpose Future improvements could be made.	Incorporation of any new groundwater level monitoring data should be incorporated into the groundwater model in future to continue to refine the model.
	Landholder Bore Data Quality	Fit for purpose	Publicly available private bore data were incorporated in the model calibration across the model domain.
	Temporal spread	Fit for purpose. Future improvements possible.	Timeseries water level data with varying resolution has been used in the model calibration.
Scenario Uncertainties Future stresses/ conditions	Calibration	Fit for purpose. Future improvement possible.	A transient calibration model was run and calibrated to observed groundwater levels using sequential Monte Carlo analysis. The model calibration could be further refined as additional monitoring data is collected in the mining areas.
	Predictive	Fit for purpose.	Model captures open cut mining progression and timing as well as OOPD development at the DNM Coal Mine based on data provided by Whitehaven. The surrounding mine plans have been included based on the data sharing agreement (i.e. most recent mine plans).
	Solute Transport	Fit for purpose. Future improvement possible.	The solute transport model was setup to provide a relatively conservative assessment (lower range porosity and dispersivity, continuous and constant source, no retardation) while adhering to general transport model criteria (Peclet and Courant number).



8.0 References

Barnett, B., Townley, L.R., Post, V., Evans, R.E., Hunt, R.J., Peters, L., Richardson, S., Werner, A.D., Knapton, A. and Boronkay, A. (2012). *Australian Groundwater Modelling Guidelines*. Waterlines Report Series No. 82, June 2012.

CSIRO, 2015. Soil and Landscape Grid of Australia – Depth of Regolith, Available at <http://www.clw.csiro.au/aclep/soilandlandscapegrid>

Department of Environment and Heritage Protection (DEHP). (2011). Groundwater Quality Assessment Guideline: Using monitoring data to assess groundwater quality and potential environmental impacts. Queensland Government.

Domenico, P. A., & Schwartz, F. W. (1998). Physical and chemical hydrogeology (2nd ed.). John Wiley & Sons.

Mackie Environmental Research. (2009). *Groundwater assessment report for Ravensworth Underground Mine: Appendix to DA 1*. Prepared for GSS Environmental on behalf of Ravensworth Underground Mine. NSW Department of Planning Major Projects.

McDonald, M. G., & Harbaugh, A. W. (1988). A modular three-dimensional finite-difference ground-water flow model. U.S. Geological Survey. Techniques of Water-Resources Investigations, Book 6, Chapter A1. <https://doi.org/10.3133/ofr83875>

MDBC (Middlemis, H., Merrick, N., and Ross, J.) (2001). *Murray-Darling Basin Commission – Groundwater Flow Modelling Guideline*. Report for MDBC. January 2001.

Muffels, C., Scantlebury, L., Wang, X., Neville, C. J., Tonkin, M., Ramadhan, M., & Craig, J. (2018). *User's guide for mod-PATH3DU: A groundwater path and travel-time simulator (Version 2.0.0)*. S.S. Papadopulos & Associates, Inc.

Panday, S., Langevin, C. D., Niswonger, R. G., Ibaraki, M., & Hughes, J. D. (2013). *MODFLOW-USG version 1: An unstructured grid version of MODFLOW for simulating groundwater flow and tightly coupled processes using a control volume finite-difference formulation* (Techniques and Methods 6–A45). U.S. Geological Survey. <https://doi.org/10.3133/tm6A45>

Peeters, L. J. M., & Middlemis, H. (2023). Information guidelines explanatory note: Uncertainty analysis for groundwater modelling. Independent Expert Scientific Committee, Commonwealth of Australia. <https://www.iesc.gov.au/sites/default/files/2022-07/information-guidelines-explanatory-note-uncertainty-analysis.pdf>

SLR, 2024, Poitrel Mine PRCP Hydrogeology Assessment for Stanmore Resources. 620.31445.00000 v1.0.

SLR, 2025a. Daunia West Infrastructure Project. Groundwater Impact Assessment. Report prepared for Whitehaven Daunia Pty Ltd. Ref 620.042120

SLR, 2025b. Central Bowen Basin Regional Groundwater Model Version 5.1. Groundwater model Update Technical Report. Prepared for BMA. Ref 620.v30759.40003

SLR, 2025c. Daunia Mine Transitional PRC Plan Hydrogeology. Report prepared for Whitehaven Daunia Pty Ltd. Ref 620.30984.00000-R02-v5.0

WRM, 2025. Daunia West Infrastructure Project Surface Water Assessment. Report prepared for Whitehaven Daunia Pty Ltd. Ref 1583-05-C2





Appendix A Calibration Hydrographs

Daunia West Infrastructure Project

Groundwater Modelling Calibration and Prediction Report

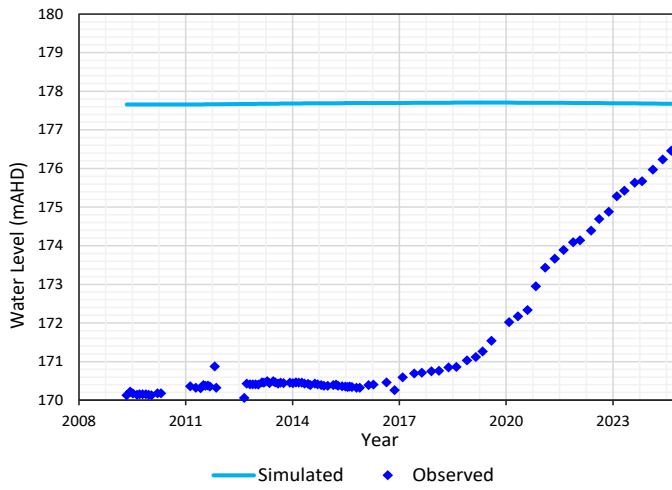
Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00001

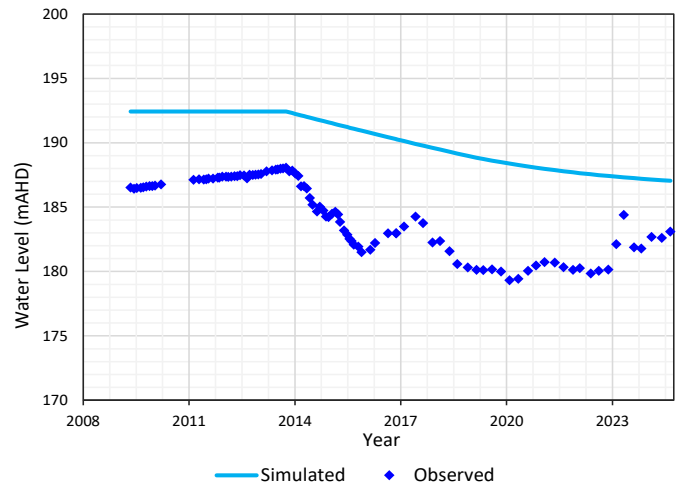
20 May 2026

Appendix A - Calibration Hydrographs

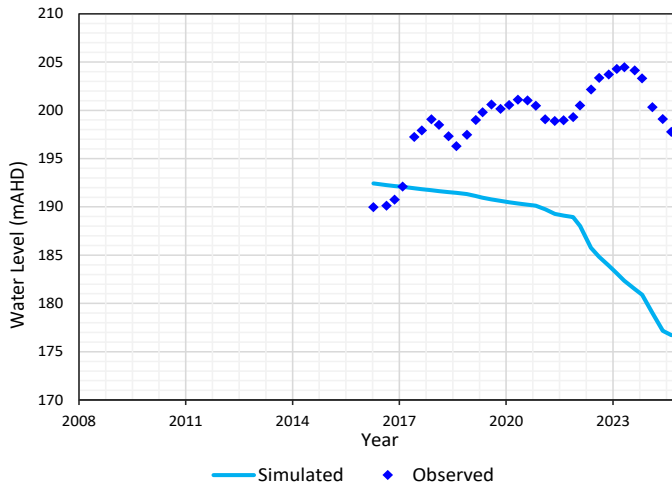
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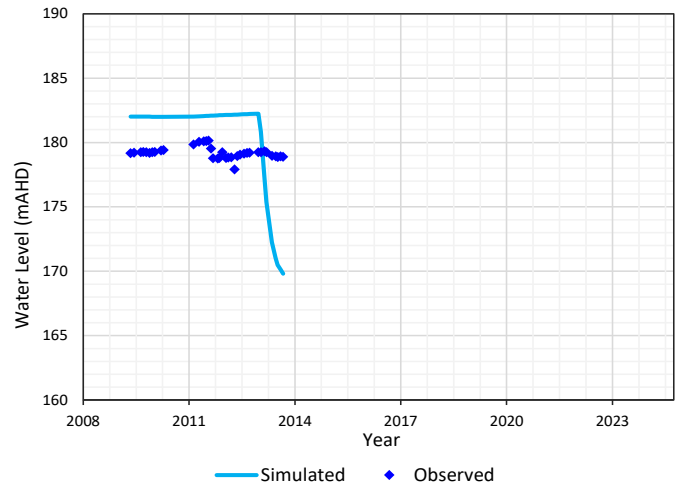
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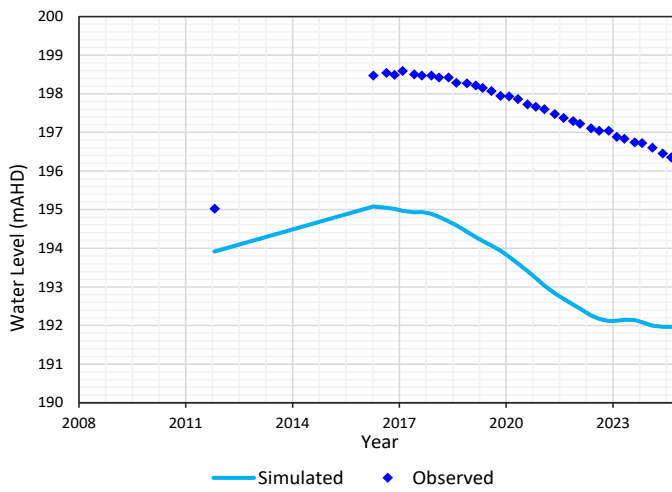
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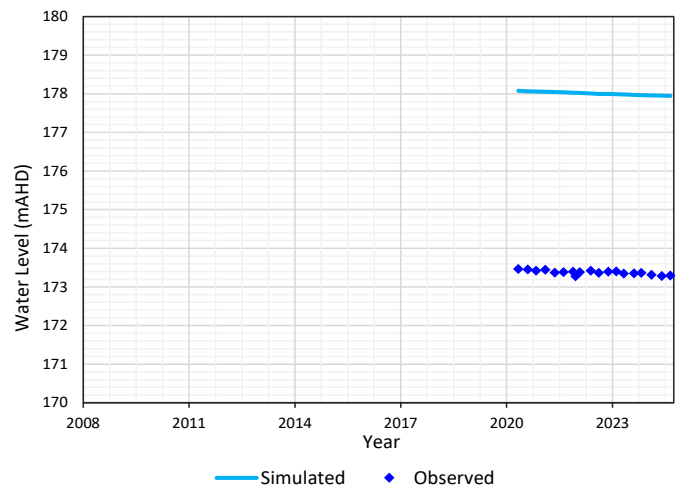
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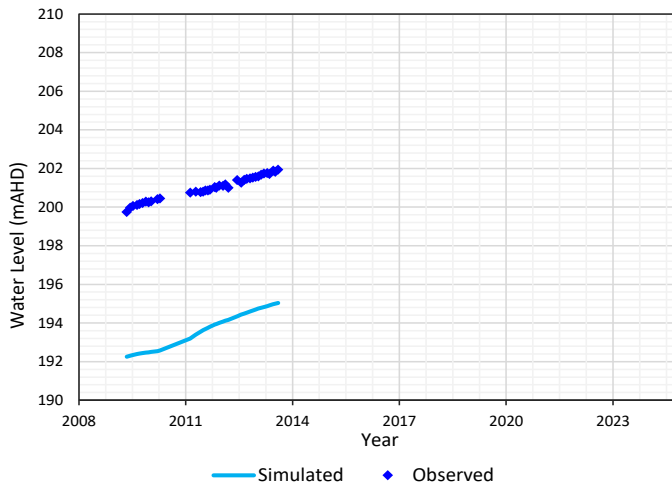


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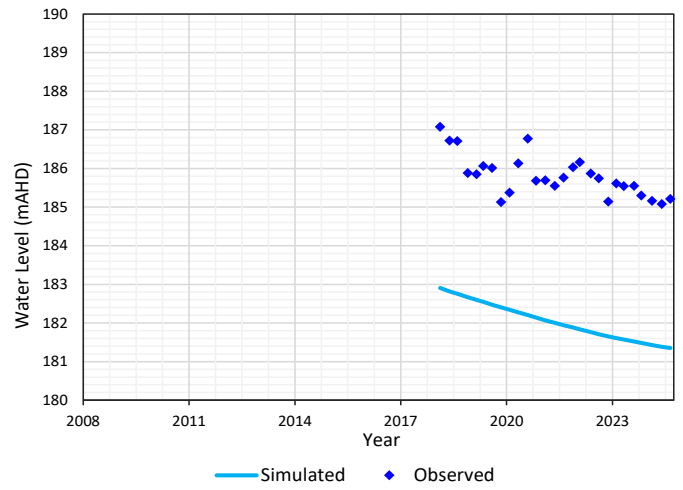


Appendix A - Calibration Hydrographs

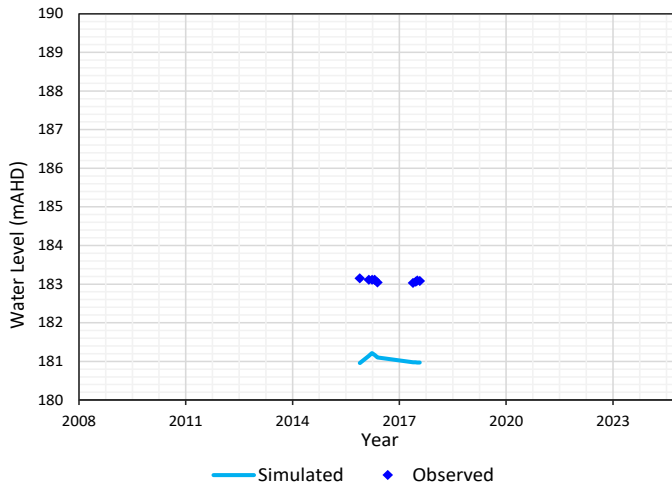
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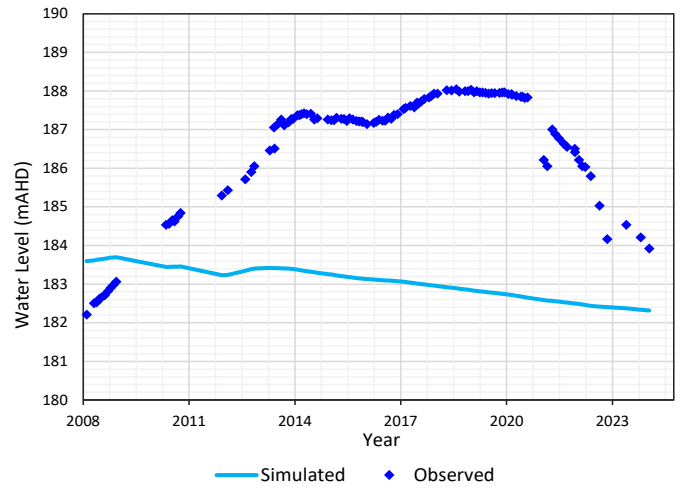
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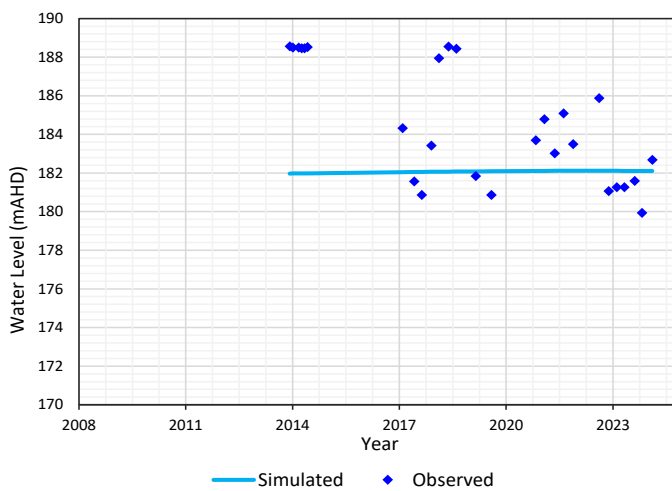
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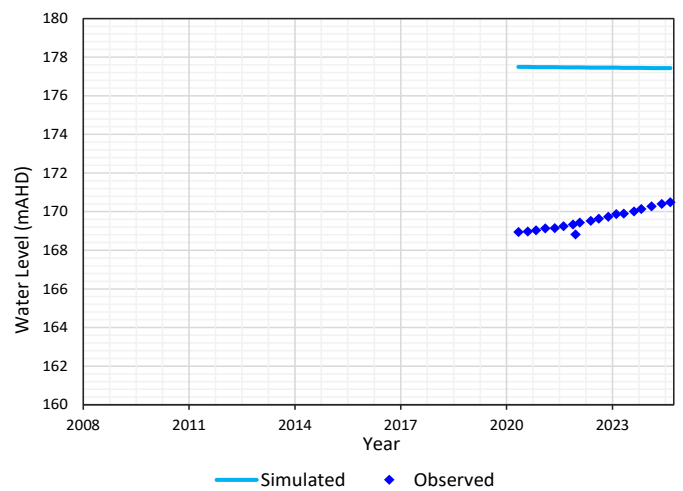
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BMB

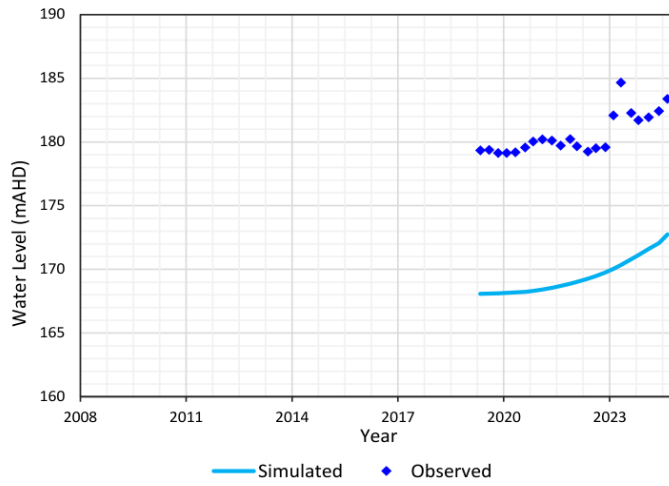


MB02P



Appendix A - Calibration Hydrographs

PZ08





Appendix B Calibrated Parameters

Daunia West Infrastructure Project

Groundwater Modelling Calibration and Prediction Report

Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00001

20 May 2026

Calibrated Hydraulic Parameters

Table B1 Calibrated Hydraulic Parameters (Hydraulic Conductivity) – MLE Realisation

Geology Unit	Unit	Layer	Min Kx (m/day)	Max Kx (m/day)	Average Kx (m/day)	Min Kz (m/day)	Max Kz (m/day)	Average Kz (m/day)	Maximum Depth for Depth Dependence Correction(m)
Alluvium ¹	Surface Cover	1	3.7 x10-02	3.7 x10-02	3.7 x10-02	1.0 x10-03	1.0 x10-03	1.0 x10-03	-
Isaac River Alluvium ²	Isaac River Alluvium	1	1.1 x10-03	1.9 x10+00	4.5 x10-02	2.2 x10-07	2.4 x10-02	2.9 x10-04	-
Regolith ¹	Surface Cover	1	2.4 x10-03	7.3 x10-01	6.1 x10-02	9.9 x10-07	5.6 x10-02	7.0 x10-04	-
Weathered Permian ¹	Surface Cover	1 & 2	3.9 x10-01	3.9 x10-01	3.9 x10-01	7.6 x10-03	7.6 x10-03	7.6 x10-03	-
Duaranga ¹	Surface Cover	1 & 2	4.8 x10-01	4.8 x10-01	4.8 x10-01	1.0 x10-02	1.0 x10-02	1.0 x10-02	-
Tertiary Basalt ¹	Tertiary Basalt	1 & 2	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.4 x10-05	3.4 x10-05	3.4 x10-05	-
Regolith ²	Surface Cover	2	2.8 x10-03	7.3 x10-01	5.9 x10-02	2.0 x10-06	5.6 x10-02	6.7 x10-04	-
Rewan ²	Triassic	3	6.2 x10-05	9.4 x10+00	9.8 x10-02	8.4 x10-08	3.2 x10-01	6.6 x10-04	175
Rangal Coal Measures ¹	Interburden	4	6.9 x10-04	6.5 x10-02	7.9 x10-03	9.6 x10-06	9.0 x10-04	1.1 x10-04	119
Rangal Coal Measures ²	Leichhardt Seam	5	3.1 x10-05	9.5 x10-01	1.1 x10-02	7.3 x10-08	1.4 x10-02	9.8 x10-05	117
Rangal Coal Measures ¹	Interburden	6	1.4 x10-07	2.0 x10-04	1.4 x10-05	1.1 x10-09	1.5 x10-06	1.1 x10-07	192
Rangal Coal Measures ²	Vermont Seam	7	8.0 x10-06	2.7 x10+00	8.9 x10-03	2.6 x10-08	4.9 x10-02	6.9 x10-05	140
Rangal Coal Measures ¹	Interburden	8	3.9 x10-06	1.4 x10-03	3.9 x10-05	6.4 x10-08	2.2 x10-05	6.4 x10-07	161



Geology Unit	Unit	Layer	Min Kx (m/day)	Max Kx (m/day)	Average Kx (m/day)	Min Kz (m/day)	Max Kz (m/day)	Average Kz (m/day)	Maximum Depth for Depth Dependence Correction(m)
Fort Cooper Coal Measures ²	Interburden	9	5.1 x10-05	5.4 x10-01	2.1 x10-02	6.3 x10-08	1.8 x10-02	1.6 x10-04	33
Fort Cooper Coal Measures ²	Fort Cooper Seams	10	1.1 x10-05	8.0 x10-01	3.5 x10-03	8.2 x10-09	1.5 x10-02	1.9 x10-05	121
Fort Cooper Coal Measures ¹	Interburden	11	3.1 x10-05	4.6 x10-04	3.4 x10-05	1.2 x10-06	1.7 x10-05	1.3 x10-06	89
Moranbah Coal Measures ²	Q Seam	12	2.0 x10-07	9.4 x10-01	2.5 x10-03	1.5 x10-10	1.9 x10-02	3.0 x10-05	254
Moranbah Coal Measures ¹	Interburden	13	3.0 x10-05	2.0 x10-02	6.3 x10-04	6.5 x10-07	4.4 x10-04	1.4 x10-05	175
Moranbah Coal Measures ²	P Seam	14	3.8 x10-04	1.1 x10+00	2.0 x10-02	2.9 x10-07	2.3 x10-03	7.1 x10-05	30
Moranbah Coal Measures ¹	Interburden	15	1.3 x10-05	1.1 x10-02	3.1 x10-04	4.3 x10-08	3.7 x10-05	1.0 x10-06	175
Moranbah Coal Measures ²	H Seam	16	1.5 x10-04	2.5 x10+00	4.5 x10-02	1.9 x10-07	3.2 x10-02	3.6 x10-04	67
Moranbah Coal Measures ¹	Interburden	17	8.6 x10-05	1.4 x10-01	5.2 x10-03	4.0 x10-06	6.6 x10-03	2.4 x10-04	190
Moranbah Coal Measures ²	D Seam	18	6.4 x10-06	1.3 x10+00	2.8 x10-03	4.4 x10-09	3.2 x10-02	6.2 x10-05	140
Moranbah Coal Measures ¹	Interburden	19	2.8 x10-04	2.4 x10-02	4.2 x10-04	1.1 x10-05	9.4 x10-04	1.6 x10-05	115
Structure	Faults ¹	4 to 13	5.3 x10-04	2.7 x10-02	1.1 x10-03	1.2 x10-05	5.8 x10-04	2.3 x10-05	219
Structure	Faults ¹	4 to 13	2.1 x10-06	6.1 x10-03	4.1 x10-04	2.0 x10-07	5.7 x10-04	3.8 x10-05	135
Structure	Faults ¹	4 to 13	2.1 x10-04	2.7 x10-02	1.1 x10-03	1.3 x10-06	1.8 x10-04	7.1 x10-06	164



Geology Unit	Unit	Layer	Min Kx (m/day)	Max Kx (m/day)	Average Kx (m/day)	Min Kz (m/day)	Max Kz (m/day)	Average Kz (m/day)	Maximum Depth for Depth Dependence Correction(m)
Structure	Faults ¹	4 to 13	1.1 x10-04	2.9 x10-02	6.1 x10-04	6.2 x10-07	1.6 x10-04	3.4 x10-06	188
Structure	Faults ¹	4 to 6	3.6 x10-03	1.3 x10-01	4.3 x10-02	1.6 x10-04	5.9 x10-03	1.9 x10-03	34
Structure	Faults ²	3	9.7 x10-06	2.3 x10-03	6.4 x10-04	2.1 x10-10	6.6 x10-07	1.1 x10-07	101
Structure	Faults ²	5	4.0 x10-06	2.2 x10-02	1.9 x10-03	1.1 x10-08	1.4 x10-04	7.1 x10-06	174
Structure	Faults ²	7	3.7 x10-05	7.1 x10-02	5.3 x10-03	5.0 x10-08	8.4 x10-04	1.9 x10-05	113
Structure	Faults ²	9	2.8 x10-05	5.4 x10-03	8.7 x10-04	1.2 x10-07	1.9 x10-04	1.8 x10-05	132
Structure	Faults ²	10	4.3 x10-06	9.3 x10-04	8.9 x10-05	5.2 x10-09	3.6 x10-06	2.6 x10-07	136
Structure	Faults ²	12	2.8 x10-05	1.3 x10-03	3.7 x10-04	3.3 x10-10	1.0 x10-06	1.2 x10-07	97
Structure	Faults ²	14	9.2 x10-06	6.5 x10-04	1.8 x10-04	1.3 x10-09	3.0 x10-07	7.0 x10-08	149
Structure	Faults ²	16	4.8 x10-09	2.3 x10-07	6.0 x10-08	1.0 x10-10	6.6 x10-10	1.8 x10-10	236
Structure	Faults ²	18	9.2 x10-06	1.2 x10-04	4.8 x10-05	6.5 x10-09	4.5 x10-07	8.1 x10-08	109
Structure	Faults ²	3	2.4 x10-03	1.9 x10+00	1.2 x10-01	8.6 x10-07	6.0 x10-03	1.1 x10-04	153
Structure	Faults ²	5	2.0 x10-05	1.2 x10-02	1.2 x10-03	5.9 x10-08	2.7 x10-04	9.5 x10-06	47
Structure	Faults ²	7	1.3 x10-07	2.3 x10-04	7.4 x10-06	1.0 x10-10	5.0 x10-08	4.9 x10-09	169
Structure	Faults ²	9	1.6 x10-05	1.7 x10-02	1.0 x10-03	7.6 x10-10	2.4 x10-06	1.3 x10-07	163
Structure	Faults ²	10	2.0 x10-06	4.6 x10-05	1.4 x10-05	1.9 x10-10	2.3 x10-08	4.4 x10-09	110
Structure	Faults ²	12	4.9 x10-07	2.8 x10-02	7.0 x10-04	1.0 x10-10	1.4 x10-05	2.8 x10-07	192
Structure	Faults ²	14	6.0 x10-10	9.7 x10-05	9.8 x10-07	1.0 x10-10	4.0 x10-08	3.3 x10-10	276
Structure	Faults ²	16	1.7 x10-07	3.4 x10-05	6.7 x10-06	1.2 x10-09	5.1 x10-07	5.8 x10-08	196
Structure	Faults ²	18	2.4 x10-06	2.9 x10-03	6.3 x10-05	1.0 x10-10	4.3 x10-08	1.7 x10-09	84
Structure	Faults ²	3	1.5 x10-05	1.8 x10-02	4.4 x10-04	4.0 x10-08	4.8 x10-05	1.4 x10-06	196



Geology Unit	Unit	Layer	Min Kx (m/day)	Max Kx (m/day)	Average Kx (m/day)	Min Kz (m/day)	Max Kz (m/day)	Average Kz (m/day)	Maximum Depth for Depth Dependence Correction(m)
Structure	Faults ²	5	2.3 x10-08	8.9 x10-05	6.9 x10-06	1.0 x10-10	2.7 x10-07	2.3 x10-08	160
Structure	Faults ²	7	4.6 x10-05	5.4 x10-02	5.1 x10-03	3.4 x10-07	1.1 x10-03	1.5 x10-04	81
Structure	Faults ²	9	1.1 x10-06	5.1 x10-04	4.8 x10-05	3.0 x10-09	6.6 x10-06	7.6 x10-07	118
Structure	Faults ²	10	2.2 x10-06	1.9 x10-02	1.2 x10-03	4.3 x10-08	1.5 x10-03	1.1 x10-04	174
Structure	Faults ²	12	2.5 x10-06	2.1 x10-03	2.9 x10-04	3.2 x10-09	2.6 x10-06	2.9 x10-07	235
Structure	Faults ²	14	1.8 x10-08	5.7 x10-05	5.7 x10-06	1.0 x10-09	5.9 x10-06	4.9 x10-07	198
Structure	Faults ²	16	3.2 x10-04	1.5 x10-02	2.4 x10-03	6.0 x10-07	3.6 x10-05	4.9 x10-06	170
Structure	Faults ²	18	6.6 x10-08	1.4 x10-06	4.9 x10-07	1.0 x10-10	2.3 x10-09	4.2 x10-10	156
Structure	Faults ²	3	8.2 x10-06	2.0 x10-02	2.1 x10-03	2.5 x10-08	2.6 x10-04	1.4 x10-05	174
Structure	Faults ²	5	1.2 x10-04	4.2 x10-03	1.0 x10-03	5.5 x10-07	7.7 x10-05	1.0 x10-05	32
Structure	Faults ²	7	2.0 x10-08	2.1 x10-03	8.5 x10-05	1.0 x10-10	1.6 x10-05	4.7 x10-07	253
Structure	Faults ²	9	1.6 x10-06	2.2 x10-03	2.8 x10-04	1.5 x10-10	7.5 x10-06	6.9 x10-07	192
Structure	Faults ²	10	8.5 x10-08	4.3 x10-05	3.6 x10-06	1.0 x10-10	6.4 x10-09	4.9 x10-10	214
Structure	Faults ²	12	5.8 x10-09	2.8 x10-07	7.6 x10-08	1.0 x10-10	1.9 x10-10	1.0 x10-10	264
Structure	Faults ²	14	6.9 x10-07	8.4 x10-05	1.0 x10-05	1.0 x10-10	8.6 x10-09	8.5 x10-10	188
Structure	Faults ²	16	6.6 x10-07	5.2 x10-06	2.3 x10-06	5.9 x10-10	1.3 x10-08	4.1 x10-09	219
Structure	Faults ²	18	1.7 x10-07	4.0 x10-06	4.8 x10-07	1.0 x10-10	3.4 x10-09	1.4 x10-10	165
Structure	Faults ²	3	1.6 x10-02	1.7 x10-01	6.7 x10-02	1.1 x10-05	4.0 x10-04	1.8 x10-04	87
Structure	Faults ²	5	1.9 x10-04	7.1 x10-03	1.8 x10-03	9.1 x10-08	6.2 x10-06	1.2 x10-06	239
Structure	Faults ²	7	4.5 x10-06	4.2 x10-04	4.4 x10-05	2.3 x10-08	3.2 x10-06	2.2 x10-07	121

1 Pilot Points are not included

2 Pilot Points are included



Table B2 Calibrated Hydraulic Parameters (Storage) – MLE Realisation

Geology Unit	Unit	Layer	Min Sy (-)	Max Sy (-)	Average Sy (-)	Min Ss (d ⁻¹)	Max Ss (d ⁻¹)	Average Ss (d ⁻¹)	Maximum Depth for Depth Dependence Correction(m)
Alluvium	Surface Cover	1	1.1 x10-02	1.1 x10-02	1.1 x10-02	5.6 x10-06	5.6 x10-06	5.6 x10-06	-
Isaac River Alluvium *	Isaac River Alluvium	1	1.1 x10-03	2.0 x10-01	2.2 x10-02	9.0 x10-07	9.0 x10-07	9.0 x10-07	-
Regolith	Surface Cover	1	1.5 x10-02	1.5 x10-02	1.5 x10-02	2.1 x10-07	2.1 x10-07	2.1 x10-07	-
Weathered Permian	Surface Cover	1 & 2	1.1 x10-02	1.1 x10-02	1.1 x10-02	9.4 x10-07	9.4 x10-07	9.4 x10-07	-
Duaranga	Surface Cover	1 & 2	2.2 x10-03	2.2 x10-03	2.2 x10-03	5.1 x10-06	5.1 x10-06	5.1 x10-06	-
Tertiary Basalt	Tertiary Basalt	1 & 2	2.6 x10-03	2.6 x10-03	2.6 x10-03	1.9 x10-06	1.9 x10-06	1.9 x10-06	-
Regolith	Surface Cover	2	1.2 x10-02	1.2 x10-02	1.2 x10-02	9.1 x10-07	9.1 x10-07	9.1 x10-07	-
Rewan	Triassic	3	1.7 x10-03	1.7 x10-03	1.7 x10-03	3.4 x10-06	3.4 x10-06	3.4 x10-06	175
Rangal Coal Measures	Interburden	4	2.9 x10-03	2.9 x10-03	2.9 x10-03	7.2 x10-07	7.2 x10-07	7.2 x10-07	119
Rangal Coal Measures	Leichhardt Seam	5	4.7 x10-03	4.7 x10-03	4.7 x10-03	9.7 x10-07	9.7 x10-07	9.7 x10-07	117
Rangal Coal Measures	Interburden	6	5.0 x10-03	5.0 x10-03	5.0 x10-03	1.0 x10-06	1.0 x10-06	1.0 x10-06	192
Rangal Coal Measures	Vermont Seam	7	3.2 x10-03	3.2 x10-03	3.2 x10-03	6.7 x10-07	6.7 x10-07	6.7 x10-07	140
Rangal Coal Measures	Interburden	8	3.4 x10-04	3.4 x10-04	3.4 x10-04	6.2 x10-07	6.2 x10-07	6.2 x10-07	161
Fort Cooper Coal Measures	Interburden	9	2.7 x10-04	2.7 x10-04	2.7 x10-04	1.5 x10-06	1.5 x10-06	1.5 x10-06	33



Geology Unit	Unit	Layer	Min Sy (-)	Max Sy (-)	Average Sy (-)	Min Ss (d ⁻¹)	Max Ss (d ⁻¹)	Average Ss (d ⁻¹)	Maximum Depth for Depth Dependence Correction(m)
Fort Cooper Coal Measures	Fort Cooper Seams	10	2.1 x10-03	2.1 x10-03	2.1 x10-03	9.3 x10-07	9.3 x10-07	9.3 x10-07	121
Fort Cooper Coal Measures	Interburden	11	7.2 x10-03	7.2 x10-03	7.2 x10-03	6.5 x10-07	6.5 x10-07	6.5 x10-07	89
Moranbah Coal Measures	Q Seam	12	6.5 x10-04	6.5 x10-04	6.5 x10-04	2.4 x10-06	2.4 x10-06	2.4 x10-06	254
Moranbah Coal Measures	Interburden	13	2.0 x10-04	2.0 x10-04	2.0 x10-04	6.8 x10-07	6.8 x10-07	6.8 x10-07	175
Moranbah Coal Measures	P Seam	14	3.7 x10-04	3.7 x10-04	3.7 x10-04	4.5 x10-07	4.5 x10-07	4.5 x10-07	30
Moranbah Coal Measures	Interburden	15	7.5 x10-04	7.5 x10-04	7.5 x10-04	6.4 x10-07	6.4 x10-07	6.4 x10-07	175
Moranbah Coal Measures	H Seam	16	5.8 x10-04	5.8 x10-04	5.8 x10-04	2.0 x10-06	2.0 x10-06	2.0 x10-06	67
Moranbah Coal Measures	Interburden	17	4.6 x10-04	4.6 x10-04	4.6 x10-04	6.8 x10-07	6.8 x10-07	6.8 x10-07	190
Moranbah Coal Measures	D Seam	18	1.5 x10-03	1.5 x10-03	1.5 x10-03	5.6 x10-07	5.6 x10-07	5.6 x10-07	140
Moranbah Coal Measures	Interburden	19	1.6 x10-03	1.6 x10-03	1.6 x10-03	3.9 x10-06	3.9 x10-06	3.9 x10-06	115
Structure	Faults	4 to 13	1.2 x10-04	1.2 x10-04	1.2 x10-04	1.6 x10-06	1.6 x10-06	1.6 x10-06	219
Structure	Faults	4 to 13	2.4 x10-04	2.4 x10-04	2.4 x10-04	1.6 x10-06	1.6 x10-06	1.6 x10-06	135
Structure	Faults	4 to 13	1.2 x10-03	1.2 x10-03	1.2 x10-03	1.5 x10-06	1.5 x10-06	1.5 x10-06	164
Structure	Faults	4 to 13	1.3 x10-02	1.3 x10-02	1.3 x10-02	4.1 x10-07	4.1 x10-07	4.1 x10-07	188
Structure	Faults	4 to 6	2.4 x10-03	2.4 x10-03	2.4 x10-03	2.8 x10-07	2.8 x10-07	2.8 x10-07	34



Geology Unit	Unit	Layer	Min Sy (-)	Max Sy (-)	Average Sy (-)	Min Ss (d ⁻¹)	Max Ss (d ⁻¹)	Average Ss (d ⁻¹)	Maximum Depth for Depth Dependence Correction(m)
Structure	Faults	3	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	101
Structure	Faults	5	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	174
Structure	Faults	7	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	113
Structure	Faults	9	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	132
Structure	Faults	10	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	136
Structure	Faults	12	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	97
Structure	Faults	14	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	149
Structure	Faults	16	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	236
Structure	Faults	18	1.3 x10-02	1.3 x10-02	1.3 x10-02	3.2 x10-06	3.2 x10-06	3.2 x10-06	109
Structure	Faults	3	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	153
Structure	Faults	5	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	47
Structure	Faults	7	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	169
Structure	Faults	9	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	163
Structure	Faults	10	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	110
Structure	Faults	12	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	192
Structure	Faults	14	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	276
Structure	Faults	16	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	196
Structure	Faults	18	1.3 x10-02	1.3 x10-02	1.3 x10-02	8.6 x10-07	8.6 x10-07	8.6 x10-07	84
Structure	Faults	3	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	196
Structure	Faults	5	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	160
Structure	Faults	7	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	81



Geology Unit	Unit	Layer	Min Sy (-)	Max Sy (-)	Average Sy (-)	Min Ss (d ⁻¹)	Max Ss (d ⁻¹)	Average Ss (d ⁻¹)	Maximum Depth for Depth Dependence Correction(m)
Structure	Faults	9	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	118
Structure	Faults	10	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	174
Structure	Faults	12	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	235
Structure	Faults	14	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	198
Structure	Faults	16	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	170
Structure	Faults	18	2.5 x10-02	2.5 x10-02	2.5 x10-02	4.2 x10-06	4.2 x10-06	4.2 x10-06	156
Structure	Faults	3	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	174
Structure	Faults	5	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	32
Structure	Faults	7	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	253
Structure	Faults	9	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	192
Structure	Faults	10	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	214
Structure	Faults	12	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	264
Structure	Faults	14	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	188
Structure	Faults	16	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	219
Structure	Faults	18	1.8 x10-02	1.8 x10-02	1.8 x10-02	6.4 x10-06	6.4 x10-06	6.4 x10-06	165
Structure	Faults	3	1.3 x10-02	1.3 x10-02	1.3 x10-02	2.0 x10-06	2.0 x10-06	2.0 x10-06	87
Structure	Faults	5	1.3 x10-02	1.3 x10-02	1.3 x10-02	2.0 x10-06	2.0 x10-06	2.0 x10-06	239
Structure	Faults	7	1.3 x10-02	1.3 x10-02	1.3 x10-02	2.0 x10-06	2.0 x10-06	2.0 x10-06	121

* Pilot points are included only for the Sy of Isaac River Alluvium



Table B3 Calibrated Spoil Hydraulic Parameters – MLE Realisation

Parameter	Value
Horizontal hydraulic conductivity (m/day)	2.48
Vertical hydraulic conductivity (m/day)	0.05
Specific Yield (%)	0.01
Specific Storage (1/m)	1.40 x10 ⁻⁰⁵

Calibrated Recharge

Table B4 Calibrated Rainfall Recharge – MLE Realisation

Model Recharge Zone	% of Rainfall	Long-term Average Rainfall Recharge (mm/yr)
Alluvium Isaac River Channel	0.08%	0.4
Alluvium Isaac River	0.04%	0.2
Alluvium (rest of the model)	0.93%	5.2
Regolith	0.02%	0.1
Weathered Permian	0.09%	0.5
Duaringa Formation (Tertiary)	0.04%	0.2
Tertiary Basalts	0.42%	2.4
Spoil	3.7%	21

Calibrated Evapotranspiration (EVT)

Table B5 Calibrated EVT Extinction Depth – MLE Realisation

Model EVT Zone	Extinction Depth (m)
Alluvium	1.4
Regolith	14.4
Weathered Permian	1.9
Duaringa Formation	1.4
Tertiary Basalts	5.2
Permian Outcrop	0.9
Spoil	0.6



Calibrated General Head Boundary

Table B6

Calibrated General Head Boundary (GHB) Properties – MLE Realisation

Layer	Zone	GHB Head (m)	GHB Conductance Factor
1	1	18.04	0.05
1	2	25.69	305.16
1	3	4.95	37.45
2	4	38.62	2.12
2	5	25.37	0.80
2	6	49.30	3.37
3	7	46.84	9.23
3	8	40.75	0.02
3	9	42.06	0.21
4	10	30.78	3.00
4	11	46.72	22.82
4	12	36.16	0.00
4	13	39.75	0.35
5	14	33.21	0.02
5	15	67.58	0.02
5	16	44.73	0.02
5	17	29.09	42.77
6	18	42.57	1.17
6	19	35.38	2.78
6	20	35.31	1.60
6	21	27.45	0.17
7	22	41.52	2.35
7	23	43.07	34.94
7	24	48.38	2.21
7	25	27.42	0.01
8	26	20.35	0.06
8	27	57.57	0.02
8	28	34.58	0.23
8	29	13.26	0.04
9	30	47.53	0.02
9	31	34.20	0.20
9	32	60.55	0.75



Layer	Zone	GHB Head (m)	GHB Conductance Factor
9	33	42.68	1.37
10	34	21.61	0.29
10	35	33.53	14.22
10	36	39.69	0.34
10	37	29.08	0.08
11	38	19.24	0.12
11	39	27.94	0.03
11	40	23.37	0.06
11	41	18.92	0.02
12	42	5.27	0.15
12	43	17.26	0.06
12	44	16.45	0.08
12	45	51.48	14.44
13	46	31.06	0.09
13	47	27.13	0.13
13	48	27.34	0.04
13	49	32.98	2.51
14	50	21.74	1.24
14	51	37.88	1.82
14	52	42.93	9.09
14	53	38.36	0.34
15	54	44.29	2.34
15	55	35.11	779.64
15	56	48.96	0.28
15	57	28.38	0.17
16	58	42.48	1.08
16	59	22.26	2.20
16	60	34.87	1.15
16	61	39.71	2.95
17	62	49.37	0.05
17	63	23.52	2.10
17	64	7.31	6.77
17	65	17.16	0.03
18	66	47.84	3.71
18	67	11.84	3.92
18	68	52.22	0.40



Layer	Zone	GHB Head (m)	GHB Conductance Factor
18	69	24.59	0.50
19	70	36.12	1.78
19	71	19.99	0.01
19	72	44.90	34.30
19	73	18.00	0.03

Calibrated Riverbed Vertical Conductivity

Table B7 Calibrated Riverbed Vertical Conductivity – MLE Realisation

Model River Zone	Riverbed Vertical Conductivity (m/day)
Isaac River_Goonyella	0.0074
Isaac River_Deverill	0.0002
Grosvenor Creek	0.0537
Conrock Gully	0.0025
Cherwell Creek	0.0030
Ripstone	0.0006
Phillips Creek	0.1370
Smoky Creek	0.0152
Billy's Gully	0.0022
New Chum Creek	0.0074
North Creek	0.0004



Appendix C Predictive Hydrographs

Daunia West Infrastructure Project

Groundwater Modelling Calibration and Prediction Report

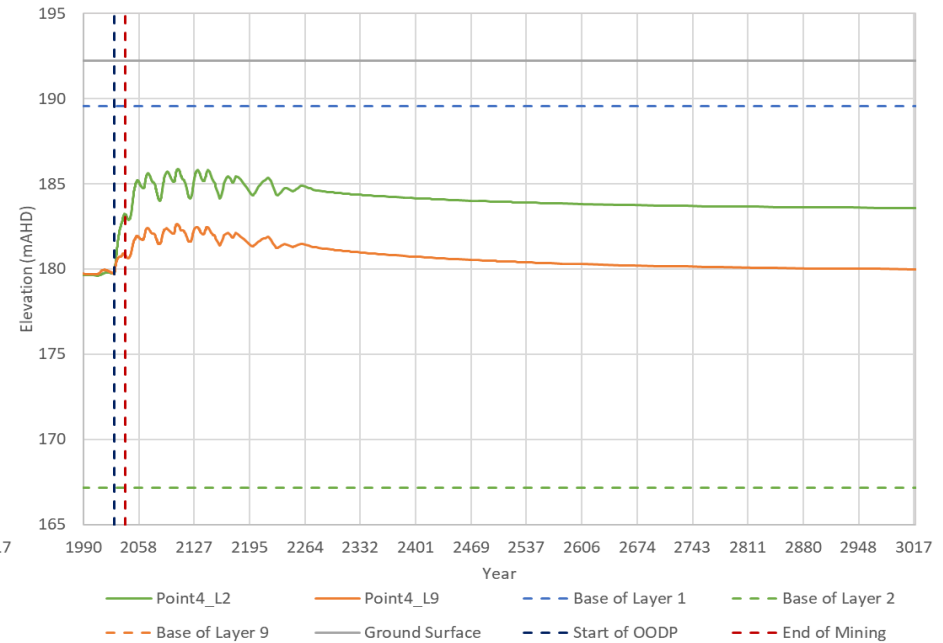
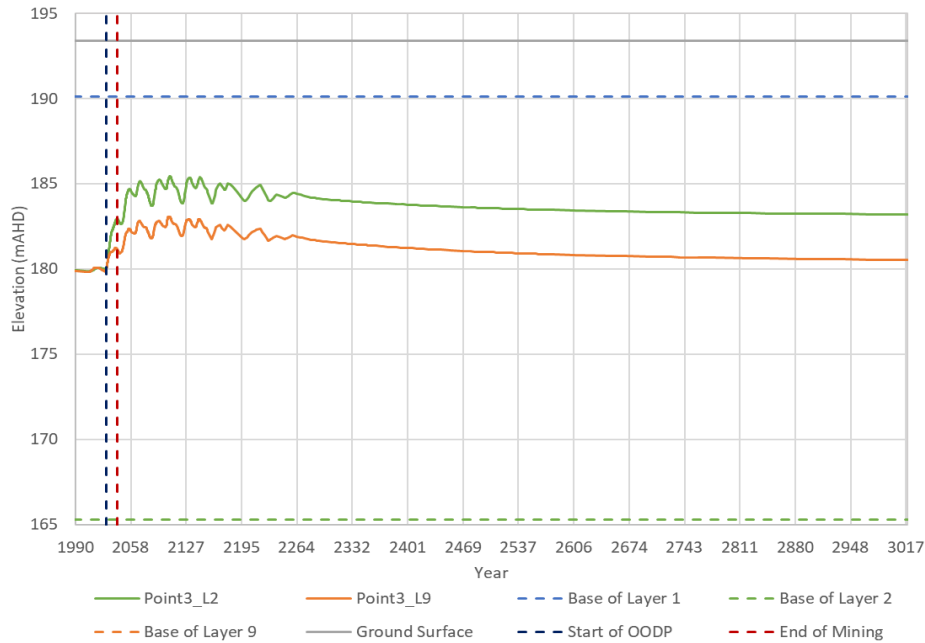
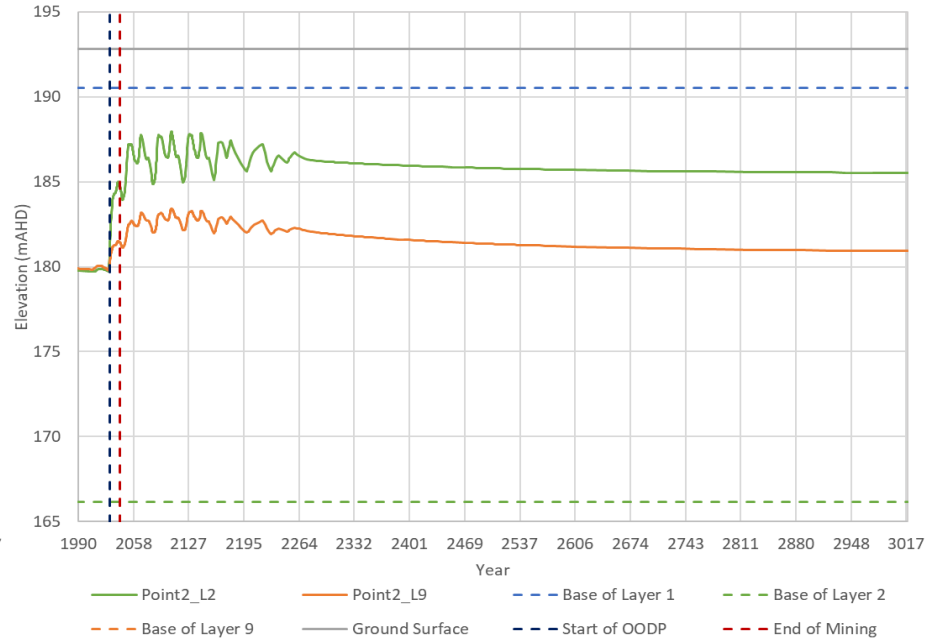
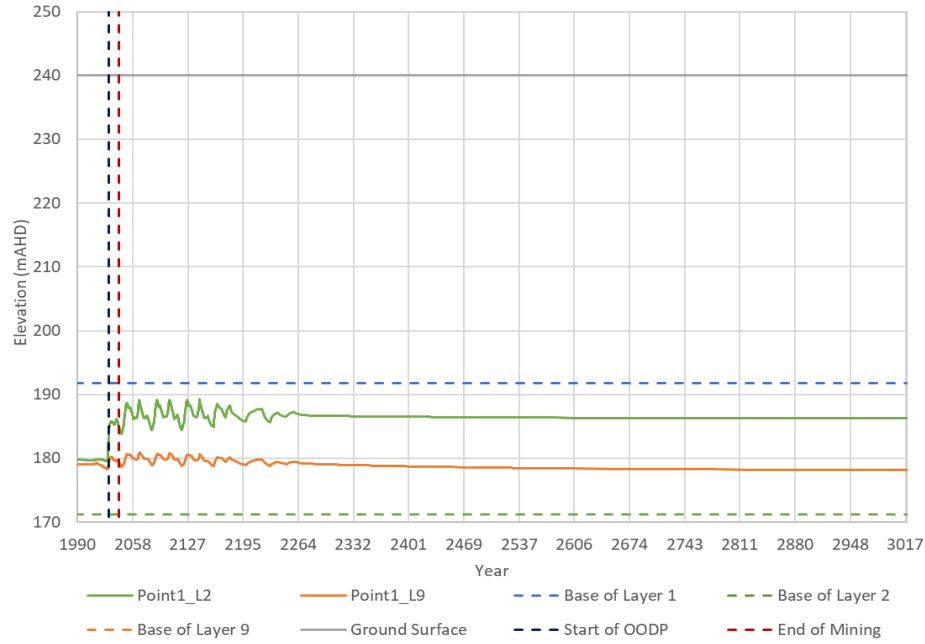
Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00001

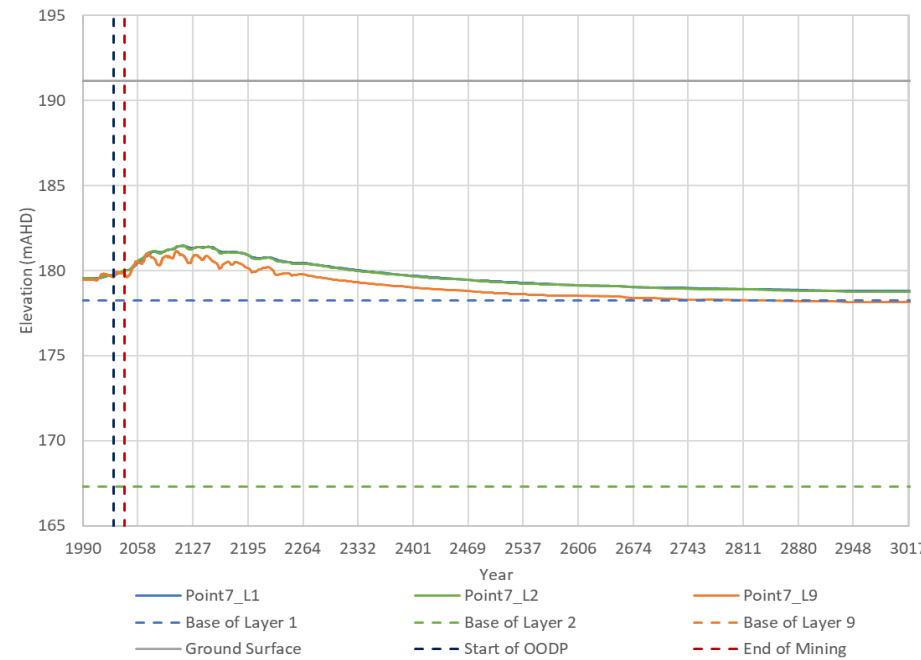
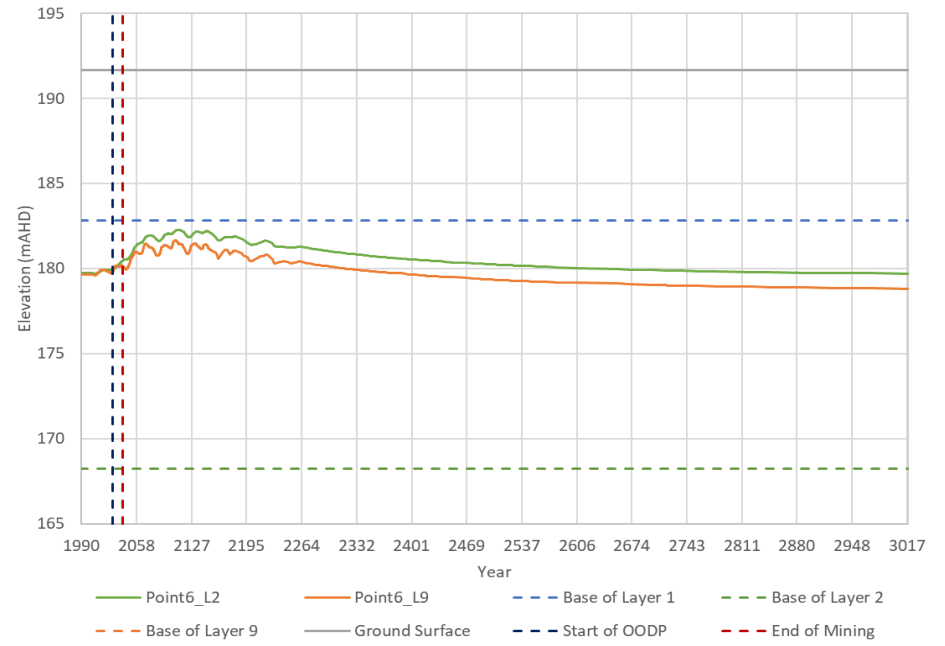
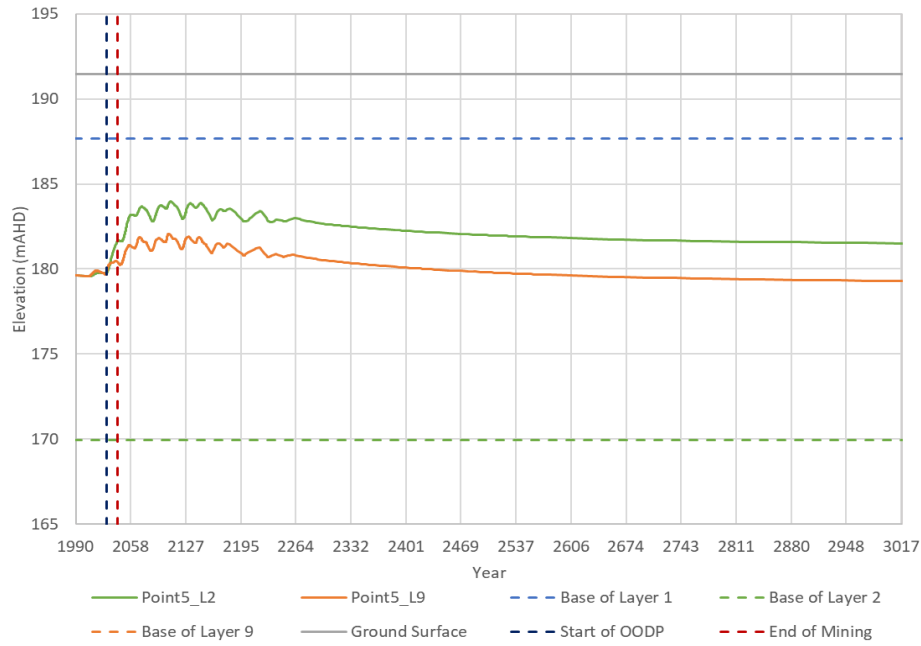
20 May 2026



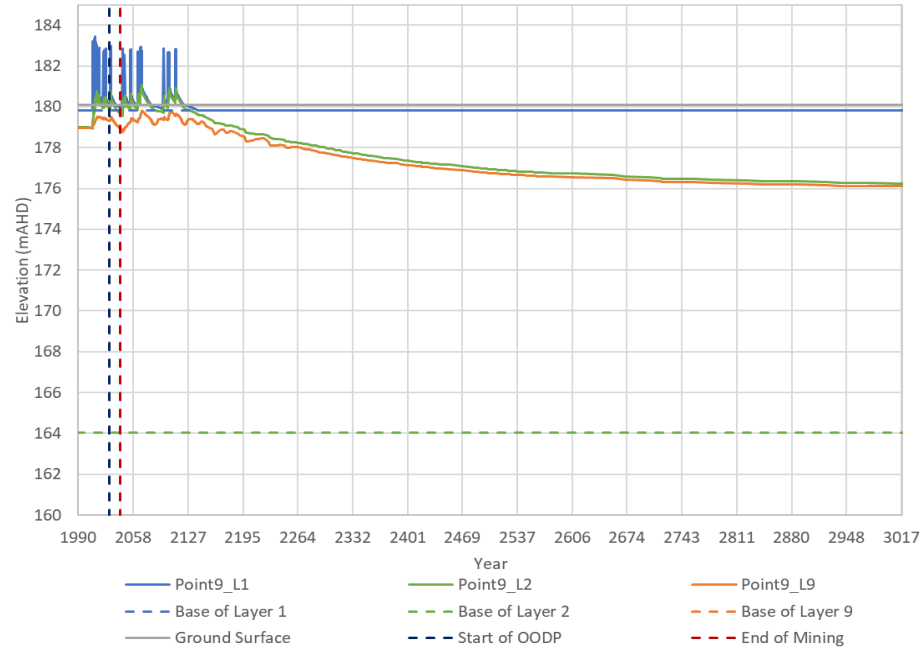
Appendix C - Prediction Hydrographs

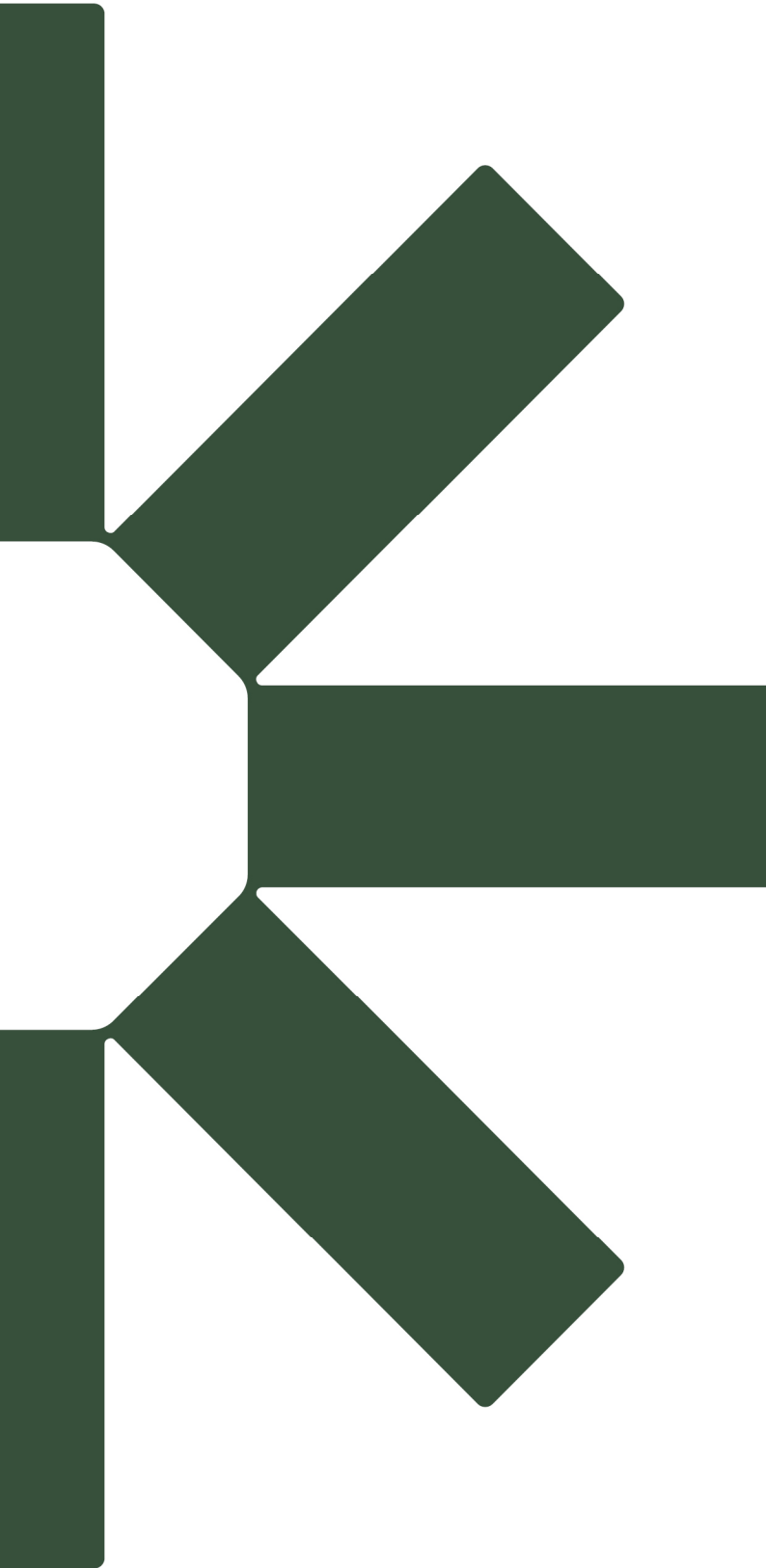


Appendix C - Prediction Hydrographs



Appendix C - Prediction Hydrographs





Making Sustainability Happen