Appendix H

Hydrogeological Interpretive Report

Hydro Tasmania

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1. Introduction

This report presents the hydrogeological interpretation for the Tarraleah Redevelopment Project (the Project) for the issue of the Request for Proposal (RFP) to potential Early Contractor Involvement (ECI) parties. It is developed for the purpose of assisting prospective contractors in preparing proposals to participate in the ECI and Front-End Engineering Design (FEED) for the Engineer Procure Construct (EPC) Contract for the Project. The information provided in this document must be read in conjunction with the full set of documentation provided with the RFP. This report is completed alongside the Geotechnical Interpretive Report (GIR) which presents the relevant geological and geotechnical interpretations (PSM4346-085R Rev 1).

1.1 Project Overview

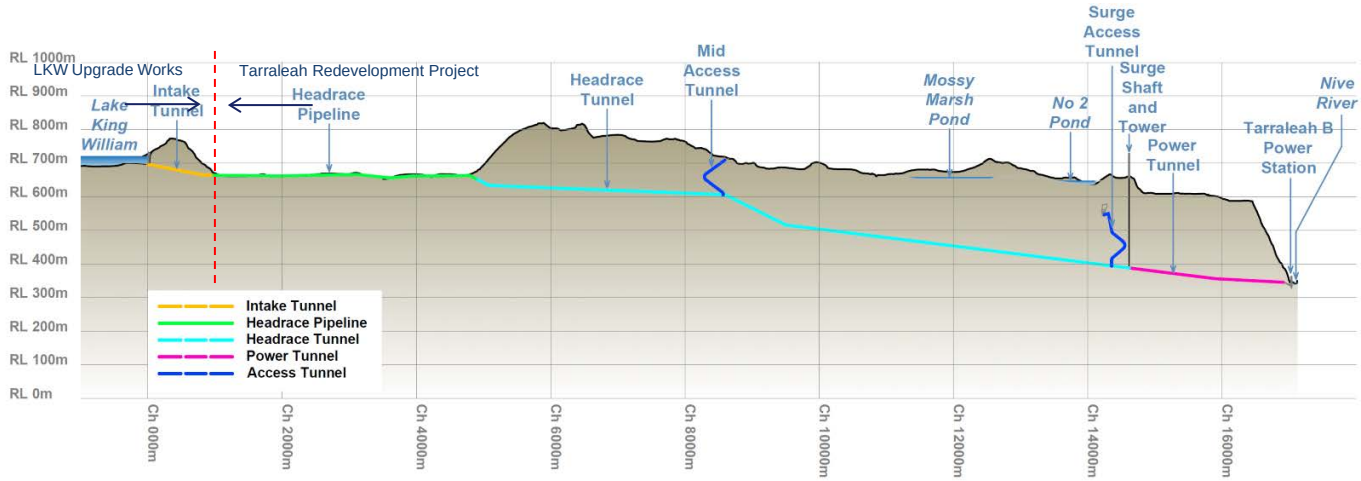
The Tarraleah hydropower scheme, constructed during the 1930s, is located at Tarraleah, within the Central Highlands of Tasmania. Hydro Tasmania is proposing to redevelop the scheme to ensure safe and reliable operation to provide a modern water conveyance and power generation scheme to meet the needs of the future electricity market.

The Tarraleah headworks project, as part of the wider redevelopment scheme, including a surface pipeline, unlined pressurised Headrace and Power tunnels, Surge Shafts, Access tunnels and Power Station are to be developed as part of the ECI phase leading to submission for the Financial Investment Decision (FID) by the Federal Government.

The reference arrangement for the Project includes the following components:

- A 4.2 km long surface pipeline connecting to the western portal of the Headrace Tunnel
- A 9.7 km long Headrace Tunnel connecting to the Power Tunnel. The tunnel is proposed to be driven by drill and blast methods, in predominantly hard dolerite with Access tunnels provided for construction
- A 140 m Surge Shaft connecting the Headrace Tunnel to an approximately 70 m high surge tower
- A pump station with rising main to divert inflowing water from existing surface infrastructure into the surge facilities
- A control structure on Mossy Marsh outlet
- A 2.4 km long Power Tunnel, connecting the Headrace Tunnel at the Surge Shaft to the Power Station. The tunnel is expected to be driven by drill and blast methods
- A surface Power Station on the Nive River
- Access tunnels
- Siteworks associated with access and egress to the station and headworks infrastructure and construction facilities.

An overview of the Project is summarised in a schematic long section provided in Inset 1 and the generalised layout show on Figure 1. Note that the Lake King William Intake and Intake Tunnel are being constructed by Hydro Tasmania as part of its Upgrade Works Project.



Inset 1: Schematic long section of the proposed redevelopment scheme.

1.2 Report Objectives

This HIR has been prepared to inform Hydro Tasmania of the hydrogeological conditions for the Project and provide context regarding civil construction and environmental risks predominantly associated with the Project tunnels. It is based on review of existing geological, geotechnical, and hydrogeological data, from site investigations. The hydrogeological information presented herein comprises:

- The hydrogeological setting
- Organisation of relevant site investigation data for application in hydrogeological assessments
- A hydrogeological conceptual model, including:
  - Definition of surface water catchment boundaries and flow systems
  - Characterisation of groundwater recharge sources:
    - Direct recharge from rainfall
    - Losing streams, that is recharge to aquifer via infiltration and percolation from streams
    - Perched water bodies, that is recharge to aquifer via infiltration and percolation from perched water bodies.
  - Baseline water table elevations with relationship to surface waters
  - Groundwater to surface water interactions, that is baseflow contributions to stream flow
  - Conceptualisation of dolerite fracture zone characteristics, including definition of local and catchment-scale flow
  - Conceptualisation of palaeovalley aquifer characteristics, including definition of anisotropy and heterogeneity
  - Development of Hydrogeological Rock Mass Units (HRMUs) with applied hydraulic properties.
- Conceptual hydrogeological cross sections to inform numerical modelling
- Surface water and groundwater quality
- Numerical groundwater modelling informed by the conceptual model, including:
  - Steady-state calibration
  - Baseline water balance
  - Potential groundwater inflow ranges during tunnel driving
  - Drawdown developed during tunnel excavation
  - Potential development of springs during conveyance operation
  - Potential tunnel water loss ranges during conveyance operation
  - Potential elevated pore pressures within the Tarraleah hillside during operation.

This report will be subject to further updates as additional monitoring and sampling data becomes available. It is also subject to updates to reflect the final reference scheme to be adopted – for example, to reflect the final adopted approach for lining of the tunnels.

1.3 Prior Investigations and Studies

Geotechnical site investigation data and reports compiled by Entura/ Hydro Tasmania prior to the Project feasibility phases in 2019 are termed 'historic'. Data and reports acquired by Entura during the feasibility study and Entura/PSM within this Pre-FID design phase are termed 'recent'.

Geotechnical data collated for and used to inform the geotechnical and hydrogeological interpretation of ground conditions for the Project, is presented within the Geotechnical Data Report (GDR). Relevant investigations included:

- Hydro-Electric Commission (1950-1955) Mossy Marsh Tunnel and No. 2 Canal
- Hydro-Electric Commission (1971-1972) Tarraleah Pipeline (Penstocks)
- Entura (2015, 2016, 2019) Tarraleah Pipeline (Penstocks)
- Entura (2019) Tarraleah Redevelopment Feasibility
- Entura (2021) Mossy Marsh Tunnel Inspection Report and Repurposing Concept Study
- Groundwater Consulting Australia (2023) Power Station Hillside – Conceptual Hydrogeological Model

- Groundwater Consulting Australia (2023) Letter on Headrace and Power Tunnel – Groundwater Inflow Estimates
- Stuart-Smith (2022) Structure and Geology of the Tarraleah and Mossy Marsh areas
- Stuart-Smith (2023) Structure and Geology of the Tarraleah Redevelopment Project Area
- Entura (2023) Application Document to EPBC for Tarraleah Redevelopment Project:
  - Attachment 1 – Scheme Overview
  - Attachment 2 – MNES Summary
  - Attachment 3 – Upgrade Works Locations
  - Attachment 4 – Terrestrial Ecology Baseline
  - Attachment 5 – Aquatic Ecology Baseline
  - Attachment 6 – Hydrogeology Baseline, Impact and Flow Mitigation
  - Attachment 7 – Modelling for Environmental Assessment.
- PSM geotechnical reports, which encompass the interpretation of geological units, hydrogeological testing, borehole construction details, have been utilised by this HIR. The following reports have been referenced:
  - TARDEV-PSM-GEO-XX-RP-G-0002: Lake King William No.3 Intake, Approach Channel, Downstream Outlet and Tunnel – Factual Data Report Rev2 (31 October 2022)
  - TARDEV-PSM-GEO-XX-RP-G-0006: Tarraleah Redevelopment Project - Geotechnical Data Report (GDR) – Stage 2 Rev1 (20 December 2024)
  - TARDEV-PSM-GEO-IT-RP-G-0006: Lake King William Tunnel – Geotechnical Interpretive Report (GIR) (21 December 2023)
  - TARDEV-PSM-GEO-XX-RP-G-0005: Tarraleah Redevelopment Project – Geotechnical Interpretive Report (GIR) Stage 1 (5 August 2024).

1.4 Project Datum

The following datums are used for all work undertaken as part of this assessment:

- Horizontal datum: Geocentric datum is GDA2020 MGA Zone 55
- All bearing measurements provided are to True North unless stated otherwise
- The magnetic declination for the Tarraleah is +14°
- Elevation is shown as metres above Australian Height Datum (m AHD83).

2. Project Setting

2.1 Climate

Tarraleah resides in a high precipitation, cool-temperate climatic region of central Tasmania. Inset 2 presents the recent (2000 to 2022) monthly mean precipitation data, averaged across four climate stations (Figure 2), including:

- Butlers Gorge (Bureau of Meteorology, BOM station 96003), 1.5 km to the southeast of Lake King Willam outlet
- Derwent Bridge (BOM station 96069), 14.5 km to the North of Lake King William outlet
- Wayatinah (BOM station 95047), 11.5 km to the south of Tarraleah Power Station
- Bronte Heights (BOM station 96002), 17.2 km to the north of Tarraleah Power Station.

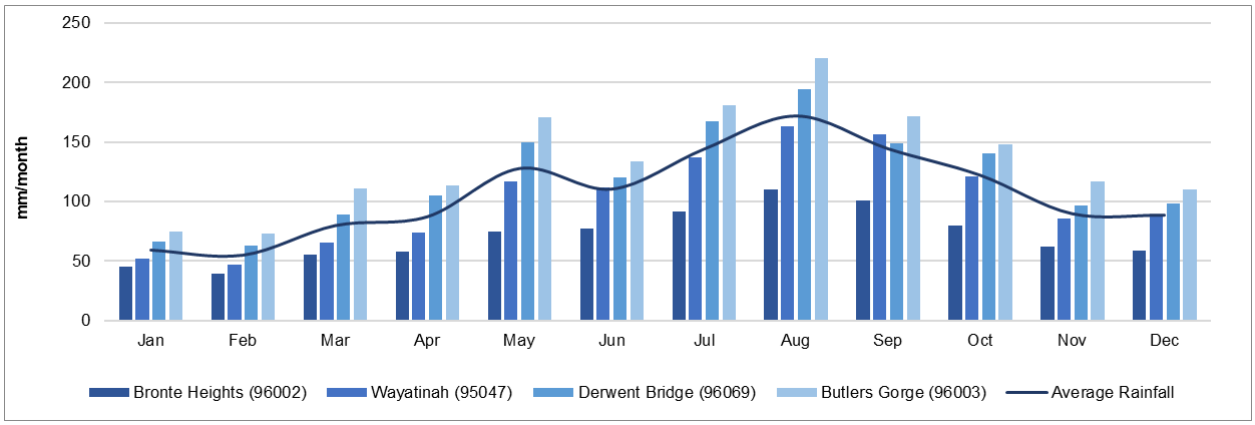
The local Butler's Gorge station is shown on Figure 2.

Total mean annual precipitation (2000 to 2022) is recorded at 1,274 mm. The data reflects an orographic rainfall pattern where stations in the west regularly recorded higher amounts of rainfall than stations in the east due to the prevailing westerly weather patterns.

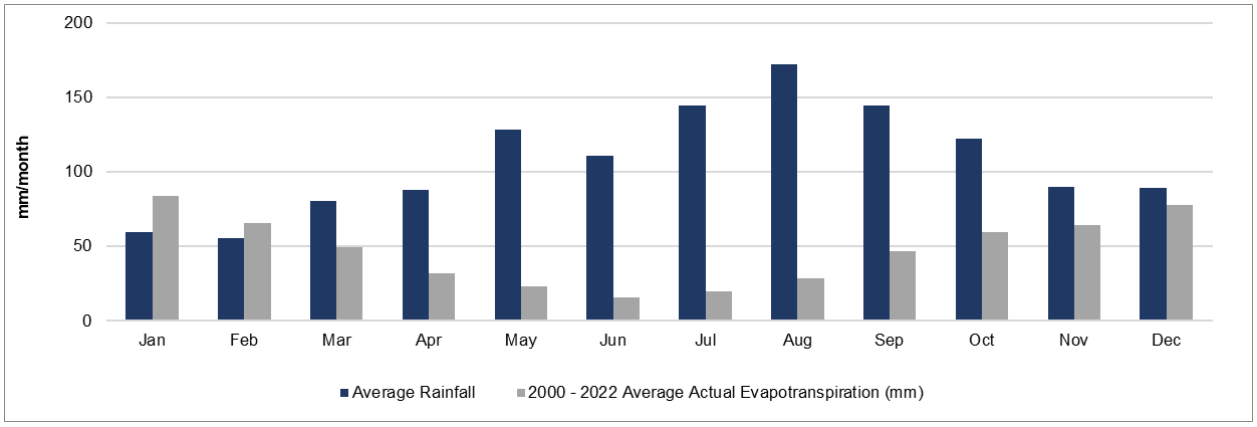
A localised analysis of rainfall in the Project area is presented in Inset 3, which considers average rainfall data from the selected stations against mean actual evapotranspiration (AET) calculated using the Terrestrial Ecosystem Research Network (TERN) CRMSET algorithm (McVicar et al. 2022). The algorithm uses reflective remotely sensed indices from Sentinent-2 and Landsat datasets to estimate AET from potential evapotranspiration (PET), calculated using daily gridded BoM meteorological data. The calculated mean AET is representative of a 105 km^2 area which captures the entire Project alignment and local groundwater recharge areas.

Monthly rainfall exceeds actual evapotranspiration except during the summer months of January and February. Total mean annual AET is recorded at 566 mm presenting a net positive annual water budget, with rainfall exceeding AET by about 700 mm.

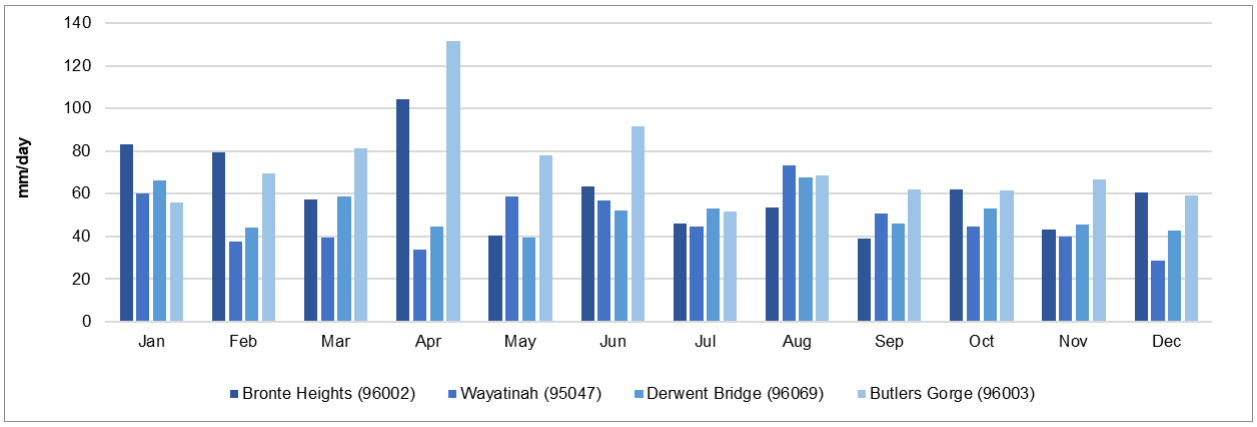
Short-term rainfall intensity (Inset 4) is presented as maximum single day rainfall events per month. The data indicates the maximum rainfall intensity expected at the Project setting which is used to inform potential surface flow flood risk. A maximum single day rainfall of 132 mm (Butlers Gorge (BOM station 96003) in April 1960) signifies that there is moderate risk to the project during construction of surface flooding and water flow into excavations.



Inset 2: 2000 to 2022 monthly mean precipitation for catchment wide weather stations.



Inset 3: 2000 to 2022 monthly mean precipitation (all stations) and estimated actual evapotranspiration.



Inset 4: 1910 to 2022 short-term rainfall intensity (maximum single day rainfall per month).

2.2 Topography

The Project corridor is characterised by gently undulating topography across the Tarraleah Plateau with rolling dolerite slopes. The Wentworth Hills encroach on the western margins of the alignment from the north. The remaining Project alignment is bound to the south by Butlers Gorge in the west and the Nive River in the east.

The lower smoothed surface profiles of the local hillsides are consistent with glacial ice carving. Tasmania's Pleistocene glacial history is well documented (Corbett et al., 2014) with numerous glacial cycles (thought to be more than ten) resulting in extreme changes in climatic conditions around the Tasmanian central plateau and adjacent melt water streams.

2.3 Hydrology

A detailed assessment of the Project hydrology has been undertaken by Entura as a part of EPBC applications for Project approval (Entura (2023), Attachment 5 – Aquatic Ecology Baseline and Attachment 6 – Hydrogeology Baseline, Impact and Flow Mitigation). Reference should be made to these documents for information regarding project hydrology. A brief overview for contextualisation purposes is provided below.

Associated waterbodies of the Project are all regulated through the Hydro Tasmania current operations of the Derwent Power Scheme. The waterbodies are shown on Figure 3 and include:

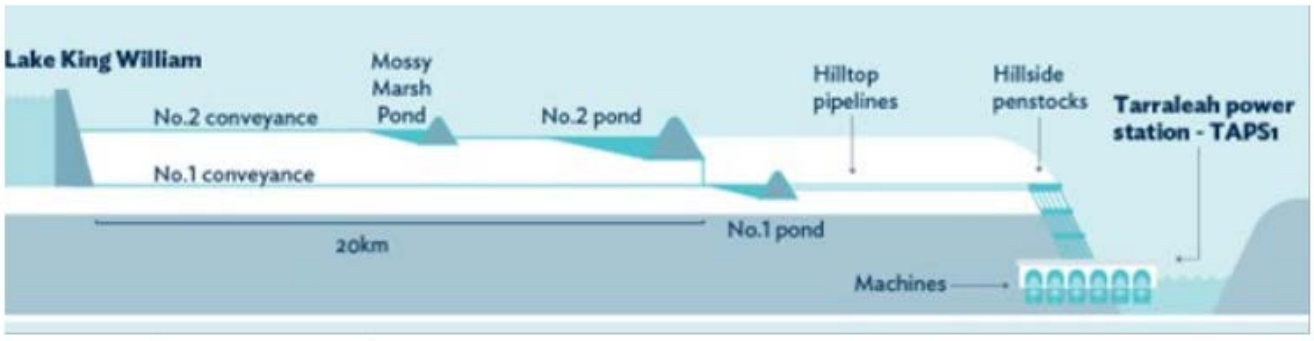
- River Derwent from Clark Dam to Lake Catagunya
- Nive River from Tarraleah Power Station to Wayatinah Lagoon
- Lake King William
- Lake Liapootah
- Wayatinah Lagoon
- Mossy Marsh Pond
- Horne's Dam
- No. 1 Pond and No. 2 Pond.

The Project hydrology is bounded by the Derwent River to the south and Nive River to the east. These rivers form steep narrow gorges cut into the dolerite plateau, with meandering gravel to boulder stream beds. Surface flows are typically absent under baseline conditions; there are numerous shallow pools along the length of the rivers. Flow on the rivers has been altered by anthropogenically engineered embankments and conveyances of the Hydro Tasmania Derwent Power Scheme (Ling et al. 2009).

The anthropogenically altered shallow drainage system of Mossy Marsh and associated ponds sits on top of the dolerite plateau. The anthropogenically engineered conveyances that influence the surface water on the Tarraleah Plateau include:

- Lake King William (created by Clark Dam) is the storage for the Tarraleah Power Station where water is delivered via two canals, No. 1 Canal and No. 2 Canal, as shown Inset 5 EER, September 2023. Lake St Clair is immediately upstream of Lake King William
- Water from No. 1 Canal combines with flow from No. 2 Canal in No. 1 Pond, and then flows to Tarraleah Power Station before eventual discharge to the Nive River
- No. 2 Canal flows to Mossy Marsh Pond and No. 2 Pond, before combining with flow from No. 1 Canal in the No. 1 Pond. The Hilltop pipeline then feeds the penstocks of the existing Tarraleah Power Scheme.

Mossy Marsh Pond and associated surface conveyance water bodies are characterised by fine lacustrine sediments and basal peaty material.



Inset 5: Local aspects of Derwent Power Scheme on Tarraleah Plateau.

2.4 Geology and Structure

A detailed description of the project geology is presented in Stuart-Smith (2023), with the engineering geology and geotechnical model documented in the Project GIR. This report adopts the relevant hydrogeological aspects from both documents for use in conceptual and numerical modelling. A brief overview taken from Stuart-Smith (2023) is provided below (in italics) for contextualisation purposes.

The area comprises Jurassic dolerite sills, consisting of a single sheet locally at least 250 – 350m thick which forms an extensive plateau capped in places by remnant Tertiary basalt flows underlain and intercalated with minor lacustrine and fluvial sediments. The dolerite intrudes underlying Permo-Triassic clastic sediments which outcrop extensively in the Butlers Gorge area, to the south of Mount Hobhouse, and within the Nive River Valley. Surficial unconsolidated Quaternary alluvial, glacial, swamp, and colluvial deposits cover much of the region.

The structural architecture of the area is principally controlled by Late Cretaceous/Early Tertiary faulting of the Permo-Triassic sediments and Jurassic dolerite with faulting particularly intense in the Nive River valley where the dolerite and Triassic strata are downfaulted within a NW-trending graben. Fault orientations parallel the three subvertical joint sets, indicating that the latter, representing a penetrative fracture fabric within the jointed dolerite, provided a primary control on later faulting. In addition to mapped faults with observable displacements, broader fracture zones, probably comprising several smaller fault breccia and zones of closer spaced jointing, are interpreted.

Important elements of the structural architecture framed by Stuart-Smith (2023) is that the faulting of the Jurassic dolerite beneath the Tarraleah Plateau is vertical/sub-vertical and forms a connected network (rather than disconnected network) of fracture zones. The connected network describes:

- A comparatively continuous and extensive fractured rock aquifer beneath the plateau
- Outcrop and sub-crop zones within the fracture zones with direct surface water to groundwater connections.

2.5 Sphagnum Peatland TECs

Sphagnum peatland is a vegetation community that is included within the Alpine Sphagnum Bogs and Associated Fens ecological community. Descriptions of potential indirect impacts by the Project on the Alpine Sphagnum Bogs and Associated Fens ecological community are provided in the Project MNES Summary (Entura 2023). The Alpine Sphagnum Bogs and Associated Fens ecological community is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Sphagnum peatland is also listed as a threatened native vegetation community under the *Nature Conservation Act 2002* (Tasmania).

In the central highlands of Tasmania, Sphagnum peatland typically occurs in consistently wet areas in river valleys, adjacent to lakes and streams, and in areas where drainage is impeded within peat swamps. Kitchener and Harris (2013) describe Sphagnum peatlands generally covering less than 10 ha and commonly occurring on shelves, along drainage lines, in areas of impeded drainage, and generally above 600 m AHD elevation. The Threatened Ecological Communities (TECs) can be predominantly moss beds or may include sedges such as *Baloskion australe* (southern cordrush), *Gahnia grandis* (cutting grass) and *Gymnoschoenus sphaerocephalus* (buttongrass), and/or the shrubs *Richea scoparia* (scoparia), *Richea gunnii* (bog candleheath), *Baeckea gunniana* (alpine heathmyrtle), *Epacris gunnii* (coral heath), (Kitchener and Harris 2013). Sphagnum peatland can also have occasional trees present including *Athrotaxis cupressoides* (pencil pine), *Eucalyptus rodwayi* (swamp peppermint) and *Leptospermum lanigerum* (woolly tea-tree).

The absorptive properties of *Sphagnum* spp. and underlying peat regulate the lateral spread of moisture within this ecological community. Bogs are found in permanently wet areas and where soils are waterlogged (Costin et al. 2000; Slattery, 1998). Bog formation is dictated by a good supply of groundwater and an impeded drainage system that enables surface water to keep the water table at or near the surface. Under these conditions, the decomposition of organic materials is incomplete, eventually forming the peat that underlies the Alpine *Sphagnum* Bogs and Associated Fens ecological community (Good, 1992).

Sphagnum has cellular structures, hyaline cells, that retain large amounts of water and a reliance on capillary rise to move water upwards from the water table to its growing surface. Due to the capillary rise function, water table depth is an important control on Sphagnum moss productivity (Goetz 2014; after Hayward & Clymo, 1982; Schipperges & Rydin, 1998; Strack et al., 2006; Strack & Price, 2009).

There are two *Sphagnum* peatland TEC settings associated with the Project:

- Mossy Marsh TEC – A 3.0-ha patch on the western bank of the unconfined Mossy Marsh surface water conveyance which transfers water from the No. 2 Canal Tunnel to Mossy Marsh Pond (Figure 2)
- Northern TEC – An approximate 0.75 ha patch within the Wentworth Hills, approximately 1 km north (and uphill) of the Headrace Tunnel alignment (Figure 2).

Each TEC is discretely discussed below. Project-wide surface water features and presence are shown on Figure 3. Local domain contexts of the surface water presence in the vicinity of the Mossy Marsh TEC and Northern TEC are shown on Figure 4 and Figure 5, respectively.

2.5.1 Mossy Marsh TEC

The Mossy Marsh TEC is located on the western bank of the unconfined channel that conveys water from the No. 2 Canal to Mossy Marsh Pond (Figure 4). Mossy Marsh Pond, an artificial impoundment located on what was previously a swampy area, is located approximately 400 m downstream of the TEC. Currently, up to 12.7 m^3/sec of water can be released to the surface water environment from No. 2 Canal. Typical flows are around 9 m^3/sec. These flows are dispersed across multiple channels upstream and east of the Sphagnum peatland TEC due to patchy islands of native vegetation dominated by *Leptospermum lanigerum* (woolly tea-tree). There are also small channels abutting the Sphagnum peatland TEC along the western margins of Mossy Marsh (Figure 4).

The Mossy Marsh TEC has an almost complete cover of Sphagnum moss interspersed with the sedge *Gahnia grandis* and the shrubs *Baeckea gunniana* and *Melaleuca squarrosa* (scented paperbark). *Eucalyptus rodwayi* is present as a scattered overstorey tree. The coverage by *Eucalyptus rodwayi* is greater than is typically present in a Sphagnum peatland at around 10% canopy cover, but it still has the defining characteristic of a Sphagnum peatland with the presence of a dense cover of (90% or more) of Sphagnum mosses. Photo 1 and Photo 2 show perspectives of the Mossy Marsh TEC.

A field and drone survey were undertaken on the 27 September 2018 and 5 November 2018, respectively to verify the presence of Sphagnum peatland and to map its boundaries. The surveys identified a 3.0 ha TEC, in excellent condition, located on gentle 0.25% slopes from 660.1 m AHD on the upstream edge to 659.0 m AHD on the southern perimeter, with a fall of just over 1.1 m over about 400 m. The fall from east to west of the Sphagnum peatland ranged from 0.4 m in the north, almost nothing in the mid-sections, and 0.2 m in the south.



Photo 1: Close Perspective of Mossy Marsh TEC (2018).



Photo 2: Wider View of the Mossy Marsh TEC.

2.5.2 Northern TEC

The Northern TEC is located on within the Wenworth Hills, on the western bank of a depression in the local landscape (Figure 5), and within the source of a structurally controlled watershed to the south. A small watercourse flows southward nearby to the Sphagnum peatland patch. The watercourse source (August 2024) was immediately west of the Sphagnum peatland, from a sedge-dominated and *Eucalyptus subcrenulata* forest and woodland high point at about 931 m AHD. It was assumed the source represented baseflow (groundwater) contributions as a seep or spring. The TEC patch is of low relief.

The Northern TEC is dominated by *Richea scoparia*. Photo 3 and Photo 4 show perspectives of the Northern TEC.

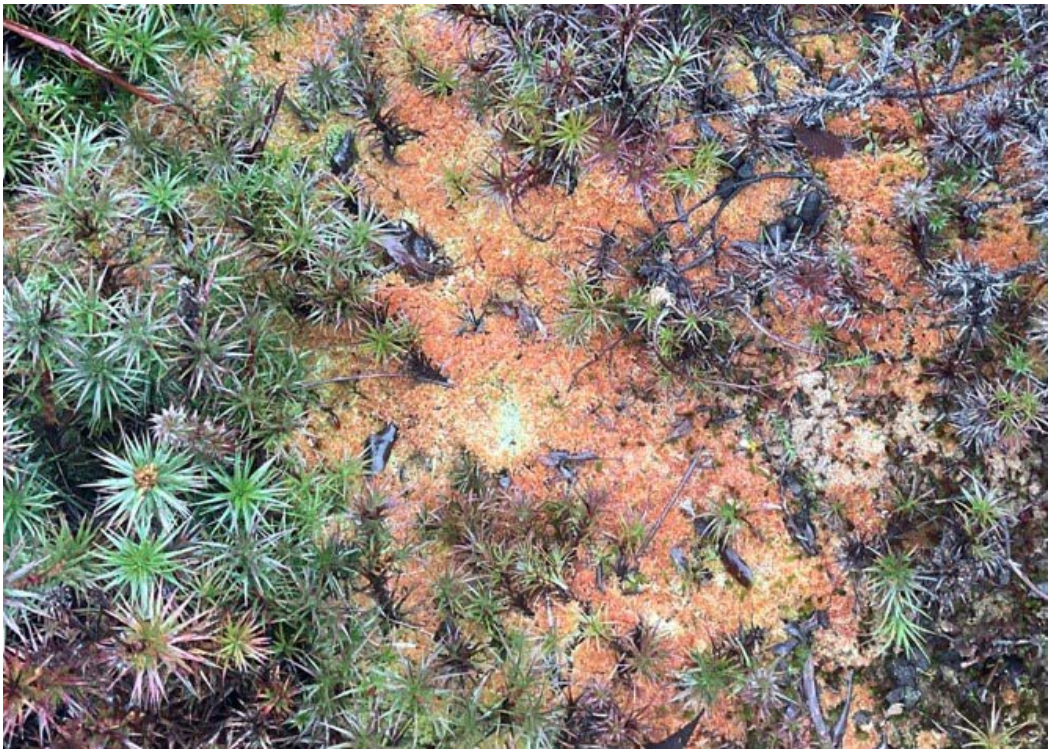


Photo 3: Close Perspective of Northern TEC (2024).



Photo 4: Wider View of the Northern TEC (2024).

2.6 Drained Structures

Within a hydrogeological context, “drained structures” are defined as anthropogenic elements that can locally drawdown the groundwater table and affect the baseline flow regimes. The existing drained underground infrastructure within the study area includes the Mossy Marsh Tunnel and Butler Gorge Tunnel. However, those tunnels might have been fully drained already in the past decades.

The proposed reference design includes the following elements of drained infrastructure:

- Lake King William Tunnel
- Headrace Tunnel
- Power Tunnel (partially unlined)
- Mid Access Tunnel
- Surge Access Tunnel
- Unlined Surge Shaft.

2.7 Stockpiles

There are three proposed stockpiles (West, Mid-point, and Paddy’s Quarry, as shown in Inset 1) aligned with the Project and positioned near the tunnel portals. The West Stockpile is located at the west end of the Power Tunnel, within the Upper Derwent Catchment. The Mid-point Stockpile in situated at the entry portal of the Mid Access Tunnel, spanning both the Upper Derwent and Lower Nive Catchments. The Paddy’s Quarry stockpiles, within the Lower Nive Catchment, comprise three sperate stockpiles (Stockpiles 1, 2, and 3) near the entry portal of Surge Access Tunnel.



Inset 6: Stockpile locations.

The footprint areas of West, Mid-point and Paddy’s Quarry stockpiles are approximately 23,211 m^2, 42,584 m^2, and 33,124 m^2, respectively.

3. Hydrogeological Data

This HIR is compiled based on available geological and geotechnical data, including information documents provided by Hydro Tasmania (that is, site investigations and associated geotechnical studies) and published literature. Available geotechnical data for the Project that was used to inform this assessment is within the Project GDR (December 2024) and included in the relevant appendices.

3.1 Relevant Geotechnical Data

3.1.1 Borehole Data

Boreholes have been categorized into three sets, presented in Figure 6 and in Appendix A, and groupings include:

- Historic Boreholes (pre-2019):
  - Includes historic logs and core photos.
- Phase 1 Boreholes (2019):
  - TA06DC series holes
  - Includes revised Entura-PSM logs and original core photos
  - All available borehole hydrogeological testing data.
- Phase 2 Boreholes (2022–2023):
  - TA-DC2 series holes
  - Includes Entura-PSM logs and core photos
  - All available borehole hydrogeological testing data.
- Phase 3a water monitoring Boreholes (2023-2024):
  - TA-MB3 series holes
  - Includes Entura-PSM logs and core photos
  - All available borehole hydrogeological testing data.

3.1.2 Test Pit Data

Test pit logs and photos to inform depth to rock. Also, laboratory testing of particle size distribution (PSD) and geotechnical tests for the refinement of soil units into geotechnical units, which have been adopted for this HIR.

3.2 Hydraulic Testing Data

Hydraulic testing along the Project alignment has been interpreted through:

- Packer tests in cored boreholes
- Slug tests in standpipe piezometers and augured holes.
- Guelph permeameter constant head tests in augured holes.

A summary of the successfully completed hydrogeologic tests per rock type are presented in Table 1. The distribution of the hydrogeology tests across the Project area is provided in Figure 7. The completed tests are only representative of the aquifer directly surrounding the well and poorly scale up to the aquifer scale. Pumping test would provide more reliable hydrogeologic parameters at the aquifer scale.

Table 1 – Summary of Hydraulic Testing Data

Test Type	Rock Type	Successful Tests	Typical Flow Behaviour
Packer Test	Tertiary Basalt	19	Laminar / Turbulent
	Tertiary Sediments	3	Uncertain – limited testing
	Jurassic Dolerite	144	Laminar / Turbulent / Void filling
	Triassic Sandstone	13	Turbulent / Void Filling
	Total	**179**	NA
Slug Test	Peat	4	
	Dolerite	5	
	Tertiary Sediments	1	
	Total	**10**	
Guelph Test	Peat	5	
	Residual Soil	9	
	Total	**14**	

3.2.1 Packer Tests

Testing sheets and depth plots are included in Appendix D. Packer tests were completed using single and double packer methods. Derived values of hydraulic conductivity from Lugeon values using both the Hoek and Bray Method (1981) and the Moye Method (1967), as presented on the packer test summary sheets.

3.2.2 Slug Tests

Rising and falling head slug tests were undertaken in open standpipes and augured holes. Interpretations of "early" and "late" portions of the test curve produced different results for the respective holes. Results are summarised in Table 1 and collated interpretations presented in Appendix D. Derived values of hydraulic conductivity are made using the Hvorslev (1951) slug test solutions for unconfined aquifers.

3.2.3 Guelph Tests

Constant head soil permeability tests were conducting using the Soil Moisture Guelph permeameter. Interpretation sheets are presented in Appendix D. The tests utilised both the single head analysis and double head analysis methods to assess shallow soil permeability ranges (Woessner and Poeter 2020). The validation of test results was undertaken using the methodology of Reynolds and Elrick (1985).

3.3 Groundwater Monitoring Data

Establishment of baseline groundwater conditions for heads and quality is concurrent with the time of writing of the report. PSM provided a baseline groundwater sampling program (TARDEV-PSM-GEO-XX-RP-G-0007) to Hydro Tasmania, which is currently being undertaken. The initial summer and autumn water sampling round have been completed from the program; however, it is just to run a complete 12-month term to capture annual data. The monitoring program based on groundwater head and groundwater quality sampling as described below.

3.3.1 Groundwater Head Monitoring

Groundwater head monitoring is achieved from dipped water levels of PVC standpipes and transient vibrating wire piezometer (VWP) dataloggers. The standpipe and VWP locations are presented in Figure 8 and Figure 9, showing head elevations and depths to standing water, respectively. A summary of standpipe and construction details is presented in Appendix A. Groundwater hydrographs for the monitoring points are in Appendix B. Further discussion on Project water levels can be found in Section 4.8.

3.3.2 Groundwater Quality Monitoring

The groundwater quality monitoring includes water sampling for laboratory analysis from selected standpipes and surface water ponds to establish the baseline conditions for the Project. Routine sampling is conducted to capture seasonal variation. The monitoring report details the recommended quality monitoring frequency and essential water quality parameters for both field and laboratory analysis. Initial baseline results are presented in Appendix C. Further discussion of the groundwater quality can be found in Section 4.9.

3.4 TEC Focused Site Investigations

Site investigations have been used to characterise the geology, structure, stratigraphy, and rock mass units associated with the Project alignment and to inform engineering design. Integral to the site investigations were the interpretations of stratigraphy and structure in Stuart-Smith (2023). The site investigations and rock mass unit classifications included hydrogeological attributes, with measurements of groundwater heads, hydraulic conductivity, and groundwater quality.

The site investigations had objectives across the Project domain but were also opportunistic in enabling characterisation of the surrounds to the Sphagnum peatland TECs. Descriptions of the TEC-focussed site investigations are provided below. Data from the site investigations are reported separately in the GIR (March 2025).

3.4.1 Mossy Marsh TEC

3.4.1.1 Preliminary Reconnaissance

A hydrogeological assessment was undertaken of the Mossy Marsh TEC using available topography, geology, local water balance analysis and the surrounding vegetation community information (Groundwater Consulting Australia 2022). This assessment concluded:

- The *Sphagnum peatland* community was likely to be rafted on saturated, fine-grained marsh (peat) deposits underlain by several meters of extremely weathered (clayey) basalt
- Groundwater was likely to be directly discharging to the surface, as springs, seeps, and baseflow or shallow to be accessible to shallow-rooted vegetation
- Groundwater was likely to contribute to the water content of the peat deposit and by association contribute to the vitality of the vegetation community
- The *Sphagnum* peatland dependency on groundwater was uncertain.

3.4.1.2 Hydrogeological Site Investigations

Hydrogeological site investigations within the Mossy Marsh TEC surrounds have included:

- Cored boreholes – TA06DC016, TA-DC207, TA-DC208, TA-DC242, TA-DC250, TA-DC252, TA-DC301, and TA-DC312
- Packer hydraulic tests – TA06DC016, TA-DC208, TA-DC250, and TA-DC301
- Packer and slug hydraulic tests – TA-DC207 and TA-DC312
- Standpipe monitoring bores – TA-DC207, TA-DC242, and TA-DC252
- Vibrating Wire Piezometers (VWPs) – TA-DC250, TA-DC252, and TA-DC301
- 18 test pits
- 8 Guelph permeameter tests
- Groundwater head and groundwater quality monitoring.

The locations of the localised Mossy Marsh hydrogeological site investigations are shown on Figure 10 (a). Boreholes TA-DC207, TA-DC242, TA-DC252, and TA-DC312 with associated standpipe monitoring bore constructions are located on the northern perimeter of the TEC.

3.4.2 Northern TEC

3.4.2.1 2024 Reconnaissance

Access to Wentworth Hills (Figure 1) and the Northern TEC setting is limited by steep terrain and few tracks. Site reconnaissance was conducted in multiple campaigns from June to August 2024. The watercourse that flows south through the two *Sphagnum* peatland patches was followed upstream to its source. The source (August 2024) was at about 931 m AHD immediately west of the northern patch of *Sphagnum* peatland. It was assumed the source represented baseflow (groundwater) contributions as a seep or spring. The small patch of *Sphagnum peatland* is low relief, and it appears that groundwater is slowly seeping into the creek. The main source of the creek seems to be a very soggy, sedge-dominated high point to the west of the *Sphagnum* peatland.

Hydrogeological site investigations within the Northern TEC surrounds have included:

- Photograph reconnaissance
- Hand-auger boreholes TA-AHSphagnum01 and TA-AHSphagnum02, with maximum depth up to 1.8 m at three sites
- Groundwater head observations.

The locations of the localised Northern TEC hydrogeological site investigations are shown on Figure 10(b). Specific logging of the hand-auger boreholes is described below. Dolerite bedrock outcrop was observed approximately 200 m southwest of the Northern TEC.

3.4.2.2 TA-AHSphagnum01

Two auger holes were attempted, spaced 2.0 m apart. The first hole intersected:

- Dark gey and brown humus rich soils – 0 to 0.2 m
- Brown, medium plasticity silty and sandy CLAY - 0.2 to 0.65 m
- Abrupt termination at 0.65 m on what was interpreted to be a rock (not bedrock).

The second hole intersected:

- Humus-rich soil – 0 to 0.2 m
- Brown, medium plasticity silty and sandy CLAY – 0.2 to 1.0 m
- Blue grey silty and sandy CLAY with minor organic matter – 1.0 to 1.6 m
- Moist, orange, brown, clayey, sandy GRAVEL – 1.6 to 1.8 m
- Refusal at 1.8 m in highly weathered dolerite bedrock.

Groundwater slowly entered each auger hole after drilling. The groundwater had risen to within 0.175 of the borehole collar after 30 minutes.

3.4.2.3 TA-AHSphagnum02

Two auger holes were attempted, approximately 5 m apart. The first hole intersected:

- Dark grey humus-rich soil – 0 to 0.2 m
- Brown, medium plasticity silty and sandy CLAY – 0.2 to 0.6 m
- Orange, brown, clayey, GRAVEL - 0.6 to 0.65 m
- Refusal at 0.65 m in highly weathered dolerite bedrock.

Groundwater rose to within 0.14 m of the borehole collar after 10 minutes.

The second hole at this site intersected an identical soil profile and depth to groundwater.

4. Conceptual Hydrogeological Model

4.1 Prospective Aquifers

A hydrogeology review of the geological and structural models, described in the GIR and Stuart-Smith (2023) respectively, reveals two principal water bearing units within the project area and are described using the following nomenclature:

1. Tertiary Palaeovalley.
2. Mesozoic Bedrock.

Both aquifers are anisotropic and in heterogeneous fractured rock with low storage (specific yield). Transmissivity is widely variable across both aquifers and may be comparatively enhanced at the confluence of faults and fracture zones given these intersections may host significantly deformed rock mass. Detailed conceptualisation of flow system behaviour is described in the following section.

4.1.1 Palaeovalley

The Nive River Palaeovalley is expressed on the western flank of the present-day Nive River Valley created by the incisions of the Nive River. Locally, the palaeovalley has been filled with a 150 m thick succession of columnar-jointed massive, amygdaloidal, and vesicular basalt flows, with typically thicknesses between 10 and 15 m. Interlayered with the basalt flows are unconformity zones characterised by scoria breccia, altered palaeosol material, and terrestrial unconsolidated sand and silt beds. Sediments commonly form a higher storage fluvio-lacustrine sequence in the base of the palaeovalley.

The basalts are of unknown source but likely flowed down the Nive River Palaeovalley from near Bronte Lagoon in the north, creating the stratified basalt stack. During deposition, the basalt flows would have partially or completely dammed the minor tributaries feeding the Nive River at the time, creating small lakes and preventing the movement of sediment downstream. This included the Mossy Marsh tributary which has locally the thickest intersections of

basal fluvial-lacustrine sediments (up to 50 m). Continued filling of the palaeovalley with the basalt flows eventually would cause the basalt to flow back up Mossy Marsh Tributary covering the sediments (Inset 7).

Connected porosity within the porous/vesicular basalt flows provides a component of primary permeability to the aquifer. The degree of porosity is highly variable across different flows ranging between 0 and 35% (visual assessment). Secondary permeability is provided through the prevalent columnar jointing of the basalt.

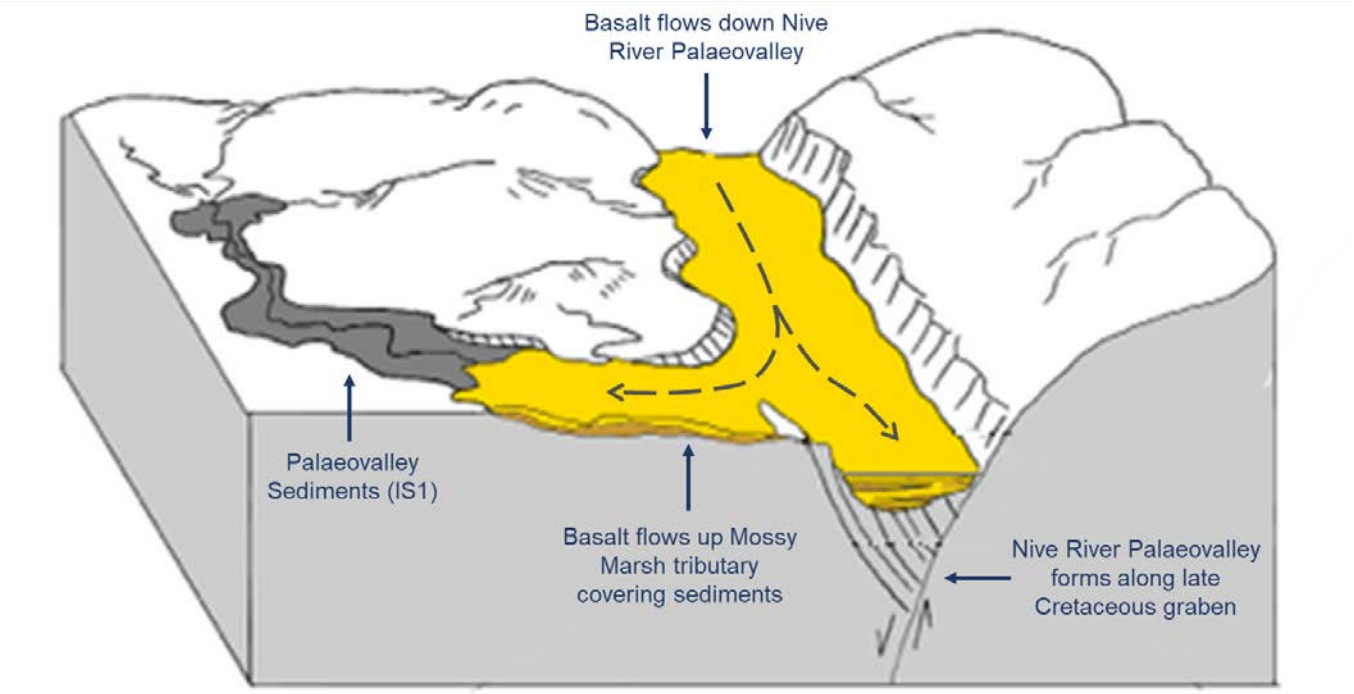


Figure adapted from Stuart-Smith (2023)

Inset 7: Schematic block diagram of interpreted Nive River Palaeovalley.

4.1.2 Mesozoic Bedrock

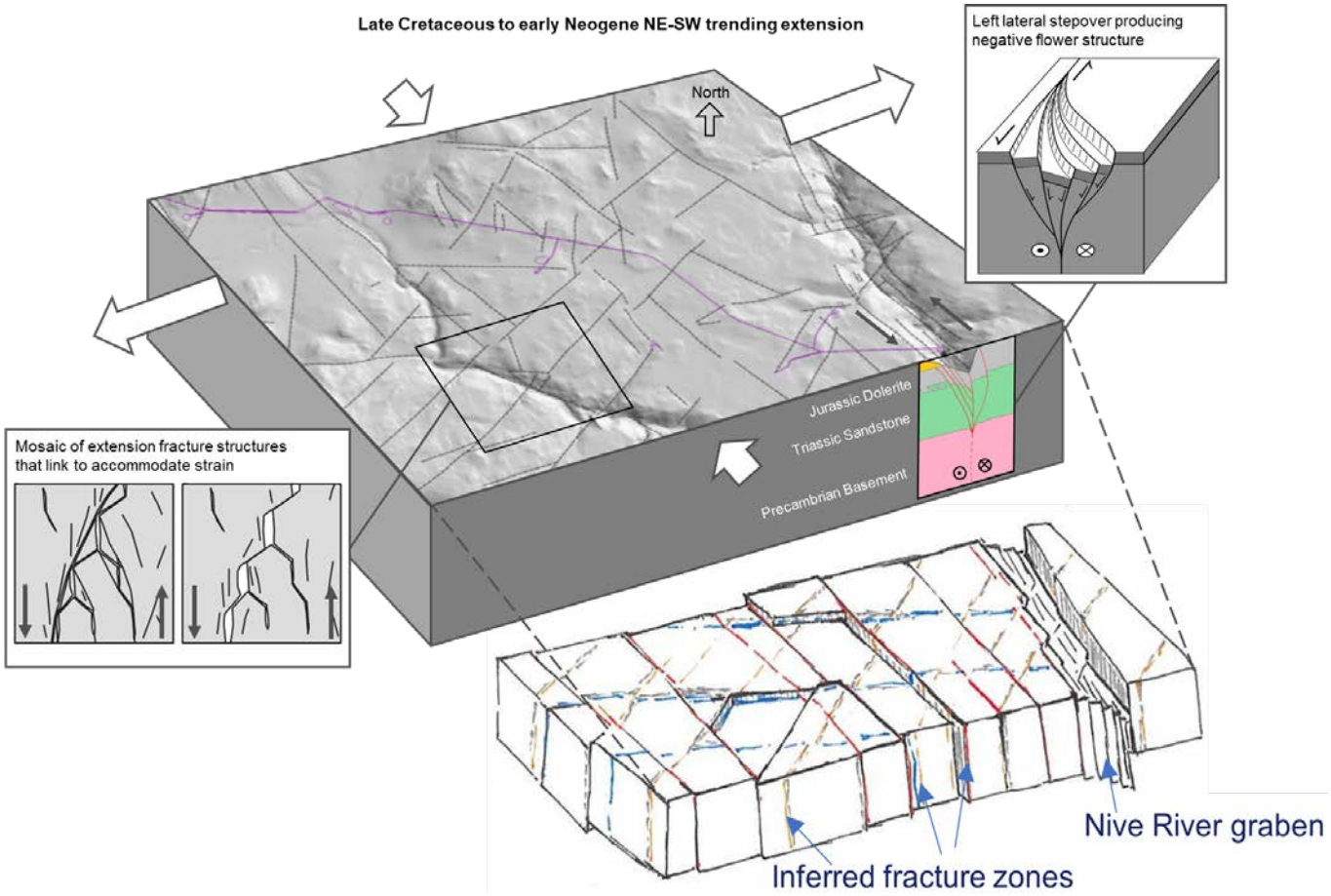
The basement rocks around the Project are typical of the Mesozoic sequences in Tasmania, including flat to shallow dipping Triassic Sandstone, intruded by laterally penetrating dolerite sills that locally cap the sedimentary beds. The top of the Triassic Sandstone where it forms a discordant contact with the overlying dolerite is inferred to be sub-horizontal and dipping gently (between 5 and 10 degrees) to the east.

The Triassic Sandstone is reported as lithified and without meaningful primary permeability. Instead, groundwater occurs within fractured rocks and is transmitted through secondary permeability.

Fracturing of the dolerite to produce the secondary permeability of the basement aquifer likely occurred during a period of northeast-southwest trending crustal extension during the Late Cretaceous (Inset 8). The interpreted geology and fracture zone distributions (Figure 11(a)) and connected geometries (Figure 11(b)) offer the following potential fractured rock flow mechanisms:

1. Vertical columnar joints which are developed throughout the Jurassic dolerite sills, formed by contraction during cooling after emplacement. The joints are pervasive on both outcrop and Project scales and control the dolerite fractured rock aquifer through a hexagonal framework of interconnected fracture zones.
2. The hexagonal fracture zone framework contains three equally weighted structural orientations:
    a. East to west striking
    b. Northeast to southwest striking
    c. Southeast to northwest striking.
3. The left lateral left stepover of the Nive River graben produces a negative flower structure. The graben structure is defined by down faulted dolerite blocks and associated fracturing around the fault planes.

Groundwater flow within the fractured dolerite aquifer is inferred to occur preferentially along the dolerite mosaic structures and fault damage zones, with little or no flow within the blocky dolerite rock. The geometry, persistence and distribution of the dolerite structures is described further in the GIR (March 2025).



Inset 8: Schematic block diagram of Mesozoic fractured rock aquifer.

4.2 Hydrogeological Rock Mass Units

Refinement of a conceptual hydrogeological model was achieved through the development of hydrogeological rock mass units (HRMUs). Classification of units was based primarily on the geotechnical rock mass units presented in the GIR. Other data sets used to classify the HRMUs were:

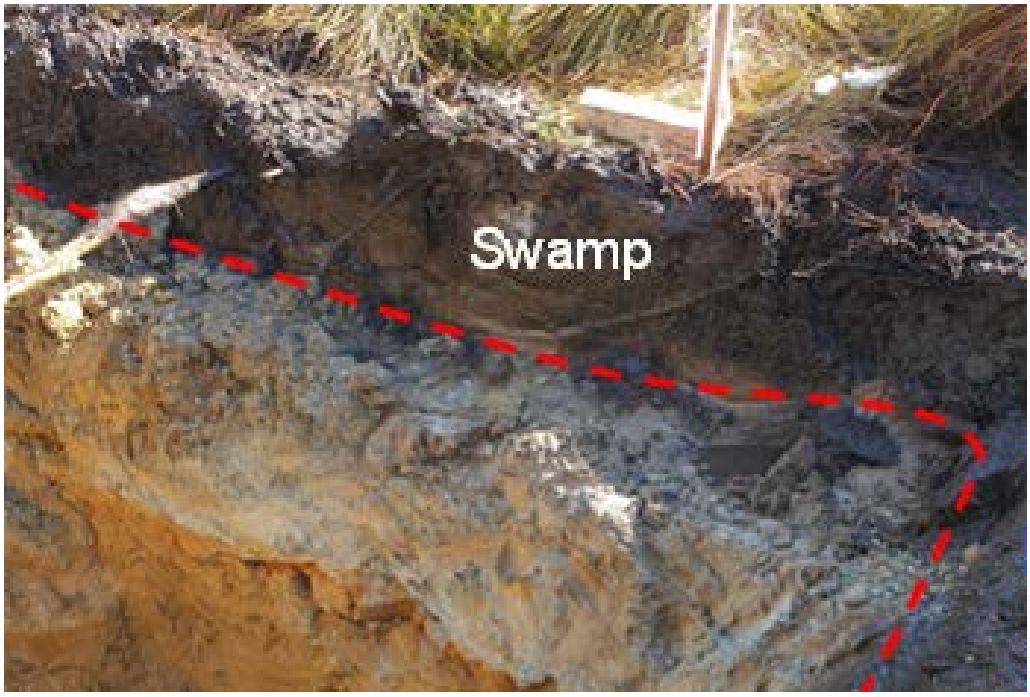
1. Core photos and geotechnical borehole log review.
2. Hydraulic packer testing.
3. Rising and falling head slug tests.
4. Stereographic structural data.
5. Auger hole and test pit data.

Abbreviation HRMU codes are based on the corresponding Geotechnical RMU where possible, with the addition of a hydrogeological (H-) prefix to differentiate.

A detailed description of each HRMU is included in Sections 4.2.1 to 4.2.5.

4.2.1 Soils

Soils units adopt classifications as defined in the GIR (March 2025). These are further categorised into alluvium and colluvium, glacial, and peat soil types. The distribution has been defined by Stuart-Smith (2023) and are shown in context to the Mossy Marsh TEC and Northern TECs in Figure 12. Inset 9 shows a peat soil profile as exposed in a test pit in the Mossy Marsh setting.



Inset 9: Test pit – peat soil profile.

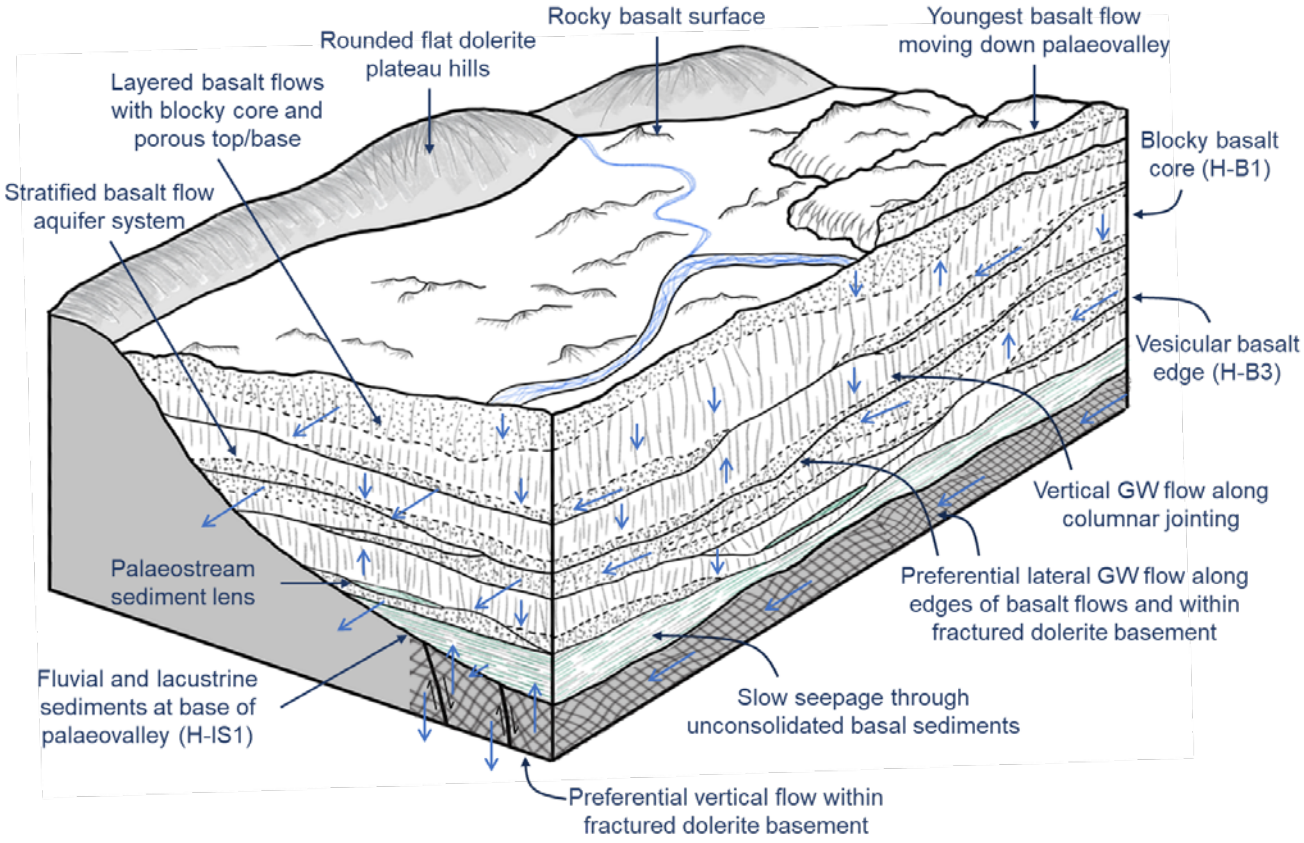
Typical attributes, morphology, and derivation of hydraulic conductivity (K) ranges for soil units are as follows:

- Colluvial and Alluvial Soils (SCol):
  - Alluvium included with colluvium, due to small localised spatial extent on flanks of Derwent River and Nive River, with a greater distribution around Butlers Gorge area
  - Colluvium on hillside flanks above banks of Derwent River and Nive River, with a greater distribution on the western slopes of the Wentworth Hills
  - Typically, clayey gravel and sand mixtures
  - Hydraulic conductivity range determined from 5 slug tests and the Hazen (1911) correlation between permeability and particle size distributions (PSD).
- Glacial Soils (SGl):
  - Observed in the flatter/lower lying areas of the Tarraleah Plateau within the limits of Quaternary glaciation. This extends from Lake King William, throughout Butlers Gorge, and as far east as the No.2 Pond
  - Very large range of grain sizes from boulders to clay (refer GIR)
  - Hydraulic conductivity range determined from typical ranges observed in glacial tills (Rosenshein and Bennett 1984).
- Peaty Soils (SPt):
  - Typically located within the mapped swampy areas around Mossy Marsh and associated surface water bodies on the Tarraleah Plateau
  - Thin horizons (1 to 3 m) with an organic silty clay grain-size distribution
  - Hydraulic conductivity range determined from in-situ slug and Guelph permeameter tests comparable to typical ranges observed in medium to highly decomposed peats (Kaczmarek et al. 2023).

The testing data for soils reflects a broad range of hydraulic conductivity as presented in Table 2. This broad range is not uncommon in fractured rock settings and indicates widely variable surface water percolation recharge rates.

4.2.2 Tertiary Basalt

Basalt is the dominant rock type within the palaeovalley aquifer. Multiple lava flow events formed the layered basalt sequence, which are interlayered by tuff deposits and palaeosols that accumulated during the intra-basaltic periods. Inset 10 shows a schematic block diagram of the inferred depositional setting and groundwater system of the palaeovalley aquifer. Figure 13(a) shows hydrogeological logs from TA-DC301 – basalt over dolerite terrain, with typical H-B1 core photographs.



Inset 10: Schematic block diagram of basalt aquifer palaeovalley flow systems and emplacement.

Vesicle size and intensity is variable within the basalt. Correlation of vesicle intersects across neighbouring boreholes reveals that individual lava flows are partially continuous across the palaeovalley. The basalt flows follow the traditional lava flow jointing and rock mass pattern of a solid aphanitic massive core with a porous and brecciated margin.

Columnar jointing is a common phenomenon within basalt and is well documented within the Tarraleah basalts (refer to GIR (March 2025) for structural model and stereo plots for basalt). The jointing is typically oriented vertical and present within lava flow core. This provides a vertical groundwater flow mechanism between individual lava flows. Flow behaviour is considered to occur preferentially along the porous brecciated basalt margins with the massive core restricting groundwater movement. Where permeable margins pinch out, groundwater is expected to move vertically within columnar blocky core to overlaying and underlaying H-B3 units.

Lithologies intersected by boreholes show the basalt aquifer can be divided as follows:

1. Massive and blocky Basalt (H-B1) – Photo 5:
    a. Rock mass is competent, with RQD typically >90% and defect spacing >0.5 m
    b. The lava flows are massive with very low to no connected porosity
    c. Rock mass is slightly weathered to fresh
    d. Columnar jointing provides secondary permeability, with vertical groundwater flow.



Photo 5: Example of core from TA-MB308, blocky basalt (H-B1).

2. Near surface Basalt (H-B5) – Photo 6:
    a. Where basalt is close to the surface, it has a lower RQD typically <80% and defect spacing of 0.1 to 0.5 m
    b. Rock mass contains slightly weathered to fresh boulders and high to extremely weathered seams
    c. Correlated to topography with basal depth ranges between 10 and 30 m
    d. Defects appear tight to partly open, with some clay infills from weathering. Applied hydraulic conductivity range is inferred to be like the near-surface dolerite (H-D2) described below.



Photo 6: Example of core from TA-DC266, near surface basalt (H-B5).

3. Basalt Flow Margins (H-B3) – Photo 7 and Photo 8:
    a. Vesicle size and intensity is sufficient to enable permeable flow within connected porosity
    b. Locally brecciated near contacts of individual flows creates secondary permeability
    c. Preferential lateral groundwater flows due to geometry of flow margins
    d. Contains thin palaeo-sol and tuff horizons between flows, typically <2 m thick
    e. Rock mass is mostly slightly weathered to fresh with highly weathered palaeo-sols
    f. Palaeo-sols have demonstrated variable hydraulics from the degree of weathering.



Photo 7: Example of core from TA-DC262, porous basalt (H-B3).



Photo 8: Example of core from TA-DC246, palaeo-sols (H-B3).

4.2.3 Tertiary Sediments

The Tertiary sediments are described as pebbly, sandy and silty clay beds, alternating with boulder gravel beds that contain predominantly basaltic clasts. The Tertiary sediments were deposited in a fluvial lacustrine environment. Stratigraphically, they sit below the basalt in the base on the palaeovalley (Inset 10). Lenses of sediment may be present within the basalt, between individual lava flows. The sediments are unconsolidated and may host most of the storage within the aquifer. The elements to be considered for incorporation into the conceptual model are:

1. Tertiary Sediments – Photo 9:
    a. Stratified fluvial lacustrine deposits of clayey silts with occasional occurrences of sands and gravels
    b. Confidence in hydraulics is not well refined due to only four packer tests completed within this HRMU. Distribution in lugeon values attributed to testing of different grain-size beds within the unit
    c. Presence of low permeability beds from packer tests suggests there is potential to act as a confining or semi-confining unit between the basalt and dolerite
    d. Borehole intersection thickness is variable across the palaeovalley, ranging between 1 and 50 m. Subsequent low confidence in sediment distribution.



Photo 9: Example of core from TA-DC242, Tertiary sediments (H-IS1).

4.2.4 Jurassic Dolerite

The dolerite sill intruded into the basement geology sits unconformably below the Tertiary sediments and basalt flows. Groundwater is hosted within a fractured rock aquifer, where secondary permeability is provided by interconnected joint systems, open veins, sheared zones and fracture zones. Figure 13(b) shows hydrogeological logs from TA-DC250 dolerite fracture zone intersections together with typical H-D3, H-D4, and H-D5 HRMU core photographs.

4.2.4.1 HRMU Core Photos

A range of rock mass conditions are observed within the dolerite, with a detailed structural assessment and rock mass classification undertaken in the GIR. Findings from the GIR have been applied to the hydrogeology conceptual model, with division of the dolerite into analogous hydrogeology RMUs:

1. Blocky Dolerite (H-D1) – Photo 10:
    a. Rock mass is competent, RQD typically >95 per cent and defect spacing >1.5 m
    b. Rock mass is slightly weathered to fresh
    c. Intact rock mass. Jointing provides secondary permeability, with preferential vertical groundwater flow
    d. Joints are very tight to tight.

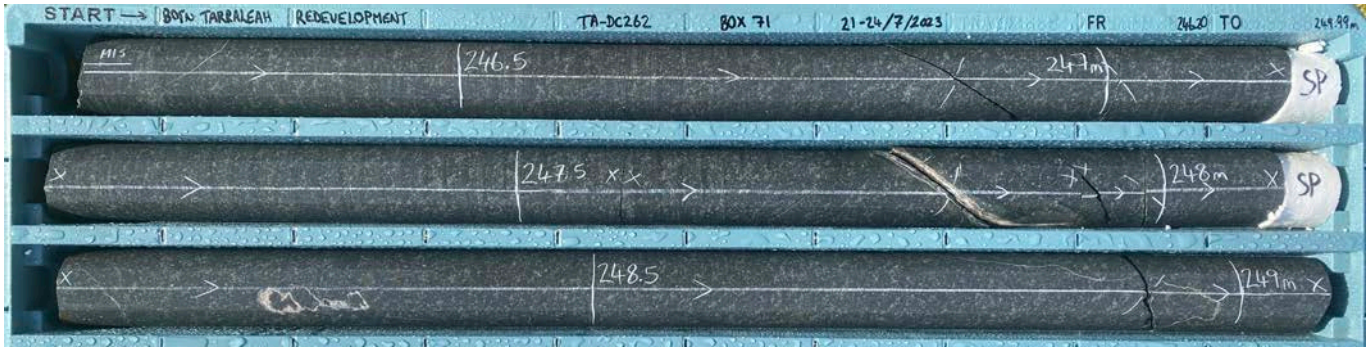


Photo 10: Example of core from TA-DC262, blocky dolerite (H-D1).

2. Near-surface Dolerite (H-D6) – Photo 11:
    a. Dolerite is close to the surface, has an RQD typically <80 per cent and defect spacing of 0.1 to 0.5 m
    b. Rock mass is highly to slightly weathered
    c. Occurrence is correlated to topography, with depth from surface ranging between 10 and 30 m
    d. Joints are tight to partly open. Some clay infills from weathering.



Photo 11: Example of core from TA-DC275, near surface dolerite (H-D6).

3. Blocky-broken Dolerite (H-D3) – Photo 12:
    a. Very block rock mass often associated with areas of tectonic deformation
    b. RQD typically > 95 per cent and defect spacing from 0.5 to 1.5 m
    c. Rock mass is moderately weathered to fresh
    d. Has both sub-vertical columnar jointing and inclined joints which provide secondary permeability
    e. Joints are tight to partly open.

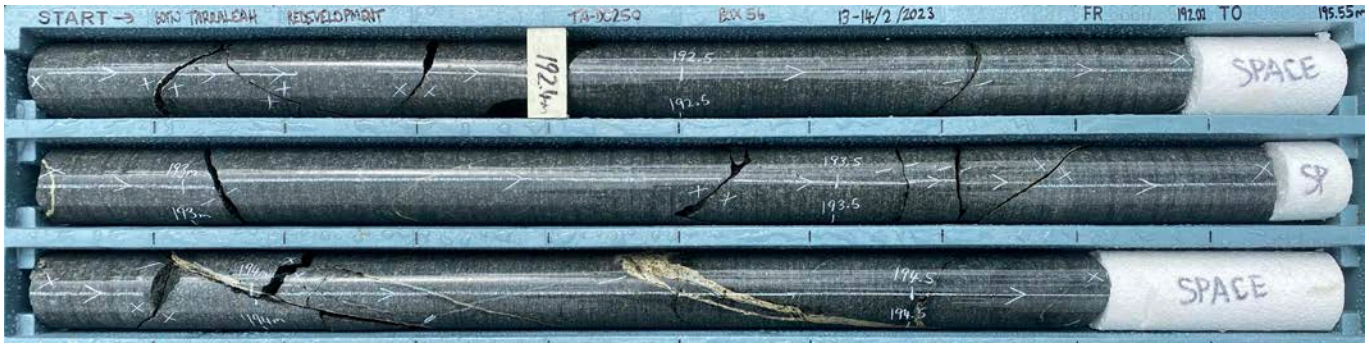


Photo 12: Example of core from TA-DC250, blocky-broken dolerite (H-D3).

4. Fractured Dolerite (H-D4) – Photo 13:
    a. Very blocky to disturbed rock mass with closely spaced jointing, breccia damage zones, and shears
    b. Rock mass is moderately weathered to fresh
    c. Primary groundwater flow medium in dolerite
    d. Defects are between tight to many open.

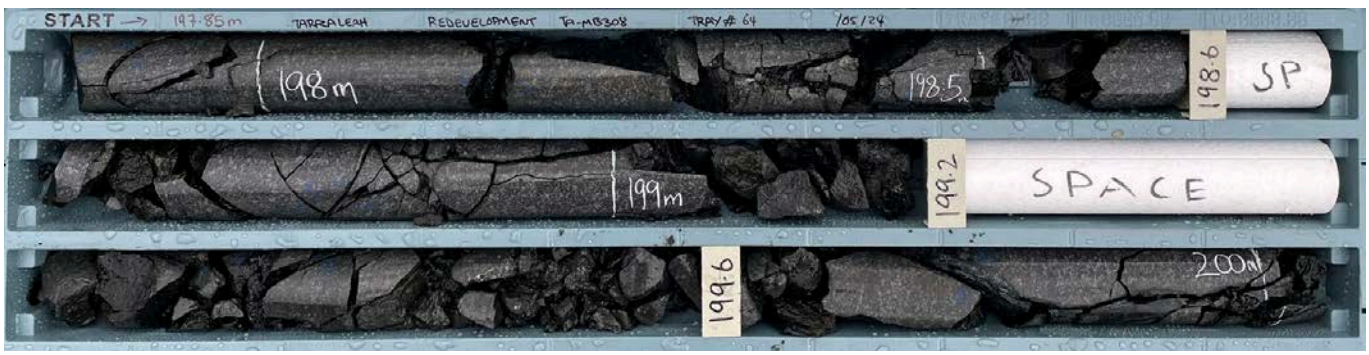


Photo 13: Example of core from TA-MB308, fractured dolerite (H-D4).

5. Sheared Dolerite (H-D5) – Photo 14 and Photo 15:
    a. Disintegrated to disturbed rock mass
    b. Characterised by faults and shears, crushed zones, and brecciated zones with zeolite-carbonate infills
    c. Variable between extremely to slightly weathered and can have a deep weathering profile with oxidation along sheared zones
    d. Defects between very tight to some open.



Photo 14: Example of core from TA06DC016, sheared dolerite (H-D5).

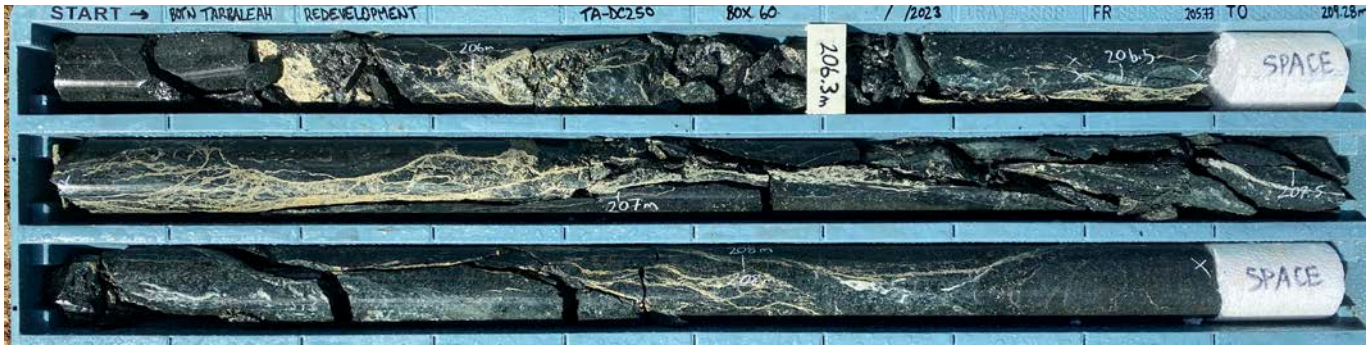


Photo 15: Example of core from TA-DC250, zeolite infill in sheared dolerite (H-D5).

A further HRMU is incorporated into the dolerite hydraulics model to capture the anomalous high yield flows within discrete veins, identified from packer testing.

6. High Yield Dolerite Defects (H-D0) – Photo 16:
    a. Hydro rock mass unit to capture anomalous hydraulic testing data in competent rock which reported comparatively high Lugeon values
    b. Discrete unit where groundwater flows are typically confined to 1 or 2 defects
    c. Defects are both sub-horizontal and sub-vertical, very persistent, have a small aperture of <10 mm, have zeolite or carbonate growth, can accommodate high yields of >2 L/s
    d. Distributed across the Project and likely formed as large-scale cooling joints of the dolerite sill emplacement
    e. Considered part of a different defect set species than the fracture zones, with unique characteristics and groundwater flow parameters.



Photo 16: Example of core from TA-MB309, high yield dolerite vein (H-D0).

4.2.4.2 Dolerite fracture Zone Conceptualisation

Conceptualisation of HRMUs within the vertical dolerite fracture zones is presented in Inset 11. Broad 60 to 300 m wide "fracture zones" are identified from topographic depressions, geophysical surveys and borehole coring. These dolerite fracture zones are comprised of numerous discrete damage zones.

For the conceptual hydrogeology, individual H-D4 damage zones were simplified to be of vertical orientation and between 1 and 15 m wide, forming the preferential groundwater flow structures within the broader, up to about 450 m width, dolerite fracture zones. Between the discrete damage zones is typically H-D1/H-D3, very blocky rock mass, which has a lower groundwater flow potential and limits connection between discrete H-D4 HRMU zones. The arrangement of the H-D4 fracture zones means that groundwater flow is preferential vertically and along strike, with lesser flow potentials in the country rocks of competent H-D1 massive rock mass.

The H-D0 HRMU was difficult to assimilate in the three-dimensional fracture zone conceptualisation because:

- The drillhole intersections were widely and randomly spaced
- The lateral and vertical extents of the individual H-D0 defects were not defined
- Potential interconnections between individual H-D0 defects were unable to be confidently identified in three-dimensional block models
- Fracture attitudes were variable between sub-horizontal and sub-vertical
- Apertures were < 10 mm, hence comparatively finite
- Connections of H-D0 defects to recharge sources that be required to promote sustained flows.

A reasonable conceptualisation is that if the sub-horizontal and sub-vertical H-D0 fractures have extensive lateral and vertical extents, they would intersect the H-D4 fracture zones. In doing so, they would contribute to the H-D4 fracture zones, forming part of this interpreted network. By the nature of the H-D4 and H-D0 comparative footprints (dimensions, spread, connectivity, hydraulics, and capture of surface water recharge sources), the H-D0 fractures form a subordinate part of the wider fractured rock aquifer. Further context in relation to the H-D0 fractures being subordinate includes:

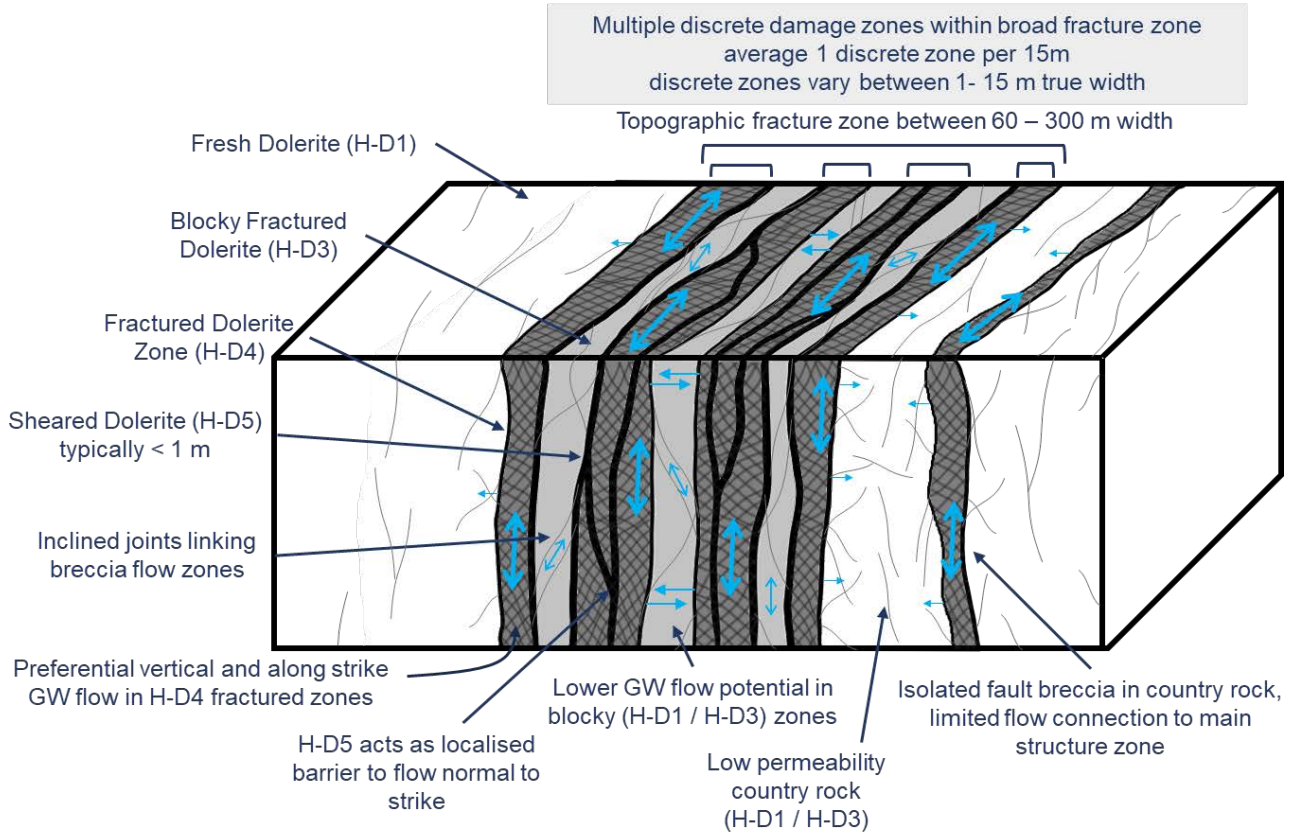
- The H-D0 fractures from individual discrete features
- The H-D1/H-D3 and H-D4 fracture zones host many small aperture fractures, with cumulative aperture thickness significantly exceeding that of the individual H-D0 fractures
- Under Darcy's Law and Cubic Law principles:
  - The flow rate in a single H-D0 fracture is proportional to the cube of the <10 mm fracture aperture
  - The flow rate in the individual 1 to 15 m with H-D4 damage zones is proportional to the cube of the sum of all fracture apertures within this zone
  - The flow rate in the broader H-D1/H-D3 and H-D4 fracture zones is proportional to the cube of the sum of all fracture apertures within this zone.
- Estimates of instantaneous maximum inflows to a tunnel (based on Goodman et al 1965) ranged from about 8 to 12 L/s, assuming a fracture hydraulic conductivity of 4 m/day and head of 100 to 200 m
- The inflow estimates would quickly decay in:
  - Fractures of limited extents
  - Fractures not connected to a perennial recharge source.

  That is, the sub-horizontal fractures would not produce sustained high inflows unless connected to sub-vertical fractures, which in turn were connected to perennial recharge source.

Conceptually the uncertainty culminated in an approach where the H-D0 defects were imbedded in the broader dolerite HRMUs. Contextually, this conceptualisation reflected that the H-D0 fracture zones would need to be connected to and integrated with the broader H-D1/H-D3 and H-D4 fracture zones to impose meaningful influences on inflows and drawdown. That is, one their own the individual H-D0 defects form a subordinate part of the groundwater flow field.

In three-dimensional context, these zones where intersected or near the tunnel excavations may promote:

- Local influences on short-term inflow rates to the tunnels
- Localised enlargement of drawdown amplitudes and extents in settings where they may bridge between the fracture zones
- Difficulties in grouting to limit inflows.



Inset 11: Schematic block diagram of fractures zones within dolerite.

4.2.5 Triassic Sandstone

The Triassic Sandstone is intersected by two geotechnical boreholes at the headrace portal intake. It is locally described as thinly bedded, laminated fine to medium-grained, well-sorted, quartz sandstone with minor pebbly lithic quartz sandstone, micaceous silty sandstone, and siltstone. Rafts of Triassic Sandstone have also been identified below the Tertiary units on the flanks of the Tarraleah Hillside and on the plateau in TA-DC246 and TA-DC266.

It is understood that these are remnant rafts of the basement rock, isolated during dolerite sill emplacement. For incorporation into the conceptual model, the elements to be considered are:

1. Triassic Sandstone (H-TS) Photo 17 and Photo 18:
    a. Rock mass is competent. RQD is typically 70 to 100 per cent and defect spacing typically 0.5 to 3 m
    b. Secondary permeability provided by joints and bedding partings
    c. Joints are very tight to tight
    d. Rock mass hydraulic conductivities cover a broad range as derived from hydraulic packer tests.

Triassic sandstone rafts exhibit weathering conditions from fresh to extremely weathered. Joints vary from very tight to open. The rafts were not differentiated from Triassic Sandstone bedrock given absence of hydrogeological tests.

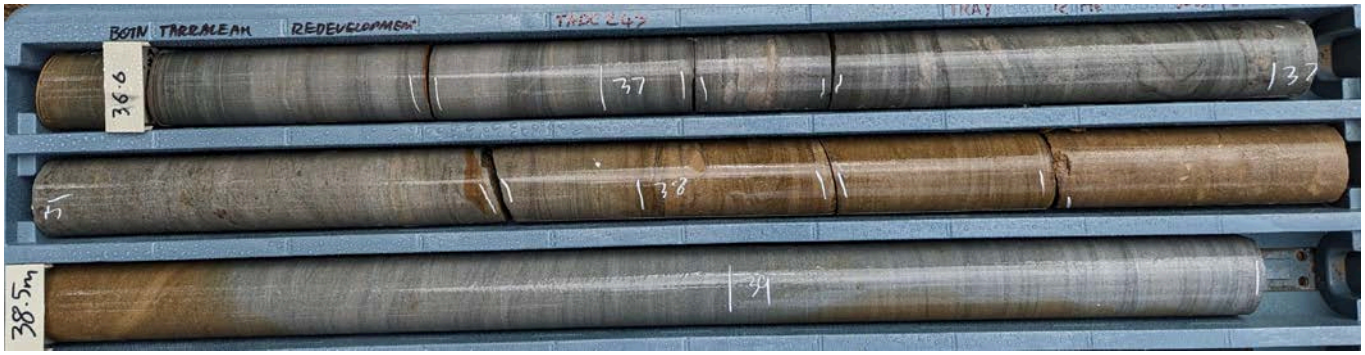


Photo 17: Example of core from TA-DC247 Triassic Sandstone Bedrock (H-TS).



Photo 18: Example of core from TA-DC266 Triassic Sandstone Raft (H-TS).

4.3 HRMU Distributions on Sections

Four hydrogeological schematic cross-sections have been produced to aid in the conceptualisation of the groundwater environment and to inform the groundwater flow numerical model. The cross-sections show:

- Completed diamond boreholes adjacent to section line with domain HRMUs
- Distribution of HRMUs
- Geological relationship of bedrock structure and HRMUs
- Lugeon values from packers at test interval depths
- VWP installations and associated pore pressures
- Baseline water tables (as described in Section 4.8)
- Infrastructure alignment within HRMUs.

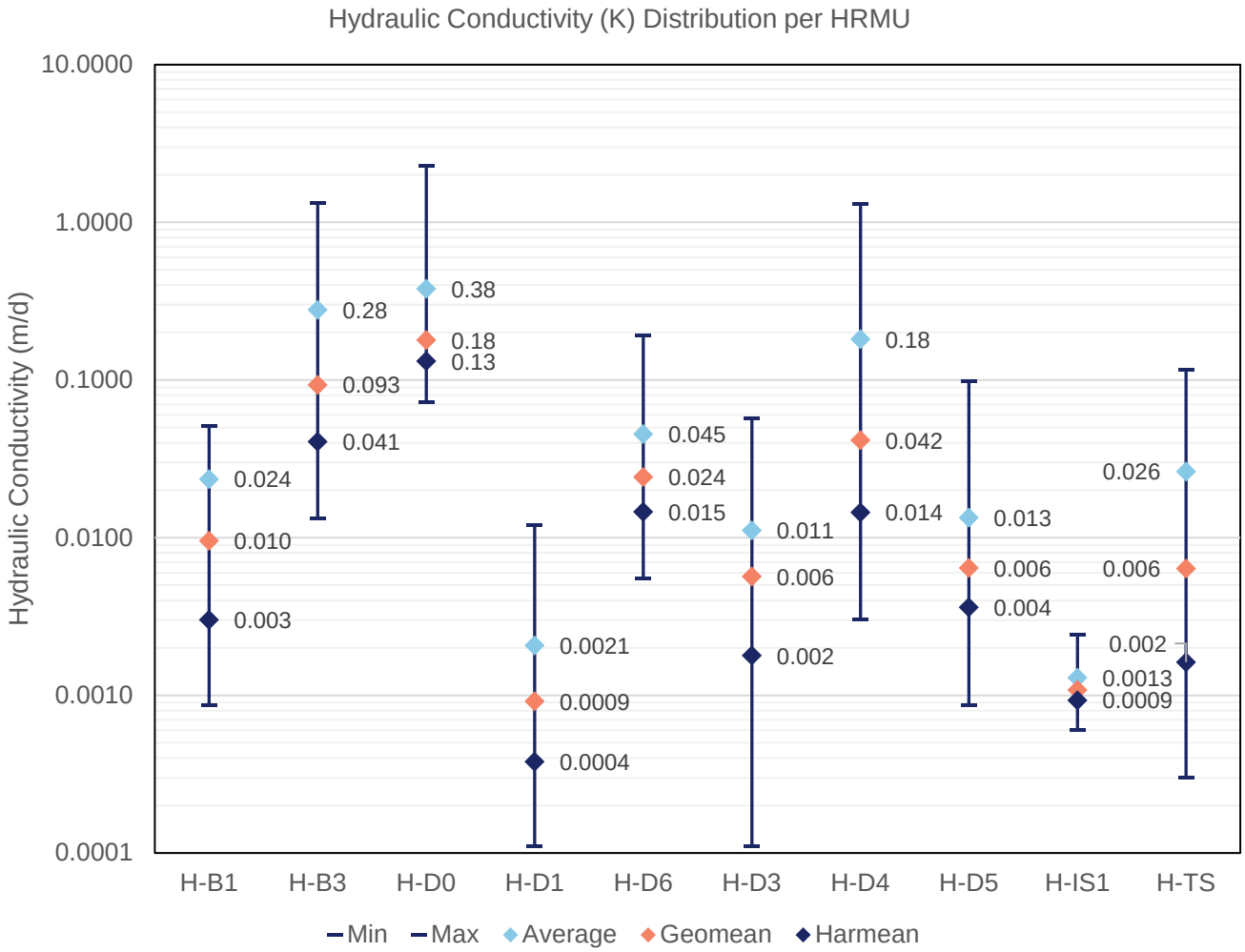
For detailed section drawings, refer to the GIR. The four sections are located at the:

1. Existing Tarraleah Hillside Penstocks – (Figure 14).
2. Power Tunnel Alignment, Tarraleah Hillside – (Figure 15).
3. Upper Headrace Tunnel, west and east portions - (Figure 16 and Figure 17).

4.4 Interpreted HRMU Hydraulics

4.4.1 Packer Test Interpretations

Inset 12 describes hydraulic conductivity for each HRMU based primarily on Lugeon test distributions. The Lugeon test distributions were derived from packer testing data (Appendix D).



Inset 12: Hydraulic conductivity distribution per HRMU derived from packer test data.

4.4.2 Summary of Interpreted HRMU Hydraulic Conductivity

Table 2 contains a summary of all HMUs with interpreted ranges of hydraulic conductivity.

Table 2 – Interpreted HRMU Hydraulic Conductivity

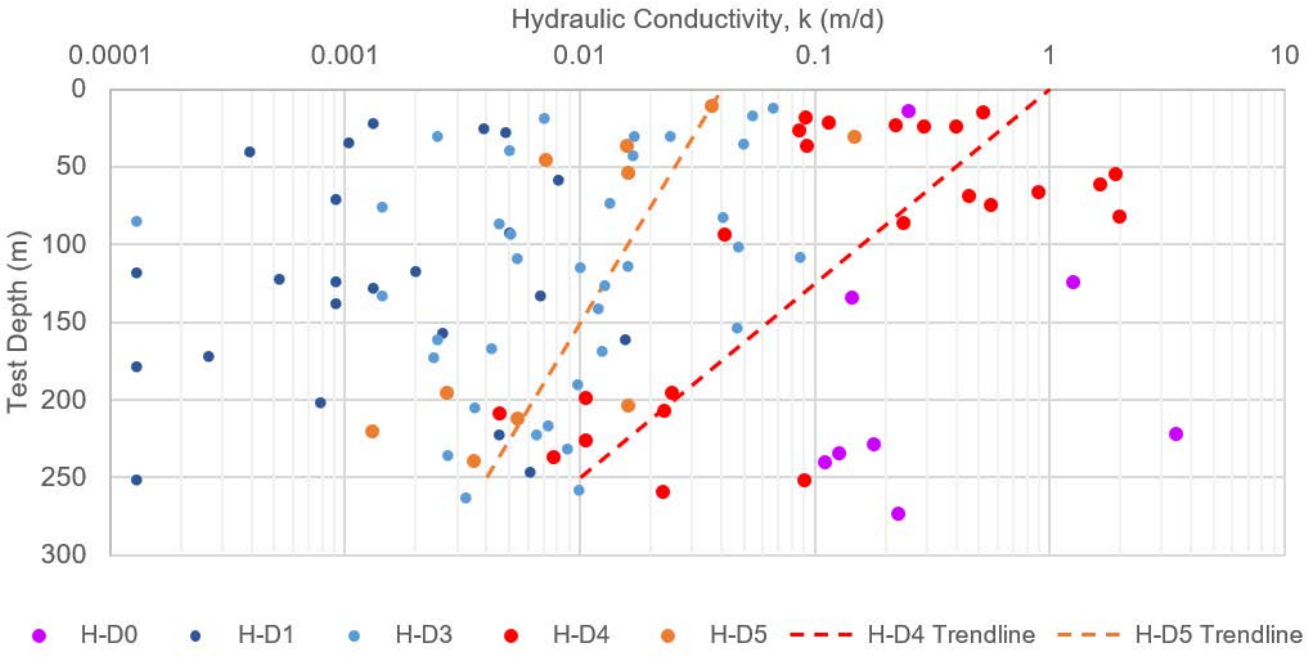
HRMU Code	Lithology	Brief Description	Lugeon Range	No. of Tests	Applied Hydraulic Conductivity Range (1)	
					m/s	m/day
SCol	Soil	Alluvium / Colluvium.	-	5 (3)	3.1×10^{-7} – 1.5×10^{-4}	0.027 – 13
SGl (2)		Glacial till.	-	-	1.2×10^{-9} – 1.2×10^{-5}	0.0001 – 1
SPt		Peat swamp.	-	11 (3)	1.2×10^{-8} – 9.0×10^{-7}	0.001 – 0.075
H-B1	Basalt	Massive and blocky Basalt.	0.10 – 5.87	7	3.5×10^{-8} – 4.1×10^{-7}	0.003 – 0.024
H-B3		Basalt Flow Margin.	1.54 – 153	12	4.7×10^{-7} – 4.8×10^{-6}	0.04 – 0.42
H-B5		Broken near surface Basalt.	-	0 (4)	1.7×10^{-7} – 7.9×10^{-7}	0.015 – 0.068
H-IS1	Tertiary Sediments	Mudstone, semi-consolidated silts, fine sands.	0.01 – 0.28	3	1.1×10^{-8} – 2.3×10^{-8}	0.001 – 0.002
H-D0	Dolerite	Anomalous high yield defects.	8.4 – 263.8	10	1.1×10^{-6} – 4.6×10^{-5}	0.1 – 4.0
H-D1		Intact or massive to blocky rock mass, joint spacing > 1.0 m.	0.001 – 1.18	25	4.4×10^{-9} – 3.6×10^{-8}	0.0004 – 0.003
H-D3		Blocky-broken rock mass with typical joint spacing between 0.3 and 1.0 m. Some reduction in rock mass strength and increased weathering possible.	0.002 – 6.62	39	2.1×10^{-8} – 1.9×10^{-7}	0.002 – 0.017
H-D4		Shallow D4 (<100 m). Very blocky/disturbed rock mass. Closely spaced jointing, discrete faults and shears.	0.35 – 152	37	2.0×10^{-6} – 6.8×10^{-6}	0.18 – 0.59
		Deep D4 (>100 m). Same as above but defects tighten with depth.			1.4×10^{-7} – 2.8×10^{-7}	0.012 – 0.024
H-D5		Shallow D5 (<100 m) Disintegrated to blocky/disturbed rock mass. Characterised by faults and shears, crushed and brecciated.	0.10 – 11.3	17	1.9×10^{-7} – 5.1×10^{-7}	0.017 – 0.044
		Deep D5 (>100 m). Same as above but defects tighten with depth.			3.5×10^{-8} – 6.7×10^{-8}	0.003 – 0.006
H-D6		Jointed rock mass with typically joint spacing between 0.6 and 2 m.	0.64 – 22.3	8	1.7×10^{-7} – 7.9×10^{-7}	0.015 – 0.068
H-TS	Triassic Sandstone	Intact to blocky siltstone and sandstone, and HW and EW Triassic rafts.	0.04 – 13.5	13	1.9×10^{-8} – 4.6×10^{-7}	0.002 – 0.04

(1) Applied hydraulic conductivity ranges for HRMUs (excluding soils) are derived from packer testing data distributions (see Inset 12) and based on the numerical average, geometric mean, and harmonic mean.
(2) Applied hydraulic conductivity ranges for glacial soils are indicative only and not supported by hydrogeologic testing (see Section 4.2.1).
(3) Slug tests and Guelph tests (not packer tests).
(4) No testing data for H-B5 so applied hydraulic conductivity range assumed to be comparable to H-D6.

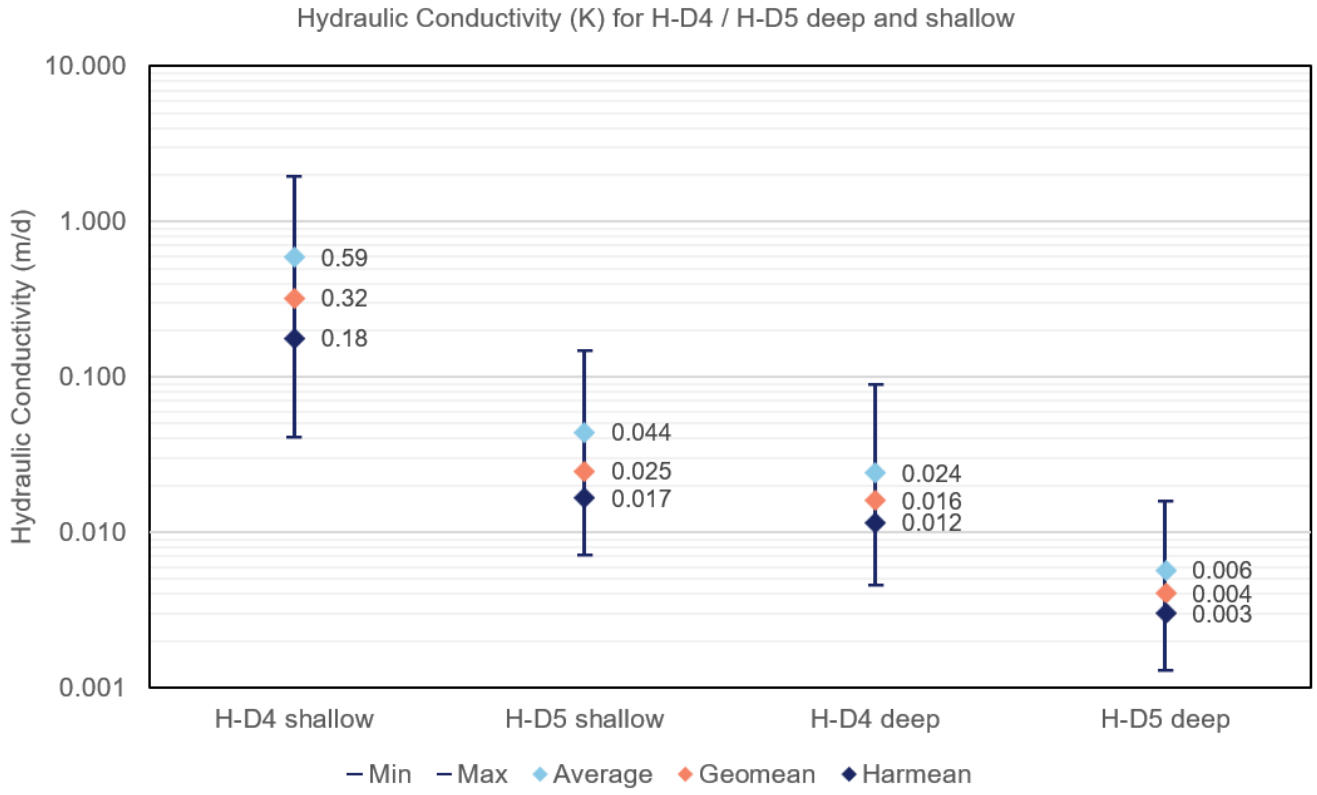
Hydro Tasmania

4.4.3 Hydraulics and Depth Relationships

The relationships between hydraulic conductivity and depth are shown in Inset 13. The plot includes all packer test data outside of the Nive River Graben. The data has been split by dolerite HRMUs and shows a decrease in hydraulic conductivity with depth for the units H-D4 and H-D5. Inset 14 presents numerical averages of data distributions from Inset 13. These are used to inform applied hydraulic conductivity values for the H-D4 and H-D5 HRMUs (Table 2).



Inset 13: Hydraulic conductivity versus packer test depth.



Inset 14: Revised hydraulic conductivity distributions for H-D4 and H-D5.

4.4.4 Applications to the Numerical Model

The conceptual hydrogeological elements described above require simplification to be incorporated into the numerical groundwater model. Of primary interest was the geometry of the basalt flows within the Tertiary Palaeovalley and the hydraulics of the fracture zones in dolerite. To account for integration with the numerical model the grouped HRMUs will have anisotropy applied (Table 3). The integration of wetland soils into the numerical model is discussed in Section 4.7.

Borehole coverage in the Tertiary Basalt is good in some locations and poor in others. As such, drawing correlations between boreholes is subject to uncertainty due to discrete basalt flow persistence. Instead of being modelled as discrete flow horizons, the basalt profile will be modelled as a single unit where the predominant flow orientation (H-B3 hydraulics) is in the horizontal direction and vertical hydraulic conductivity (H-B1 hydraulics) restrict vertical flow.

Due to the mesh size of the numerical model, the 1 to 15 m width H-D4 and H-D5 units within the vertical fracture zones are unable to be individually discretised in the numerical model. Instead, the dolerite fracture zones are simulated as one zone, with a single set of hydraulic properties that captures the flow characteristics presented in Inset 11. Fracture zones are extended from those presented by Stuart-Smith (2023) to form an interconnected and integrated aquifer and flow system which allows for inflows from and drawdown propagation between fracture zones of differing strike orientations. The fracture zones used for the numerical modelling are presented in Figure 11(b).

The H-D0 HRMU was not discretised in the groundwater model. Based on the conceptualisation (Section 4.7 the H-D0 HRMU distributions were random and difficult to assimilate within a three-dimensional fracture zone block model, making them difficult to explicitly represent in the groundwater model. The upper-bound model parameterisation, however, respected that widespread and interconnected preferred flow paths like the H-D0 HRMU may occur and be intersected by the tunnels, potentially leading to sustained higher inflow potentials where they form persistent preferred flow paths connected to surface water recharge sources. Hence, the upper-bound model was viewed as a reasonable hybrid which captured the essence of the H-D0 HRMU without explicit representation.

Table 3 – Adapted Hydraulic Properties for Integration Within the Numerical Model

HRMU	Hydraulic Conductivity					
	Conceptual Range (m/day)	Numerical Range (m/day)			Anisotropy	
		Lower	Base	Upper	Kx : Ky : Kz	
Tertiary Basalt						
H-B1	0.003 – 0.024	0.04	0.1	0.42	10: 10 : 1	
H-B3	0.04 – 0.42					
Tertiary Sediments						
H-IS1	0.001 – 0.002	0.001			1: 1 : 1	
Dolerite Country Rock						
H-D1	0.0004 – 0.003	0.0004	0.001	0.003	1: 1 : 2	
H-D6	0.015 – 0.068	0.02			1: 1 : 1	
Dolerite Structures, Shallow (<100 m)						
H-D3	0.002 – 0.017	0.015	0.05	0.1	1: 1 : 2	
H-D4 (s)	0.18 – 0.59					
H-D5 (s)	0.017 – 0.044					
Dolerite Structures, Deep (>100 m)						
H-D3	0.002 – 0.017	0.003	0.01	0.02	1: 1 : 2	
H-D4 (d)	0.012 – 0.024					
H-D5 (d)	0.003 – 0.006					
Triassic Sandstone						
H-TS	0.002 – 0.04	0.002	0.006	0.02	1: 1 : 1	
Wetland Soils						
SPt	0.001 – 0.075	0.001	0.01	0.075	1: 1 : 1	

4.5 Groundwater Recharge

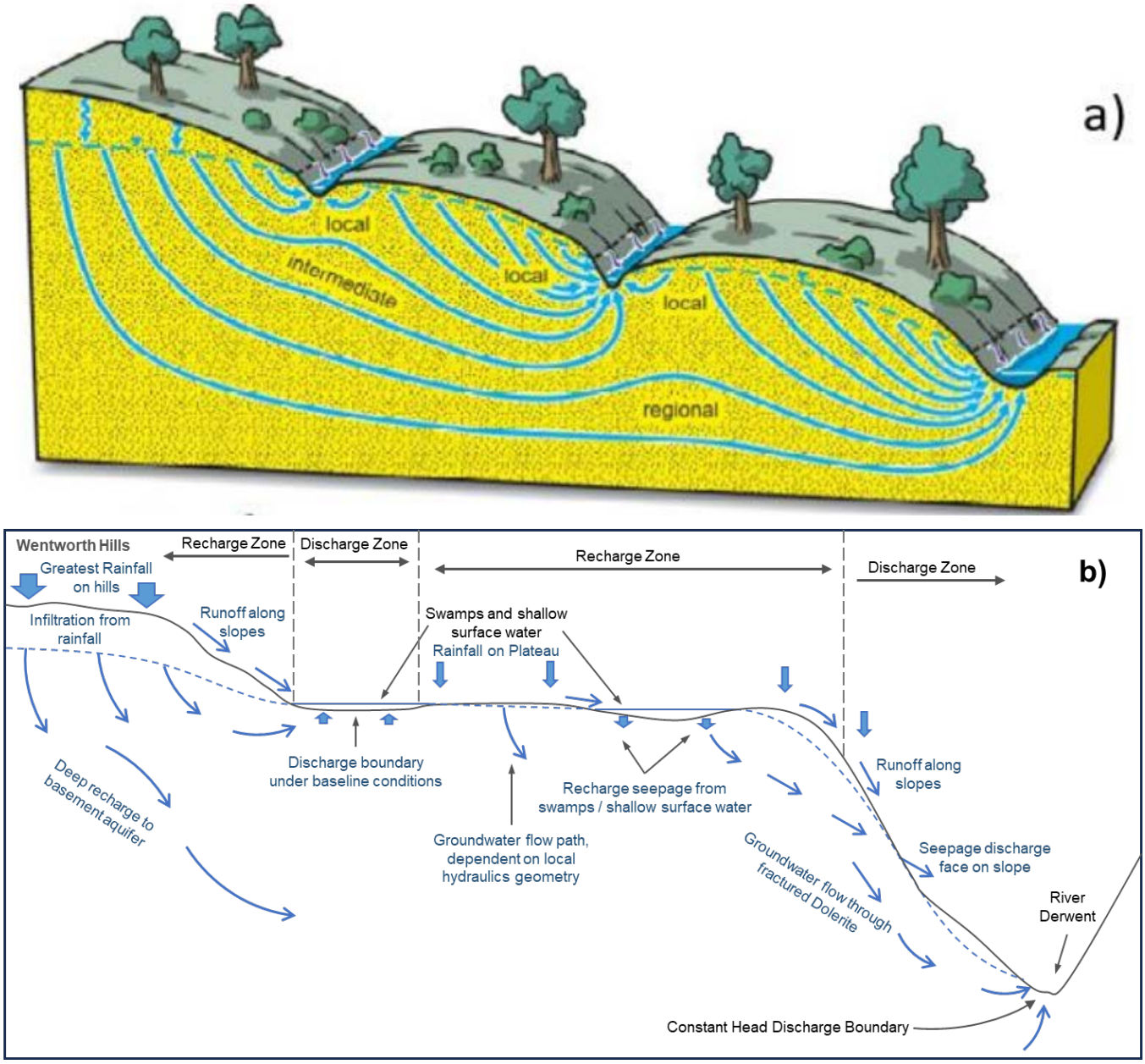
4.5.1 Overview

Assessment of the Tarraleah Plateau topography, surface waters, and near surface geology was used to evaluate the capacity and distribution of recharge. Potential recharge mechanisms to the groundwater system occur through direct rainfall infiltration and potential downward leakage of surface water atop the plateau. A schematic of recharge, throughflow, local-scale and catchment-scale discharge concepts is shown on Inset 15(a) (after Woessner 2020).

This schematic shows the presence of local, intermediate, and regional flow lines emanating from upland and local hillock recharge zones. Inset 15(b) provides a Wentworth Hills and Tarraleah Plateau adaptation of this schematic, conceptualising:

- An aquifer system that is full, with Mossy Marsh and numerous other wetlands and shallow water tables beneath adjoining hillocks. This aspect also reflects the net positive water balance at Tarraleah, with rainfall exceeding annual evapotranspiration by about 700 mm, and the presence of anthropogenic (artificial) recharge supplied by surface flows from Mossy Marsh Canal
- The recharge rates from rainfall infiltration are assumed to vary dependent on topographic elevation and slope, where steeper slopes provide lower local recharge and greater runoff potential. The orographic rainfall pattern (see Section 2.1) may realise declining rainfall infiltration recharge capacity from west to east
- The Wentworth Hills, north of the alignment (Figure 1), is expected to be characterised by comparatively high rainfall given elevations typically being about 200 m above the rest of the plateau. The higher rainfall may be accompanied by higher rainfall infiltration recharge
- Recharge on local scale hillocks on the plateau – localised recharge variations are anticipated associated with changes in slope that define hillocks and small dolerite rolling hills. For example, multi-level hydrographs from TA-DC250 (Figure 13(b)) show a downward (recharge) vertical head profile signature, with a 4 m head difference between the top and bottom VWP instruments over a vertical interval of about 75 m
- Local scale flow lines and discharge to wetlands and hollows on the plateau. For example, multi-level hydrographs from TA-MB301 (Figure 13(a)) show an upward (discharge) vertical profile signature, with a 3 m head difference between the top and bottom VWP instruments over a vertical interval of about 175 m
- Intermediate flow lines, with sources beneath the Wentworth Hill and termination within wetlands on the Tarraleah Plateau
- Catchment scale (regional) flow lines from Wentworth Hills to the River Derwent. The interconnected fracture zones (Figure 11(b)) would predominantly control these flow lines from recharge zones to discharge into the Derwent and Nive rivers
- The River Derwent in the south and Nive River in the east (Figure 2) form deeply incised hydrogeological discharge boundaries where heads correlate to the elevation of the riverbeds.

The local scale, intermediate and catchment-scale (regional) flow lines would be predominantly controlled by the weathered and fractured dolerite terrain H-D3, H-D4, and H-D5 HRMUs. Shallow local flow lines would also be controlled by the soil Scol HRMU.



Inset 15: Schematic a) groundwater flow paths (Woessner 2020) and b) groundwater recharge and discharge concepts.

4.5.2 Estimates from Lake King Willaim Tunnel

The Lake King William Tunnel occurs in dolerite terrain, and predominantly traverses beneath a ridgeline with depths to the water table commonly in the range 10 to 20 m. The tunnel setting is shown in plan and cross-section views on Figure 18.

Groundwater inflow rates to the Lake King William Tunnel have been measured since December 2024 together with daily rainfall. Hydrographs of inflow rates and daily rainfall from mid-February to end-April 2025 are on Figure 19.

The inflow and rainfall observations have been used to estimate recharge from rainfall. For these estimates, it was assumed:

- Inflows to the tunnel represent rainfall recharge, given expectations of low storage characteristics (less than 1 %) of fractured dolerite
- The recharge capture zone was a consistent 800,000 m^2, expecting this area might be conservatively large for early times given the capture zone would progressively expand during mining of the tunnel below the water table
- There may be delays between rainfall events and corresponding tunnel inflow observations, hence recharge estimations would benefit from consideration of average inflow rates over designated periods.

The estimations of recharge to the Lake King William Tunnel included:

- Early period 21 December 2024 to 24 March 2025:
  - Cumulative 130 mm rainfall over 73 days amounting to 105,300 m^3
  - Tunnel inflows averaged 1.5 L/s during this 93-day period, cumulative volume 12,053 m^3
  - Recharge estimate 11.4 % of rainfall.
- Mid-period 10 to 29 March 2025:
  - Cumulative 43.4 mm rainfall over 20 days amounting to 35,154 m^3
  - Tunnel inflows averaged 2.2 L/s during this 20-day period, cumulative volume 3,802 m^3
  - Recharger estimate 10.8 % of rainfall.
- Late-period 4 to 17 April 2025:
  - Cumulative 36.6 mm rainfall over 14 days amounting to 29,646 m^3
  - Tunnel inflows averaged 2.9 L/s during this 14-day period, cumulative volume 3,508 m^3
  - Recharger estimate 11.8 % of rainfall.

In summary, the estimates for the Lake King William Tunnel indicate recharge as 10 to 12 % of rainfall. The early period recharge estimates may be conservatively low. If a smaller recharge capture zone was assumed, then the recharge estimates as a percentage of rainfall would increase.

4.5.3 Rejected Recharge

The rainfall and actual evapotranspiration data indicate a net positive 700 mm annual water budget, together with monthly rainfall exceeding actual evapotranspiration except during January and February. The net positive water budget coupled with the shallow water table environments on the Tarraleah Plateau introduce a rejected recharge conceptualisation. That is:

- The water table aquifer system is full, hence with limited storage
- Infiltration from rainfall discharges as baseflow on short (length and duration) flow paths to springs, seeps, streams, and wetlands because the aquifer cannot accept all the recharge.

Conceptually, drawdown of the water table would increase the available storage in the soils and fractured rock aquifer HRMUs. Hence the drawdown may induce increases in recharge rates on the Tarraleah Plateau.

4.6 Groundwater Discharge

Evidence of groundwater discharge is recorded on the Tarraleah Hillside, through ephemeral springs that are sourced from both the palaeovalley and Mesozoic aquifers. Conceptually discharge is expected to arise from small springs in the headwater of the catchment, incised streams and from seepage faces at the base of outcropping permeable basalt horizons.

Downstream of Lake King William (Figure 1) the River Derwent forms a hydrogeological boundary condition to the southwest of the Project area. Being deeply incised into the surrounding topography, the river acts as a constant head discharge boundary where heads are equal to the elevation of the riverbed. As a result, the River Derwent hillside is considered a groundwater discharge zone, with the presence of small springs in gullies that bisect the hillside, and seepage faces on the lower slopes of the hillside. The same discharge conditions are observed for the Tarraleah Hillside which flanks the Nive River.

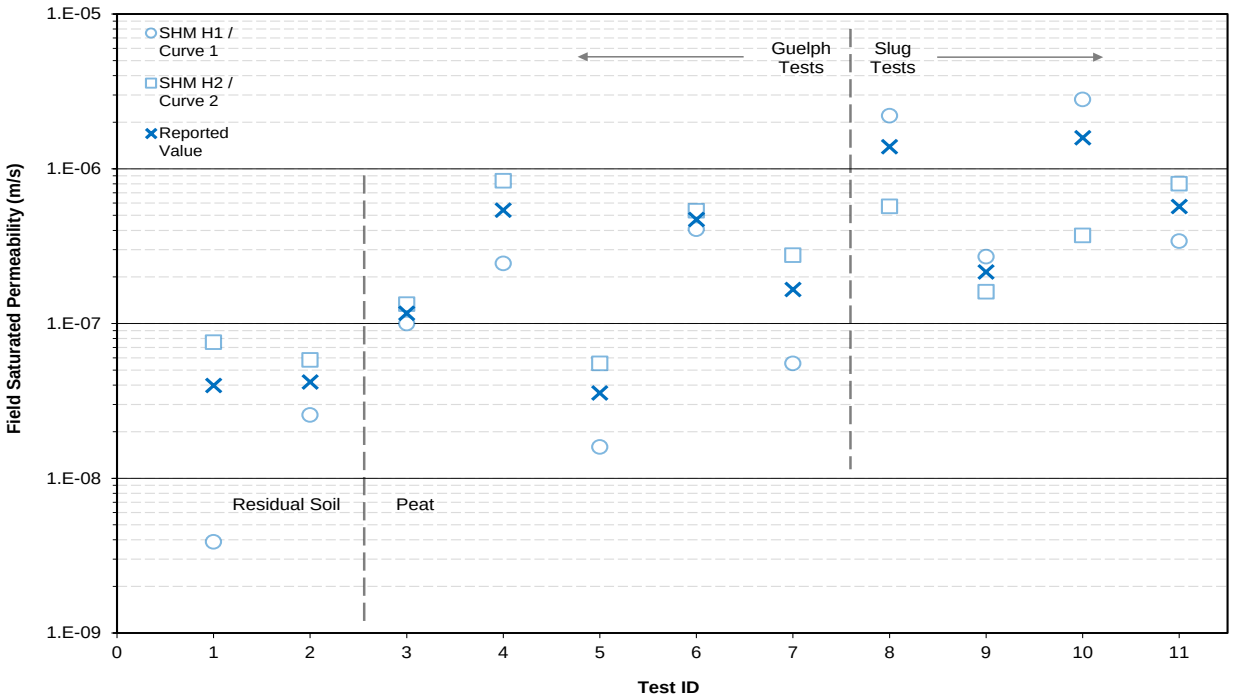
The Tarraleah Plateau at the base of the Wentworth Hills also behaves as a groundwater discharge location under fully saturated baseline conditions, supplying recharge to surface waters and swamps.

4.7 Connectivity Between Surface Water and Groundwater

A control on the connection between surface water and groundwater at the Project is the water exchange capacity of the soils below ponded water, perennial surface watercourses, and wetlands. The water exchange capacity of soils between the surface and the fractured rock bedrock aquifers is determined by several factors, including:

1. Thickness of soil horizons.
2. Effective vertical hydraulics (leakiness) of soil horizons.

The distribution of peaty and residual soils around Project wetlands is expected to be variable with a potential total thickness between 2 and 10 m. For conceptualisation purposes and integration into the numerical groundwater model, the soils below Mossy Marsh and associated wetlands have a 2 m thick peat horizon which sits on top of a 3 m thick residual soil horizon. Soil hydraulics (Inset 16) are informed from falling head slug tests and Guelph permeameter testing. The reported soil permeability ranges are in Table 3.



Inset 16: Permeability test results for Mossy Marsh soils.

The conceptual hydrogeology recognises:

- Groundwater to surface water connection under baseline conditions. This aspect is demonstrated by the vertical flux potentials observed in multi-level monitoring bores and this data being used to differentiate groundwater recharge and discharge zones. For example, multi-level hydrographs from TA-MB301 (shown on Figure 13(a)) indicate an upward vertical profile signature, indicative of baseflow discharge to local wetlands or streams
- Surface water to groundwater connection during the construction stage of the Project. The conceptualisation includes:
  - Inflows to the tunnel during construction would predominantly occur from H-D3, H-D4, and H-D5 HRMUs fracture zone intercepts
  - Inflows would be dominated by surface waters sourced from wetlands (for example Mossy Marsh), ponds (for example Mossy Marsh Pond), and perennial reaches of streams (for example Horne's Creek Canal). Artificial recharge streams, such as the discharges from the Mossy Marsh Canal, increase the surface wate availability
  - Groundwater inflow contributions would be grossly subordinate given the fractured rock aquifers are being characterised by low (<1 %) primary and secondary porosity. This aspect informs that significant sustained inflows would predominantly be derivatives of perennial recharge and surface waters.
- Leakage from the tunnel onto the groundwater surface during the operational stage. Post construction, the tunnel would progressively rewet and become submerged as groundwater heads recover. Subsequently, maximum operating heads would pressurise the tunnel to heads above baseline water table elevations and above the ground surface, contributing to leakage of tunnel waters onto the ground along fractures zones in the dolerite. Refer to Figure 11(b) which provides context for intersections between the Project tunnels and interpreted fracture zones which can vertically and laterally transmit leakages from the operating tunnels onto the ground surface on the Tarraleah Plateau.

4.8 Groundwater Heads

The Tarraleah Plateau and Tarraleah Hillside standpipe and VWP monitoring bores are shown on Figure 22. Water table head contours (Figure 8) are interpreted from spot heights captured by standpipe monitoring wells, water strikes during drilling, and transient VWP heads. Interpreted and interpolated depths to groundwater contours are shown on Figure 9.

Head contours were drawn with the following assumptions:

- Where surface water bodies are present, groundwater is equal to the elevation of the surface water
- Water table levels are 1 m below ground level at mapped swamp / wetland deposits
- Water table contours are tied to topography and will mirror elevations
- Depth to water below the crest of steep hillsides is between 20 and 60 m
- Mossy Marsh Tunnel is a drained structure that locally draws the water table down to the tunnel elevation
- Localised drawdowns will be present within gullies that bisect river incised hillsides
- The aquifer is saturated and in equilibrium.

Aspects that were excluded from the baseline water table head assessments were the presence of localised perched groundwater that is observed in the basalt palaeovalley and in landslide deposits on the Tarraleah Hillside.

4.8.1 Groundwater Flow Directions

Groundwater within the site generally flows along a hydraulic gradient from the northwest toward the southeast, discharging to the Nive River in the east (Figure 8). This flow pattern is largely governed by regional topography, with Butlers Gorge and the Nive River acting as primary discharge zones. Along its path, groundwater emerges at surface water features such as the Mossy Marsh wetland, indicating localised discharge zones where the water table intersects the land surface.

In the southern portion of the site, dolerite slopes act as a topographic divide, redirecting groundwater flow southward toward the Derwent River. Water level monitoring across the site indicates that groundwater elevations range from approximately 330 to 680 m RL, with an average elevation of 488 m RL. The depth to groundwater averages around 20 m below ground level, reflecting a relatively shallow system influenced by surface topography and subsurface geology (Figure 9).

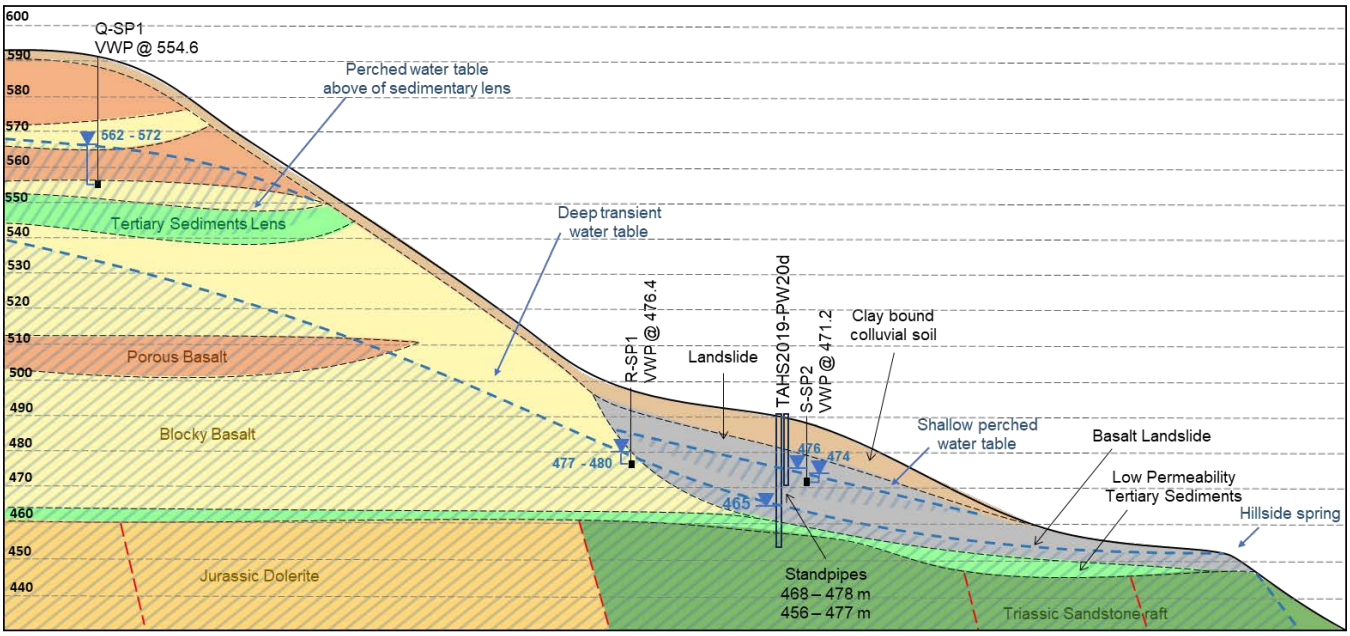
4.8.2 Tarraleah Hillside Heads

Data from multi-level monitoring points and drilling observations alludes to the presence of shallow perched water tables, which were encountered twice within landslide deposits on the Tarraleah Hillside. Perched groundwater is also recorded by piezometer Q-SP1 below the crest of the hill slope, below the existing penstocks.

Perched groundwater in the landslide located halfway down along the existing penstocks is shown by Inset 17. The multi-level standpipe constructed in borehole TAHS2019-PW20d shows water depths around 13 m (shallow) and 22 m (deep). VWPs next to the standpipes (Appendix B) that monitor the landslide, show that the deep groundwater level is directly responsive to individual rainfall events (R-SP1 data), whereas the shallow water levels are only partially responsive (S-SP2 data). Review of the borehole logs and core photos of DH-8233 and DH-8236 reveal that the shallow water levels are within a clay-bound colluvium. The deeper responsive groundwater levels are recorded within more permeable in situ basement / blocky landslide material, with cobble and boulder sized blocks.

Q-SP1 VWP data (Appendix B) indicates a seasonal variation in the baseline groundwater heads between 562 m AHD in summer and 572 m AHD during winter. This cyclic, seasonal variation is overprinted by direct rainfall recharge signatures which occur on the day scale. The presence of seasonal variation is less clear or absent from the remaining VWPs due to either missing data or non-responsive soils.

Groundwater levels recorded by Q-SP1 are anomalously high when compared to surrounding monitoring bores. The elevated heads were inferred to be a result of the localised sedimentary lens below the VWP in the upper palaeovalley profile (intersected by DH-8245 and DH-8246) (see Figure 14). The Tertiary sediments have locally low hydraulics which inhibits vertical flux; as a result, water is perched on top within the porous basalt. The absence of monitoring data within and below the sedimentary lens (Inset 17) provides uncertainty whether the shallow and deeper water tables are connected within a pseudo-hydrostatic or losing-hydrostatic flow field.

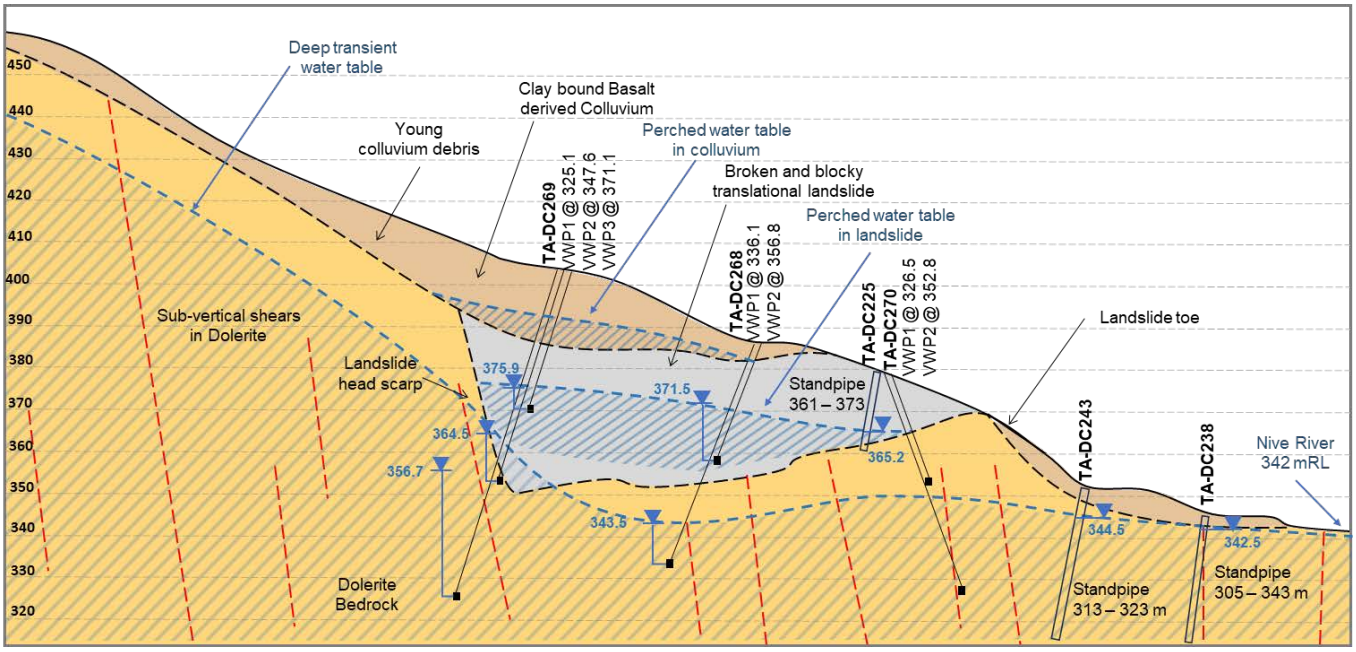


Inset 17: Schematic cross section of penstocks landslide with inferred groundwater conditions.

The second location of an identified perched aquifer was within the landslide immediately upslope of the proposed Power Station, Inset 18. Perched groundwater was recognised during drilling of TA-DC268, TA-DC269, and TA-DC270.

These three boreholes have been instrumented with multi-level VWPs, with early monitoring data presented in Appendix B. Two constructed standpipes in TA-DC238 and TA-DC243, at the toe of the landslide, have recorded shallow groundwater heads at depths of 3.5 and 8.5 m below ground level, respectively.

A shallow perched water table aquifer system, like the penstocks hillside, is modelled for the landslide zone identified in the lower hillside (refer to the GIR for details on landslide). Perched groundwater is held both within the colluvium slope wash and within the blocky landslide. The transient baseline deeper bedrock aquifer is disconnected below.



Inset 18: Schematic of disturbed dolerite within Tarraleah Hillside and inferred water tables.

4.9 Groundwater Flow Nets

A series of flow nets have been developed for hydrogeological sections that traverse the Tarraleah Hillside, with the objective to conceptualise different groundwater flow scenarios (Figure 20 to Figure 22, inclusive). These figures present a base-case flow net model with anticipated hydraulics, interpreted from hydraulic testing (Table 2) as described in Section 4.2. Upper – and lower-bound anticipated hydraulics is applied to the simplified HRMUs to produce hypothetical flow scenarios that could affect the Project feasibility. The base-case flow net model and associated scenarios are also used to inform and calibrate the numerical model, as well as inform anticipated flow paths and iso-potential distributions.

4.9.1 Basement Geology Effects on Recharge / Discharge

There is potential for discharge to occur in low-lying topography of the Tarraleah Plateau, producing the shallow water bodies associated with swamps. This is dependent on the geometries of the fracture zones and local fractured rock aquifer hydraulics (Figure 22), which may produce deep drainage to the River Derwent and shallow flow lines upwelling to the swamps. Possible scenarios considered by the type-section flow net model are:

1. Scenario 1 – Dolerite and Sandstone are homogeneous with no structure zones:
    a. Isotropic conditions, and sandstone hydraulic conductivity = dolerite hydraulic conductivity
    b. Isotropic conditions, and sandstone hydraulic conductivity > dolerite hydraulic conductivity
    c. Anisotropic conditions, and sandstone hydraulic conductivity = dolerite hydraulic conductivity.
2. Scenario 2 – Dolerite and sandstone are heterogeneous with structure zones present below swamps and river valley:
    a. Isotropic conditions, and sandstone hydraulic conductivity = dolerite hydraulic conductivity
    b. Isotropic conditions, and sandstone hydraulic conductivity > dolerite hydraulic conductivity
    c. Anisotropic conditions, and sandstone hydraulic conductivity = dolerite hydraulic conductivity.

The main observations from these flow nets are:

- Swamps at the base of slopes are discharge locations in all scenarios, except Scenario 2b, where structures and the Triassic Sandstone can produce sufficient deep drainage pathways to the river
- Applying anisotropy to the model promotes deep downwelling and deep upwelling through the dolerite to the deep sandstone
- When geological structures are present, discharge at the river is concentrated at the structures. When they are absent, groundwater is discharge through a seepage face on the lower hillside and in the river.

4.9.2 Flow Net Validation

Data from multi-level VWPs is used to validate the schematic flow net results and inform on the most representative scenario. Changes in hydraulic head downhole is used as an indicator for vertical flux. For example, a higher hydraulic head in the shallow piezometers relative to deep piezometers represents a downward flowing vertical gradient. Validation is included in Figure 20 to Figure 22, inclusive.

4.10 Groundwater Quality

4.10.1 Baseline Groundwater Types

A groundwater monitoring program (PSM4346-140M) was developed at the end of 2023 to guide collection of baseline quality data across the Project area. Thirteen sampling rounds with reported laboratory results have been completed.

The selected suite of groundwater quality parameters to develop baseline values is presented in Table 4. The analysis suite covers a broad range to capture any anomalous analytes. It is noted that sodium was not analysed, or no result was provided, thus was analytically inferred using two methods:

- *Charge Balance Estimation*: This method estimates sodium concentration by calculating the difference between the total anion and cation charges (in meq/L) and converting that charge difference to mg/L of sodium, ensuring charge balance in the solution
- *Mass Balance Difference*: This method estimates sodium concentration by subtracting the total measured ion mass (excluding sodium) from the estimated Total Dissolved Solids (TDS), assuming the remaining mass is due to sodium.

Laboratory measurements of sodium concentrations would be preferred.

Table 4 – Water Quality Parameters for Field and Laboratory Testing

Parameters for Field Analysis	Parameters for Laboratory Analysis
Filtered samples: Electrical Conductivity (EC), pH, Dissolved Oxygen (DO), temperature, turbidity.	• Physicochemical parameters: pH, EC, TDS, Total Suspended Solids (TSS), Total Alkalinity as $CaCO_3$, Bicarbonate Alkalinity as $CaCO_3$, Carbonate Alkalinity as $CaCO_3$, Hydroxide Alkalinity as $CaCO_3$ • Major ions: calcium, magnesium, sodium, chloride, sulphate, bicarbonate, potassium • Minor ions: carbonate, silica, hydroxide, fluoride • Metals (total and soluble): aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, zinc • Nutrients: nitrite, nitrate, ammonium, total phosphorus.

The resulting concentrations of water quality parameters for March 2025, including inferred sodium, are presented as mg/L in Table 5 and milli-equivalents per litre (meq/L) in Table 6 – . Results from the sampling rounds are reported in Appendix C.

Table 5 – Summary of Groundwater Analyte Concentrations for March 2025

Sample Site	Concentration (mg/L)									pH
	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4	TDS	
TA-DC214	5.9	0.8	14.9	11.3	12.0	2.0	92.0	1.7	165	7.2
TA-DC215	5.0	0.5	25.7	15.0	16.2	2.0	133.0	2.0	198	7.5
TA-DC218	22.8	0.7	16.8	9.8	12.8	2.0	131.0	3.7	191	8.4
TA-DC234	1.2	0.3	18.4	9.6	8.6	2.0	86.0	2.4	151	7.2
TA-DC235	5.0	0.3	18.2	9.9	8.8	2.0	97.0	1.8	164	7.5
TA-DC237	10.1	0.7	23.4	8.9	6.7	2.0	121.0	5.4	190	8.1
TA-DC238	9.3	0.4	18.3	9.4	9.0	2.0	106.0	1.8	180	7.2
TA-DC242	6.7	1.2	19.6	19.8	5.4	2.0	157.0	6.5	186	6.7
TA-DC243	3.4	0.4	16.9	9.0	9.0	2.0	85.0	1.3	79	6.8
PW20d (D)	9.6	2.0	16.3	10.3	7.9	2.0	109.0	2.4	95	7.9
PW20d (S)	5.3	0.9	7.6	4.7	6.0	2.0	44.0	3.1	146	6.7
TA-DC207	3.2	1.6	38.0	0.4	6.9	51.0	5.0	5.6	150	11.2
TA-DC241	6.7	0.5	13.8	7.1	9.1	2.0	75.0	1.2	133	6.6
TA-DC247	5.4	0.5	7.9	3.4	8.6	2.0	36.0	0.8	81	7.0

Table 6 – Summary of Groundwater Anions and Cations Concentrations for March 2025

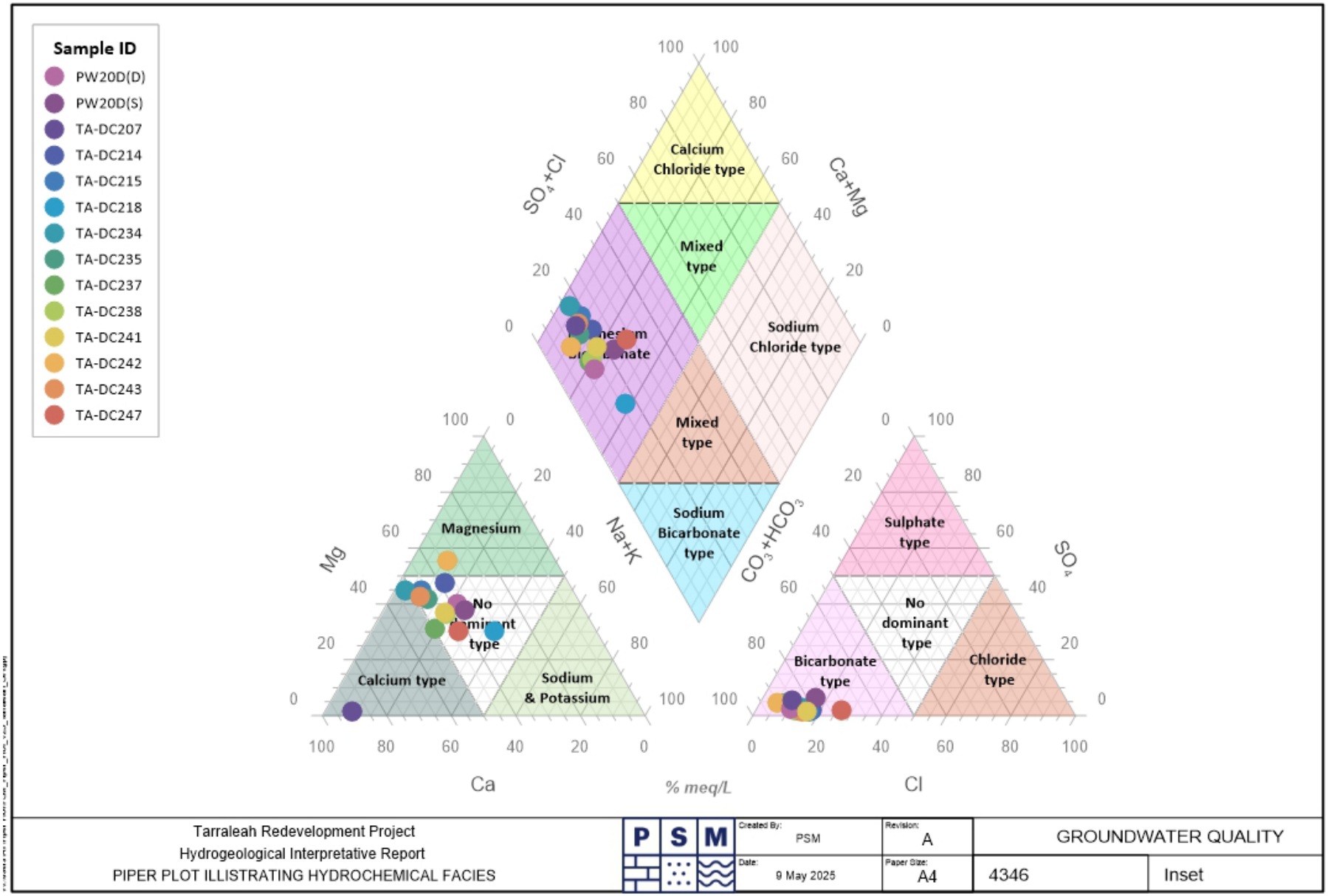
Sample Site	Concentration (% meq/L)							
	Na	K	Ca	Mg	Cl	CO3	HCO3	SO4
TA-DC214	0.26	0.02	0.74	0.93	0.34	0.07	1.51	0.04
TA-DC215	0.22	0.01	1.28	1.23	0.46	0.07	2.18	0.04
TA-DC218	0.99	0.02	0.84	0.80	0.36	0.07	2.15	0.08
TA-DC234	0.05	0.01	0.92	0.79	0.24	0.07	1.41	0.05
TA-DC235	0.22	0.01	0.91	0.81	0.25	0.07	1.59	0.04
TA-DC237	0.44	0.02	1.17	0.73	0.19	0.07	1.98	0.11
TA-DC238	0.41	0.01	0.91	0.77	0.25	0.07	1.74	0.04
TA-DC242	0.29	0.03	0.98	1.63	0.15	0.07	2.57	0.14
TA-DC243	0.15	0.01	0.84	0.74	0.25	0.07	1.39	0.03
PW20d (D)	0.42	0.05	0.81	0.85	0.22	0.07	1.79	0.05
PW20d (S)	0.23	0.02	0.38	0.39	0.17	0.07	0.72	0.06
TA-DC207	0.14	0.04	1.90	0.03	0.19	1.70	0.08	0.12
TA-DC241	0.29	0.01	0.69	0.59	0.26	0.07	1.23	0.02
TA-DC247	0.23	0.01	0.39	0.28	0.24	0.07	0.59	0.02

The graphical representation of these parameters and associated hydrochemical groundwater types are shown as a Piper Diagram in Inset 19.

Based on the distribution of points on the Piper Diagram, the following observations were made:

- All groundwater samples plot within a relatively tight cluster indicating a uniform hydrochemical signature across the Project area
- Magnesium-bicarbonate (Mg-HCO_3) is the dominant groundwater type. This is characteristic of groundwater interaction with mafic igneous of the Jurassic Dolerite and Tertiary Basalt, which are rich in silicate minerals such as plagioclase feldspar and pyroxenes/olivine. Weathering of these minerals in the presence of CO^2 readily produces bicarbonate ions and releases calcium into the water. This groundwater type is characteristic of recently recharged groundwater with limited mineralisation
- Chloride, sulphate, and potassium concentrations are consistently low, suggesting minimal influence from processes like dissolution of evaporite minerals (halite and gypsum).

The groundwater chemistry appears to be primarily controlled by water-rock interactions, with a dominance of magnesium-bicarbonate waters suggesting active recharge and relatively short residence times in many areas, particularly where Jurassic Dolerite forms the aquifer. The slightly higher sodium-chloride groundwater type in some samples indicated longer flow paths or areas with more restricted flow.



Inset 19: Piper Plot Hydrochemical Types in Groundwater Samples.

4.10.2 Groundwater Flow Influences on Groundwater Quality

Conceptually in context to the groundwater flow lines shown on Inset 15 it is interpreted that:

- Rejected recharge will be characterised by comparatively low TDS concentrations and neutral pH as derivatives from rainfall infiltration and short duration residence times in the water table zone before discharge as baseflow to seeps, spring, stream and wetlands
- Local shallow flow systems from hillocks to discharge zones would be characterised by longer residence times compared to the rejected recharge, with associated incremental changes in groundwater TDS concentrations, pH, and metals concentrations due to interactions with the fractured rock aquifers
- Groundwater flow on intermediate and regional flow lines would have comparatively lengthy residence times, enabling the fractured rock aquifer zones to impose on and influence the groundwater quality. These flow lines may be characterised by higher TDS and selected metals concentrations because of the long residence times and bedrock interactions. Both dolerite and basalt are characterised by mineralogy rich in iron and magnesium, leading to potential groundwater enrichment in iron and manganese. Iron-staining is evident in core samples in oxidized zones, as shown in Section 4, Photo 8 (H-B3 basalt), Photo 11 (H-D6 dolerite), and Photo 14 (H-D5 dolerite) and on Figure 13a (basalt).

4.10.3 Groundwater Quality Assessment

A summary of physicochemical, nutrient, and selected metal field and laboratory analytical results from January 2024 to May 2025 for standpipe monitoring bores is presented in Table 7. Data from the recent March 2025 sampling is shown in Table 8. Both these datasets provide insight into groundwater quality trends over time and guide the following observations:

- EC generally ranged from 110 to 314 µS/cm, average 215 µS/cm, reflecting fresh groundwater with low TDS
- pH values range from 6.6 to 8.4, average of 7.6, reflecting circum-neutral to mildly alkaline conditions. These values are consistent with groundwater buffered by carbonate minerals and show no evidence of significant acidification
- Sulphate concentrations in most samples are low, ranging from 1 to 40 mg/L, consistent with the low sulphide contents of the host rocks in general. This suggests limited sulphide mineral oxidation, indicating shallow water table settings and corresponding limited oxidation, with commensurate low risk of acid mine drainage (AMD) under baseline circumstances
- Nutrients such as nitrate, nitrite, and phosphorus concentrations were consistently low across most samples, implying negligible contributions from anthropic nutrient-rich sources
- Dissolved metals concentrations, such as iron, manganese and trace metals, are present at low concentrations and generally within acceptable guideline ranges.

Some notable sample outliers and their potential causes are summarised below, with corresponding values presented in Table 7 and Table 8. Outliers are defined as analyte concentrations that deviate from the typical range across the groundwater samples and do not necessarily indicate higher risk anomalies. The spatial distributions of outliers are illustrated in Figure 23a:

- TA-DC207: Elevated pH (~11) and aluminium concentrations, likely due to grout signatures from standpipe construction
- TA-DC242: Higher EC, and sulphates and dissolved iron, manganese, nickel likely from reducing conditions in the Mossy Marsh Wetland
- TA-DC237: Unusually high EC and sulphate concentrations from March to July 2024 (see Appendix C), returning to typical ranges by November 2024. This likely indicates sampling or laboratory error during that period, with current elevated concentrations potentially influenced by the nearby switchyard
- PW20d (D): Elevated TSS and phosphorus concentrations in the deeper screen, not replicated in the shallow counterpart PW20d (S). The TSS may have skewed the phosphate concentrations and introduced limited reliability regarding analytical results. It is noteworthy the sediment disturbance is from comparatively permeable *in situ* basement or blocky landslide material which contains cobble- to boulder-sized fragments. There may be groundwater quality variation on these preferred flow paths.

Table 7 – Groundwater Quality Summary – Tarraleah Plateau (January 2024 to March 2025)

Parameter, and (Units)	Field Observations (Range; Average)	Laboratory Measurements (Range; Typical; Comment)
Physicochemical Characteristics		
TDS (mg/L)	-	68 - 213; 100 – 170
EC (µS/cm)	110 – 314; 215	64 – 1782; 140 – 230; TA-DC237 outlier
pH (-)	6.4 – 11.1; 7.8	6.5 – 10.4; 6.5 – 7.2; TA-DC207 outlier
DO (%)	2.4 – 84; 40	-
Temperature (°C)	9.3 – 18.1; 12.5	-
Turbidity (NTU)	0 – 999; 125	-
TSS (mg/L)	-	2 - 4130; 15 - 160; PW20d (D) outlier
Sulphate (mg/L)	-	<0.1 – 7.5; 1 – 15
Nutrients		
Nitrate (mg N/L)	-	<0.002 – 0.11; <0.002 – 0.1
Nitrite (mg N/L)	-	LOR <0.002 – <0.02; <0.002 - <0.02
Phosphorus (Total, mg P/L)	-	0.01 – 2.15; 0.2
Dissolved Metals		
Aluminium (µg/L)	-	<8 – 1600; <8; TA-DC207 outlier
Cadmium (µg/L)	-	<0.1
Chromium (µg/L)	-	<1 – 7; <1
Copper (µg/L)	-	<1 – 2; <1
Iron (µg/L)	-	<20 – 45700; <20 – 50; TA-DC242 outlier
Lead (µg/L)	-	<0.05
Manganese (µg/L)	-	<1 – 2440; <1 – 30; TA-DC242 outlier
Nickel (µg/L)	-	<0.8 – 28; <0.5 – 2; TA-DC242 outlier
Nickel (µg/L)	-	<2 – 4; <2 - 4

Table 8 – Groundwater Quality Summary – Tarraleah Plateau (March 2025)

Sample Site	TDS	EC	pH	TSS	SO_4	NO_3	NO_2	P	Al	Cd	Cr	Cu	Fe	Pb	Mn	Ni
Unit	mg/L	µS/cm		mg/L		mg N/L		mg P/L	µg/L							
NHMRC[1]	1200	-	6.5 - 8.5	-	-	50	3	-	-	2	50	2000	300	10	500	20
ANZECC[2]	-	-	-	-	-	0.7	-	-	55 pH>6.5	0.2	1	1.4	-	3.4	1900	11
TA-DC214	165	227	7.19	19	1.7	0.41	0.02	0.076	8	0.1	2[2]	1	20	0.5	2	0.5
TA-DC215	198	305	7.45	267	2	0.76[2]	0.02	0.141	8	0.1	1	1	20	0.5	1	0.5
TA-DC218	191	309	8.44	5	3.7	0.66	0.02	0.013	8	0.1	1	1	20	0.5	10	0.5
TA-DC234	151	217	7.22	2	2.4	1.64[2]	0.02	0.023	8	0.1	1	1	20	0.5	7	0.5
TA-DC235	164	230	7.46	2	1.8	1.09[2]	0.02	0.031	8	0.1	1	1	20	0.5	1	0.5
TA-DC237	190	295	8.12	7	5.4	1.02[2]	0.08	0.038	8	0.1	1	1	20	0.5	23	0.5
TA-DC238	171	253	7.18	4	1.8	1.59[2]	0.02	0.036	8	0.1	1	1	20	0.5	1	0.5
TA-DC242	186	339	6.70	36	6.5	0.02	0.02	0.073	8	0.1	1	1	10500[1]	0.5	2440[2]	7.1
TA-DC243	156	212	6.83	2	1.3	1.55[2]	0.02	0.029	8	0.1	1	1	20	0.5	18	0.7
PW20d Deep	146	216	7.92	4130	2.4	0.4	0.02	1.8	8	0.1	1	1	20	0.5	216[2]	0.5
PW20d Shallow	95	120.5	6.74	515	3.1	0.88[2]	0.02	0.131	8	0.1	2[2]	1	20	0.5	41	0.7
TA-DC207	150	381	11.22[1]	2	5.6	0.02	0.02	0.046	720	0.1	1	1	20	0.5	1	0.5
TA-DC241	133	179.8	6.58	757	1.2	0.12	0.02	0.204	8	0.1	1	1	20	0.5	4	0.5
TA-DC247	81	103.3	6.97	4	0.8	0.02	0.02	0.022	61	0.1	1	4[2]	120	0.5	25	1.6

(1) Indicates exceedance of NHMRC Drinking Water Standards.
(2) Indicates exceedance of ANZECC Freshwater Ecology Guidelines.

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4.10.4 Nitrate in Groundwater

Two groundwater sample locations were near stockpiles (refer to Figure 23(a)):

- West stockpile – TA-DC247
- Paddy's Quarry stockpiles – TA-DC241 (upstream of the Surge Access Tunnel).

Neither location indicated elevated nitrate concentrations, with TA-DC247 0.20 mg N/L and TA-DC241 0.12 mg N/L (Table 8). These concentrations were below NHMRC (2011) drinking water standards and ANZECC (2018) freshwater ecology guideline thresholds of 50 mg N/L and 0.7 mg N/L, respectively. The observed nitrate concentrations at both locations remained consistent from January 2024 through March 2025.

Elevated nitrate concentrations were observed in TA-DC238 and TA-DC243, located within 50 m of each other near the switchyard at Tarraleah Power Station. These monitoring bores consistently recorded nitrate concentrations of ~1.5 mg N/L, throughout the monitoring. These data suggest a localised source of nitrate in the switchyard area.

4.10.5 Standards Comparison

Groundwater samples were evaluated against both the NHMRC drinking water standards and the ANZECC freshwater ecology guidelines, with exceedances highlighted in Table 8. Most samples complied with NHMRC guidelines, except for:

- TA-DC207 - highly alkaline pH ~11, probably grout signatures from construction
- TA-DC242 - elevated iron concentrations.

The ANZECC guidelines (2000 and 2018) are more conservative, particularly for nitrate, with a threshold of 0.7 mg N/L. Approximately half of the groundwater samples exceeded this threshold.

TA-DC242 and PW20(d) exceeded the ANZECC guideline for manganese.

4.10.6 Groundwater Quality Summary

The overall assessment of the Project groundwater indicates:

- Groundwater Quality: The groundwater is generally fresh, with EC ranging from 110 to 314 µS/cm and TDS less than 500 mg/L. Metal concentrations do not exceed standard guideline thresholds (for example lead < 0.01 mg/L and copper < 0.05 mg/L). Outliers observed in specific standpipes or sampling events are likely due to localised conditions, rather than widespread natural enrichment
- Groundwater Types: The groundwater quality plots and data indicate a predominant calcium-bicarbonate type, reflecting active recharge and interaction with local calcium- and carbonate-bearing geology. This suggests a stable, naturally occurring hydrogeochemical environment, where the observed few outliers are likely attributable to localised conditions rather than broader hydrogeochemical processes

- AMD: The risk of AMD in the baseline environment is low, with pH consistently in the neutral range (6.6 to 8.4) and sulphate concentrations remaining low (1 to 40 mg/L). Typical AMD sites exhibit pH values < 4.5 and sulphate levels > 500 mg/L. Dissolved metals, such as iron (< 1 mg/L) and manganese (< 0.5 mg/L), are also comparatively low and not indicative of AMD. These aspects suggest no significant oxidation of sulphide minerals or acidification in the baseline environment, indicating a low risk of AMD
- Nutrients: Nitrate and nitrite concentrations are consistently low (averaging ~ 0.6 mg N/L). and phosphorus concentrations are also low (< 0.1 mg N/L). These concentrations indicate no significant nutrient inputs from anthropogenic sources.

4.11 Surface water Quality

4.11.1 Baseline Surface Water Types

Thirteen rounds of surface water sampling have been completed in conjunction with the groundwater sampling. The March 2025 sample concentrations of water quality parameters, including inferred sodium, are presented as mg/L in Table 9 and milli-equivalents per litre (meq/L) in Table 10. Laboratory results are reported in Appendix C.

Sodium was analysed from sites SW-P1, SW-P3, SW-P5, SW-P6, and SW-P8 for the June 2024 sampling. For the remaining surface water samples, sodium concentrations were analytically inferred using the Charge Balance Estimation and Mass Balance Difference (refer to Section 4.10.1).

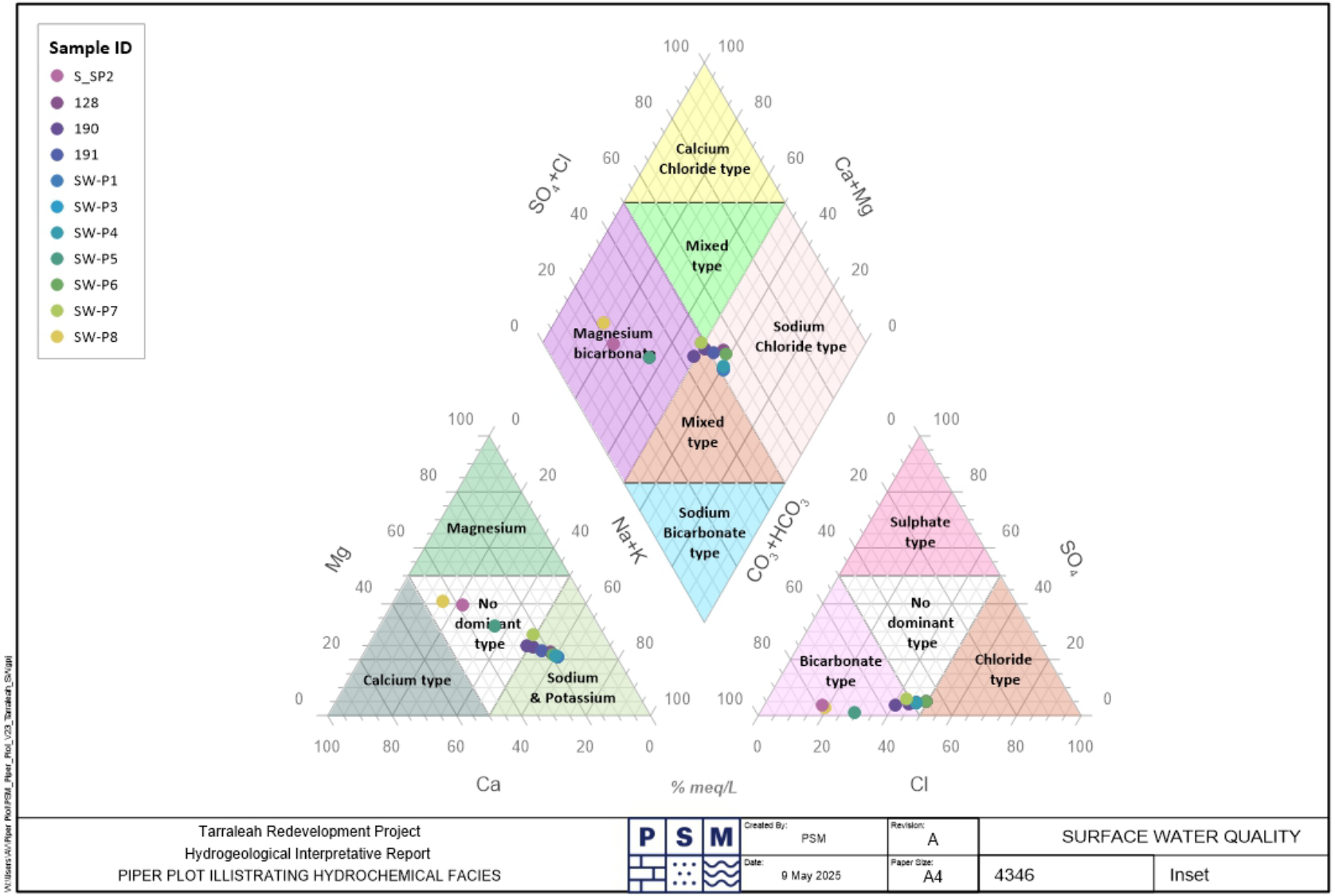
Table 9 – Summary of Surface Water Analyte Concentrations for March 2025

Sample Site	Concentration (mg/L)									pH
	Na	K	Ca	Mg	Cl	CO_3	HCO_3	SO_4	TDS	
128	3.3	0.1	1.0	0.7	4.5	2.0	3.0	0.6	30	6.6
190.3	3.6	0.2	1.7	1.0	4.7	2.0	7.0	0.6	44	-
190.4	3.4	0.1	1.4	0.9	4.6	2.0	5.0	0.6	38	-
190.7	3.4	0.1	1.2	0.8	4.5	2.0	4.0	0.6	39	-
156	2.7	0.1	1.0	0.7	4.5	2.0	4.0	0.6	34	6.6
SW-P1	2.7	0.1	1.0	0.7	4.5	2.0	4.0	0.6	39	6.7
SW-P6	2.7	0.2	1.0	0.7	4.5	2.0	3.0	0.6	38	6.5
SW-P4	3.7	0.1	1.0	0.7	4.5	2.0	4.0	0.6	31	6.6
SW-P7	4.2	0.4	1.7	1.4	5.9	2.0	8.0	1.1	42	6.9
SW-P5	3.4	0.3	4.1	2.5	6.6	2.0	23.0	0.4	63	7.1
SW-P8	3.7	1.3	11.0	6.2	8.5	2.0	55.0	1.8	124	7.3
S_SP2	4.2	0.9	7.1	4.4	5.9	2.0	40.0	1.6	91	6.7

Table 10 – Summary of Groundwater Anions and Cations Concentrations for March 2025

Sample Site	Concentration (% meq/L)							
	Na	K	Ca	Mg	Cl	CO_3	HCO_3	SO_4
128	0.15	0.00	0.05	0.06	0.13	0.07	0.05	0.01
190.3	0.16	0.00	0.09	0.08	0.13	0.07	0.11	0.01
190.4	0.15	0.00	0.07	0.07	0.13	0.07	0.08	0.01
190.7	0.15	0.00	0.06	0.06	0.13	0.07	0.07	0.01
156	0.12	0.00	0.05	0.06	0.13	0.07	0.07	0.01
SW-P1	0.12	0.00	0.05	0.06	0.13	0.07	0.07	0.01
SW-P6	0.12	0.00	0.05	0.06	0.13	0.07	0.05	0.01
SW-P4	0.16	0.00	0.05	0.06	0.13	0.07	0.07	0.01
SW-P7	0.18	0.01	0.09	0.11	0.17	0.07	0.13	0.02
SW-P5	0.15	0.01	0.21	0.20	0.19	0.07	0.38	0.01
SW-P8	0.16	0.03	0.55	0.51	0.24	0.07	0.90	0.04
S_SP2	0.18	0.02	0.36	0.36	0.17	0.07	0.66	0.03

The graphical representation of the surface water analytes and associated hydrochemical types are shown as a Piper Diagram in Inset 20.



Inset 20: Piper Plot Illustrating Hydrochemical Facies in Surface Water Samples

Based on the sample point distributions on the Piper Diagram, the following surface water observations were made:

- Samples plot across a wider range than groundwater, indicating greater chemical variability. Most samples cluster within the sodium-bicarbonate and mixed water type fields, suggesting relatively fresh water with some mineral interaction
- Several samples, including SW-P3, SW-P5, and S_SP2 plot within or near the magnesium-bicarbonate field. This suggests that these waters have been influenced by silicate weathering and/or ion exchange processes, which enrich the water in sodium and bicarbonate.

In summary, the surface water chemistry is moderately variable across the Project area, with most samples showing signatures of sodium-chloride, magnesium-bicarbonate, or mixed water types. These compositions reflect surface waters interaction with local geology, especially basalt and dolerite rocks.

4.11.2 Surface Water Quality Assessment

A summary of the physicochemical, nutrient, and selected metal results from surface water samples from March 2025 is shown in Table 11. Both these datasets provide insight into groundwater quality trends over time and reveal the following key observations:

- pH average 6.8 indicating circum-neutral conditions
- EC average 63 µS/cm, reflecting fresh surface water with low TDS
- Sulphate concentrations in most samples range from 0.4 to 1.6 mg/L. This suggests a very low risk of acid mine drainage (AMD) and minimal influence from industrial source on surface water bodies
- Nutrients nitrate, nitrite, and phosphorus concentrations were consistently low (<1 mg/L) across most samples, implying negligible contributions from anthropic sources
- Dissolved iron, manganese and trace metals concentrations are present at low concentrations and generally fall within acceptable background ranges.

Analyte outliers and their potential causes are summarised below, with corresponding values presented in Table 11 along with their spatial representation displayed in Figure 23(b). Outliers were defined as analyte concentrations that deviated from the average across surface water samples; however, such deviations do not necessarily indicate anomalies of concern:

- SW-P5, Horne's Dam, shows elevated iron concentrations. This could be due to iron leaching from surrounding soils or redox-driven mobilisation within the dam
- SW-P8 and S_SP2 showed comparatively high concentrations of nitrate and chromium. The underlying cause was unclear.

4.11.3 Nitrate Trends

Surface water sample SW-P1, located south of the Mid Access Tunnel (See Figure 23(b)), showed nitrate concentrations below both NHMRC and ANZECC guidelines.

In contrast, SW-P8 and Sample 10172 exceeded the > 0.7 mg N/L ANZECC nitrate guideline with a concentration of ~1 mg N/L. These samples suggest elevated nitrate is due to localised catchment factors.

Standards Comparison

Surface water samples were assessed against the NHMRC drinking water standards and the ANZECC freshwater ecology guidelines, with exceedances summarised in Table 11. All samples complied with these guideline thresholds except for:

- SW-P5, with elevated iron concentrations at 570 µg/L
- SW-P8 and S_SP2, with comparatively high concentrations of nitrate and chromium.

Table 11 – Surface Water Quality Summary – Tarraleah Plateau (March 2025)

Sample ID	TDS	EC	pH	TSS	SO_4	NO_3	NO_2	P	Al	Cd	Cr	Cu	Fe	Pb	Mn	Ni
Unit	mg/L	µS/cm		mg/L				mg/L	µg/L							
NHMRC[1]	1200	-	6.5 - 8.5	-	-	50	3	-	-	2	50	2000	300	10	500	20
ANZECC[2]	-	-	-	-	-	0.7	-	-	55 pH>6.5	0.2	1	1.4	-	3.4	1900	11
128.4	30	-	-	2	0.6	0.01	0.002	0.01	28	0.1	1	1	20	0.5	1	0.5
190.3	44	-	-	2	0.6	0.006	0.002	0.01	15	0.1	1	1	56	0.5	3	0.5
190.4	38	-	-	2	0.6	0.003	0.002	0.01	16	0.1	1	1	36	0.5	3	0.5
190.7	39	-	-	2	0.6	0.012	0.002	0.01	24	0.1	1	1	36	0.5	4	0.5
SW-P3	34	-	-	2	0.6	0.006	0.002	0.01	25	0.1	1	1	51	0.5	9	0.5
SW-P1	39	-	-	2	0.6	0.011	0.002	0.01	27	0.1	1	1	20	0.5	2	0.5
SW-P6	38	-	-	2	0.6	0.008	0.002	0.01	28	0.1	1	1	56	0.5	10	0.5
SW-P4	31	-	-	2	0.6	0.006	0.002	0.01	24	0.1	1	1	54	0.5	7	0.5
SW-P7	42	-	-	3	1.1	0.004	0.002	0.015	11	0.1	1	1	148	0.5	11	0.5
SW-P5	63	-	-	2	0.4	0.002	0.002	0.01	13	0.1	1	1	570[1]	0.5	29	0.5
SW-P8	124	-	-	2	1.8	1.05[2]	0.022	0.03	8	0.1	2[2]	1	60	0.5	89	0.5
S_SP2	91	113.8	6.84	2	1.6	1.16[2]	0.02	0.027	8	0.1	3[2]	1	20	0.5	1	0.5

(1) Indicates exceedance of NHMRC Drinking Water Standards.
(2) Indicates exceedance of ANZECC Freshwater Ecology Guidelines.

4.11.4 Surface Water Quality Summary

The overall assessment of the Project surface water quality suggests that:

- Surface water quality: the surface water is fresh with EC averaging 63 µS/cm and low TDS, indicating minimal salts and mineral loading. Metals and other trace elements remained within natural background concentrations
- Surface water types: the Piper Diagram shows most samples being sodium-bicarbonate, magnesium-bicarbonate, or mixed-type water types. This variation reflects interaction with local dolerite and basalt geology and suggests a combination of mineral weathering and ion exchange processes
- AMD: The risk of AMD in surface water is low. pH averaged 6.8, indicating circum-neutral conditions, while sulphate concentrations median was 0.6 mg/L. These values are contrasted with typical AMD conditions, which exhibit pH < 4.5 and sulphate > 500 mg/L. Dissolved metal concentrations such as iron and manganese were generally low, except for SW-P5 at 570 µg/L iron. No widespread signs of sulphide oxidation or acid generation were observed
- Nutrients: Concentrations usually low, with nitrate and nitrite typically <0.01 mg N/L. phosphorus was also low at <0.1 mg/L. SW-P8 and S_SP2 exceeded the 0.7 mg/L ANZECC (2000) guideline for nitrate.

4.12 AMD Risks

AMD is a collective term that can be used to describe acid rock drainage (ARD), pH neutral metalliferous drainage (NMD) and saline drainage (SD) (Jones et al., 2016). Characteristics of AMD water runoff includes low pH, reduced dissolved oxygen, and raised concentration of metals and ions. These qualities can impact upon aquatic and riparian ecosystems, and downstream beneficial uses of waterways.

The prediction, identification, and management of AMD is important for environmental and industrial compliance of earthworks (such as those associated with the construction of the Project. AMD can be a risk when excavating rocks and soils containing sulphides or disturbance of acidic soils. Technical guidelines used in the assessment of AMD issues included:

- ARD Test Handbook. Project P387A Prediction & Kinetic Control of Acid mine Drainage [AMIRA (EGi & IWRI) 2002]
- The Global Acid Rock Drainage Guide (INAP 2014)
- Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (MEND 2009)
- The Good Practice Guide for Management of Acid and Metalliferous Drainage (Mineral Resources Tasmania 2020).

Also, The List Tasmania (https://maps.thelist.tas.gov.au/listmap/app/list/map) is a publicly accessible collection of maps including the Mineral Resources Tasmania AMD database which assigns acid formation potential classifications. This highlights inland button grass plains as having a low acid forming potential.

Baseline groundwater quality monitoring shows a predominant calcium bicarbonate water type with approximately equal cation proportions of calcium and magnesium. Typically, the groundwater is circumneutral to slightly basic with pH in the range 6.6 to 8.4.

Mineralogical, petrological, and geotechnical material laboratory testing has been conducted on various soil and all stratigraphic rock units across the Project. Trace quantities of sulphides (pyrite) were encountered within borehole cores along the Project alignment. The Jurassic Dolerite is a primarily carbonate dominant rock mass and classified as a Non-Acid Forming (NAF) rock mass. The dominant Dolerite metals are iron, with lesser magnesium and titanium. These present as magnetite/ilmenite and pyroxenes. When combined with a circum-neutral groundwater pH, the potential for leaching of metals is low.

Trace sulphides have been logged in basalt and dolerite, as described in the GIR (March 2025).

AMD risks may be associated with:

- Runoff and seepage from waste rock landforms and temporary stockpiles due to Potential Acid Forming (PAF) blast rock spoils
- Lowering of the water table which would increase the depths of oxidation fronts and potentially expose PAF trace quantities of sulphides in the Dolerite and Basalt rock mass.

5. TEC Conceptual Hydrogeology

The hydrogeology conceptualisation of the *Sphagnum* peatland TEC settings has been developed based on expert opinion and guided by the Australian groundwater modelling guidelines (Barnett et. al. 2012). In this context, the conceptualisation has been supported by relevant references, including:

1. Structure and Geology of the Tarraleah Redevelopment Project Area (Stuart-Smith, 2023).
2. Tarraleah Redevelopment Project Geotechnical Interpretive Report (GIR, PSM4346-085R).
3. Finite Element Modelling of Flow, Mass and Heat Transport in Porous Fractured Media (Diersch, 2014).
4. Australian Standard for Water Quality Sampling (AS/NZS 5667.11:1998).
5. Australian and New Zealand Guidelines for Fresh Water Quality (ANZECC, 2000).
6. Interim Default Guideline Values for Aquatic Ecosystems of Groundwater in Tasmania (EPA, 2020).
7. Australian Drinking Water Guidelines (NHMRC, 2011).

Conceptualisation of groundwater flow system and surface water to groundwater interconnection behaviours associated with the Mossy March and Northern TECs is described in the following sections, including:

- Surface waters
- Fractured rock aquifers
- Interpreted HRMU hydraulics
- Interpreted baseline water table environments.

5.1 Surface Waters

5.1.1 Surface Water Expressions on the Tarraleah Plateau

Local water bodies potentially significant to the *Sphagnum* peatland TEC settings (Figure 2 and Figure 3) and potential impacts from the Project include:

- Mossy Marsh TEC (refer to Figure 4):
  - Mossy Marsh Tunnel
  - Mossy March Canal, Mossy Marsh, and Mossy Marsh Pond
  - Horne's Creek Canal and Horne's Dam
  - No. 1 Pond
  - No. 2 Pond
  - The numerous wetlands (Figure 3) on the Tarraleah Plateau.
- Northern TECs (refer to Figure 5):
  - The depression in the local landscape
  - Local watercourses and water shedding into the depression
  - The stream with headwaters in the depression in the local landscape and flowing south from the Wentworth Hills.

The anthropogenically altered drainage system of Mossy Marsh and Horne's Creek (associated ponds) sits atop the Jurassic dolerite, on the Tarraleah Plateau (Figure 1). Typically, 9 m^3/sec of water is transferred from Lake King William via canal and open tunnel (Mossy Marsh Tunnel and Canal, Figure 3) to the headwaters of Mossy Marsh, with subsequent release to the environment and gravity flow to Mossy Marsh Pond. Water flows then feed No. 1 Pond and No. 2 Pond which in turn feeds the penstocks of the existing Tarraleah Power Scheme.

The net positive annual water budget, with annual rainfall substantially exceeding actual annual evapotranspiration, when viewed in context to the surface water expressions supports concepts which include:

- The water table aquifer system is full, characterised by shallow water table and numerous wetlands where the water table intersects the topography
- Rainfall that infiltrates to the water table discharges on short flow paths to springs, seeps, streams, and wetlands because the aquifer is full and cannot accept the recharge – a rejected recharge circumstance
- Major faults and fracture zones in the fractured rock aquifers would dominate the water shedding and potentially control discharge locations and presence of wetlands.

During the operational stage of the Project, it is expected that the typical discharges from Mossy Marsh Canal will decay from 9 m^3/sec to about 4 m^3/sec.

5.1.2 Lake King William (and Mossy Marsh Canal) Qualitative Data

Lake King William captures inflows from Lake St Clair, Navarre River and water shedding off the King William ranges. Hydro Tasmania monitors water quality in the lake. Water quality characteristics for Lake King William source (Derwent Catchment Review Steering Committee, 2011) and hence discharges from Mossy Mash Canal include:

- Physicochemical profiles showed:
  - Constant lateral and vertical Electrical Conductivity in the range 20 to 25 µS/cm, indicative of consistent source terms for inflow to the lake
  - Seasonal temperature changes from about 5 to 10 °C with thermal stratification evident during summer. The thermal stratification was accompanied by:
    - Elevation pH 7 at the lake surface, with progressive lowering to pH 6.1 at depth
    - Decay of dissolved oxygen with depth, from about 90 %Sat near the lake surface to about 60% Sat at depth
    - Propensity of surface algal growth and degradation of organic material at depth.
  - Turbidity showing transient variability below 10 NTU, with the variability potentially linked to higher seasonal inflows during winter, wave action, and transient variability in algal growth
  - Sulphate maximum and average concentrations of 1 and 0.66 mg/L, respectively.
- Nutrient concentrations showed:
  - Total Nitrogen fluctuated seasonally, with observed range from 0.1 to 0.24 mg/L. The concentrations were lower during summer, indicative of consumption through algal growth
  - Total Phosphorous in the range 0.004 to 0.008 mg/L
  - Chlorophyll-a in the range 0.5 to 5.5 µg/L during 2008, with transient variability. Historical concentrations from 1992 to 2002 typically occurred in the range 0.5 to 2 µg/L
  - Blue-green algae were observed to be present through the 2008 monitoring.
- Metals concentrations showed maximum and average concentrations, respectively, including:
  - Aluminium – 0.058 and 0.045 mg/L
  - Cadmium, Chromium and Nickel – 0.001 mg/L
  - Copper – 0.002 and 0.001 mg/L
  - Iron Total – 0.075 and 0.041 mg/L
  - Lead – 0.005 mg/L
  - Zinc – 0.005 and 0.003 mg/L.

5.2 Fractured Rock Aquifers

Groundwater flows in the Mossy Marsh and Northern TEC settings are conceptually controlled by the network of vertical and laterally interconnected faults and fracture zones, as interpreted by Stuart-Smith (2023) and shown on Figure 11(b).

Figure 24(a) and Figure 24(b) provide perspectives of geology, fracture zones, and groundwater discharge zones in context to the Mossy Marsh TEC and Northern TEC, respectively. Fractured rock aquifer profiles intersected in cored boreholes in basalt/dolerite and dolerite terrains in surrounds to the Mossy Marsh TEC are shown on Figure 26 and Figure 27, respectively. Similarly, dolerite terrain fractured rock intersections relevant to the Northern TEC are shown on Figure 28.

5.3 Interpreted HRMU Hydraulics

Refinement of a conceptual hydrogeological model is achieved through the development of hydrogeological rock mass units (HRMUs). These are described in more detail in Section 4.2.

For the Mossy Marsh TEC the following conceptual model elements for the soils included:

- Thickness:
  - Cumulative, about 5 m, comprising:
    - Commonly 2 m thick peat bed
    - A basalt regolith typically 3 m beneath the peat beds.
- Soil effective hydraulic conductivity:
  - Informed by 11 slug and Guelph Permeameter tests (Figure 6)
  - Upper-bound = 0.075 m/day
  - Median = 0.010 m/day
  - Lower-bound = 0.001 m/day.

The upper-bound and median hydraulic conductivity values indicate rainfall infiltration and groundwater to surface water vertical flux capacities may range typically from 10 to 75 mm/day. These daily capacities are significant in context to daily and monthly rainfalls (refer to Inset 2) and support concepts of rejected recharge (Section 5.1). The lower-bound hydraulics reflect a leaky profile, where infiltration capacities of flux potentials of 1 mm/day would tend to limit vertical flux potentials, but leakiness would increase as a function of drawdown induced steepening of vertical downward hydraulic gradients.

5.4 Interpreted Baseline Water Table Environments

Interpretations of water table head contours considered topographic elevations, the presence of surface water, spot heads observed in standpipe monitoring bores, water strikes during drilling, and transient VWP heads. It was assumed that water table elevations would reflect the topographic elevations. There was comparatively fewer data associated with the Wentworth Hills and the Northern TEC, hence leading to potentially lower confidence interpretations in these settings.

The water exchange capacity of soils is influenced by several factors, including:

1. Thickness of soil horizons. The distribution of peat and residual soils around Project wetlands is known to be variable, with thickness range from 2 to 10 m. For conceptualisation purposes, it was assumed the soils below the Mossy Marsh TEC, Northern TEC, and other wetlands within the dolerite terrain on the Tarraleah Plateau typically comprise:
   a. A 2 m thick peat horizon overlying residual soils
   b. A 3 m residual soil thickness.
2. Hydraulics of soil horizons. The hydraulics of the soils derived from slug tests, Guelph permeameter tests, and as referenced are described in Table 2.

The interpreted baseline water table settings and groundwater to surface water interactions for the Mossy Marsh TEC and Northern TEC are discretised below.

5.4.1 Mossy Marsh TEC

Interpretations of the groundwater environments of the Mossy Marsh TEC setting include assumptions as follows:

- The aquifer system is full
- Within the surface water bodies, for example Mossy Marsh Pond, immediate groundwater heads conform to the elevation of the surface water
- Water table elevations are within 1 m below ground elevations within wetlands and swamp settings
- Water table contours conform to the ground surface topography.

Interpretations of baseline heads in surrounds to the Mossy Marsh TEC are shown on Figure 29. These interpretations are supported by the hydrograph data (Appendix B) from the standpipe monitoring in TA-DC252 located on the northern perimeter of the Mossy Marsh TEC.

The hydrograph shows seasonal low heads of about 659.0 m AHD, compatible to depths to the water table of about 0.9 to 1.0 m. Water table heads seasonally peak at 659.8 to 659.9 m AHD at depths from 0.1 to 0.2 m below the ground. Interpreted depth to groundwater contours are shown on Figure 30 and associated indications of local groundwater recharge and groundwater discharge zones are shown on Figure 31. Contextually, the groundwater discharge zones shown in the Mossy Marsh TEC setting represent groundwater to surface water interactions. Schematics of this local groundwater to surface water interaction context are shown on Figure 32 (stratigraphic and structural profile) and Figure 33 (flow nets).

Groundwater heads in the vicinity of the Sphagnum community also correlate to water levels in Mossy Marsh and/or discharges for the Mossy Marsh Canal. Changes in flows and water levels in Mossy Marsh are also closely correlated with rainfall. Discerning the comparative influences of rainfall, changes in flows, and baseflow is not straightforward, however, it is anticipated that rainfall is the predominant influence on groundwater heads in the Mossy Marsh TEC setting.

Typical discharges of 9 m^3/sec from Mossy Marsh Canal to the headwaters of the Mossy Marsh provide supplementary waters to an aquifer system that is full. Therefore, most of these discharges would contribute to the immediate watershed, with grossly subordinate and limited infiltration. The 0.8 to 0.9 m amplitudes of seasonal water table fluctuations evident in TA-DC252, provide indications, however, that these discharges may form a seasonal artificial recharge source to Mossy Marsh: dampening the amplitudes and hydro-period of seasonal fluctuations within Mossy Marsh and immediate surrounds.

5.4.2 Northern TEC

Interpretations of the groundwater environments of the Northern TEC setting include assumptions as follows:

- Recharge to Wentworth Hills is comparatively high as a function of higher rainfall and associated infiltration capacities
- The aquifer system is full in the basin-form setting immediately west of the Northern TEC, supporting seasonal baseflow to the headwaters of the local structurally controlled watercourse
- Water table elevations are within 1 m below ground elevations within the basin-form setting
- Water table contours broadly conform to the ground surface topography.

These assumptions do not discount the possibility of a perched shallow water table, within peat and weathered dolerite profiles, and a disconnected deeper water table under circumstances where the hydraulics of the fresh massive dolerite (H-D1 HRMU) inhibits vertical infiltration. The net positive water balance at Tarraleah would be enhanced on the Wentworth Hills, such that the perched water table would tend to be a persistent perennial feature sustained by rainfall infiltration within the known 0.65 to 1.8 m soil profiles.

Interpretations of baseline groundwater heads and depths to groundwater in surrounds to the Northern TEC are shown on Figure 34 and Figure 35, respectively. These interpretations are supported by the snapshot observations from the hand-auger boreholes TA-AHSphagnum01 and TA-AHSphagnum02 which showed depths to groundwater from 0.14 to 0.175 m. Indications of local groundwater recharge and groundwater discharge zones based on the interpreted depths to groundwater are shown on Figure 36. Contextually, the groundwater discharge zones shown in the Northern TEC setting represent groundwater to surface water interactions. Schematics of this local groundwater to surface water interaction context are shown on Figure 37 (stratigraphic and structural profile) and Figure 38 (flow nets). Flow net schematics for the alterative conceptualisation of a perennial shallow perched and a disconnected deeper water table in the Northern TEC setting are shown on Figure 39.

6. Power Station Site Conceptual Hydrogeology

The Power Station, referred as TAPS2, is located at the end of the two Penstock tunnels, next to the existing Tarraleah Power Station and the Nive River. The location is shown on Figure 1. TAPS2 involves an excavation to depths of 12 to 15 m. The Nive River would form a recharge boundary under circumstances where the water table is lowered by excavations below the river stage.

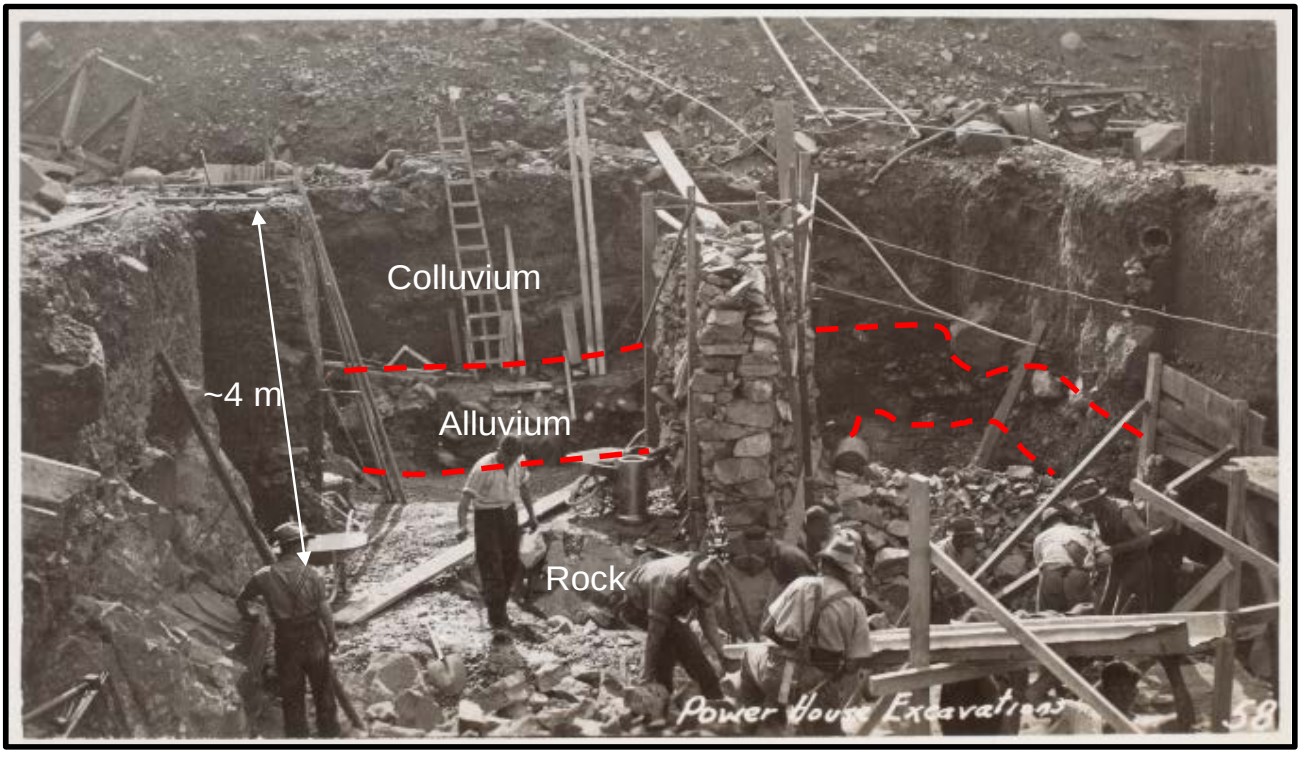
6.1 Geology and Structure

The TAPS2 site is in dolerite terrain at the base of the Tarraleah Hillside, locally covered by alluvium from the Nive River, colluvium, and fill. TAPS2 is located wholly within the core of regional scale Nive River Graben. Figure 2 and Figure 6 show the interpreted faults associated with the graben. These are expected to traverse the TAPS2 site.

The alluvium within the TAPS2 footprint is interpreted to represent a remnant river channel cross-cutting the site, deepest along the eastern side of the switchyard adjacent to the river. The alluvium is expected to be variable in distribution and provide a direct hydraulic connection with the river. This is illustrated in Inset 21 where in-situ dolerite is exposed in the riverbed and Inset 22 where about 4 m of alluvium and colluvium were excavated for the Tarraleah Power Station footings. Composition and thickness of the fill is expected to be widely variable due to historic activity at this location.



Inset 21: Exposed *in situ* dolerite (in red) near Tarraleah Power Station (2021).



Inset 22: 1938 photo of the sub-surface within Tarraleah Power Station footing.

6.2 Rock Mass Units

The station box was interpreted to be within H-D4 and H-D5 HRMUs. The rock mass through the Nive River Graben was expected to be heterogeneous with:

- Zones of brecciation or cataclastic
- Common, weakly cemented fractures
- Evidence of alteration, increased weathering and a reduction in rock strength
- Zones of zeolites, carbonates, and swelling clays within, and marginal to, fault breccias throughout the dolerite rock mass, with the potential for vugs, cavities, and/ or water-filled voids caused by dissolution of these minerals
- Zones of high to very high strength, unaltered rock separated by zones of deformation
- Potential for common and continuous random moderately dipping shears within the dolerite.

6.3 Hydraulic Conductivity

Successful packer tests performed in boreholes in the TAPS2 setting were in H-D4 and H-D5 dolerite and provided values of hydraulic conductivity typically less than 0.02 m/day. Across the broader Project area, the H-D4 and H-D5 rock mass provided maximum hydraulic conductivity up to about 0.1 m/day. Application of the local packer test hydraulics over the 12 to 15 m depth of excavation at TAPS2 indicates effective transmissivity of 1 to 2 m^2/day.

Three tests in TA-DC238 failed, with one at least due to inability to pressurise the packer interval. Bypass may explain the inability to pressurise the aquifer intervals, but the presence of zones at higher hydraulic conductivity may be the cause. In this context, the sub-vertical boreholes at TAPS2 provide constrained intersections with sub-vertical fracture and defect zones in the dolerite and may under-represent the actual hydraulic conductivity of preferred flow paths in the fractured rock mass.

Based on the core photographs and hydraulic test data obtained throughout the broader Project area (Section 4.4), the aquifer tends to progressively close with depth, though there seem to be exceptions.

6.4 Potential Inflows to the TAPS2 Excavation

The TAPS2 proximity to the Nive River provides indications of potential inflow risks under circumstances where high transmissivity fracture zones in dolerite connect the 12 to 15 m excavation to flows on the Nive River.

Local packer tests in H-D4 and H-D5 indicated hydraulic conductivity less than 0.02 m/day, transmissivity 0.3 m2/day. The H-D4 zones represent preferred flow paths. Across the broader Project, the H-D4 and H-D5 rock mass provided maximum hydraulic conductivity up to about 2 m/day, with corresponding transmissivity of about 30 m2/day for lateral flow paths to the TAPS2 excavation. The upper-bound hydraulics of the H-D0 anomalous high-yield defects have indicated upper-bound hydraulic conductivity of 4 m/day, hence also a corresponding transmissivity of about 60 m2/day for lateral flow paths to the TAPS2 excavation. Cumulatively, the hydraulics data indicate comparatively low inflow risks for the TAPS2 excavation.

Empirical estimates of inflows to the TAPS2 excavation based on the upper-bound H-D0 hydraulics, fracture zone width up to 75 m, and assuming parallel flow in a fracture zone to a shallow excavation in an unconfined aquifer ranged from about 5 to 50 L/sec. The estimates were sensitive to the assumed fracture zone widths intercepted on the perimeter of the excavation and effective transmissivity of the fracture zone HRMU. Further, the inflow rates would rapidly decay unless sustained by flows from a nearby recharge source. The Nive River may form a recharge source if there is direct connection on fractures between the surface water flows on the river and the TAPS2 excavation. It was anticipated that inflows of this magnitude would be intercepted by sump pumping within the excavation; a comparatively straightforward application given low head.

Elements of uncertainty in the TAPS2 setting within the Nive River Graben relate to the characterisation of the fracture zones which potentially connect the planned excavation to surface water flows in the Nive River. This uncertainty was reflected in:

- Local mapping of outcrops indicated the presence of zeolites and carbonate infill to individual fracture zones. Contextually such presences of zeolites and carbonates have been aligned to high inflow paths in other excavations in dolerite fracture zones
- Recognition that the completed site investigations were not specifically targeted to intersect predominant fracture zones or preferred groundwater flow paths. Contextually, the interpreted local packer test hydraulics may not be representative for inflow risk assessments, potentially underestimating inflow rates where zeolite and carbonate deposits characterise high transmissivity fractures
- Limited insight of the riverbed exposures of high flow fracture zones to recharge from stream flow.

7. Conceptual Water Budgets for Stockpiles

7.1 Overview

The water budget assessments for the stockpiles adopted key climate data (Section 2.1) and other aspects of the conceptual hydrogeology including:

- Total mean annual precipitation (2000 to 2022) is recorded at 1,274 mm
- Mean Actual Evapotranspiration between 2000 and 2022, 566 mm/a
- Interpreted water table elevations (Figure 8) and depths to groundwater (Figure 9)
- Perspectives of rejected recharge (Section 4.5.3) given the water table aquifer system is full, hence with limited storage and infiltration from rainfall may discharge as baseflow on short (length and duration) flow paths to springs, seeps, streams, and wetlands.

7.2 Stockpile Settings

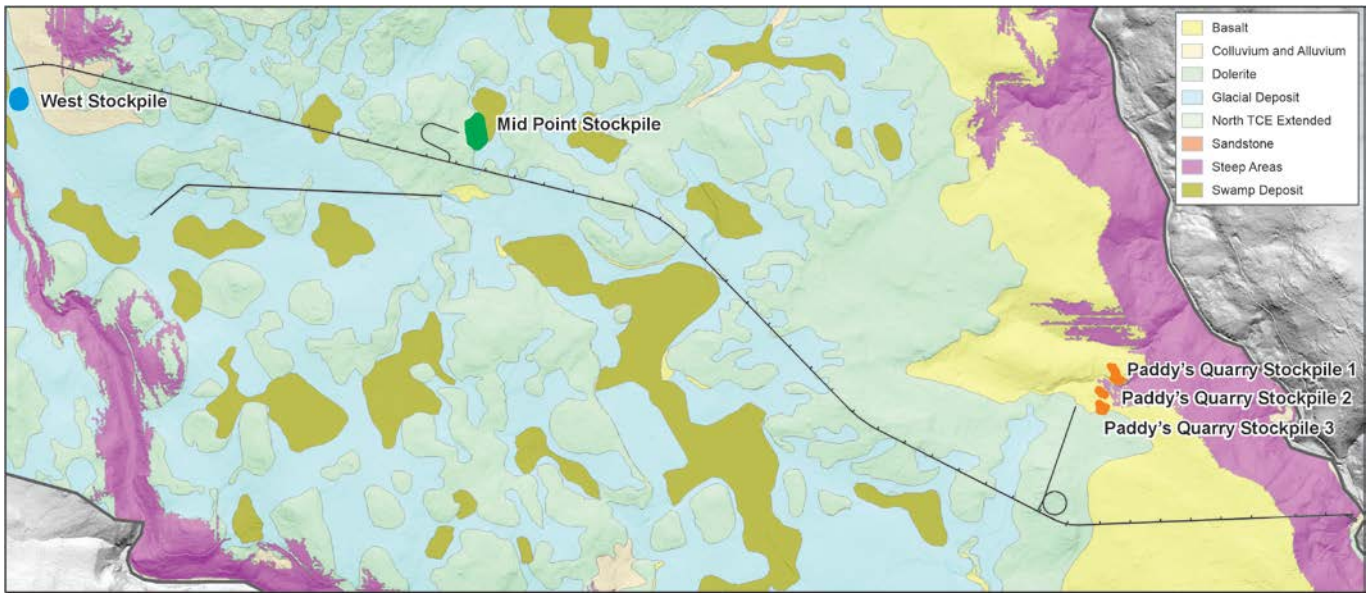
The locations of the West, Mid-point, and Paddy's Quarry stockpiles are shown on Figure 1, Figure 2, and Figure 3 with contexts to layout of the Project, surface water catchments, and surface water features. Hydrogeological aspects of the stockpile settings, including water table elevations and depths to groundwater and shown on Figure 40 and Figure 41, respectively. The stockpile locations show:

- West stockpile – A foot slope setting on the perimeter of a wetland overlying west-southwest flow paths originating on Wentworth Hills. Shallow depths of 0 to 4 m, typically 1 to 4 m, to the water table and groundwater discharge zones to wetlands on the western perimeter indicate a low net recharge setting
- Mid-point stockpile – A foot slope setting on the southeast fringe of Wentworth Hills overlying easterly flow paths. Moderate depths to the water table of typically 3 to 6 m, decreasing to shallow groundwater in the northeast where peats occupy a low-relief valley floor. A moderate to low recharge setting in transition to local groundwater discharge zones
- Paddy's Quarry stockpiles – Within incised valley of a tributary to the Nive River. Moderate depths of typically 7 to 10 m to the water table indicative of a moderate recharge setting.

When comparing the stockpile and Lake King Willam Tunnel Settings (Section 4.5.2), there was expectation that the stockpile settings would be characterised by less than 10 to 12 % recharge from rainfall. Further, given positions in the landscape, rates of recharge may be comparatively higher at Paddy's Quary, then decline from Mid-point to the West stockpiles.

The stockpiles are situated on varied Quaternary sediments and weathered bedrocks as shown on Inset 24, and the variations result in expectations of different in groundwater recharge rates:

- West Stockpile – glacial deposits
- Mid-point Stockpile – 21, 46, and 33% glacial, swamp, and dolerite, respectively
- Paddy Quarry Stockpiles:
  - Stockpile 1 and Stockpile 2 – basalt
  - Stockpile 3 – 86 and 14% basalt and dolerite, respectively.



Inset 23: Recharge zones distribution and stockpiles.

7.3 Methodology

The basic balance equation below can inform the local water balance for stockpile:

$$P = R + ET + I + S \qquad \text{eq (1)}$$

Where:

P = Rainfall (Precipitation)

R = Run-off (surface water that does not infiltrate)

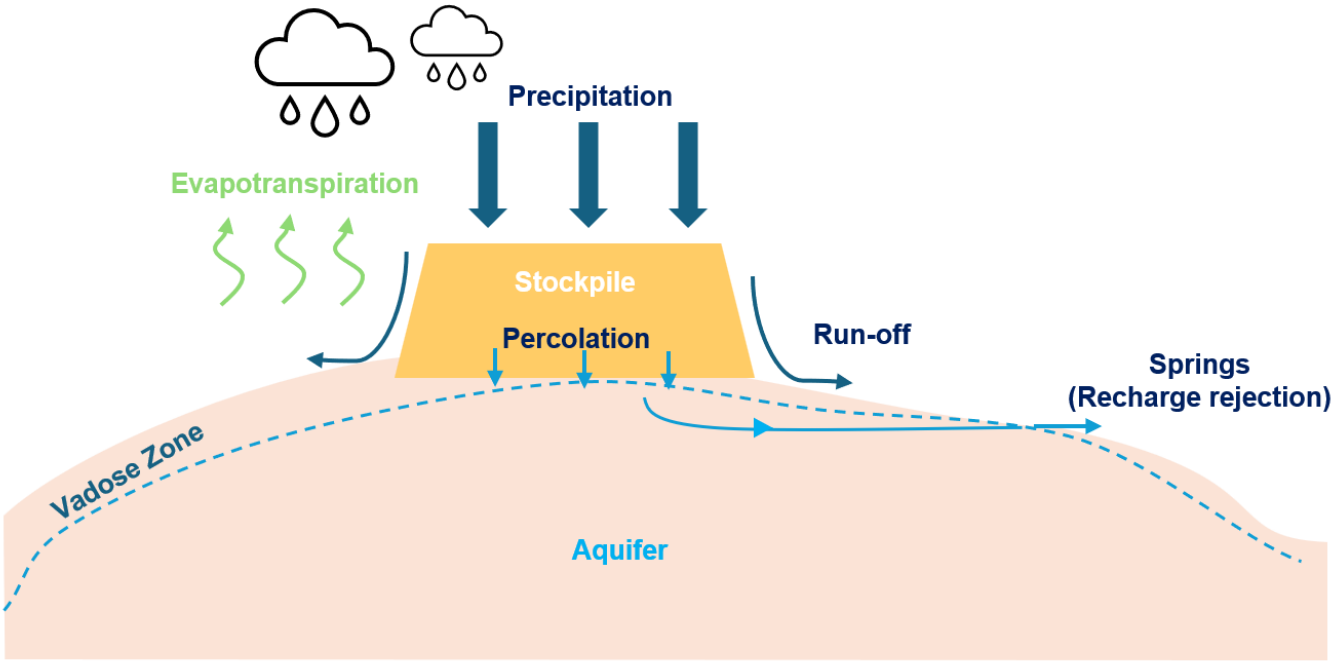
ET = Evapotranspiration (water lost to atmosphere)

I = Infiltration or Groundwater Recharge

S = change in storage; it is zero assuming a steady-state system.

In the water balance assessment, rainfall and evapotranspiration were considered constant, while recharge was treated as a variable, constrained by recharge boundary conditions in calibrated numerical models. Where a stockpile spans multiple recharge zones, a weighted average was applied to estimate recharge. Run-off was calculated using the water balance equation above.

Inset 22 illustrates the water components of the conceptual groundwater balance model for the stockpiles.



Inset 24: Conceptual schematics for water balance model of stockpiles.

Table 12 represents the potential groundwater recharge volumes for all stockpiles, while Table 13 shows the recharge as a percentage of rainfall. Both tables explore a lower bound, base case, and upper bound range based on the guidance provided from the recharge estimates at the Lake King William Tunnel and expectations of increased recharge in setting where the water table is comparatively deeper.

Table 12 – Estimated Water Balances for Stockpiles

Stockpile	Components	Water Balance (ML/annum)		
		Lower Bound	Base Case	Upper Bound
West Stockpile	Rainfall	29.6		
	Actual ETA	13.1		
	Net Groundwater Recharge	0.1	0.3	1.2
	Runoff and Rejected Recharge	16.4	16.1	15.2
Mid-point Stockpile	Rainfall	54.3		
	Actual ETA	24.1		
	Net Groundwater Recharge	0.8	1.4	2.4
	Runoff and Rejected Recharge	29.3	28.8	27.8
Paddy's Quarry Stockpile 1	Rainfall	23.7		
	Actual ETA	10.5		
	Net Groundwater Recharge	0.8	1.5	2.9
	Runoff and Rejected Recharge	12.4	11.7	10.3
Paddy's Quarry Stockpile 2	Rainfall	8.0		
	Actual ETA	3.6		
	Net Groundwater Recharge	0.3	0.5	1.0
	Runoff and Rejected Recharge	4.2	3.9	3.5
Paddy's Quarry Stockpile 3	Rainfall	10.4		
	Actual ETA	4.6		
	Net Groundwater Recharge	0.3	0.7	1.3
	Runoff and Rejected Recharge	5.5	5.1	4.5

Table 13 – Water Balance for Stockpiles as a Percentage of Rainfall

Stockpile	Components	Proportional Water Balance (Per cent)		
		Lower Bound	Base Case	Upper Bound
West Stockpile	Rainfall	100		
	Actual ETA	44.4		
	Net Groundwater Recharge	0.2	1.0	4.1
	Runoff and Rejected Recharge	55.3	54.6	51.4
Mid-point Stockpile	Rainfall	100		
	Actual ETA	44.4		
	Net Groundwater Recharge	1.5	2.6	4.3
	Runoff and Rejected Recharge	54.1	53.0	51.2
Paddy's Quarry Stockpiles 1, 2, and 3	Rainfall	100		
	Actual ETA	44.4		
	Net Groundwater Recharge	3.2	6.5	12.3
	Runoff and Rejected Recharge	52.3	49.1	43.3

7.4 Infiltration Excess

Infiltration excess occurs when rainfall intensity exceeds the soil infiltration capacity, resulting in increased surface runoff. This process is assessed in relation to groundwater recharge to determine if long-term recharge may be rejected due to infiltration limitations.

Soil infiltration capacities have been estimated by Guelph Permeameter tests conducted within alluvium/colluvium and peat swamp deposits. For other hydrogeological units, the calibrated range of vertical hydraulic conductivity from regional numerical models (PSM, 2025) were used as a proxy for infiltration capacity.

Table 14 compares the estimated recharge rates for each stockpile with the corresponding estimated infiltration capacities. The results indicate that the maximum recharge rate in all cases remains below the minimum estimated infiltration capacity. This suggests that infiltration excess is highly unlikely in the study area, as the soils can accommodate the expected recharge without generating excess runoff.

Table 14 – Comparisons of Estimated Recharge and Infiltration Capacities

Stockpile	Model Recharge Rate Range (m/d)	Infiltration Capacity (m/d)
West	0.00004 to 0.0007	0.05 to 1.5
Mid-point	0.0004 to 0.003	0.001 to 1.5
Paddy's Quarry 1		0.004 to 0.042
Paddy's Quarry 2		
Paddy's Quarry 3	0.0004 to 0.003	

7.5 Saturation Excess

Saturation excess occurs when the soil or aquifer becomes fully saturated. Once the aquifer is fully saturated, the recharge becomes constrained leading to a high rejection ratio. Excess water is often redirected as discharged through springs and runoff.

A bucket model based on mass balance beneath the stockpile footprint was used for the estimation of saturation excess. The model assumed that saturation was governed by groundwater recharge by rainfall, with all other influencing factors being negligible. The storage volume of the vadose zone was calculated using the water depth to the wate table, specific yield, and footprint area.

The typical water depths for each stockpile setting were:

- West: 2 m
- Mid-point: 4 m
- Paddy's Quarry: 8 m.

The assumed depth of typical soils was 5 m, while the weathered dolerite extends to 20 m. If the depth to the water table exceeds 5 m, such as at the Paddy's Quarry stockpiles, the underlying rock unit and its associated specific yield (dimensionless) beneath must be considered when calculate vadose zone volume. The estimated times to saturate the vadose zone are described in Table 15.

Table 15 – Estimated Time to Fully Saturated Vadose Zones beneath Stockpiles

Stockpile	Vadose Zone Volume (ML)	Time to Saturated Vadose Zones (Years)
West	4.6	4 to 65
Mid-point	1.7	6 to 16
Paddy's Quarry 1	3.6	0.5 to 2
Paddy's Quarry 2	7.9	
Paddy's Quarry 3	1.5	

7.6 Key findings

The major findings from water balance, infiltration excess, and saturation excess included:

- West stockpile:
  - Location in shallow water table settings on the perimeter of a wetland – a low recharge setting
  - Infiltration excess unlikely
  - The groundwater recharge component of the water budget was estimated in the range 0.2 to 4.1%
  - Unsaturated zone beneath is unlikely to be saturated during construction activities.
- Mid-point stockpile:
  - Location is Wentworth Hills foot slope setting, with underlying shallow water table nearby to peat swamps – a low to moderate recharge setting
  - Infiltration excess unlikely
  - The groundwater recharge component of the water budget was estimated in the range 1.5 to 4.3%
  - Unsaturated zone beneath is unlikely to be unlikely to be saturated during construction activities.
- Paddy's Quarry stockpiles:
  - Location within incised stem lines for a tributary to the Nive River – a moderate recharge setting
  - Infiltration excess unlikely
  - The groundwater recharge component of the water budget was estimated in the range 3.2 to 12.3%
  - The underlying aquifer can reach saturation in comparatively short periods. Once saturated, recharge will be rejected and manifest as seeps, springs and surface water run-off.

Recharge components would be mixed with and diluted by the groundwater in storage, with further substantial dilution by recharge outside of the stockpile footprints and groundwater fluxes on flow paths beyond the stockpiles.

Ultimately, the stockpiles water budgets may be dictated by the infiltration capacities of the stockpile surfaces. If the stockpile surfaces are compacted, with comparatively low hydraulic conductivity, then infiltration can be significantly reduced and runoff increased. Under these circumstances, infiltration excess may become the dominant mechanism. This aspect would potentially alter the interpreted balance between recharge, rejected recharge, and runoff. If the local infiltration is reduced by 90%, then the groundwater component of the estimated water budgets would decline. Further, the stockpile water budgets are subject to change because of Project tunnel developments, with associated dewatering and drawdown during construction and pressurisation with discharges onto the ground surface during operations.

8. Numerical Model Design

8.1 Modelling Approach

8.1.1 Objectives

The modelling approach is focussed on the Project tunnels (Figure 1). The objectives of the groundwater modelling for the Project included:

- Evaluation of groundwater inflows into the Project works during excavation
- Evaluation of tunnel water loss from the Project works during operation
- Evaluation of the potential drawdown caused by seepage into Project works, especially for the Mossy Marsh and Northern Sphagnum Peatland TECs
- Assessment of pressurisation at the potential geotechnically instable zones of Tarraleah Hillside.

8.1.2 Modelling Software, Settings and Post-processing

The Finite Element subsurface FLOW simulation system (FEFLOW 8.0; DHI, 2023) was selected to solve the differential equations governing flow in porous and fractured media. FEFLOW was selected because it is a widely used code in the groundwater modelling community, has been extensively verified, and provides flexible meshing capabilities for representation of the Project tunnels.

FEFLOW applied the Finite Element Method to solve Richard's Equation (Diersch, 2014; Richards, 1931) for variably saturated porous media flow. It was assumed that the fractured rock aquifers behave as Equivalent Porous Media (EPM) at a large enough Representative Elementary Volume (REV). Within the REV, hydraulic properties may vary significantly, potentially by orders of magnitude, around the assumed EPM properties.

The results from numerical models were processed to estimate seepage/water loss to/from, and drawdown/pressurisation caused by, the Project. Seepage rates are reported as monthly averages to filter out the effects of very short time-steps introduced in response to transient boundary conditions by the FEFLOW automatic time-stepping algorithm. Drawdown and groundwater mounding were estimated by simulating the position of the water table (phreatic surface) for the pre-Project condition and then subtracting the future modelled phreatic surface. Accordingly, drawdown was not associated with a particular model layer, rather it was calculated in three-dimensions over the full model domain. In this context, the uppermost water table was considered where multiple phreatic surfaces were evident in the simulated results from FEFLOW.

Backwards particle tracking is performed for the drained excavations of the Project. Particle tracking involved virtual particles being released at the mesh nodes of tunnel inverts and edges of the simulated excavations, just before the tunnels were pressurised. FEFLOW utilised transient velocity fields to track particles back to their source locations, thereby delineating their capture zones. Forwards particle tracking was also performed for the pressurised sections of the Project by releasing the virtual particles at the corresponding mesh nodes at the beginning of operations. FEFLOW utilised transient velocity fields to track forwards to the particle destinations, thereby informing their impact zones.

8.2 Project Works

The following engineering elements within the proposed redevelopment alignment have been included in the model domain as well as the interpreted ground model:

- Tarraleah Redevelopment Engineering Elements:
  - Headrace Tunnel
  - Power Tunnel
  - Mid Access Tunnel
  - Surge Access Tunnel
  - Surge Shaft and Connection Chamber.
  - Penstock Tunnels:
    - Intersection support / Distributor
    - Penstock No.1
    - Penstock No.2.
- Lake King William Tunnel.

The revision to the Project reference alignment occurred during November 2023 with adjustments to the western headrace portal and Mid Access Tunnel locations are included in this assessment.

Existing infrastructures in proximity to the Project area includes:

- Existing tunnel:
  - Mossy Marsh Tunnel
  - Butler Gorge Tunnel.
- Existing surface water storage:
  - Lake King William
  - Butlers Diversion Pond
  - No.1 Pond
  - No.2 Pond
  - Mossy Marsh Pond
  - Horne's Dam
  - Dammed Freshwater
  - Lake Liapootah.

Figure 42 shows the Project works, the existing tunnels and water storages included in the groundwater model.

The construction schedule for the Project is uncertain regarding several key aspects including:

- The start date for tunnel excavation
- The duration of construction.

A schedule risk assessment suggested construction could take approximately 18 months longer at P90; with P90 representing a 90% probability of completion within that timeframe, respectively.

Table 16 presents the latest construction schedules for the Project tunnels and Lake King William Tunnel (received on 28 May 2024). To account for schedule uncertainty, the start and completion dates for the Project are provided in months instead of dates. The P90 scenario maintains the same start date as the base case but increases the excavation and lining durations by 30% compared to base case. While schedule dates for Lake King William Upgrade Work are available, they cannot be directly incorporated because the timing for the Tarraleah Redevelopment Project is unknown. To align both projects in a single model, it is assumed that Lake King William construction begins simultaneously with Tarraleah construction (from Day 0).

Figure 43(a and b) illustrate the construction sequence and their completion timelines relative to the Project construction start. It includes the base case schedule (Figure 43 (a)), as well as the P90 schedule (Figure 43 (b)).

The construction schedule is subject to potential changes as the reference design progresses. The changes in the duration and sequence of excavation may impact the predicted drawdowns and seepages.

The modelling adopted the value engineering design which included a steel liner traversing about 690 m of the Power Tunnel (chainage from 16,300 to 16,986 m) and assumed to be impermeable. The uppermost 50 m of Surge Shaft was also lined to be impermeable after excavation. Tunnels without steel lining were assumed to function as drained structures during construction and pressurised structures during operation.

Table 17 presents the approximate geometries of Project tunnels and the existing tunnels considered in groundwater models, along with the associated lining requirements. The tunnel cross-section geometry was explicitly simulated in the 3D groundwater model by assigning mesh nodes within the tunnel footprint to the corresponding crown and invert elevations.

Table 16 – Construction Schedule Scenarios for Tarraleah Redevelopment

Project	Project Work	Months Relative to Start of Construction					Notes
		Excavation Start	Base Schedule		P90 Schedule		
			Excavation Completion	Lining Completion	Excavation Completion	Lining Completion	
The Project	Headrace Tunnel, Western Section - D/S	6	37	-	46.3	-	Drained Pressurised
	Headrace Tunnel, Western Section - U/S	14	22	-	24.4	-	Drained Pressurised
	Mid Access Tunnel	8	14	-	15.8	-	Drained Pressurised
	Headrace Tunnel, Mid-Section - D/S	14	47	-	56.9	-	Drained Pressurised
	Headrace Tunnel, Mid-Section - U/S	21	47	-	54.8	-	Drained Pressurised
	Surge Access Tunnel (1)	7	21	-	25.2	-	Drained Pressurised
	Power Tunnel - D/S	21	36	55	40.5	65.2	Steel lining
	Power Tunnel - U/S (2)	3	16	-	19.9	-	Drained Pressurised
	Penstocks	12	15	52	15.9	64.0	Steel lining
LKW Upgrade Work	LKW Tunnel on Downstream End	0	11.1	-	14.4	-	Drained Pressurised
	Upstream 30 m Stub	0	2.5	-	3.2	-	Drained Pressurised
	Concrete Invert Lining	0	2.6	-	3.4	-	Drained Pressurised

(1) Surge access tunnel will be pressurised only between the tunnel plug and Headrace Tunnel. The tunnel plug is situated about 440 m from the portal.
(2) The schedule for surge tower and connection chamber was not specified. Therefore, it is presumed that the excavation aligned with the nearest Headrace Tunnel excavation schedule.

Table 17 – Modelled Dimensions of Tunnels in the Groundwater Model

Infrastructure	Dimension (m)	Approximate Length (m)	Invert (m AHD)	Comments for Lining
Mossy Marsh Tunnel	3.7 (H) 3.7 (W)	2,489	673.8 to 677.7	Lined, partially lined, inverted lined and unlined with weep holes exist. It is conservatively simplified as an unlined drained structure here.
Headrace Tunnel – Western Section	5.5 to 6.5 (H) 5.4 to 6.2 (W)	3,680	606.7 to 654.2	Unlined.
Headrace Tunnel – Mid Section	6.5 (H) x 6.2 (W)	5,826	394.5 to 606.7	Unlined.
Power Tunnel	5.7 to 7.2 (H) 5.7 to 7.1 (W)	2,537	346.1 to 394.5	A final 690m long steel lined section before bifurcations connects the tunnel to the units in the station.
Surge Shaft and chamber	5 to 11.2 Diameter 263.2 Depth	-	388.5	50m of the top of the surge shaft is required an impermeable lining; others are unlined.
Stockpile Cuddy	6.2 (H) 5.4 to 11.2 (W)	20 each	Variable	Unlined.
Mid Access Tunnel	6.5 (H) 5.7 to 12.1 (W)	736	606.6 to 709.2	Unlined.
Surge Access Tunnel	6.5 (H) 5.7 to 12.0 (W)	1529	394.9 to 550.7	Unlined.
LKW Tunnel	6.5 to 8.6 (H) 5.7 (W)	795	662.2 to 693.7	Unlined.
LKW Upstream Transition Zone	8. to 8.7 (H) 7.5 to 8.3 (W)	24	693.6 to 694.8	The rock mass around the tunnel plug will be grouted. They are conservatively simplified as an unlined drained structure here.
LKW Downstream Transition Zone	6.3 (H) 6.4 (W)	103	663.1 to 663.7	
Intersection support / Distributor	7.2 (H) 9.5 (W)	76	345.4 to 346.8	Steel lined.
Penstock Tunnels	4.6 (H) 4.7 (W)	180	334.4 to 346.3	Steel lined.

8.3 Hydrogeological Setting

As described in Section 4, the HRMUs in the Project area primarily comprise Jurassic dolerite, Triassic sandstone, Tertiary basalt, and Quaternary soils, along with the overprinting geological structures network and fractured zones (Stuart-Smith 2023).

Figure 11(b) presents the simulated structure network and fractured zones within the groundwater models. The simulated structure network is compatible to the Stuart-Smith (2023) interpretation, shown in Figure 11(a), but attributed to provide a connected network of fracture zones through ensuring individual fracture zones are locally extended to intersect other fracture zones.

The HRMUs and soils incorporated in groundwater model align with the HRMUs described in Section 4.2.

The Mossy Marsh Tunnel is an existing drained structure in the vicinity of Headrace Tunnel. It influences the local baseline groundwater heads and flow patterns and may also capture water from pressurised tunnels during operations. Thus, Mossy Marsh Tunnel was incorporated in the groundwater model. The Bulter Gorge Tunnel, situated 500 m to the south of the Lake King William Tunnel, was excluded from the groundwater model due to the lack of available details to inform modelling.

8.4 Model Design

8.4.1 Model Domain

The model domain starts at Lake King William and terminates at the Nive River, traversing boundaries of the Lake King William, Upper Derwent, and Lower Nive sub-catchments. The model domain is bordered by natural water courses where practical. Figure 42 shows the model domain of the groundwater model, covering an area of approximately 137 km^2, and corresponds with:

- Lake King William to the west
- Nive River, Lake Liapootah to the east
- Outflow boundary from Palaeochannel to the south-east
- A part of Derwent River to the south
- No-flow boundary for the remaining boundaries.

The extent of domain to the north and south where a no-flow boundary is applied, was selected to ensure sufficient distance from the Project works. This is done to mitigate potential impacts of a barrier boundary on the propagation of simulated drawdown.

8.4.2 Finite Element Mesh

The model domain is divided into six distinct mesh zones based on their proximity to significant elements in the groundwater models, comprising:

- Tunnels: average elemental diameter is 3.1 m
- Within 200 on each side of the tunnel alignment: average elemental diameter is 12.5 m
- In the range of 200 to 500 m on each side of the tunnel alignment: average elemental diameter is 72 m
- In the range of 500 to 1500 m on each side of the tunnel alignment: average elemental diameter is 79 m
- Within structure network polygons: average elemental diameter is 36 m
- Tarraleah hillside: average elemental diameter is 28 m
- Other area: average elemental diameter is 210 m.

The mesh consisted of approximately 158,419 nodes per slice, with 17 computational slices incorporated to represent HRMUs. The vertical mesh resolution ensured a minimum two layers of elements for each modelled HRMU while only a single thin layer of element was applied to represent the shallow Quaternary soils in models. Each tunnel comprises minimum two mesh slices, representing their crown and invert.

8.4.3 Model Geometry

The model vertical domain was defined by the 1 m Digital Elevation Model (DEM) at the top and terminated at 200 m AHD. The geometries of lumped geology units and fracture zones relied on the interpreted geology and structure (Stuart-Smith 2023). Additionally, the borehole logging data was also re-interpreted to define the geometry of each hydrogeological unit.

- Soils:
  - Soils above the top of sandstone and dolerite are designated as 5 m below ground surface
  - Soils above the top of basalt occupy the vertical domain between topography and the top of Basalt.
- Tertiary basalt and sediment units (palaeovalley) based on the Stuart-Smith (2023) interpretations:
  - Basal elevations of lumped Tertiary basalts and sediments follow the Stuart-Smith (2023) interpretation
  - The thickness of Tertiary palaeochannel (including H-B1 to H-B4 and H-IS1) is interpreted from borehole intersections, as illustrated in Figure 44
  - The thickness of H-IS1 is interpreted along the palaeo-valley based on available drilling boreholes, as presented in Figure 45.
- Dolerite HRMUs:
  - Broken basalt near surface H-D6 has a typical thickness of 15 m below soil or 20 m below the ground surface
  - The Stuart-Smith (2023) interpretation for dolerite basal elevation was adopted as H-D1 basal elevation for the Project area
  - Around Lake King William, the H-D1 base was defined as 150 m below the ground surface.

- The structures and fractures are defined as follows:
  - The H-D3/H-D4/H-D5 HRMUs were defined as polygons by the simulated fracture zone network, as shown in Figure 11(b)
  - The simulated H-D3 fractured zones align with the Stuart-Smith (2023) interpretation
  - The H-D3/H-D4/H-D5 HRMUs were vertically extended from the top of dolerite to the model bottom and were categorised into shallow and deep parts to distinguish the changes of hydraulic conductivity with depth, refer to Inset 11.

8.4.4 Model Boundary Conditions

Table 18 presents a summary of general boundary conditions applied in the groundwater model. Figure 46 illustrates the boundary conditions applied in the numerical model. The Project tunnels were represented with seepage face boundary conditions, which were controlled by modulation functions for activation or de-activation through time to reflect the sequential construction of tunnels or lining.

The Cauchy boundaries applied to the soil and unlined watercourses (including Mossy Marsh Canal, Mossy Marsh, Mossy Marsh Pond, and other perennial wetlands) were attributed by conductance values derive from the interpreted hydraulics and infiltration capacities of the soils. The conductance values limit the vertical flux potentials from surface water to groundwater, hence limiting seepage inflow potentials to the drained tunnels during excavation. The conductance values represent assumptions which were not able to be tested during model calibration.

It was noted that Hydro Tasmania operates its water storage using the State Height Datum (SL). A conversion of an operations water level to m AHD was necessary to inform the groundwater model. Details on the vertical datum conversion for several ponds can be found in the report TARDEV-HYD-AGA-XX-RP-C0001 (Hydro Tasmania, 2022).

Table 18 – Summary of Model Boundary Conditions for Baseline Modelling

Location	Elevation (m AHD)	Notes
Dirichlet Boundary Condition (Constant Head)		
Derwent River (Perennial section)	Ground	DEM Elevation
Lake King William	719.94	Full Supply Level (FSL)
Nive River	Ground	DEM Elevation
Cauchy Boundary Condition (Transfer Rate) – Same Transfer Rate Governed by Soils		
Butlers Diversion Pond (1)	663.82	Full Supply Level (FSL)
No.1 Pond (1)	643.65	Full Supply Level (FSL)
No.2 Pond	647.37	Full Supply Level (FSL)
Mossy Marsh Pond	657.3	Full Supply Level (FSL)
Horne's Dam (1)	661.82	Full Supply Level (FSL)
Dammed Freshwater	587.5	DEM Elevation
Lake Liapootah	341.83	Full Supply Level (FSL)
Perennial Wetlands	Ground	DEM Elevation
Sewage pond	Ground	DEM Elevation
Unlined Canals	Ground	DEM Elevation
Cauchy Boundary Condition (Transfer Rate) – Very Low		
Concrete lined canals	Ground	DEM Elevation
Seepage Face		
Derwent River (Intermittent section)	-	Surface Drainage
Drainage Lines	-	Surface Drainage
Mossy Marsh Tunnel	-	Existing Drained Structure

(1) The corresponding conversion from m SL to m AHD is unknown; Therefore, it has been estimated by using m SL + 0.150 m. The impact of these conversion errors on the prediction of groundwater models is considered negligible.

8.4.5 Hydraulic Properties

The adopted rock mass hydraulic and storage properties are summarised in Table 19 and Table 20.

Table 19 – Model Hydraulic Properties

Hydrogeological Unit	Lateral Hydraulic Conductivity (m/d)			Anisotropy
	Base Case	Lower Bound	Upper Bound	Base Case
Soils				
Alluvium/Colluvium – Scol	2	2	20	5:5:1
Glacial Deposits – SGI	0.05	0.05	1.5	1:1:1
Swamp Deposit – SPt	0.01	0.001	0.075	1:1:1
Bedrock				
Tertiary Basalt - H-B1/H-B3/H-B5	0.1	0.04	0.42	10:10:1
Tertiary Sediments – H-IS1	0.001	0.001	0.001	1:1:1
Triassic Sandstone – H-TS	0.006	0.002	0.002	1:1:1
Jurassic Dolerite				
Near-Surface Dolerite – H-D6	0.02	0.02	0.02	1:1:1
Blocky Dolerite – H-D1	0.001	0.0004	0.003	1:1:2
Shallow Fracture Zones H-D3/H-D4/H-D5 (1)	0.05	0.015	0.1	1:1:2
Deep Fracture Zones H-D3/H-D4/H-D5	0.01	0.003	0.02	1:1:2

(1) Hydraulic conductivity of D3/D4/D5 is halved beneath Wentworth Hills and in proximity to the Northern TEC.

Table 20 – Model Storage Properties

Hydrogeological Unit	Specific Yield (dimensionless)	Specific Storage (1/m)
Alluvium/Colluvium – Scol	0.1	1.0×10^{-5}
Glacial Deposits – SGI	0.1	1.0×10^{-5}
Swamp Deposit – SPt	0.1	1.0×10^{-5}
Tertiary Basalt - H-B1/H-B3/H-B5	0.01	5.0×10^{-6}
Tertiary Sediments – H-IS1	0.05	5.0×10^{-6}
Triassic Sandstone – H-TS	0.03	1.0×10^{-6}
Near-Surface Dolerite – H-D6	0.03	5.0×10^{-6}
Blocky Dolerite – H-D1	0.02	1.0×10^{-6}
Shallow Fracture Zones H-D3/H-D4/H-D5	0.03	5.0×10^{-6}
Deep Fracture Zones H-D3/H-D4/H-D5	0.03	5.0×10^{-6}

The adopted transfer rates for the soil beneath ponds, perennial wetlands, unlined watercourses, and concrete lined watercourse are show in Table 21. The transfer-in and transfer-out rates for Cauchy boundary condition were assumed to be equal. For concrete lined canals, they were considered constant and not subject to further calibration. The hydraulic conductivity of concrete lining for canals is assumed to be 1×10^{-8} m/s with a thickness of 2 m. Thus, the transfer rate was calculated as $(1 \times 10^{-8}$ m/s) / 2 m = 5×10^{-9} /s.

Table 21 – Transfer Rates for Cauchy Boundary Conditions

Cauchy Boundary	Transfer Rate (In and Out) (1/s)		
	Base Case	Lower Bound	Upper Bound
Concrete lined canals	5×10^{-9}		
Soils beneath ponds, perennial wetlands and unlined canals	6×10^{-8}	6.0×10^{-9}	4.5×10^{-7}

8.4.6 Groundwater Recharge

Recharge from rainfall and runoff was applied to six zones based on outcrop geology. The groundwater recharge rates for each zone are summarised in Table 22 and illustrated in Figure 47. Base case, lower bound and upper bound recharge rates were determined by fitting the simulated and observed heads for corresponding hydraulic parameters, respectively. Transient recharge rates were applied using a factor on the actual rainfall sequence.

Table 22 – Model Groundwater Recharge Rates

Recharge Zone	Area (km^2)	Steady-State Recharge (mm/annum)		Transient Recharge (%) (1)	
		Base Case	Range	Base Case	Range
Alluvium/Colluvium	8.69	1	26 – 213	<1	2 – 13
Glacial Deposits	35.47	63	16 – 263	4	1 – 15
Swamp Deposit	6.50	36	26 – 39	2	2
Basalt	16.07	329	156 – 1360	19	9 – 80
Dolerite	38.40	10	2 – 0.05	<1	<1
Sandstone	8.74	46	<0.1 – 127	3	<1 – 7
Steep Area	18.81	20	85 – 395	1	5 – 23
North TEC and Surroundings	4.41	228	80 – 724	13	5 – 43
Overall	137.09	72	40 – 328	4	2 – 20

(1) Percentage of monthly rainfall observed at the Butlers Gorge Station. Percentage = Steady-state recharge / 1,699 mm per annum.

8.4.7 Conceptual Model Uncertainties

The uncertainties inherently associated with the development of fractured rock aquifer conceptual models primarily comprises:

- The variability of hydrogeological parameters
- Heterogeneity in geology formations
- Simplifications and generalisations made in conceptualising complex hydrogeological processes
- Uncertainties in boundary conditions and initial values
- Uncertainties in the connectivity between surface water and groundwater
- Temporal uncertainties in dynamic aquifer systems.

The lower bound and upper bound scenarios presented in this report are intended to provide a range of outcomes to address the uncertainties.

9. Model Calibration

The history matching dataset comprises steady-state and transient groundwater heads from 26 monitoring locations aligned with the Project works and within the Project extent, including:

- 17 single standpipe installations
- 7 open bores
- 2 VWPs.

The observations made during drilling, as well as the identified perched water data, have been excluded from the history matching process.

The model calibration intrinsically reflects the baseline groundwater environment and excludes significant transient stressors and surface water to groundwater interactions like those expected to be imposed by the Project development. A consequence is that the Cauchy boundary conditions for applied to the soil and unlined watercourses (including Mossy Marsh Canal, Mossy Marsh, Mossy Marsh Pond, and other perennial wetlands) host uncertainty and impose sensitivity to model outcomes.

9.1 Steady State Calibration

Average groundwater heads recorded over the monitoring period (May 2016 to November 2023) were used as the steady-state history matching targets.

History matching results presented herein reflect the base case hydraulic properties and recharge rates:

- Table 23 presents simulated hydraulic heads and residuals
- Table 24 presents steady-state history matching statistics
- Figure 48 presents the simulated steady-state water table contours and hydraulic head residuals
- Inset 25 presents the steady state residuals plotted about the 1:1 line.

Table 23 – Steady-State Groundwater Heads and Calibration Residuals

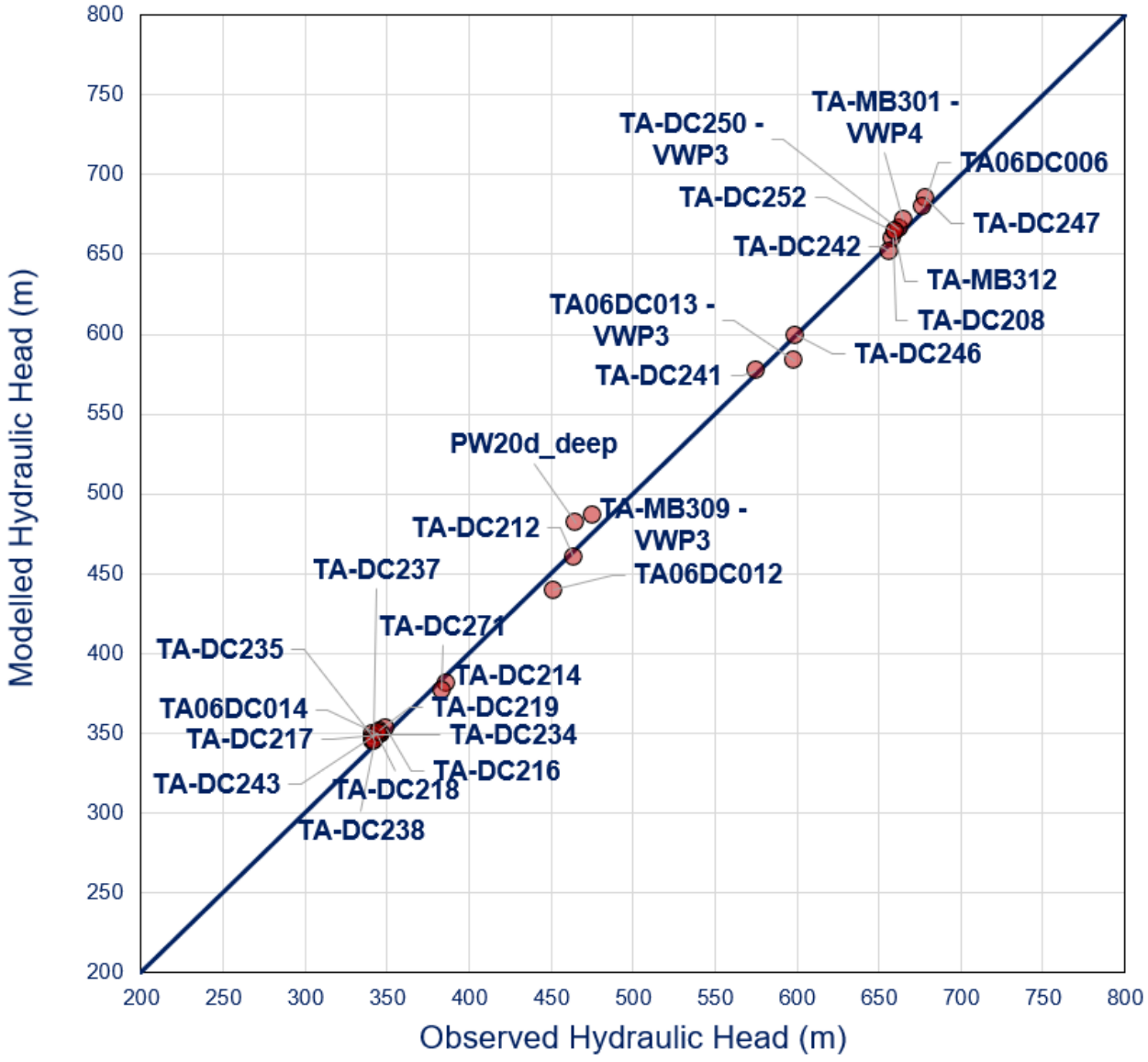
Borehole	Easting (1) (m E)	Northing (1) (m N)	Elevation (1) (m AHD)	Target Head (m AHD)	S.D. (m) (2)	Simulated Head (m AHD)	Residual (m) (3)
TA06DC014	455081	5317177	334.5	345.6	0.26	349.3	3.7
TA-DC208	449676	5317876	577.1	658.2	0.38	660.2	2.0
TA-DC212	454684	5317114	400.4	463.4	1.42	460.3	-3.1
TA-DC214	454891	5317168	379.9	385.6	1.12	381.3	-4.3
TA-DC216	455013	5317215	335.2	349.4	0.44	352.9	3.5
TA-DC217	455023	5317247	334.2	346.6	0.14	349.0	2.4
TA-DC218	455120	5317147	324.2	344.1	0.29	347.9	3.8
TA-DC219	455049	5317193	336.9	345.5	6.23	351.7	6.2
TA-DC234	455286	5316708	332.6	341.5	0.17	349.1	7.6
TA-DC235	455319	5316691	327.8	341.4	0.19	346.8	5.4
TA-DC237	455338	5316726	327.1	341.4	0.32	345.8	4.4
TA-DC238	455329	5316772	333.9	342.3	0.27	345.6	3.3
TA-DC241	453029	5317602	561.5	575.0	1.69	576.9	1.9
TA-DC242	450589	5316341	602.7	656.3	0.28	652.0	-4.3
TA-DC243	455289	5316779	329.2	344.1	0.61	350.2	6.1
TA-DC246	453551	5316713	520.9	599.4	3.78	599.6	0.2
TA-DC247	444277	5320447	655.4	678.8	0.14	685.0	6.2
PW20d_deep	454974	5316464	436.7	465.0	0.57	481.5	16.5
TA-DC271	455108	5316830	353.8	383.0	8.09	376.9	-6.1
TA-DC252	449244	5318288	656.3	659.3	0.35	664.4	5.1
TA06DC012	454853	5317026	441.7	451.1	0.31	439.9	-11.2
TA06DC013 - VWP3	454024	5316628	557.6	598.4	0.66	583.6	-14.8
TA-DC250 - VWP3	449960	5318877	649.1	662.1	0.26	666.2	4.1
TA-MB309 - VWP3	454906	5316760	474.0	475.3	0.09	486.8	11.5
TA-MB301 - VWP4	448422	5319142	662.1	664.8	0.38	671.1	6.3
TA-MB312	449198	5318318	639.5	659.6	0.53	664.6	5.0
TA06DC006	445725	5318751	680.3	677.0	-	680.0	3.0

(1) X, Y, Z denotes the single representative monitoring position in three-dimensional space, considering the azimuth and inclination for angled boreholes. Z represents the midpoint of screen for standpipes, the sensor tip for VWPs, and midpoint between water table and bottom of hole for open holes.
(2) S.D. = Standard deviation.
(3) Residual = Simulated hydraulic head – target hydraulic head. Positive and negative residuals indicate over and under estimation, respectively.

Table 24 – Steady State History Matching Statistics

Statistic	Value
Number of Observations	27
Min Residual	-14.8
Max Residual	16.5
Root Mean Squared (RMS) Error (m)	6.8
Normalised RMS (%)	2%
Average Residual (m)	5.6
Normalised Average Residual (%)	2%
Targets within +-2 m	3
Targets within +-5 m	14
Targets within +-10 m	23

The simulated heads in general matched with the observed heads. Steady-state history matching for the lower-bound and upper-bound parameter scenarios achieved a similar level of fit to the data as the base case, highlighting the non-uniqueness in the calibrated parameters. Lower-bound and upper-bound residuals and statistics are presented in Appendix F.



Inset 25: Steady-state groundwater heads | simulated versus observed.

9.2 Transient Calibration

Transient calibration plays an important role in the history matching process, guiding the determination of model storage parameters and elevating the level of confidence in predictions. A transient validation (Appendix F Figure F4) was conducted to compare the available transient monitoring data with the model predictions using typical storage parameters.

From a practical perspective, the transient monitoring data are of limited durations and this aspect constrains transient calibrations. Hence, the application of transient history matching was postponed until additional monitoring data was available over a longer duration.

9.3 Limitations

The major limitations in the history matching included:

- Monitoring points are spatially sparse and provide a linear perspective along the Project alignment, lack regular and continuous monitoring data, and hence mainly consist of snapshots
- The average groundwater heads adopted as history matching targets were assumed to represent quasi steady state conditions. It was recognised the groundwater system may not be in steady state
- The boundary conditions for the current storage infrastructure were assumed to remain at their full supply levels for modelling purposes. It was recognised the storage levels are dynamic as influenced by episodic and seasonal variations and a range of power generation demands
- Measurements in open bores were used where the effective monitoring depth was estimated as the midpoint between the observed heads and the base of the bore. In hillside terrain with steep hydraulic gradients, the simulated heads were sensitive to changes in the monitoring point depth
- The vertical mesh resolution between geology layers was also likely to affect parameter estimation.

9.4 Water Balance

The baseline water balance for the groundwater domain as estimated by the steady-state history matching models is summarised in Table 25 for the base case, lower bound and upper bound scenarios.

Table 25 – Baseline Water Balance

Boundary Condition	Component	Water Balance (GL/annum)		
		Base Case	Lower-Bound	Upper-Bound
Dirichlet (Constant Heads)	Outflow	9.49	5.28	42.94
	Inflow	0.05	0.02	0.08
Cauchy (General Heads)	Outflow	0.83	0.35	3.81
	Inflow	0.28	0.1	1.26
Distributed sources and Sink	Recharge	9.97	5.53	45.31
Total	Imbalance	-0.02	0.02	-0.10

10. Predictive Modelling

10.1 Model Confidence Level Classification

The confidence level (classification) for different attributes of the Tarraleah model was assessed using templates in the Australian Groundwater Modelling Guidelines (Barnett et al. 2012) as shown in Table 26. The guidelines describe class 1 to class 3 attributes, with class 1 being inferior and class 3 being superior. In summary, the classifications included:

- Data - class 2
- Calibration – class 1
- Prediction – class 1
- Key Indicator – class 1.

Overall, the predictive model level of confidence was classified as Class 1. Key factors that informed the Class 1 predictive model attributes included:

- The conceptualisation hosts inherent uncertainty, particularly in context to:
  - The fractured rock aquifer formed by interpreted H-D1/H-D3 and H-D4 fracture zones
  - The three-dimensional aspects of the H-D0 fractures
  - The connections between the individual fracture zones
  - Connections between the fracture zones and individual H-D0 fractures
  - Surface water to groundwater interactions through the fracture zones and H-D0 fracture networks.
- Limitations in transient data and calibrations. The predictive time frame was more than 10 times longer than transient calibration period
- The absence of stressors of similar amplitudes as the simulated Project tunnel infrastructure. Stresses in predictions were more than 5 times higher than those in calibration, limiting reliability of the predictions
- Recognition that some elements of the catchment scale model, including the Hillside, may benefit from local scale modelling to improve the discretisation of stratigraphy and structure, and in doing so improve local scale resolutions.

These key factors describe limiting circumstances for higher confidence predictive model classification. Contextually, Class 1 models are common for projects in early stages of development and in fractured rock environments. Further, the developed Class 1 model was viewed as appropriate to:

- Inform reference designs for the Project tunnels
- Provide reasonable and practical perspectives of inflows, drawdowns, operating losses, and risks associated with the Project tunnels risks
- Support regulatory approvals in context to:
  - Construction and long-term operations impact on a low value fractured rock aquifer system
  - Estimation of impacts on potentially sensitive receptors, for example the Mossy Marsh TEC.

The Class 1 model may be uplifted to a Class 2 level of confidence as additional data is gathered from a monitoring program that demonstrates aquifer responses to tunnel construction. Such an uplift may add value to forecasts of loss rates from the operating tunnels. Data from the construction of the Lake King William Tunnel may also be used to improve the confidence in the predictive model through comparisons between observed and predicted inflow rates and drawdowns associated with tunnel excavations in dolerite.

Table 26 –Model Confidence Assessment – Australian Groundwater Modelling Guideline (Barnett et al. 2012)

Category	Component	Current Model	Classification
Data	Groundwater Monitoring data	Groundwater head observations in standpipes, open bores and VWPs and the bore logs are available. However, the spatial and temporal distribution are limited. There are insufficient proper monitoring points along the alignment and at Mossy Marsh and transient monitoring data.	Class 2
	Aquifer Geometry	Reasonable spatial distribution of bore logs define the aquifer.	Class 2
	Metered Groundwater Excavation and Injection	No groundwater extraction and injection data identified within the Project area.	Not Appliable
	Climate Data	Refer to HIR Section 2.1.	Class3
	Aquifer Testing data	Refer to HIR Section 3.2: • Numerous packer tests in Dolerite can well define the Dolerite aquifer • Limited aquifer testing data to well define the basalt aquifer • No pumping test was conducted to define the aquifer storage or test the connectivity between the geological structures and the basalt aquifer.	Class 2
	Streamflow data and baseflow estimate	Not available.	Class 1
	Land-use and soil mapping data	Soil mapping was well defined by Stuart-Smith (2023). The staged water levels data in surface water storage ponds are available from Hydro Tasmania.	Class 3
	Irrigation application data	No irrigation identified within the Project area.	Not Appliable
	DEM data	1m DEM covers the entire modelling domain.	Class 3
Calibration	Validation	All reliable data used for calibration.	Not Appliable
	Calibration results	A reasonable calibration target was achieved; refer to Appendix F.	Class 3
	Adequately replicated long-term trends	Transient calibration was not conducted due to the absence of sufficient transient monitoring data.	Class 1
	Adequately replicated seasonal fluctuations		Class 1
	Transient calibration		Class 1
	Calibration to heads and fluxes	The model is calibrated to heads only.	Class 1
	Observations of the key modelling outcomes dataset is used in calibration.	All reliable data was used in calibrations.	Class 3
Prediction	Length of predictive model compared length of calibration period	Transient calibration was not conducted due to the absence of sufficient transient monitoring data.	Class 1
	Temporal discretisation in the predictive model verse transient calibration		Class 1
	Level and type of stresses in the predictive model verse transient calibration		Class 1
	Model validation suggestions		Class 1
	Steady-state predictions used when the model is calibrated in steady state only		Class 1
Key indicator	Key calibration statistics and agreed targets	A reasonable steady-state calibration target was achieved; refer to Appendix F.	Class 3
	Model predictive time frame versus the duration of transient calibration	Transient calibration was not conducted due to the absence of sufficient transient monitoring data.	Class 1
	Stresses versus those included calibration	Predictive stresses (tunnel excavations and tunnel pressurisation) far exceed those used in calibration.	Class 1
	Temporal discretisation in predictive model	Transient prediction made but calibration in steady state only.	Class 1
	Mass balance closure error	Mass balance closure error is acceptable; refer to Section 6.6.	Class 3
	Model parameters versus conceptualisation	The lower bound and base case models are consistent with the conceptualisation, but the upper bound model is used to explore an extreme scenario and thus not consistent with the conceptualisation.	Class 2
	Computation methods and spatial discretisation	Well refined spatial discretisation is applied for the key components of the model (landside areas, tunnels, and structure network); However, the vertical mesh might be too coarse in certain areas; refer to Section 8.4.2.	Class 2
	Model review	The model was reviewed by PSM Principal Hydrogeologist.	Not Appliable

10.2 Scenario Descriptions

The Project works were simulated based on the construction schedule outlined in Section 8.2:

- Base schedule – Figure 43(a)
- P90 schedule – Figure 43(b).

Additionally, two grouting scenarios were superimposed to these schedules:

- No Grouting
- Grouting of simulated fracture zones intercepted by the tunnels.

The grouting scenario assumed that the fracture zones were grouted as soon as excavation encountered them. In the simulation, the hydraulic conductivity of the intersected fracture zones was reduced, leading to decreased seepage and drawdown during construction stage and decreased water loss and pressurisation during operation stage. To simplify the simulation of grouting process, the model directly assigned a hydraulic conductivity of 0.0009 m/d (1 x 10^{-8} m/s) to finite elements representing the fracture zones in contact with the tunnels at the initial time step, rather than simulating a transient grouting process. The 0.0009 m/d parameterisation for the grout property zones was estimated to be optimistic, with actual grouting during tunnel excavation unlikely to achieve effective hydraulic conductivity as low as that simulated. Hence changes to inflows and drawdowns due to the simulated grouting scenarios were expected to be optimistic. The grouting was a full surround zone, with thickness variable dependent on the local element layer thickness.

Three hydrogeological scenarios were simulated:

- Base case parameter scenario
- Lower-bound parameter scenario
- Upper-bound parameter scenario.

The base case represents the best estimate based on the interpretation of the available hydrogeological data. The lower bound and upper bound scenarios account for conceptual model uncertainties.

The permutations between the schedules, grouting scenarios, and bounds result in 12 distinct predictive scenarios.

11. Modelling Results

11.1 Tunnelling Construction Stage

11.1.1 Groundwater Seepage

Table 27 summarises the simulated peak seepage rates observed during the construction period. Table 28 presents the seepage rates observed immediately before the operation starts, corresponding to the lining of Penstock tunnels, a part of the Power Tunnel and a section of Surge Shaft. Illustrations of the predicted seepage rates include:

- Figure 49(a) – Transient seepage hydrographs for the base case model, base schedule, and no grouting and grouting scenarios
- Figure 49(b) – Transient seepage hydrographs for the base case model, P90 schedule and no grouting and grouting scenarios
- Figure 50(a) – Simulated annual water take, base schedule, and no grouting and grouting scenarios
- Figure 50(b) – Simulated annual water take, P90 schedule, and no grouting and grouting scenarios.

Appendix G presents:

- Sensitivity analyses and transient seepage hydrographs for each Project works along with Mossy Marsh Tunnel
- Total “water take” volume annualised by calendar year (January to December).

The modelling indicates that the peak seepage will be reached prior to any lining. The scenario prediction indicated that the peak seepage is likely to take place in 47th month for base schedule or 54th month for P90 schedule. Sensitivity analyses showed that the seepage to Project works was most sensitive to the hydraulic conductivity of dolerite H-D1 and fracture zone HRMUs H-D3, H-D4, and H-D5.

Table 27 – Simulated Peak Groundwater Inflows During Construction Stage

Project Works	Inflows (L/s)					
	Base Case		Lower Bound		Upper Bound	
	Peak	Date	Peak	Date	Peak	Date
Base Case – No Grouting						
Headrace Tunnel	84.4	47	31.9	47	196.9	47
Power Tunnel	31.8	36	12.3	36	74.4	36
Mid Access Tunnel	1.3	14	0.5	14	3.7	14
Surge Access Tunnel	7.1	21	2.9	21	17.1	21
Surge Shaft/Chamber	0.4	23	0.2	23	1.1	23
Penstock Tunnels	1.8	14	1.2	15	7.1	15
Combined Project	120.8	47	47.2	47	282.5	47
Lake King William Tunnel	0.7	11	0.8	11	2.6	11
Base Case – Grouted Fracture Zones						
Headrace Tunnel	61.5	47	27.4	47	147.8	47
Power Tunnel	21.8	36	10.3	36	50.0	36
Mid Access Tunnel	1.3	14	0.5	14	3.7	14
Surge Access Tunnel	5.1	21	2.4	21	13.7	21
Surge Shaft/Chamber	0.4	23	0.2	23	1.1	23
Penstock Tunnels	0.2	15	0.2	15	0.3	15
Combined Project	87.3	47	39.7	47	206.2	47
Lake King William Tunnel	0.7	11	0.7	11	2.6	11
P90 – No Grouting						
Headrace Tunnel	81.6	55	31.4	56	191.8	55
Power Tunnel	31.1	40	12.2	40	73.3	40
Mid Access Tunnel	1.2	16	0.4	16	3.3	16
Surge Access Tunnel	6.0	25	2.5	25	14.0	25
Surge Shaft/Chamber	0.4	24	0.2	24	1.1	24
Penstock Tunnels	1.7	15	1.2	16	7.1	16
Combined Project	117.0	54	46.5	55	275.0	55
Lake King William Tunnel	0.7	14	0.7	14	2.5	14
P90 – Grouted Fracture Zones						
Headrace Tunnel	60.4	56	26.9	56	144.6	56
Power Tunnel	21.6	40	10.2	40	49.7	41
Mid Access Tunnel	1.2	16	0.4	16	3.2	16
Surge Access Tunnel	4.2	25	2.0	25	10.6	25
Surge Shaft/Chamber	0.4	24	0.2	24	1.1	24
Penstock Tunnels	0.2	16	0.2	16	0.3	16
Combined Project	85.7	56	38.9	56	201.6	56
Lake King William Tunnel	0.7	14	0.7	14	2.5	14

Table 28 – Simulated Groundwater Inflows before Operation Starts

Project Works	Groundwater Inflows (L/s)					
	Base Case		Lower Bound		Upper Bound	
	No Grouting	Grouting	No Grouting	Grouting	No Grouting	Grouting
Base Schedule						
Headrace Tunnel	79.3	59.8	31.1	26.6	184.0	141.0
Power Tunnel	28.4	20.6	11.6	9.7	68.4	48.2
Mid Access Tunnel	0.8	0.8	0.4	0.4	1.4	1.6
Surge Access Tunnel	3.5	3.2	2.0	1.6	5.0	5.5
Surge Shaft/Chamber	0.2	0.2	0.1	0.1	0.4	0.5
Penstock Tunnels	1.4	0.1	0.9	0.2	6.2	0.3
Combined Project	114.1	85.4	46.6	39.2	267.6	199.1
Lake King William Tunnel	0.5	0.5	0.6	0.6	2.1	2.1
P90 Schedule						
Headrace Tunnel	77.4	59.1	30.8	26.3	179.9	138.6
Power Tunnel	27.6	20.2	11.5	9.7	67.6	47.8
Mid Access Tunnel	0.8	0.8	0.3	0.3	1.2	1.3
Surge Access Tunnel	3.3	3.0	1.9	1.6	4.4	5.3
Surge Shaft/Chamber	0.2	0.2	0.1	0.1	0.3	0.5
Penstock Tunnels	1.3	0.1	0.9	0.2	6.2	0.3
Combined Project	111.2	84.0	46.0	38.8	261.9	195.9
Lake King William Tunnel	0.5	0.5	0.6	0.6	2.1	2.1

11.1.2 Groundwater Drawdown

The base-case model was used to provide snapshots of predicted groundwater heads and drawdowns at the time the steel lining of the Headrace Tunnel was to start. This timing represented the maximum drawdown around the unlined Power Tunnel. Illustrations of the predictive snapshots include:

- Figure 51(a) – Simulated base case water table prior to steel lining – base schedule
- Figure 51(b) – Simulated base case water table prior to steel lining – base schedule and grouting
- Figure 52(a) – Simulated base case water table prior to steel lining – P90 schedule
- Figure 52(b) – Simulated base case water table prior to steel lining – P90 schedule and grouting
- Figure 53(a) – Simulated base case drawdown prior to steel lining – base schedule
- Figure 53(b) – Simulated base case drawdown prior to steel lining – base schedule and grouting
- Figure 54(a) – Simulated base case drawdown prior to steel lining – P90 schedule
- Figure 54(b) – Simulated base case drawdown table prior to steel lining – P90 schedule and grouting.

The predictions show that drawdown:

1. Preferentially propagates within the fracture zones.
2. Is comparatively constrained in amplitudes within the H-D1 rock mass.
3. Is limited and fully offset by the Cauchy boundary conditions which control the surface water to groundwater interactions from Mossy Marsh Pond, Horn's Dam, No 2 Pond, and parts of Mossy Marsh. In these settings, the recharge rates from the Cauchy boundaries exceed the groundwater throughflow rates to the local drained tunnels.
4. Is retarded and offset in part at least by the Cauchy boundary conditions which control the surface water to groundwater interactions from Mossy Marsh Canal and upstream reaches of Mossy Marsh. In this setting the recharge rates from the Cauchy boundaries are insufficient to match the groundwater throughflow rates to the local drained tunnels.

Appendix H presents transient drawdown snapshots in year 1, year 2, year 4 and prior to operations. Transient drawdown snapshots are presented for the base case and the lower-bound and upper-bound sensitivity analyses.

11.1.3 Particle Tracking

Particle tracking was used in the predictive models to characterise the capture zones of flow paths to the tunnels during construction. Results from the particle tracking analysis of transient path lines and capture zones include:

- Figure 55(a) – Simulated base case captures zones – base schedule
- Figure 55(b) - Simulated base case captures zones – base schedule and grouting
- Figure 56(a) – Simulated base case captures zones – P90 schedule
- Figure 56(b) - Simulated base case captures zones – P90 schedule and grouting.

Additional figures are provided in Appendix I:

- Figure I1(a and b): Base schedule – no grouting – lower-bound and upper-bound
- Figure I2(a and b): Base schedule – grouting in fracture zones – lower-bound and upper-bound
- Figure I3(a and b): P90 schedule – no grouting – lower-bound and upper-bound
- Figure I4(a and b): P90 schedule – grouting in fracture zones – lower-bound and upper-bound.

11.2 Tunnel Operation Stage

During the tunnel operation stage, water from Lake King William and Lake King William Intake infrastructures will fill the Project tunnels. The tunnels specified as "Pressurised" in Section 8.2 will be pressurised and the water loss will occur along the unlined tunnels where the elevated operating pressure will propagate through the unlined tunnel wall into the fractured rock aquifer surrounds. The following assumptions were made to support conservative modelling and assessments:

- All hydraulic head loss within the pressurised tunnels was neglected
- The maximum static hydraulic head (full supply level of Lake King William) was imposed on the pressurised tunnels, in effect maximising the predicted seepage loss potentials
- The tunnels remain pressurised continuously for 80 years, reflecting the minimum design life. Intermediate processes that disrupt the pressurisation, such as dewatering, re-filling, maintenance and refurbishment were not considered
- The entire model uppermost slice, except for constant-head boundaries, was attributed with seepage faces for operation modelling to enable discharges to the ground surface driven by tunnel pressurisation.

11.2.1 Water Loss

Table 29 and Table 30 summarise the simulated peak water loss rates simulated during operations for the base and P90 schedule respectively. Figure 57(a) and Figure 57(b) present the corresponding base case model predicted transient tunnel water loss rate from tunnels in the first 15 years of operation for base schedule and P90 schedule, respectively. Figure 58(a) and Figure 58(b) present the predicted base case annual tunnel water losses for the base schedule and P90 schedule, respectively.

Table 29 – Simulated Peak Water Loss Rate during Operation Stage – Base Schedule

Project Works	Water Loss Rate (L/s)					
	Base Case		Lower Bound		Upper Bound	
	No Grouting	Grouting	No Grouting	Grouting	No Grouting	Grouting
Lake King William Tunnel	3.0	3.0	1.8	1.8	4.4	4.4
Headrace Tunnel	63.5	31.1	22.2	16.4	158.7	81.7
Power Tunnel	50.4	18.9	13.3	10.0	94.9	39.1
Mid Access Tunnel	1.6	1.6	0.6	0.6	4.8	4.6
Surge Access Tunnel	11.3	7.9	3.3	2.8	37.8	30.4
Surge Shaft/Chamber	0.9	0.9	0.3	0.3	3.3	3.1
Penstock Tunnels	0.0	0.0	0.0	0.0	0.0	0.0
Combined Project	127.8	60.4	39.7	30.2	299.6	158.9
Lake King William Tunnel	3.0	3.0	1.8	1.8	4.4	4.4

Typically, the peak water loss occurs at onset of pressurisation, to fill voids around the tunnel and recover the drawdown caused by seepage during excavation. The pressurisation may induce the development of new springs in locations where the water table emerges at the ground surface. Additionally, it may result in an increase of discharge into existing springs and wetlands. Figure 59 illustrates the three tracking zones adopted for monitoring the variation of groundwater discharges. These zones include the Project tunnels (areas extending 500 m on each side of tunnel alignment), Tarraleah Landslide Zone (areas on the Tarraleah Hillside with potential geohazards) and Lake King William Tunnel. Note that these tracking zones are focussed on surface discharge and encompass the discharges into existing water ponds.

Table 31 provides the estimated stead-state water loss rates. Peak and steady state discharges to the ground surface are presented in Table 32. The predicted transient groundwater discharge rates to the ground surface in the first 15 years of operation are shown on:

- Figure 60(a) – Simulated base case surface discharge rates – base schedule
- Figure 60(b) – Simulated base case surface discharge rates – P90 schedule
- Figure 61(a) – Simulated base case annual surface discharge volumes – base schedule
- Figure 61(b) – Simulated base case annual surface discharge volumes – P90 schedule.

Table 30 – Simulated Peak Water Loss Rate during Operation Stage – P90 Schedule

Project Works	Water Loss Rate (L/s)					
	Base Case		Lower Bound		Upper Bound	
	No Grouting	Grouting	No Grouting	Grouting	No Grouting	Grouting
Lake King William Tunnel	3.0	3.0	1.8	1.8	4.4	4.4
Headrace Tunnel	66.3	32.0	22.5	16.6	170.4	86.2
Power Tunnel	49.5	19.3	13.4	10.1	86.8	39.8
Mid Access Tunnel	1.7	1.7	0.6	0.6	5.1	4.9
Surge Access Tunnel	11.5	9.1	3.7	3.1	42.5	34.6
Surge Shaft/Chamber	0.9	0.9	0.3	0.3	3.3	3.1
Penstock Tunnels	0.0	0.0	0.0	0.0	0.0	0.0
Combined Project	130.0	62.9	40.4	30.7	308.0	168.5
Lake King William Tunnel	3.0	3.0	1.8	1.8	4.4	4.4

Table 31 – Simulated Steady-State Water Loss Rate, Assuming Average Rate Between Year 60 and Year 80

Project Works	Water Loss Rate (L/s)					
	Base Case		Lower Bound		Upper Bound	
	No Grouting	Grouting	No Grouting	Grouting	No Grouting	Grouting
Lake King William Tunnel	2.1	2.1	1.5	1.5	2.9	2.9
Headrace Tunnel	22.3	13.6	7.7	6.2	54.1	33.4
Power Tunnel	18.1	12.1	6.3	5.3	43.4	28.3
Mid Access Tunnel	0.1	0.1	0.1	0.1	0.2	0.2
Surge Access Tunnel	3.0	2.4	1.1	1.0	7.6	6.4
Surge Shaft/Chamber	0.3	0.3	0.1	0.1	0.8	0.8
Penstock Tunnels	0.0	0.0	0.0	0.0	0.0	0.0
Combined Project	43.7	28.5	15.3	12.7	106.1	69.1
Lake King William Tunnel	2.1	2.1	1.5	1.5	2.9	2.9

Table 32 – Simulated Discharge Rate to Surface

Project works	Discharge Rate to Ground Surface (L/s)					
	Base Case		Lower Bound		Upper Bound	
	No Grouting	Grouting	No Grouting	Grouting	No Grouting	Grouting
Peak Discharge (Base Schedule)						
Lake King William Area	4.7	4.8	4.8	4.8	17.2	17.2
Tarraleah Tunnels	41.8	30.3	16.4	14.5	121.9	95.6
Lake King William Area	4.7	4.8	4.8	4.8	17.2	17.2
Peak Discharge (P90 Schedule)						
Tarraleah Tunnels	41.7	30.4	16.3	14.4	122.5	95.3
Tarraleah Hillside	30.1	26.8	14.5	15.0	114.2	107.8
Lake King William Area	4.7	4.6	4.2	4.2	17.2	17.2
Steady-State Discharge (Either Schedule)						
Tarraleah Tunnels	41.5	30.0	16.1	14.3	120.5	93.8
Tarraleah Hillside	25.7	23.9	12.6	12.2	103.8	96.8
Lake King William Area	4.1	4.1	3.1	3.1	17.1	17.1

Appendix J presents:

- Transient ground surface discharge locations induced by tunnel pressurisation after 1 year, 3 years, 10 years, and 80 years
- Sensitivity analyses and transient water loss hydrographs for each Project element along with seepage hydrograph for Mossy Marsh Tunnel
- Sensitivity analyses and transient surface water discharge hydrographs for corresponding tracking zones
- Total “water loss” and “surface discharge volume” annualised by calendar year (January to December).

11.2.2 Drawdown Recovery and Groundwater Rise

The water loss from pressurised tunnels will either offset the drawdowns from construction and drained tunnels or mound the water table leading to discharge from the ground surface depending on the local groundwater flow patterns. This may result in the co-existence of residual drawdown areas and areas with increased heads.

Base case results are presented in the following figures:

- Figure 62(a) – Simulated base case groundwater heads at 80 years – base schedule
- Figure 62(b) – Simulated base case groundwater heads at 80 years – base schedule and grouting
- Figure 63(a) – Simulated base case operations pressurisation at 80 years - base schedule
- Figure 63(b) – Simulated base case operations pressurisation at 80 years - base schedule and grouting
- Figure 64(a) Induced base case discharge locations – base schedule
- Figure 64(b) Induced base case discharge locations – base schedule and grouting
- Figure 65(a) – Induced base case discharge locations – P90 schedule
- Figure 65(b) – Induced base case discharge locations – P90 schedule and grouting.

Appendix K presents the snapshots of water table changes during the pressurisation:

- K1: Project Tunnels – Transient pressurisation snapshots for year 1, 3, 5, and 80
- K2: Power Station – Transient pressurisation snapshots for year 1, 3, 5, and 80
- K3: Lake King William – Transient pressurisation snapshots for year 1, 3, 5, and 80

11.2.3 Hydraulic Head Changes beneath Tarraleah Hillside

The pressurised tunnels during operations can inject water into the fractured rock aquifer, altering local groundwater flow and heads. This was predicted for the Tarraleah Hillside, with water table rise, mounding, and spring formation where the water table intersects the ground surface. On the Tarraleah Hillside, rising groundwater heads and pore pressures may influence slope stability, potentially imposing geotechnical risks for landslides. To characterise the potential transient head changes, two sections within the potential landslide zone on the Tarraleah Hillside were assessed. The potential landslide zones were indictive only and subject to change based on the further geotechnical assessments.

Appendix K presents the pore pressure changes at Tarraleah Hillside:

- K4: Locations of long sections and virtual monitoring point to be assessed
- K5: Baseline hydraulic heads along Penstock and Power Tunnel sections
- K6: Multiple snapshots for hydraulic head change relative to baseline along Penstock section
- K7: Multiple snapshots for hydraulic head change relative to baseline along Power Tunnel.

The assessments of hydraulic head changes indicated:

- Penstock Section:
  - The base case showed the largest head increase among all scenarios
  - Horizontal direction:
    - In the basalt, the maximum hydraulic head change was estimated to be about 3 m behind the slope face
    - In the dolerite, the heads increased up to 5 m behind the slope face.
  - Vertical direction (maximum head increase below the slope crest):
    - 1 m at 255 m depth
    - 2 m at 400 m depth.
  - Grouting and construction schedule have a negligible impact on head increase along this section.
- Power Tunnel Section:
  - The base case shows the largest head increase among all scenarios. The predictive model was not numerically stable, and head change distribution oscillated in a few time-steps
  - In general, grouting of flow areas reduced the hydraulic head increases towards the slope face
  - Horizontal direction: (maximum head increase laterally behind the slope)
    - In the basalt – about 3 m increase behind the slope face
    - In the dolerite – up to 5 m behind the slope face.
  - Vertical direction (maximum head increase below the slope):
    - 10 m at 135 m depth
    - 15 m at 225 m depth
    - 20 m at 330 m depth.

In summary, the predictive models showed that leakages for the pressurised tunnels induced altered flow systems beneath the Tarraleah Hillside as dictated by hydraulics upon pressurised waters entering the groundwater environment and make their way to discharge locations. Fracture zones in the dolerite formed predominantly preferred flow paths and, in some respects, controlled the fates of the leakages. The simulated Hillside pore pressures also showed sensitivity to the basal palaeo-valley contact outcrop or sub-crop on the Hillside. The predicted pore pressure mounding coincides with induced discharge locations (springs) on the Hillside.

The groundwater flow model captured the 3D conceptualisation of both fracture zone and basalt contact elements based on the Stuart-Smith (2023) interpretations. Rock mass and hydraulics characterisation was based on the consolidated findings from site investigations. In the Hillside setting the class 1 model attributes included:

- The fractured rock aquifer distributions, connections, and hydraulics conceptualisation hosts inherent uncertainty
- The absence of stressors of similar amplitudes and durations as the simulated pressurised tunnels
- Recognition that elements of the catchment scale model for the Hillside may benefit from local scale modelling to improve the discretisation of stratigraphy and structure, and in doing so improve local scale resolutions.

Contextually, the predictive model identified pore pressure risks for the operations activities of the Project, with acknowledged uncertainty but also recognition that the base-case models (hence the models viewed as most representative), identified the risks. There are practical limitations in being able to demonstrate these risks, except through pressurisation of the operating tunnels. Risk mitigation was therefore viewed to be procedural, including:

- Identification of the Hillside locations where the predicted elevated pore pressures and induced discharge locations would likely pose risks. This would involve review of the Hillside settings on local scales and in view of prior landslides to add context to the predicted areas of elevated pore pressures
- Ascertain reasonable and practical strategies to mitigate the pore pressure risks. These strategies may relate to ground controls and drainage measures
- Establish and implement an adaptive management program, inclusive of monitoring, assigning staged triggers for action, and defining the actions associated with individual triggers.

11.2.4 Particle Tracking

Results from the forwards particle tracking analysis are shown on the figures and appendices described below, including transient path lines:

- Figure 66(a) – Simulated base case forward pathlines – base schedule
- Figure 66(b) – Simulated base case forward pathlines – base schedule and grouting
- Figure 67(a) – Simulated base case forward pathlines – P90 schedule
- Figure 67(b) – Simulated base case forward pathlines – P90 schedule and grouting
- Lower-bound and upper-bound models, Appendix L:
  - Figure L1: Base schedule – no grouting
  - Figure L2: Base schedule – grouting in fracture zones
  - Figure L3: P90 schedule – no grouting
  - Figure L4: P90 schedule – grouting in fracture zones.

11.3 Anticipated Impacts to Sphagnum Peatland TECs

The conceptualisation of potential altered hydrology groundwater and surface water impacts from the Project on the Mossy Marsh TEC and Northern TEC respect that different changes to the baseline environments would manifest during the construction and operations stages of the Project. Anticipated impacts during the construction and operations stages are discretised below.

11.3.1 Construction Stage

11.3.1.1 Overview

The tunnels occur at significant depths below the baseline water table. Their excavation will create drained infrastructure, forming a groundwater sink along the tunnel alignment and associated lowering (drawdown) of groundwater heads. Groundwater inflows to the tunnel would conceptually be:

- Controlled by the network of vertical and interconnected fracture zones – as interpreted by Stewart-Smith (2023) and shown on Figure 11(b). Tunnel intersections with the H-D3, H-D4, and H-D5 HRMUs would form the predominant sources of inflows. Tunnel and fracture zone intersections in the vicinity of the Mossy Marsh TEC and Northern TEC are shown on Figure 4 and Figure 5, respectively
- Dominated by surface water to groundwater interactions, that is with surface waters sourced from Lake King William (via discharges from Mossy Marsh Canal), wetlands (for example Mossy Marsh), ponds (for example Mossy Marsh Pond), and perennial reaches of streams (for example Horne's Creek Canal) contributing most to the inflows
- Characterised by grossly subordinate groundwater inflows, given the fractured rock basalt and dolerite terrain aquifers being characterised by low (<1 %) primary and secondary porosity and this aspect informs that significant sustained inflows would predominantly be derivatives of recharge from rainfall and perennial surface waters.

Drawdown associated with the inflows to the drained tunnels would conceptually:

- Preferentially propagate (from the fracture zone tunnel intersections) vertically and laterally along the fracture zones
- Propagate to the ground surface within the fracture zones, promoting surface water to groundwater interactions from wetlands, ponds, and watercourses
- Be limited in lateral extents and amplitudes by persistent recharge boundaries formed by perennial wetlands, ponds, and watercourses. That is, recharge rates from the perennial sources would be sufficient to fully offset the lateral flow rates to the drained tunnels, such that drawdowns on the perimeters and beneath the recharge sources would be nil
- Potentially promote a level of disconnect between surface water and groundwater heads where vertical infiltration capacities are lower bound.

These overview aspects are addressed below with heightened perspectives for the Mossy Marsh TEC and Northern TEC settings.

11.3.1.2 Potential Changes to Mossy Marsh TEC

Conceptually for the Mossy Marsh TEC it was anticipated that the potential perennial recharge sources formed by Mossy Marsh, and Mossy Marsh Pond would limit the southward propagation of drawdown. Under these circumstances, drawdown would not propagate onto the Mossy Marsh TEC from tunnel adjacent to these sources.

The Mossy Marsh Canal and upper reaches of Mossy Marsh, however, are characterized by comparatively limited width recharge sources and overlie a broad fracture zone and confluence of several fracture zones (Figure 29 and Figure 30). Conceptually, these settings potentially promote a level of disconnect between surface water and groundwater heads where vertical infiltration capacities are constrained, enabling propagation of drawdown to the south within the fracture zones. Two of the local fracture zones strike alongside the southern perimeter of Mossy Marsh, enabling propagation of drawdown to the south-southeast towards the Mossy March TEC. This assessment for the Mossy Marsh TEC has been supported through the completion of several figures which explore the tunnel and fractured rock aquifer intersections, predicted drawdowns, and surface water to groundwater interactions, including:

- Figure 26 – Fractured rock aquifer profiles in basalt and underlying dolerite fracture zones on the tunnel alignment and on perimeters of Mossy Marsh
- Figure 27, 29 and 30 – Fractured rock aquifer profiles in dolerite fracture zones on the tunnel alignment and on perimeters of Mossy Marsh
- Figure 68 – Interpolation of the Tertiary palaeo-valley thickness, to guide the influence of the basalt fractured rock aquifer in the vicinity of the tunnel and Mossy Marsh

- Figure 46 – Seepage and Cauchy boundary conditions applied to the surface water features in the vicinity of the Mossy March TEC – a conductance-attributed boundary that limits flux rates between surface water and groundwater
- Figure 53 (a and b) and Figure 54 (a and b) – Predicted drawdown at the end of the excavation period
- Figure H1-1(c) and Figure H1-2(c), Appendix H – predicted upper-bound model drawdown for 1-year, 2-year, 4-year snapshots and at the start of steel lining completion
- Figure 64(a) – On-ground discharge locations induced by losses from the operating tunnels
- A suite of cross-sections and transverse sections on the tunnel alignment and traversing Mossy Marsh, respectively. The locations of the sections are shown on Figure 69. The sections include:
  - Figure 70 – Baseline water table elevations on three locations on the tunnel alignment and showing contrasts between water table and tunnel elevations
  - Figure 71 – Three transverse sections showing the juxtapositions of the tunnel with fracture zones in dolerite, Tertiary palaeovalley profiles, baseline water table elevations, the domains of the perennial surface water features in Mossy Marsh Canal, Mossy Marsh, and Mossy Marsh Pond, and the Mossy Marsh TEC
  - Figure 72 – Three transverse sections showing the same juxtapositions as Figure 70 but showing indicative construction stage water table elevations on the drawdown propagation onto Mossy Marsh being limited by surface water recharge boundaries.

The base case model predictions (Figure 53(a)) show 1 m of drawdown propagating onto the Mossy Marsh TEC footprint at the end of the tunnel excavation. The predicted drawdown propagates to the southwest from tunnel fracture zone intersections adjacent to the Mossy March Canal, extends beneath Mossy March Canal, then along the fracture zone network beneath the southern perimeter of Mossy Marsh.

The predictions are sensitive to the Cauchy boundary condition which limits surface water to groundwater interactions beneath the Mossy Marsh Canal.

For the fractured zone grouting scenario (Figure 53(b)), the predicted drawdown was less than 1 m, but potentially significant. This outcome reflected a potential benefit in the grouting of the intersected fracture zones to mitigate the TEC drawdown risks and respected that the grouting scenario predictions may be optimistic (refer to Section 10.2).

In summary, the cumulative influences of a net positive hydrological water balance, artificial recharge by discharges from Mossy Marsh Canal, natural presence of the Mossy Marsh wetlands, and the interpreted hydraulics for soils and fractured rock aquifers provide indications that potential drawdown impacts on the Mossy Marsh TEC from the tunnel excavations would be predominantly mitigated by surface water recharge boundary conditions. That is, there is expectation that surface water availability and vertical infiltration capacities would be being able to predominantly offset potential local drawdowns due to the drained tunnel. Grouting of the fracture zones intersected by the tunnel excavation would likely limit the drawdown amplitudes, providing a reasonable drawdown risk mitigation strategy.

11.3.1.3 Summary

The no grouting and grouting versions of the base case model predict the propagation of drawdowns up to about 1 m amplitude onto the Mossy Marsh TEC. The predicted drawdowns propagate along fracture zones beneath the southern perimeter of Mossy Marsh.

The cumulative influences of a net positive hydrological water balance, recharge from Mossy Marsh, and the interpreted hydraulics for soils and fractured rock aquifers provide indications that potential drawdown impacts on the Mossy Marsh TEC from the adjacent tunnel excavations may be predominantly mitigated by surface water to groundwater interactions. That is, there is expectation that surface water availability in and vertical infiltration capacities from Mossy Marsh would be being able to predominantly offset potential local drawdowns due to the adjacent drained tunnel. This outcome is likely enabled by continued discharge of about 4 m3/sec during the operational stage of the Project.

Grouting of the fracture zones intersected by the tunnel excavation would likely limit the drawdown amplitudes, providing a reasonable drawdown risk mitigation strategy.

11.3.1.4 Potential Changes to Northern TEC

Conceptually for the Northern TEC, it was anticipated that potential higher rainfall recharge rates on the Wentworth Hills and absence of direct hydraulic connection to fracture zones in the dolerite terrain would limit the propagation of and risk associated with drawdown from the drained tunnel. Under these circumstances, drawdown would not propagate onto the Northern TEC. This aspect would be reinforced under the alternative conceptual model (Figure 37) where a perennial perched water table is formed within the soil and weathered dolerite and disconnected from a deeper water table in fresh dolerite. That is, the perched water table is independent of and disconnected from the drained tunnel drawdown influences.

This conceptual assessment for the Northern TEC has been supported through the completion of several figures which explore the tunnel and fractured rock aquifer intersections, drawdowns, and surface water to groundwater interactions, including:

- Figure 28 – Fractured rock aquifer profiles in dolerite fracture zones on the tunnel alignment and in the Northern TEC setting
- Figure 46 – Seepage and Cauchy boundary conditions applied to the surface water features in the vicinity of the Project alignment – a conductance-attributed boundary that limits flux rates between surface water and groundwater
- Figure 53 (a and b) and Figure 54 (a and b) – Predicted drawdown at the end of the excavation period for the base and P90 schedules, no grouting and grouting scenarios
- A suite of cross-sections and transverse sections on the tunnel alignment and traversing the Northern TEC setting, respectively. The locations of the sections are shown on Figure 73. The sections include:
  - Figure 74 – Baseline water table elevations on the tunnel alignment adjacent to the Wentworth Hills and fracture zones associated with the Norther TEC setting, showing contrasts between water table and tunnel elevations
  - Figure 75 and Figure 76 – Transverse sections showing the juxtapositions of the tunnel with fracture zones in dolerite, the domain of the Northern TEC, and baseline and construction stage water table elevations, respectively
  - Figure 77 – Local cross-sections of the Northern TEC setting showing juxtapositions to fracture zones and baseline and indicative construction stage water table elevations, respectively.

The base case no grouting and grouting model predictions (Figure 53(a and b)) showed the 1 m drawdown contour did not propagate onto the Northern TEC at the end of the tunnel excavation.

In summary, the Northern TEC is interpreted as a localised catchment feature within the Wentworth Hills; the setting is on the perimeter of a structurally controlled and drained basin feature situated above the Tarraleah Plateau and high in the landscape. The observations of shallow depths to groundwater and displacement of the Northern TEC from the interpreted fracture zones supports the local catchments being dominant factors in the hydrological water budgets and indicate indirect connection mechanisms to the drained tunnel. The predictions indicated low potentials for drawdown propagation onto the Northern TEC and any drawdown would be at amplitudes difficult to measure. Conceptually, the drawdown potentials would be fully offset by local rainfall, rechange, and water shedding.

11.3.2 Operations Stage

11.3.2.1 Overview

The constructed Project tunnels would be pressurised hence promoting rewetting and recharge of the fractured rock aquifers due to seepages losses through the tunnel walls.

The hydraulic head (elevation of the Lake King William source) at 720.09 m AHD was assumed to represent the pressurised head in the operating tunnels. Table 33 presents the Lake King William operating head together with comparative heads in the network of ponded surface waters on the Tarraleah Plateau. Note that the pressurised head of 720.09 m AHD in the operating tunnels commonly exceeds the ground surface and water table elevations along the Headrace Tunnel alignment and exceeds the heads in the ponded surface water sources on the Tarraleah Plateau.

Table 33 – Estimated Recharge Boundary Elevations During Project Operations

Location	Elevation (m AHD)	Notes
Operating Source		
Lake King William	720.09	Full Supply Level (FSL)
Ponded Surface Water Sources		
Mossy Marsh Pond	658.30	Full Level (FSL)
Horne's Dam (1)	661.97	Full Level (FSL)
No.1 Pond (1)	643.80	Full Level (FSL)
No.2 Pond	647.47	Full Level (FSL)

Leakage from the pressurised tunnels would initially consume available post-construction storage in the fractured rock aquifer adjacent to the tunnel, off set drawdowns, and subsequently predominantly have fates as discharge onto the overlying ground surface on the Tarraleah Plateau via the fracture zones. That is, the fracture zones would fully rewet and provide a direct vertical pathway for leakage from the operating tunnels to the ground surface. Discharges onto the ground surface would correspond to the existing wetlands, ponds, and streams on the Tarraleah Plateau that are located above fracture zones proximal to the tunnel alignment as shown for the Mossy Marsh TEC setting on Figure 64 (a and b) and Figure 65(a and b). Wetted footprints and discharge volumes would potentially increase to offset the higher operating head differentials when compared to baseline groundwater heads and baseflow discharges. For example, new seeps and springs may develop, ephemeral streams may become perennial, and stream flow volumes may increase.

The leakage would be sourced from Lake King William and hence discharges onto the ground surface would broadly conform to the water qualities described in Section 5.1.2. Residence times for the leakage from the tunnels during the operational stage are expected to be of short duration given limited length vertical flow paths from the tunnel to the ground surface.

These overview aspects are addressed below with heightened perspectives for the Mossy Marsh TEC and Northern TEC settings.

11.3.2.2 Operational Stage Influences on Mossy Marsh TEC

Post construction, the tunnel would progressively rewet and become submerged as groundwater heads recover. Subsequently, maximum operating heads would pressurise the tunnels to heads above the baseline water table elevations and above the ground surface, contributing to leakage of tunnel waters onto the ground along fractures zones in the dolerite. This assessment has been supported through:

- Figure 64 (a and b) and Figure 65(a and b) – Which shows the interpreted locations where leakage from the operating tunnel would express on the ground surface
- Figure 78 – Which includes three transverse sections (as per Figure 71 and Figure 72) showing indicative operational stage water table elevations, full water table recovery, and leakage of water from the tunnel onto the ground surface along fracture zones on the dolerite.

In summary, in the operating stage of the Project, any drawdown risks to the Mossy March TEC are expected to be fully mitigated. Altered hydrology influences on the Mossy Marsh TEC from the local leakage of tunnel water onto the ground surface are expected to be insignificant.

11.3.2.3 Operational Stage Influences on Northern TEC

The Northern TEC, given its higher elevation location above the Tarraleah Plateau, would not be directly influenced by the operating heads in the tunnel. The operating heads would, however, be expected to rewet all adjacent fractured rock profiles and fully offset any drawdown risks. Figure 77 shows indicative operational stage water table elevations within the Northern TEC setting; these can be compared to the baseline and construction stage water table elevations also shown on Figure 77.

In summary, the operation stage influences on the Northern TEC are expected to be negligible and not measurable.

11.4 Anticipated Impacts to Stockpile Locations

The predictive models describe the stockpile settings as transitional, with changes to the baseline environments during the construction activities when the tunnels are drained and then subsequently further changes during operations when the tunnels are pressurised.

During construction, drawdowns due to inflows to the tunnels are predicted to propagate beneath each stockpile, as shown on Figure 53 (a and b) and Figure 54 (a and b). The base case models show predicted drawdown amplitudes at the end of construction for each stockpile as follows:

- West – 5 to 10 m
- Mid-point – 1 to 5 m
- Paddy's Quarry 1 – no drawdown
- Paddy's Quarry 2 – less than 1 m drawdown
- Paddy's Quarry 3 – 1 to 2 m drawdown.

Post construction, the groundwater heads will progressively recover as the fractured rock aquifer is recharged by rainfall. Thereafter, the pressurisation of the tunnels during operations surcharges to the groundwater environment and was predicted to produce discharges onto the ground surface along the tunnel alignment and surrounds. In each stockpile setting, the predictive base case models indicate as follows:

- West – widespread discharge beneath the stockpile footprint and surrounds one year after commencement of operations; hence the local aquifer is locally full and the water table at the ground surface
- Mid-point – discharge immediately north of the stockpile footprint after 1 year, with the discharge footprint expanding to the north and south during the subsequent 10 years. Ultimately discharge onto the ground was predicted beneath the stockpile footprint
- Paddy's Quarry 1 – discharge to the tributary on the southern perimeter of the stockpile after 1 year
- Paddy's Quarry 2 – discharge on the western perimeter after 1 year
- Paddy's Quarry 3 – discharge on the northwestern perimeter after 1 year, with the discharge footprint expanding to beneath the stockpile after 10 years.

The predictions indicate that the influences of the stockpiles on their local groundwater environments will show transient variability dependent on construction and operational circumstances and associated changes in water budgets of the stockpile settings.

11.5 Limitations

The limitations in the predictive modelling include:

- Overall, the predictive model was defined by Class 1 attributes based on key factors including:
  - The conceptualisation hosts inherent uncertainty, particularly in context to:
    - The fractured rock aquifer formed by interpreted H-D1/H-D3 and H-D4 fracture zones
    - The three-dimensional aspects of the H-D0 fractures
    - The connections between the individual fracture zones
    - Connections between the fracture zones and individual H-D0 fractures
    - Surface water to groundwater interactions through the fracture zones and H-D0 fracture networks.
  - Limitations in transient data and calibrations. The predictive time frame was more than 10 times longer than transient calibration period
  - The absence of stressors of similar amplitudes as the simulated Project tunnel infrastructure. Stresses in predictions were more than 5 times higher than those in calibration, limiting reliability of the predictions
  - Recognition that some elements of the catchment scale model, including the Hillside, may benefit from local scale modelling to improve the discretisation of stratigraphy and structure, and in doing so improve local scale resolutions.

- The random distribution of the H-D0 HRMU was difficult to assimilate within a three-dimensional fracture zone conceptualisation, making them difficult to explicitly represent in the groundwater model. The upper-bound model parameterisation respected that preferred flow paths like the H-D0 HRMU may be intersected by the tunnels. Hence, the upper-bound model was viewed as a reasonable proxy of the H-D0 HRMU
- The Cauchy boundary conditions applied to Mossy Marsh Canal, Mossy Marsh, Mossy Marsh Pond, and other perennial wetlands host uncertainty and impose sensitivity to model outcomes. In effect these boundary conditions are assumed, and it is difficult to resolve whether they represent reasonable worst case, conservatively high, or conservatively low positioning in respect to infiltration capacities for surface water to groundwater interactions
- The boundary conditions for the existing storage infrastructures are assumed to remained at their full supply levels for the predictive modelling. If they act as groundwater recharge sources, they will have significant recharge capacity. Their storage levels are dynamic, and their recharge capacity is limited depending on the water balance, particularly for those ponds with relative low storage volumes
- The Project works primarily traverse dolerite H-D1, and intercept H-D3, H-D4, and H-D5 HRMUs that represent fracture zones. Therefore, the seepage into the Project works during excavation or water loss from the pressurized tunnels is sensitive to the interpreted fracture zone hydraulic parameters. There is recognition that each fracture zone and its connection mechanism to other
- The uncertainty in connectivity of the fracture zone network with surface water may influence the outcome of predictive modelling of seepage inflows during tunnel excavations and water losses during operations
- No pumping tests were conducted to provide information on the effective hydraulics and storativity of the fracture zone aquifers
- Exclusion of shallow Power Station excavations in the predictive models. The Power Station excavations extend to about 12 to 15 m below the water table in H-D4/H-D5 rock mass with potentials to locally host vuggy and karstic high-yield zones of zeolites and carbonates in fault breccias. These zones may produce high yields when connected to stream flow in the adjoining Nive River. The site investigations may not have characterised preferred groundwater flow paths and not be representative of the potentials for high inflows from the Nive River.

Given the uncertainties outlined above, the range of simulated results should be considered when using the reported modelling results.

12. Key Findings

The groundwater modelling outcomes provided critical insights into the anticipated hydrogeological dynamics and associated risks related to the Project construction and operations activities. The base case predictive models intuitively delivered the most informed estimates based on comprehensive interpretations of available data and derived conceptual understandings. It was recognised that the lower bound and upper bound scenarios provided a range of predictive outcomes which address uncertainties. The upper bound model was designed to explore an extreme scenario (notionally more severe than a reasonable worst case) of perceived low likelihood.

The modelling assumed lining of the Power Tunnel as follows:

- Lining extends 690 m from Penstock tunnels
- The uppermost 50 m of the Surge Shaft.

The predictive models were rated as Class 1. Contextually, class I models are common for projects in early stages of development and in fractured rock environments, and the developed models were appropriate to:

- Inform reference designs for the Project tunnels
- Provide reasonable estimates of inflows, drawdowns, operating losses, and risks
- Support regulatory approvals.

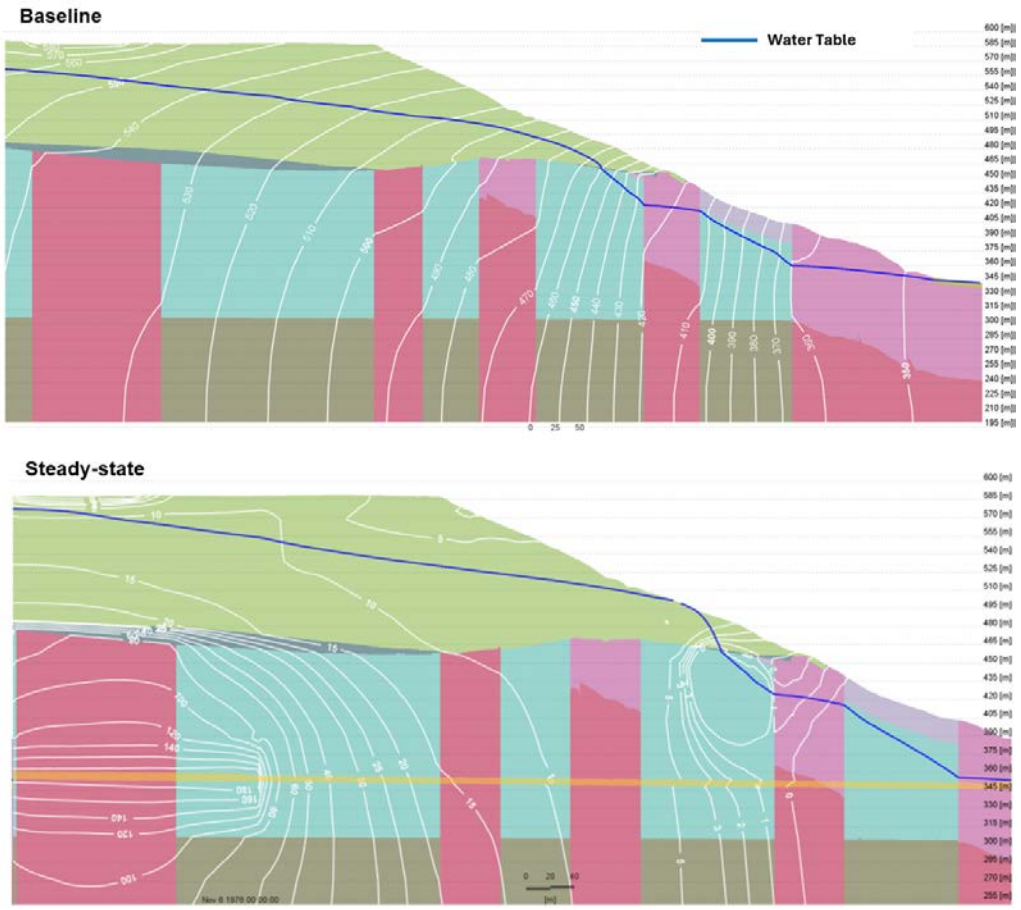
Key factors behind the Class 1 model attributes included:

- The conceptualisation hosts inherent uncertainty in context to the interpreted H-D0 fractures, fracture zones, connection mechanisms, and Surface water to groundwater interactions
- The absence of stressors of similar amplitudes as the simulated Project tunnel infrastructure.

The following key findings provide an overview of the model outcomes.

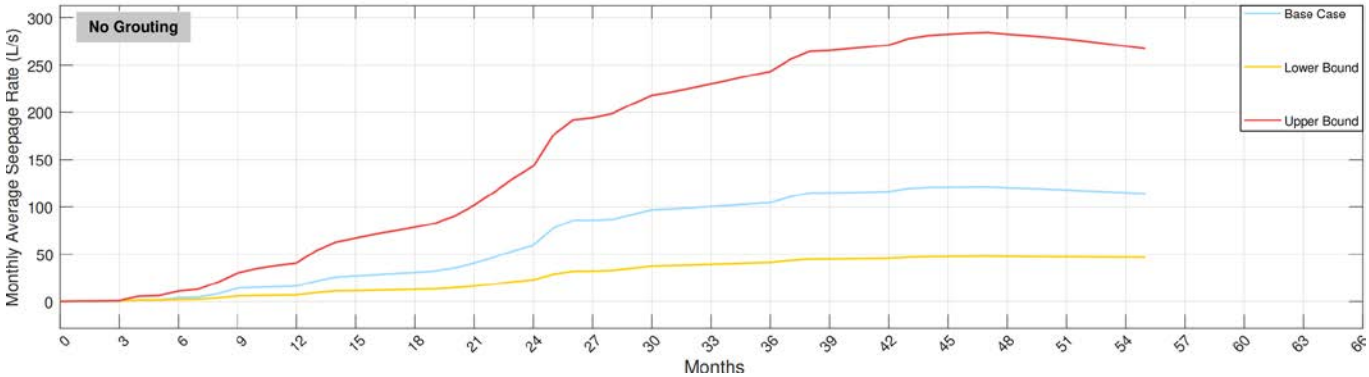
- **Peak Inflow into Tunnels:**
  - *Project Tunnels:*
    - The model predicts a peak inflow, with the best estimate at about 121 L/s in total, expected to occur in the 47th month and then drop to 114 L/s before operation starts. The peak flow might fall in the range of 47 and 283 L/s, as suggested by the lower and upper bound scenarios
    - These inflows are further reduced if fracture zones are grouted during construction. Predicted inflows peaked at 87 L/s in the 47th month during construction and reduced to 85 L/s at the operation start in the base case scenario
    - There was limited difference in terms of peak inflows between the two development schedules, but timing was shifted back in the P90 schedule. In the base scenario inflows peaked in the 54th month at 117 L/s before reducing to 111 L/s before operation started.
  - *Lake King William Tunnel:*
    - The peak inflow into Lake King William Tunnel was estimated at 0.7 L/s upon completion of excavation but could reach up to 2.6 L/s in the upper bound scenario. The simulated Lake King William Tunnel did not intersect fracture zones. The construction schedule had limited influence on both peak and steady-state inflow rates. In both schedule scenarios, the steady-state inflow was about 0.5 L/s prior to operation start and could reach up to 2.1 L/s in the upper bound scenarios.
- **Peak Annual Groundwater Take:**
  - *Project Tunnels:*
    - For the no grouting, base schedule, base case model peak annual groundwater take was approximately 3.7 GL, occurring 4 years after construction initiates at Lake King William Tunnel. The peak annual groundwater take may fall in the range 1.4 GL and 8.5 GL
    - Annual groundwater take was lower for the grouted base schedule with peak annual groundwater take varying between 1.2 and 6.0 GL
    - Peak groundwater take occurred one year later (5th year) in the P90 schedule with peak annual groundwater take almost equalling the base schedule scenario.
  - *Lake King William Tunnel:*
    - The base case estimated peak annual groundwater take was 18 ML occurring in the 2nd year and it could be up to 66 ML as suggested by the upper bound scenario
    - The construction schedule had a negligible influence on the peak water take.
- **Maximum Drawdown at the Mossy Marsh TEC:**
  - The drawdown propagates towards Mossy Marsh TEC via the fractured zones in the dolerite and then locally underdrains the Tertiary sediments and basalt palaeovalley
  - The base case models indicated drawdown of about 1 m at the Mossy Marsh TEC during the construction phase
  - Drawdown contours generally curve tightly around the perimeter of the Mossy Marsh wetlands where Cauchy and Seepage face boundary conditions are active and enable effective surface water to groundwater interactions
  - Predicted drawdowns were significantly reduced in the scenarios where the fracture zones intersected by the tunnel were grouted. The grouting scenarios were viewed as optimistic in context to drawdown mitigation, but nevertheless grouting was a reasonable drawdown risk mitigation strategy
  - The heads within the Mossy Marsh TEC recover once pressurisation begins during operations.
- **Drawdown at the Northern TEC:**
  - The base case predictions showed the 1 m drawdown contour does not propagate onto the Northern TEC at the end of the tunnel excavation
  - The predictions indicated low potentials for drawdown propagation onto the Northern TEC and any drawdown would be at amplitudes difficult to measure.

- **Water Loss during Pressurisation:**
  - *Project Tunnels*:
    - The base case estimate of the total water loss rate from Project tunnels was approximately 128 L/s reaching a steady state at 44 L/s loss in the no grouting scenario. Peak water loss was decreased to 60 L/s in the grouted scenario and stabilised around 29 L/s
    - The annual water loss volume peaked at 2.2 GL in the first year, with subsequent decay to around ~1.4 GL. Grouting of fracture zones lowered the peak volume to 1.3 GL and steady-state volume to 0.9 GL
    - Peak water loss rate estimates for the P90 scenario were slightly higher than for the base scenario (differing by 4 L/s on average), but with negligible impacts on the peak and steady-state annual loss volumes.
  - *Lake King William Tunnel:*
    - The base case estimated peak water loss was about 80 ML in the first year, and decayed to 60 ML
    - The base case estimated peak annual water loss is about ~80 ML in the first year, and decays to 60 ML
    - Both grouting and construction schedule had no influence on the predictions.
  - *Surface Discharge:*
    - The best estimated discharge to the ground surface via springs was just under 5 L/s around Lake King William Tunnel, about 40 L/s along the Project tunnels, and between 25 and 30 L/s at the Tarraleah Hillside. Cumulatively this was about 2.2 GL/annum (1.8 GL/annum in the grouted scenario) and represented a steady state where loss for the Project tunnels is matched by discharge via springs
    - Water loss calculated for the P90 schedule was the same as for the base schedule.
- **Pressurisation and Associated Risks:**
  - Groundwater was predicted to emerge on the ground surface as tunnel pressurisation persisted during operations. The development of new springs was dynamic, initiating along fracture zones within the dolerite and then expanding to saturate available storage in the dolerite and Tertiary palaeo-valley basalt rock mass profiles before discharging at springs and low-lying areas. This dynamic phase transitioned to steady state over time as available storage was consumed and water loss and discharge at the ground surface equalise. The locations of the emerging springs became consistent after approximately 5 to 10 years. The convergence of new spring locations around both baseline discharge points and fracture zones highlighted the interplay between tunnel pressurisation effects and subsurface fracture zones
  - Typically, the pressurisation of the tunnels induced water table recovery. In locations where the baseline water table elevation was higher than the Fully Supply Level of Lake King William, full recovery was not achieved. This resulted in residual drawdowns that persisted after 80 years of operations. This aspect seemed to mitigate some pore pressure risks in the dolerite terrain beneath the lower foot-slopes of the Tarraleah Hillside
  - The predictive models identified pore pressure risks for the operations activities. Pore pressures beneath the Tarraleah Hillside were predicted to increase up to 5 m locally. The Tarraleah Hillside includes identified landslide features. The predicted higher pore pressures potentially increase landslide susceptibility. Mounding of the water table and pore pressure rise after high rainfall recharge events and periods of high rainfall may tend to exacerbate the pore pressure risks and associated landslide susceptibility
  - The increased pore pressures lead to localised groundwater discharge onto the ground surface, with propensity for mounding of the water table within the basalt, and within discharge zones controlled by the basalt and dolerite contact as shown in Inset 26
  - There was a relationship between increased pore pressures and groundwater discharge locations, with the latter influencing the former. For example, where discharge was significant, this may have resulted in lower local pore pressures. Conversely, where discharge was minor or constrained this could have generated higher local pore pressures.

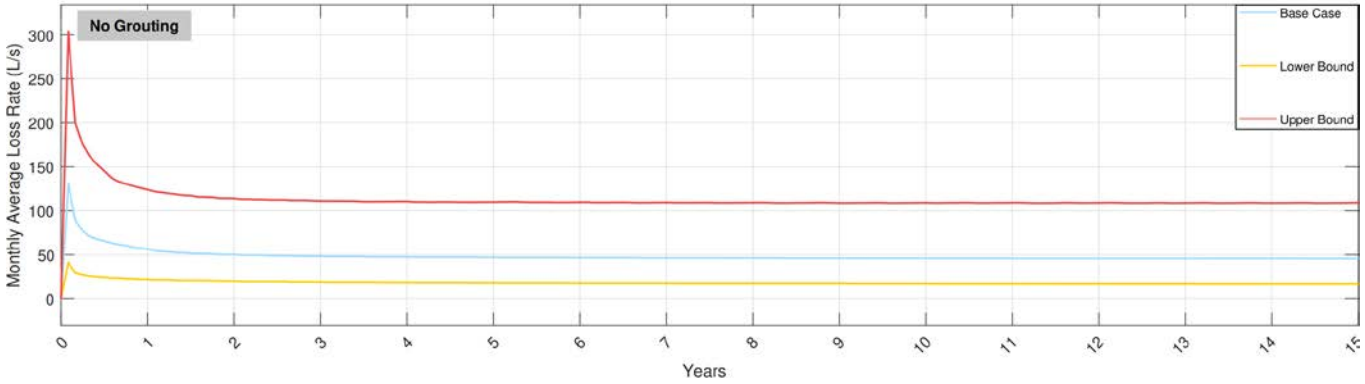


Inset 26: Simulated baseline and steady-state water tables for pressurisation stage (base case).

- **Sensitivity and Uncertainty in Predictive Outcomes:**
  - Cauchy Boundary conditions were applied to the soil beneath the unlined Mossy Marsh Canal and Mossy Marsh, where parameter variations were recognised to significantly influence the local surface water and groundwater interactions. The sensitivity in these parameters introduced uncertainties in the simulated drawdown around Mossy Marsh. To account for this, three hydrogeological models (base case, lower bound and upper bound) incorporated soils with varying infiltration capacities beneath the Mossy Marsh
  - Three hydrogeological models were developed to explore impacts of different hydraulic characteristics of fractured rocks. The upper-bound scenario assumed more open fractures, leading to about 140% higher peak inflows compared to the base case. The lower-bound scenario assumed more closed fractures, resulting in inflows at about 40% of the base case. As shown in Inset 27 and Inset 28, the variations similarly influenced the water losses during operation.

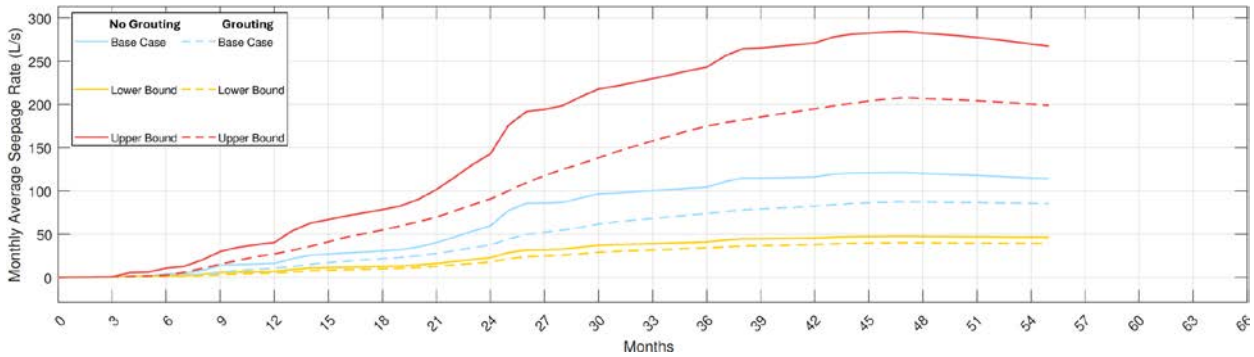


Inset 27: Predicted inflow rates into tunnels with no grouting (base schedule).

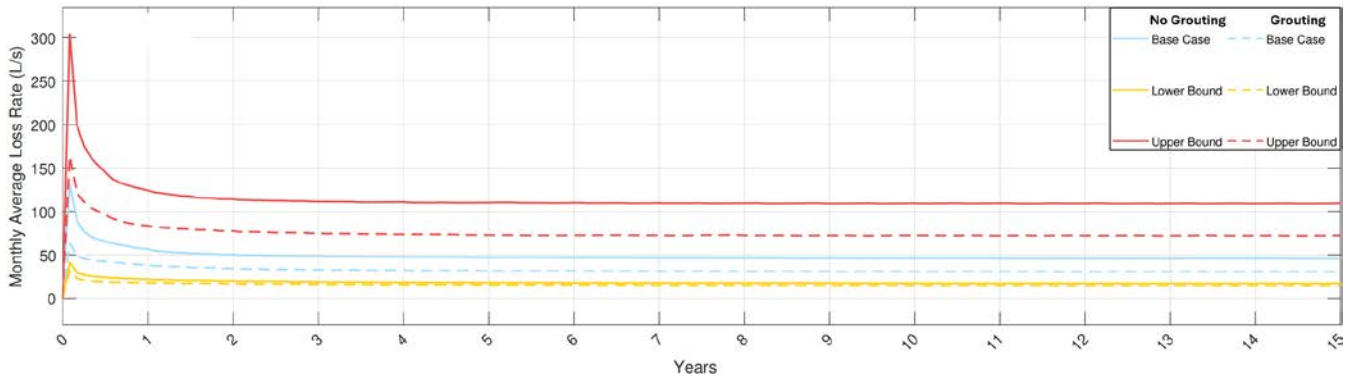


Inset 28: Predicted water loss rates from tunnels with no grouting (base schedule).

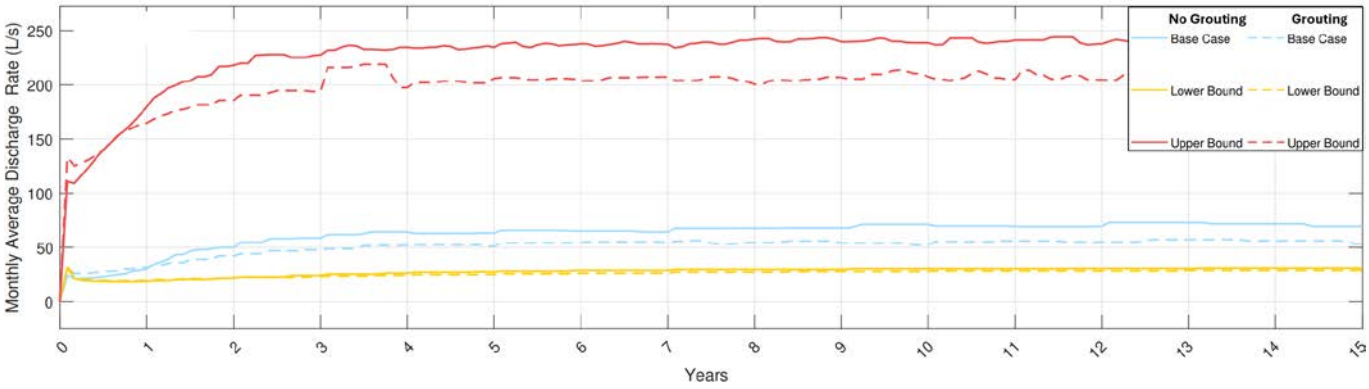
– A grouting scenario was developed to assess influences on inflows, drawdown, water losses and pressurisations. In this scenario, the hydraulic conductivity of finite elements in contact with the tunnels and representing a grouted rock mass was 0.0009 m/d (1x 10-8 m/s). The simulated grouting was a full surround zone, with variable thicknesses dependent on the local element layer thickness. As shown in Inset 29, Inset 30 and Inset 31, grouting significantly reduced seepage inflows during construction, as well as water losses and surface discharge during operations. The grouting influence was more obvious when the contrast in hydraulic conductivity between the grouted zoned and surrounding rock mass was higher. Contextually, the grouted rock mass hydraulic conductivity of 0.0009 m/d was considered optimistic.



Inset 29: Predicted inflow rates into tunnels for no-grouting and grouting scenarios.



Inset 30: Simulated combined water loss rates from tunnels for no-grouting and grouting scenarios.



Inset 31: Simulated combined surface discharge rate for grouting and no-grouting scenarios.

Stockpile Settings

In the stockpile settings, the predictive models describe transitional circumstances dependent on construction and operational activities and associated changes in water budgets of the stockpile settings.

During construction, drawdowns from about 1 to 10 m due to inflows to the tunnels are predicted to propagate beneath the West, Mid-point, and Paddy's Quarry 2 and 3 stockpiles. During operations, the surcharges from pressurisation of the tunnels were predicted to produce discharges onto the ground surface in most of the stockpile settings. For the West stockpile discharge to the ground occurred beneath the stockpile and surround one year after commencement of operations. For the Mid-point and Paddy's Quarry stockpiles, discharge onto the ground in the immediate surrounds was predicted after 1 year. Ultimately discharge was predicted beneath the Mid-point and Paddy's Quarry 3 stockpiles after about 10 years.

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440000 442500 445000 447500 450000 452500 455000

5322500 5320000 5317500 5315000

Wentworth Hills

Northern TEC

Headrace Portal

Pipeline

Mid Access Tunnel

Nive River

West Stockpile

Mid Point Stockpile

Lake King William Tunnel

Tarraleah Plateau

Paddy's Quarry Stockpiles

Tarraleah Hillside

Tarraleah Power Station

Surge Access Tunnel

Headrace Tunnel

Mossy Marsh TEC

Power Tunnel

Surge Shaft

River Derwent

440000 442500 445000 447500 450000 452500 455000

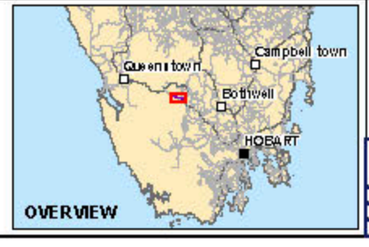
Legend

- Groundwater Model Domain
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel
- Lake King William
- Sphagnum Peatland TEC

Elevation DEM (m AHD)

High : 900

Low: 450



N

Scale 1:45,000

0 0.5 1 1.5 2 2.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH REDEVELOPMENT
DEM & LAYOUT SCHEMATIC

PSM4346-115R | Figure 1

Lake King William

Northern TEC

West Stockpile

Butlers Gorge

Typical release of 9m³/sec to surface water environment

Mid Point Stockpile

Horne's Dam

Paddy's Quarry Stockpiles

Mossy Marsh

Mossy Marsh TEC

Mossy Marsh Pond

No. 2 Pond Overflow Canal

Sewage Ponds

No.2 Pond

No.1 Pond

440000 442000 444000 446000 448000 450000 452000 454000 456000

5324000 5322000 5320000 5318000 5316000 5314000

Legend

Surface Water Aspects
- Sphagnum Peatland TEC
- Wetlands
- Waterbodies
- Streams

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Home's Creek Canal
- Tarraleah Canals, Tunnels, Penstocks

Upper Derwent Sub-Catchments
- Lake King William
- Lower Nive
- Upper Derwent (incl. Beech)
- Rainfall Station



N

Scale 1:45,000

0 0.5 1 1.5 2 2.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 09 May 2025	Page Size: A3	PSM4346-115R	Figure 2

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

LOCAL CATCHMENTS AND SURFACE WATER

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 2 Project Wide Local Catchments and Surface Water.mxd

Lake King William

Northern TEC

West Stockpile

Butlers Gorge

Mid Point Stockpile

Horne's Dam

Typical release of 9 m³/sec to surface water environment

Paddy's Quarry Stockpiles

Mossy Marsh

Mossy Marsh TEC

Mossy Marsh Pond

No. 2 Pond Overflow Canal

Sewage Ponds

No.2 Pond

No.1 Pond

440000 442000 444000 446000 448000 450000 452000 454000 456000

5324000 5320000 5316000 5314000

Legend

Surface Water Aspects
- Sphagnum Peatland TEC
- Wetlands
- Streams
- Perennial Wetlands
- Perennial Ponds and Storages
- Groundwater Discharge Zones
- Concrete-Lined Canals
- Perennial Wetlands
- Perennial Watercourses
- Groundwater Discharge Zones
- Rainfall Station

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- MossyMarsh Tunnel
- Horne's Creek Canal
- MossyMarsh Canal
- Tarraleah Canals, Tunnels, Penstocks

Upper Derwent Sub-Catchments
- Lake King William
- Lower Nive
- Upper Derwent (incl. Beech)

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined



N

Scale 1:45,000

0 0.5 1 1.5 2 2.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT-WIDE SURFACE WATER FEATURES AND PRESENCE

PSM4346-115R | Figure 3

C:\Arcgis\PSM4346\GIS_Figures\PSM4346-115R\May 2025\Figure 3 Project-Wide Surface Water Features and Presence.mxd

Typical release of 9 m^3/sec to surface water environment

Mossy Marsh TEC

Mossy Marsh Pond

Mossy Marsh Pond

447000 448000 449000 450000 451000 452000

5319000

5318000

5317000

Legend

Surface Water Aspects

- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Perennial Wetlands
- Perennial Ponds and Storages
- Groundwater Discharge Zones
- Groundwater Discharge Zones
- Perennial Watercourses
- Perennial Wetlands

Tarraleah Infrastructure

- Tarraleah Redevelopment Alignment
- Mossy Marsh Canal
- Mossy Marsh Tunnel
- Horne's Creek Canal

Upper Derwent Sub-Catchments

- Lake King William
- Lower Nive
- Upper Derwent (incl. Beech)

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

MOSSY MARSH TEC
SURFACE WATER PRESENCE

C:\Arcdata\PSM\4346\GIS_figures\PSM4346-115R_Fig 04 Figure 4 - Mossy Marsh TEC Surface Water Presence.mxd

444000 445000 446000 447000 448000 449000

532000

532100

531900

Wentworth Hills

Northern TEC

Typical release of 9 m^3/sec
to surface water environment

Mossy Marsh

Hornets Dam

Legend

Surface Water Aspects

- Northern Sphagnum Peatland TEC
- Wetlands
- Streams

- Perennial Wetlands
- Perennial Ponds and Storages
- Groundwater Discharge Zones
- Perennial Wetlands
- Perennial Watercourses
- Groundwater Discharge Zones

Tarraleah Infrastructure

- Tarraleah Redevelopment Alignment
- Mossy Marsh Canal
- Mossy Marsh Tunnel
- Tarraleah Canal No 1
- Concrete-Lined Canals

Upper Derwent Sub-Catchments

- Lake King William
- Lower Nive
- Upper Derwent (incl. Beech)

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretive Report	
Date: 07 May 2025	Paper Size: A3	NORTHERN TEC SURFACE WATER PRESENCE	
		PSM4346-115R	Figure 5

C:\Vic\GIS\PSM4346\R0_Figures\PSM4346-115R Rev 2\Figure 5 Northern TEC Surface Water Presence.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Hillside

TA-DC217 TA-DC216 TA-DC214 TA-DC219 TA06DC014 TA-DC212 TA-DC215 TA-DC218 TA06DC015 TA06DC012 TA-DC213 TL492-P1 TA-DC270 TA-DC268 TA-DC225 TL492-P2 TA-DC271 TA-DC243 TA-DC239 DH-8253 TA-DC262 TA-MB309 TA-DC269 TA-DC238 TL491-P3 TA-MB308 TA-DC237 TA-DC260 TA-DC234 TA-DC235 DH-8241 DH-8242 DH-8244 DH-8243 S_SP2 DH-8240 S_SP5 DH-8239 DH-8257 DH-8238 S_SP1 R-SP1 DH-8256 DH-8234 DH-8255 DH-8235 DH-8233 DH-8254 DH-8236 DH-8252 DH-8246 DH-8237 DH-8245 Q-SP1 TAHS2019-PW20d DH-8250

Scale 1:7,500
0 50 100 200 300 m

TA-DC247 TA-DC275 TA-DC249B TA-MB301 TA-DC250 TA06DC006 TA06DC003 TA06DC005 TA06DC013 TA-MB312 TA-DC207 TA-DC252 TA-DC208

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

TA-DC201 TA-DC202 TA06DC001 TA-DC203 TA-DC205 TA-DC261 TA-DC226 TA-DC227 TA06DC002

TA-DC241 TA-DC242 TA-DC263 TA-DC246A TA-MB311 TA-DC266 TA-DC246 TA06DC013 TA06DC007 TA06DC008 TA06DC009 TA06DC017B TA06DC010 TA06DC011 DH-8251 DH-8249

SEE INSET Tarraleah Hillside

TA-DC217 TA06DC014 TA-DC212 TA-DC218 DH-8247 DH-8248 TA06DC012 TL492-P1 TA-DC213 TL492-P2 TA-MB308 TA-DC262 DH-8242 DH-8238 DH-8241 R-SP1 DH-8245 DH-8254 DH-8252 DH-8250

Legend

- Tarraleah Redevelopment
- Tarraleah Upgrade Works - Lake King William Tunnel

Geotechnical Boreholes

- Historic
- Phase 1
- Phase 2
- Phase 3

Interpreted Faults (PGSS)

- Concealed
- Inferred
- Defined
- Sphagnum Peatland TEC
- Mossy Marsh Tunnel

OVERVIEW (Lake King William Outlet, Tarraleah Hillside)

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 12 May 2025	Page Size: A3	PSM4346-115R	Figure 6

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT WIDE
GEOTECHNICAL BOREHOLES

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444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

TA-DC247 TA-DC275 TA-DC249B TA-MB301 Guelph 8-10 TA-DC250 Guelph 1-4 TA06DC006 TA06DC003 TA06DC016 TA-MB312 TA-DC252 TA-DC207 TA-DC208 TA-DC241

INSET - Tarraleah Hillside

TA-DC217 TA-DC216 TA-DC219 TA-DC214 TA-DC212 TA-DC215 TA-DC218 TA06DC012 Guelph 5-7 TA-DC239 TA-MB308 TA-MB309 TA-DC276 TA-DC225 TA-DC238 TAHS2019-PW20d

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

TA-DC201 TA-DC202 TA06DC001 TA-DC226 TA-DC205 TA-DC227 TA06DC002

Scale 1:15,000
0 100 200 400 600 m

TA-DC217 TA-DC216 TA-DC214 TA-DC219 TA-DC212 TA-DC215 Guelph 11-14 TA-MB308 TA-DC239 TA-DC225 TA-DC266A TA-DC276 TA06DC013 TA-MB309 TA-DC238 TA-MB311 TAHS2019-PW20d TA06DC008 TA06DC010

SEE INSET Tarraleah Hillside

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel

Interpreted Faults (PGSS)

- Concealed
- Inferred
- Defined

Slug and Packer Testing

- Slug Tests
- Packer Tests
- Slug and Packer Tests
- Guelph Tests

- Sphagnum Peatland TEC
- Mossy Marsh Tunnel

OVERVIEW — Lake King William Outlet — Tarraleah Hillside

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report PROJECT WIDE HYDROGEOLOGY TESTING LOCATIONS
	Date: 09 May 2025	Page Size: A3	PSM4346-115R | Figure 7

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INSET

SEE INSET

Scale 1:7,500
0 50 100 200 300 m

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Legend

- Tarraleah Redevelopment Alignment
- Groundwater Head Observations, m AHD (Date/Period)
  - Open Hole / Drilling Observation
  - Standpipe
  - VWP
- Interpreted Baseline Groundwater Flow Lines
- Interpreted Baseline Groundwater Heads (m AHD)
- Mossy Marsh Tunnel
- Surface Water Aspects
  - Lake
  - Wetland
  - Rivers
  - Sphagnum Peatland TEC
- Bedrock Geology
  - Dolerite
  - Triassic Sand
  - Basalt
- Interpreted Faults (PGSS)
  - Concealed
  - Inferred
  - Defined

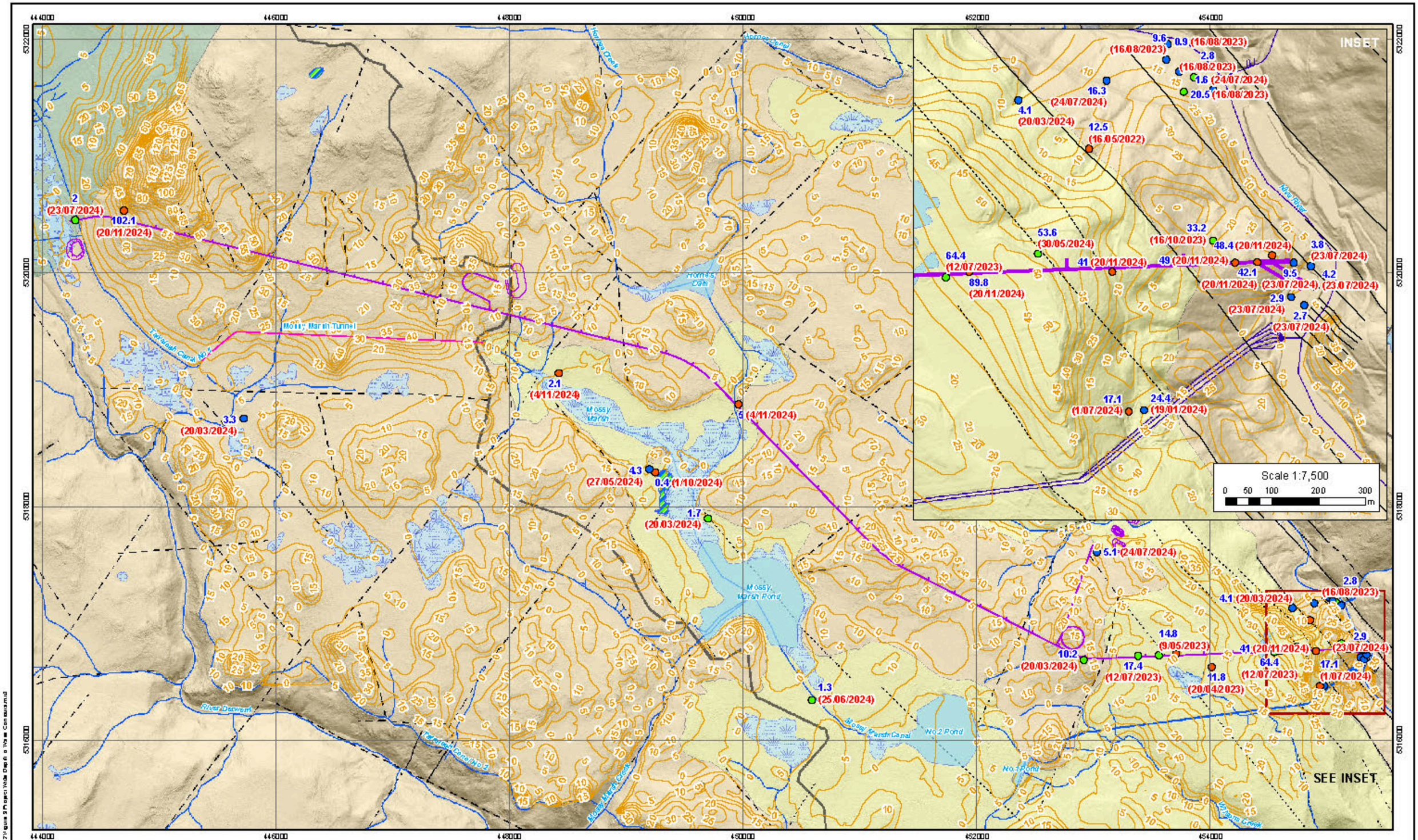
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT WIDE
WATER LEVEL MONITORING LOCATIONS
AND WATER TABLE CONTOURS

PSM4346-115R | Figure 8

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 8 Project Wide Water Level Monitoring Locations and Water Table Contours.mxd



Legend

Groundwater Head Observations mAHD (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP

- Interpreted Baseline Depth to Groundwater (m)
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel

Surface Water Aspects
- Lake
- Wetland
- Rivers
- Sphagnum Peatland TEC
- Subcatchment

Bedrock Geology
- Dolerite
- Basalt

Interpreted Faults (PGSS)
- Concealed
- Inferred
- Defined

N

Scale 1:30,000

0 250 500 1,000 1,500 Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 07 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT WIDE
DEPTH TO GROUNDWATER
CONTOURS

PSM4346-115R | Figure 9

C:\Arcgis\Sites\PSM4346-115R\Figures\PSM4346-115R_Figure 9 Project Wide Depth to Water Contours.mxd

Typical release of 9 m^3/sec to surface water environment

TA-MB301
TA-MB301
TA-DC250
TA-DC250
TA06DC016
TA-MB312
TA-MB312
TA-DC207
TA-DC252
TA-DC252
TA-DC207
TA-DC208
TA-DC208
TA-DC242
TA06DC008
Mossy Marsh
Mossy Marsh Pond
No2 Pond

447000 448000 449000 450000 451000 452000
5319000 5318000 5317000

Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Groundwater Monitoring Locations
- Standpipe
- VWP
- Test Pits

Hydraulic Testing
- Slug Tests
- Packer Tests
- Slug and Packer Tests
- Guelph Tests

- 10 m Elevation Contours (m

Tarraleah Infrastructure
- Tarraleah Redevelopment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Horne's Creek Canal

DEM Elevation (m
High : 900
Low : 500

N
Scale 1:15,000
0 150 300 600 900 m
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SITE INVESTIGATIONS NEAR TO MOSSY MARSH TEC

C:\Work\PSM4346\002_Figures\PSM4346-115R Rev 2\Figure 10(a) Site Investigations Near to Mossy Marsh TEC.mxd

444000 445000 446000 447000 448000 449000

5322000

5321000

5320000

5319000

Wentworth Hills

Horne's Dam

Mossy Marsh

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Watercourse Alignment
- Auger Hole Locations

Quaternary Soils
- Alluvium
- Colluvium
- Peat
- Glacial

Bedrock Geology
- Dolerite
- Basalt

Tarraleah Infratructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1

OVERVIEW

Queenstown
Campbell town
Bothwell
HOBART

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Date: 07 May 2025

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SITE INVESTIGATIONS NEAR NORTHERN TEC

PSM4346-115R

Figure 10(b)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 10(b) Site Investigations Near Northern TEC.mxd

440000 442000 444000 446000 448000 450000 452000 454000 456000

5324000 5320000 5316000 5314000

Legend

- Tarraleah Redevelopment
- Tarraleah Upgrade Works - Lake King William Tunnel

Interpreted Faults (PGSS, Jun 2023)

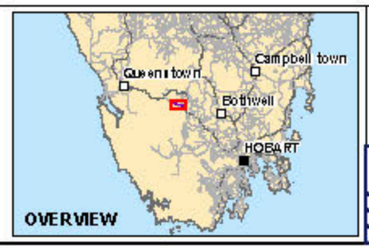
- Concealed
- Inferred
- Defined

- Interpreted Joints (PGSS, Jun 2023)
- Fracture Zones

Bedrock Geology

- Basalt
- Dolerite
- Triassic Sandstone
- Permian Sediments

- Lake
- Sphagnum Peatland TEC
- Mossy Marsh Tunnel



N

Scale 1:45,000

0 0.25 0.5 1 1.5 2 2.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT WIDE
GEOLOGY AND STRUCTURE

C:\Work\PSM\4346\03_Figures\PSM4346-115R Rev2\Figure 11(a) Project Wide Geology and Structure.mxd

436000 440000 444000 448000 452000 456000 460000

5324000
5320000
5316000
5312000

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel
- Interpreted Faults (PGSS) not simmulated
- Fracture Zones
- Sphagnum Peatland TEC
- Model Domain



N

Scale 1:65,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PROJECT WIDE
CONNECTED STRUCTURE NETWORK

PSM4346-115R | Figure 11(b)

C:\Arcgis\PSM4346\03_Figures\PSM4346-11 Rev 2\Figure 11(b) Project Wide Simulated Redirect Structure Network.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

Legend

- Tarraleah Redevelopment
- Subcatchment Divide

Surface Water

- Lake
- Wetland
- Sphagnum Peatland TEC

Quaternary Geology

- Alluvium
- Colluvium
- Peat
- Glacial

Bedrock Geology

- Dolerite
- Basalt

Interpreted Faults (PGSS)

- Concealed
- Inferred
- Defined
- Mossy Marsh Tunnel

OVERVIEW

Queenstown
Campbell town
Bothwell
HOBART

N

Scale 1:30,000

0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M

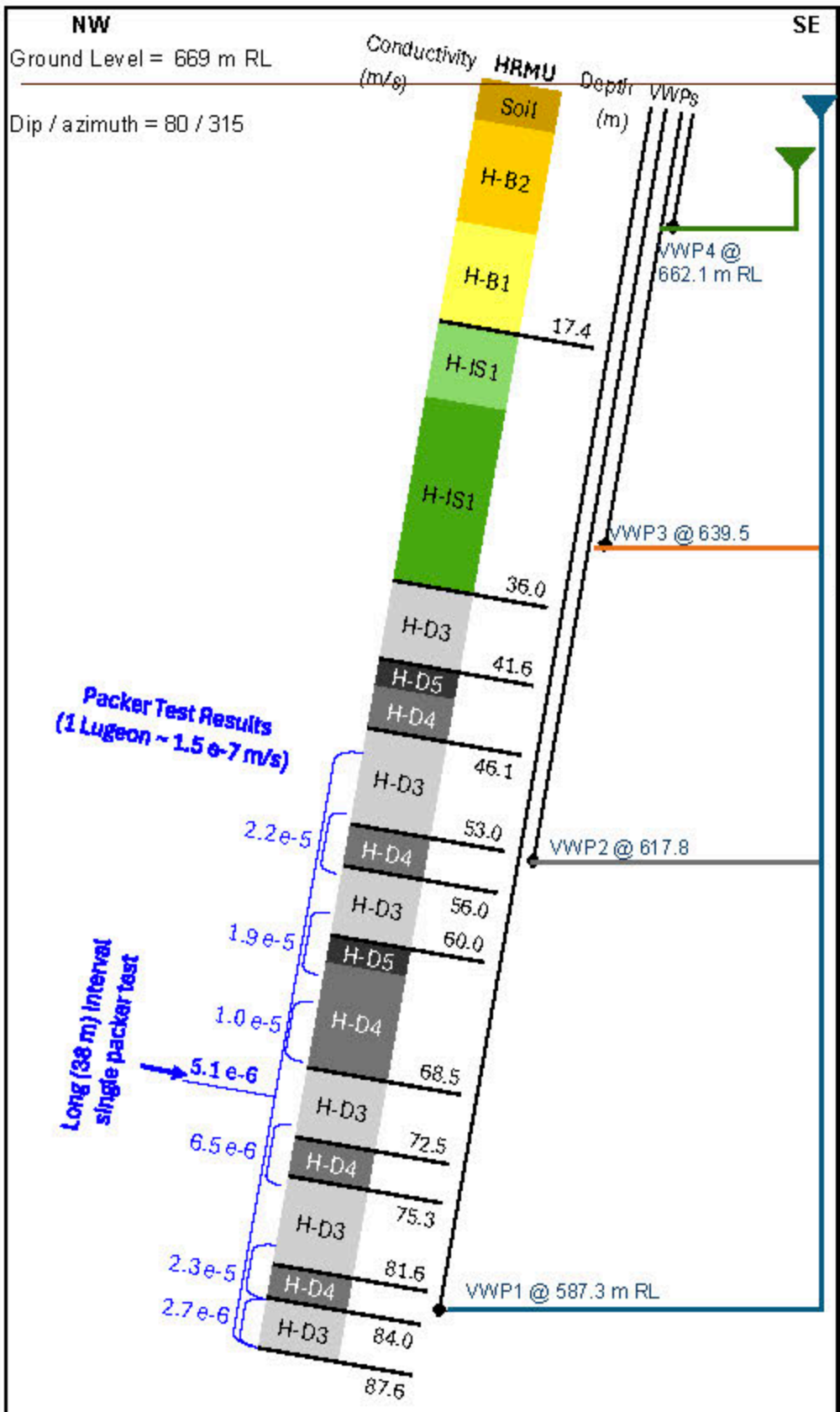
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

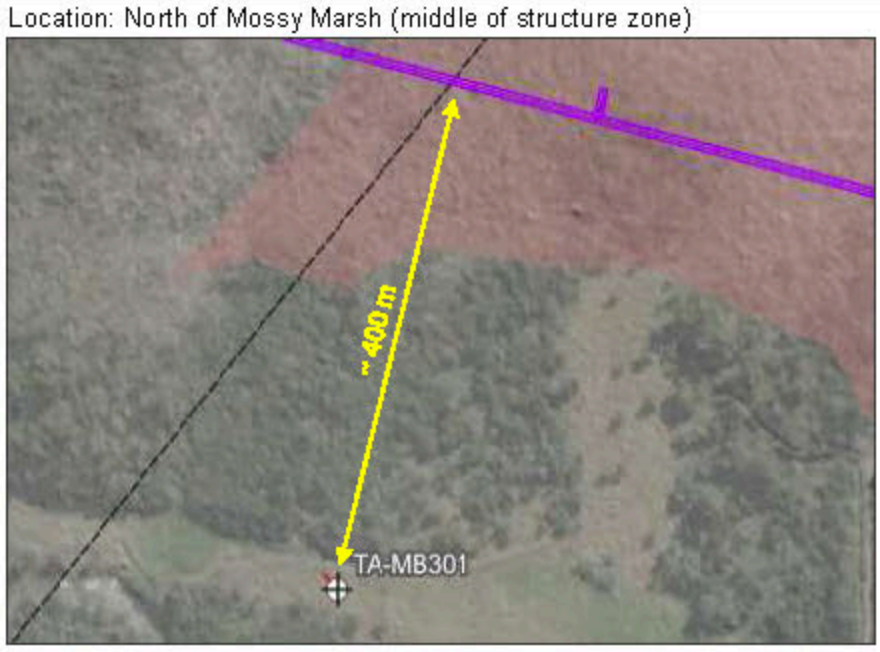
PROJECT WIDE
SOILS AND SURFACE WATER BODIES

PSM4346-115R | Figure 12

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115_Figure 12 Project Wide Soils and Surface Water Bodies.mxd

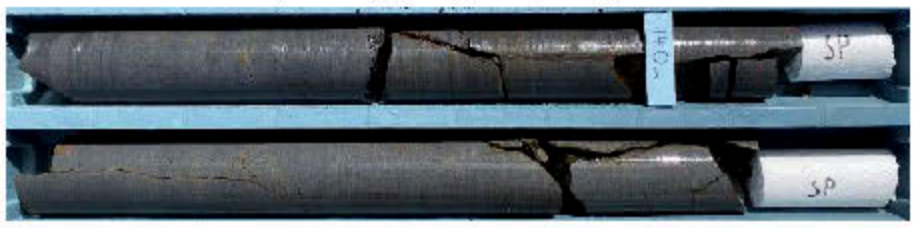


Location: North of Mossy Marsh (middle of structure zone)



Hydro Rock Mass Units:

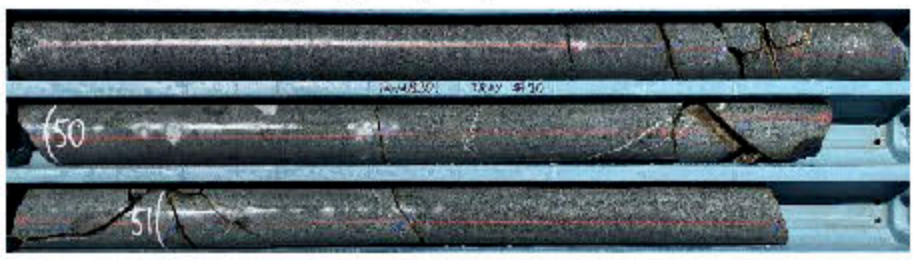
B1 = Massive to Blocky Basalt, typical joint spacing > 0.5 m



IS1 = Tertiary Sediments, unconsolidated fluvial lacaustrine clay / silt / sand



D3 = Blocky Dolerite, typical joint spacing between 0.3 and 1.0 m

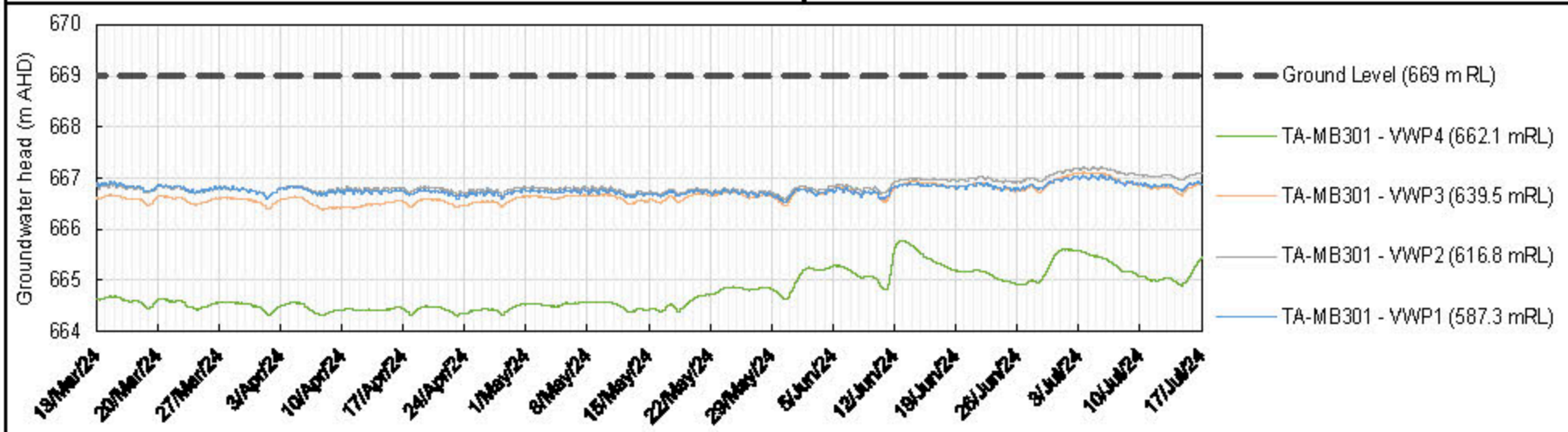


D4 = Fractured Dolerite, typical joint spacing < 0.3 m



D5 = Sheared Dolerite, faults, shears and crush zones





Notes:

- Diagram is not to scale
- Borehole located on top of Mossy Marsh Palaeovalley, with 36m thickness of Tertiary Basalt and Sediments
- Packer testing shows dolerite to be very transmissive below low permeability Tertiary Sediments
- VWPs shows the 3 deepest sensors have the highest heads (blue, grey and orange lines)
- The shallowest sensor (green line) has the lowest head suggesting an upward hydraulic gradient
- Groundwater setting is a water discharge zone

Hydro Tasmania

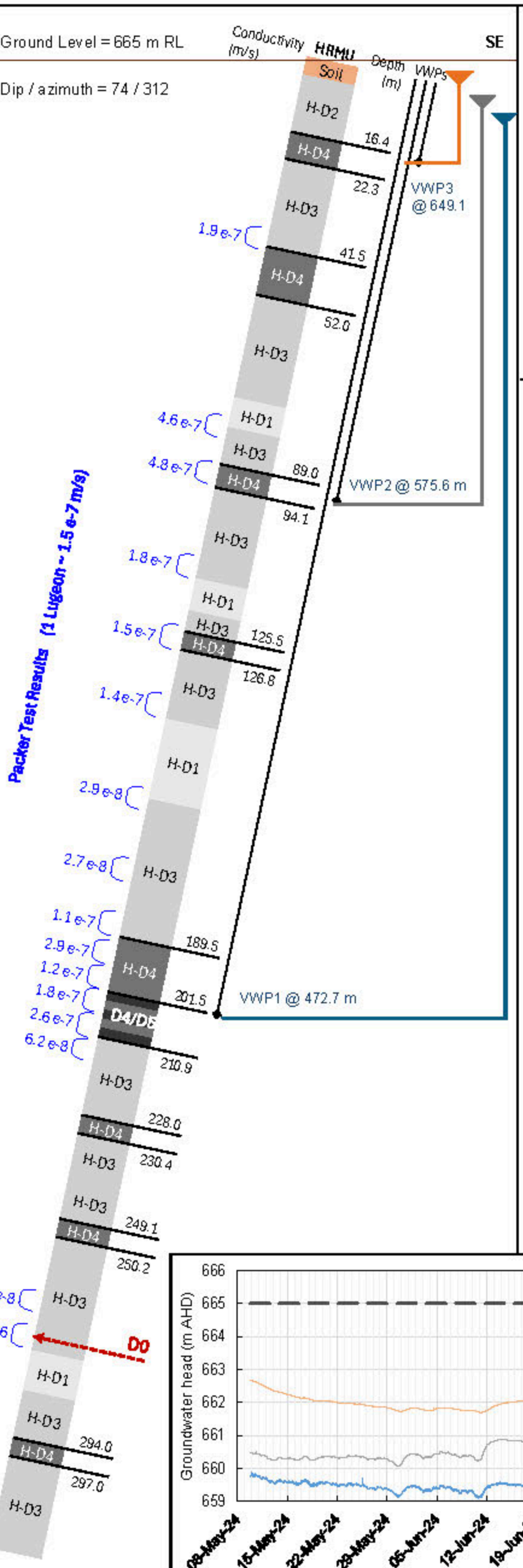
Tarraleah Redevelopment Project

Hydrogeological Interpretative Report

HYDROGEOLOGY PLOT
TA-MB301 - PALAEOVALLEY TERRAIN

PSM4346-115R

Figure 13(a)



Location: Northeast of Mossy Marsh at Hornes Canal (middle of structure zone)

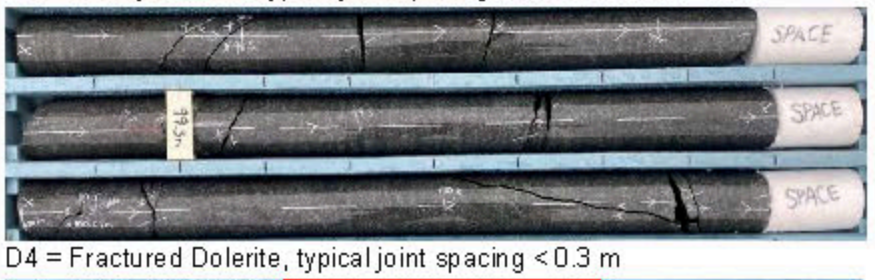


Hydro Rock Mass Units:

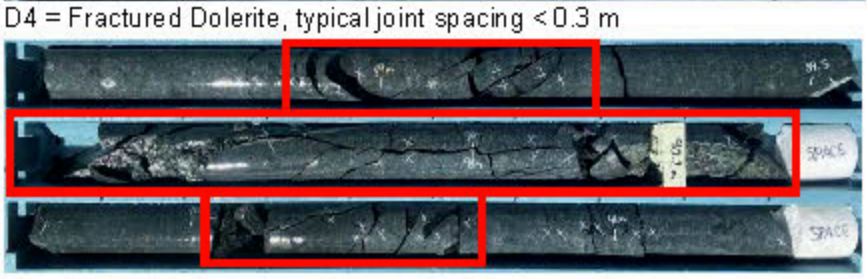
D1 = Massive to blocky Dolerite, typical joint spacing > 1.0 m



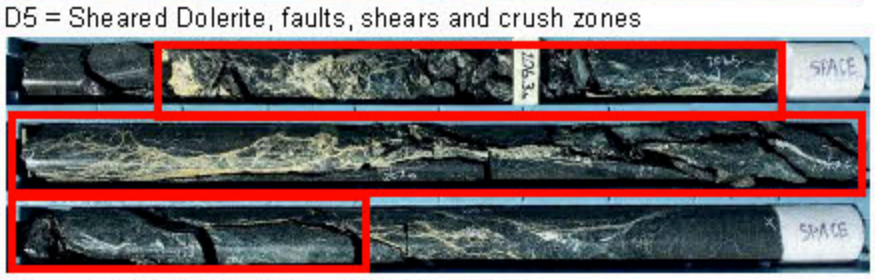
D3 = Blocky Dolerite, typical joint spacing between 0.3 and 1.0 m



D4 = Fractured Dolerite, typical joint spacing < 0.3 m

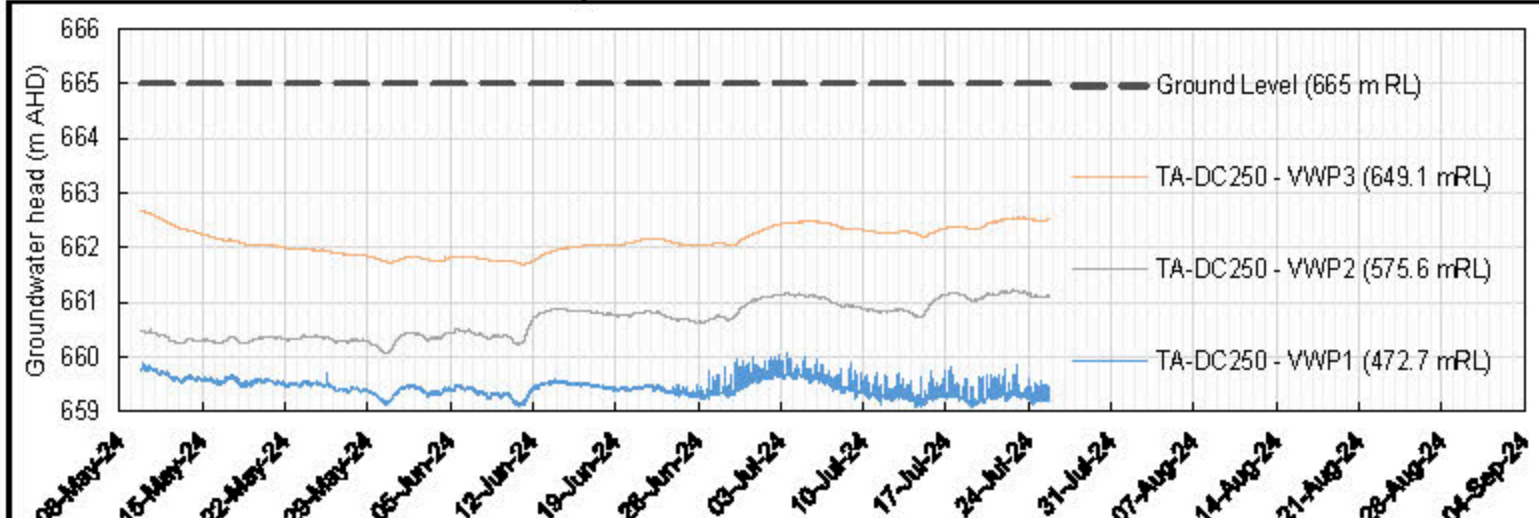


D5 = Sheared Dolerite, faults, shears and crush zones



D0 = Anomolous high yield Dolerite defects





Notes:

- Diagram is not to scale
- Hydrograph of VWP sensors shows the shallower sensors have corresponding higher heads
- Suggesting a downward hydraulic gradient and a groundwater recharge zone

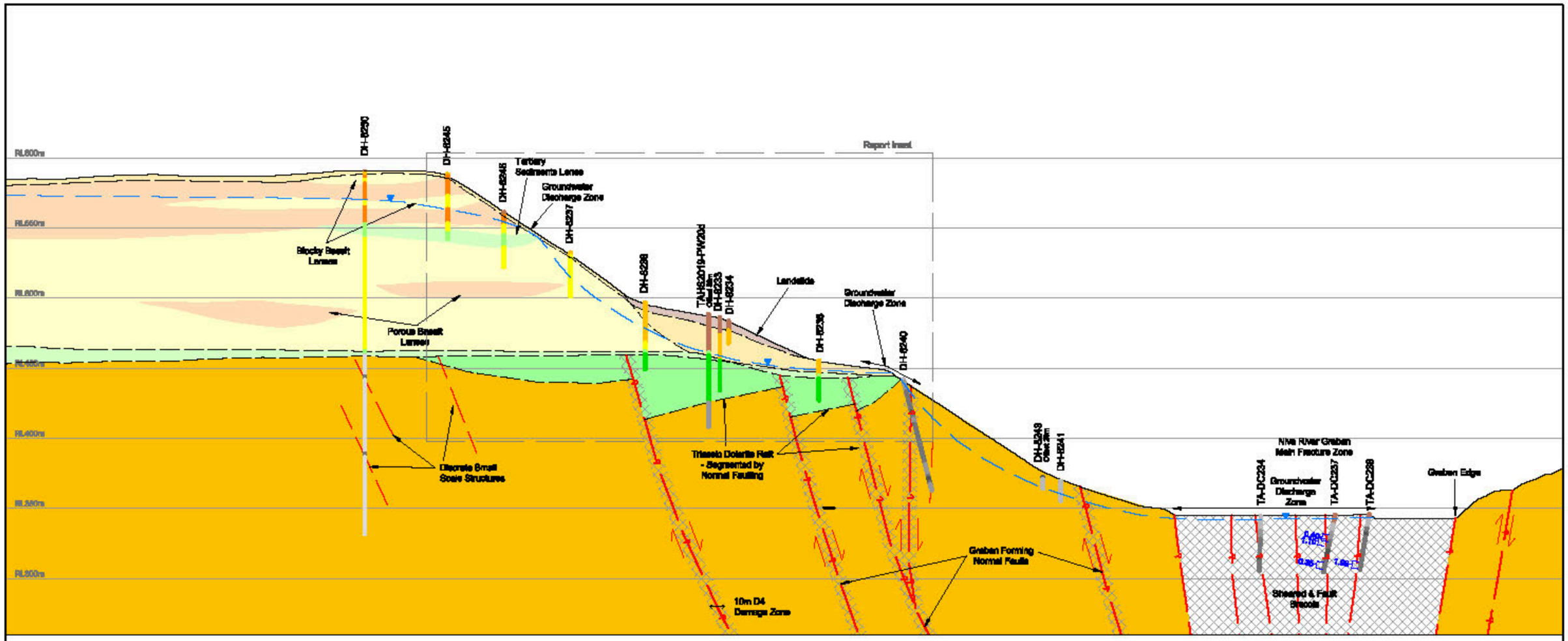
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Hydrogeological Interpretative Report

HYDROGEOLOGY PLOT
TA-DC250 - DOLERITE TERRAIN

PSM4346-115R	Figure 13(b)



LEGEND

- Topography
- Inferred Faults (PGSS)
- Fracture Zone (PGSS)
- Interpreted Baseline Water Table

Borehole Legend - Hydrogeology Rock Mass Units

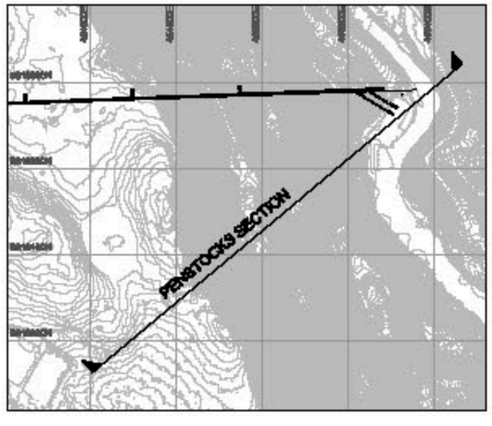
- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- H-IS1 - Tertiary Sediments
- H-D1 - Blocky Dolerite
- H-D6 - Near Surface Dolerite
- H-D3 - Outer Structure Zone
- H-D4 - Fractured Zone Dolerite
- H-D5 - Sheared Zone Dolerite
- H-TS - Triassic Sandstone

Packer Tests

1.31 ← Borehole; Depth from (m); Lugeon; Depth to (m)

Lithology

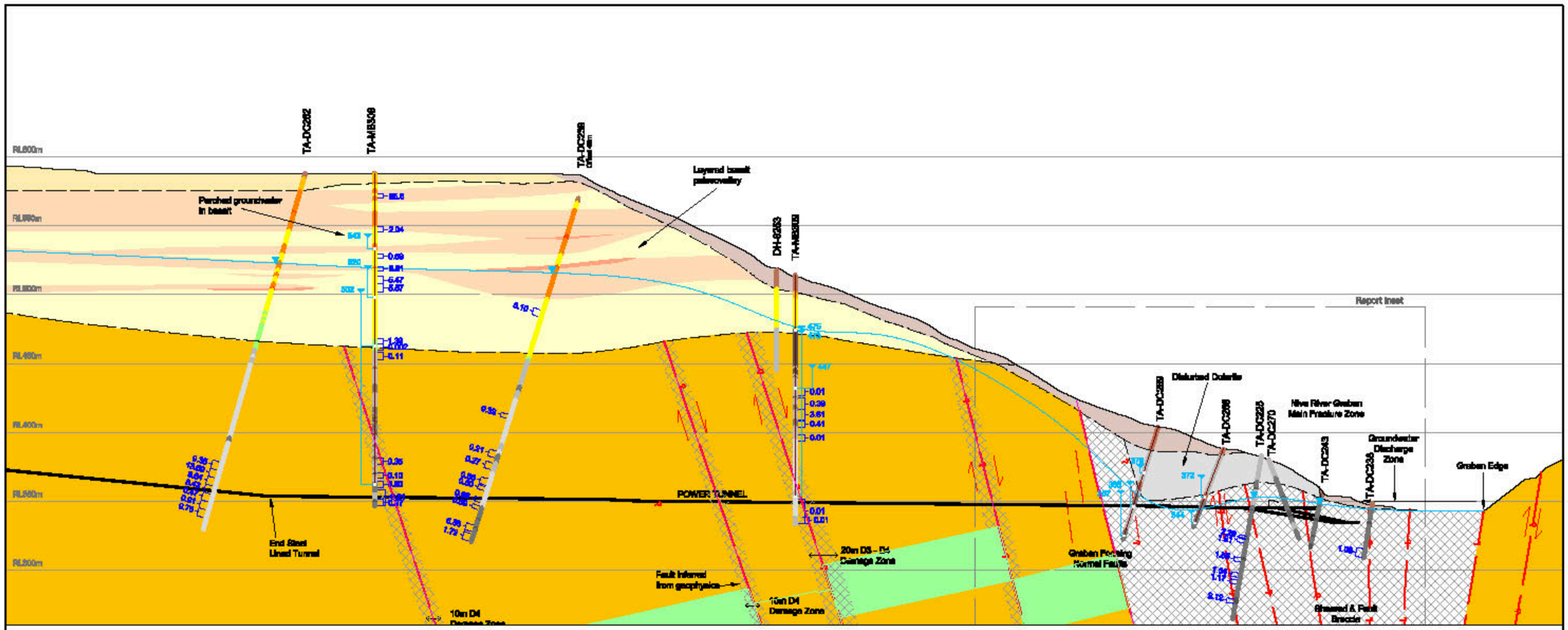
- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- H-IS1 - Tertiary Sediments
- H-D - Jurassic Dolerite
- H-D3 - Disturbed Dolerite
- H-TS - Triassic Sandstone



0 50 100
Scale (m)

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Hydrogeological Interpretative Report
CONCEPTUAL ROCK MASS AND STRUCTURAL HYDROGEOLOGY - PENSTOCKS

PSM4346-115R | Figure 14



LEGEND

- Topography
- Inferred Faults (PGSS)
- Fracture Zone (PGSS)
- Interpreted Baseline Water Table
- VWP sensor

Borehole Legend - Hydrogeology Rock Mass Units

- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- IS1 - Tertiary Sediments
- H-D1 - Blocky Dolerite
- H-D6 - Near Surface Dolerite
- H-D3 - Outer Structure Zone
- H-D4 - Fractured Zone Dolerite
- H-D5 - Sheared Zone Dolerite
- H-TS - Triassic Sandstone

Packer Tests

1.31 — Borehole Depth from (m) / Lugeon / Depth to (m)

Lithology

- H-SCl - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- H-IS1 - Tertiary Sediments
- H-D - Jurassic Dolerite
- H-D3 - Disturbed Dolerite
- H-TS - Triassic Sandstone

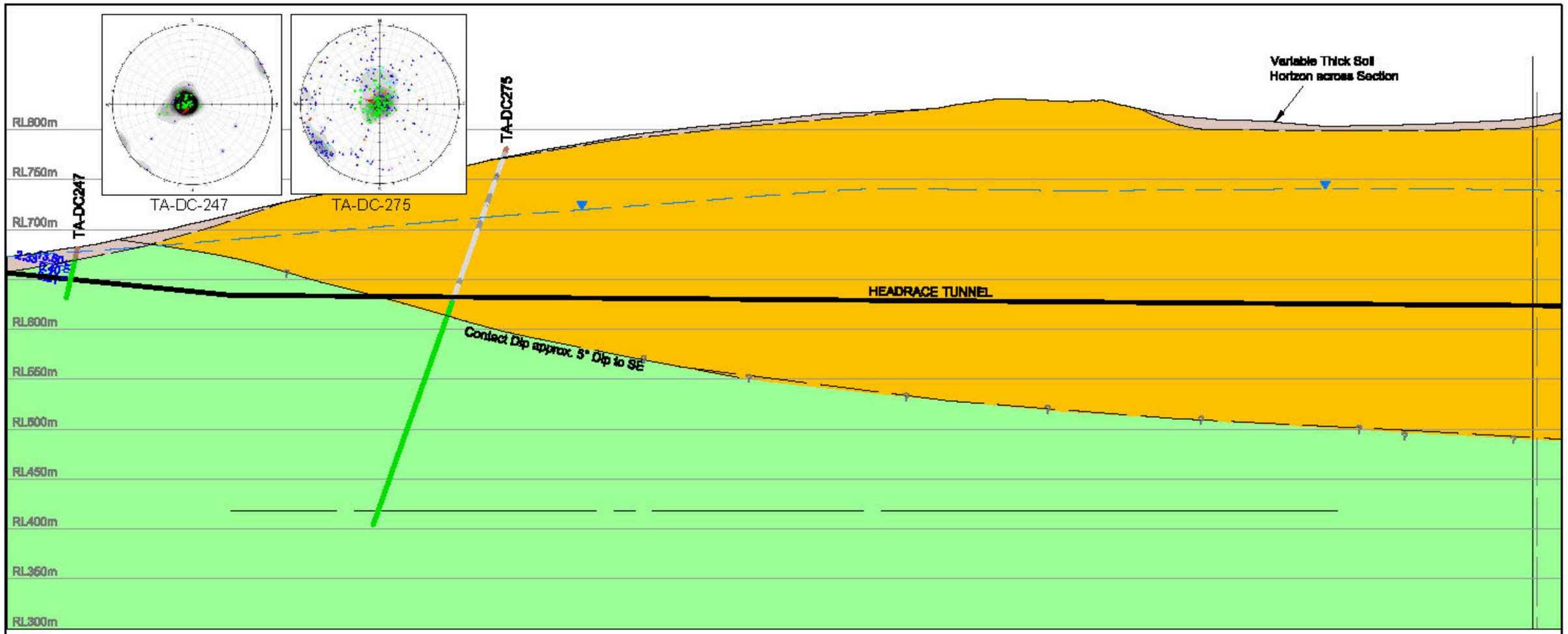


0 60 100
Scale (m)

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Hydrogeological Interpretative Report

CONCEPTUAL ROCK MASS AND STRUCTURAL HYDROGEOLOGY - TARRALEAH HILLSIDE

PSM4346-115R | Figure 15



LEGEND

- Topography
- Inferred Faults (PGSS)
- Fracture Zone (PGSS)
- Interpreted Baseline Water Table

Borehole Legend - Hydrogeology Rock Mass Units

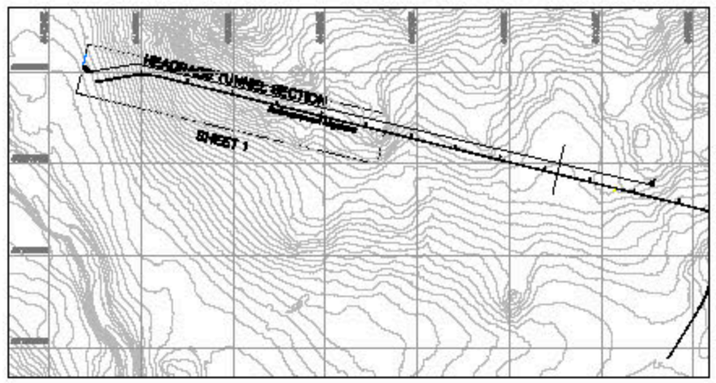
- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B3 - Porous Basalt
- H-B5 - Near Surface Basalt
- H-IS1 - Tertiary Sediments
- H-D1 - Blocky Dolerite
- H-D3 - Outer Structure Zone
- H-D4 - Fractured Zone Dolerite
- H-D5 - Sheared Zone Dolerite
- H-D6 - Near Surface Dolerite
- H-TS - Triassic Sandstone

Packer Tests

1.31 — Borehole Depth from (m) / Lugeon / Depth to (m)

Lithology

- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- H-IS1 - Tertiary Sediments
- H-D - Jurassic Dolerite
- H-D3 - Disturbed Dolerite
- H-TS - Triassic Sandstone



0 50 100 150 200
Scale (m)

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Hydrogeological Interpretative Report

CONCEPTUAL ROCK MASS AND STRUCTURAL HYDROGEOLOGY - HEADRACE TUNNEL - S1

PSM4346-115R | Figure 16

50 - 80m Fracture Zone Identified by Stuart-Smith (2023)

40 - 60m Fracture Zone Identified by Stuart-Smith (2023)

TA-DC2498

RL800m
RL750m
RL700m
RL650m
RL600m
RL550m
RL500m
RL450m
RL400m
RL350m
RL300m

Isolated Discrete Structure

6.82

0.2

HEADRACE TUNNEL

Dip Shallows to < 5°

LEGEND

- Topography
- Inferred Faults (PGSS)
- Fracture Zone (PGSS)
- Interpreted Baseline Water Table

Borehole Legend - Hydrogeology Rock Mass Units

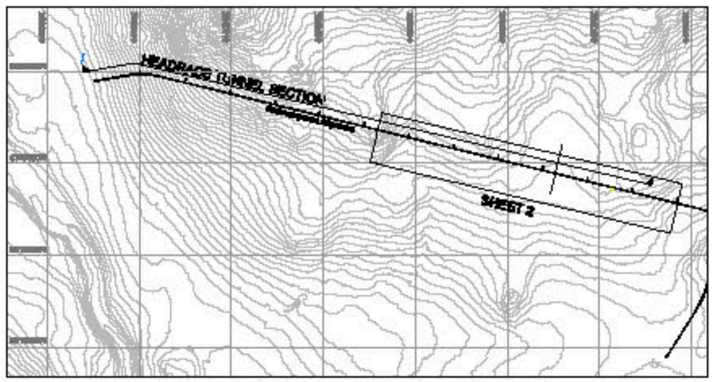
- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B3 - Porous Basalt
- H-B5 - Near Surface Basalt
- H-IS1 - Tertiary Sediments
- H-D1 - Blocky Dolerite
- H-D3 - Outer Structure Zone
- H-D4 - Fractured Zone Dolerite
- H-D5 - Sheared Zone Dolerite
- H-D6 - Near Surface Dolerite
- H-TS - Triassic Sandstone

Packer Tests

1.31 — Borehole Depth from (m) / Lugeon / Depth to (m)

Lithology

- H-SCol - Soil Colluvium
- H-B1 - Blocky Basalt
- H-B5 - Near Surface Basalt
- H-B3 - Porous Basalt
- H-IS1 - Tertiary Sediments
- H-D - Jurassic Dolerite
- H-D3 - Disturbed Dolerite
- H-TS - Triassic Sandstone

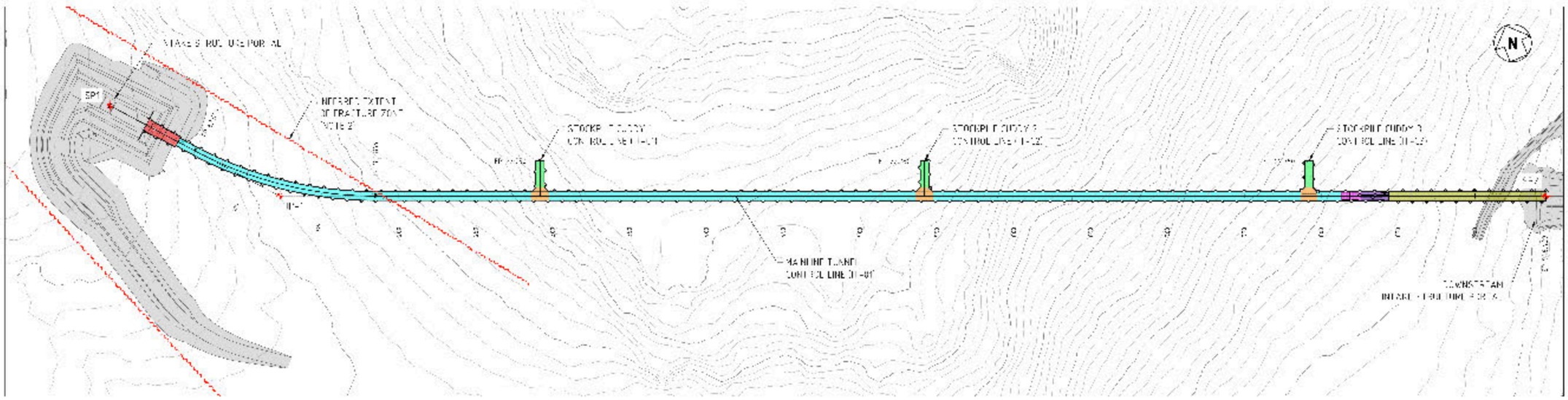


0 50 100 150 200
Scale (m)

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Tarraleah Redevelopment Project
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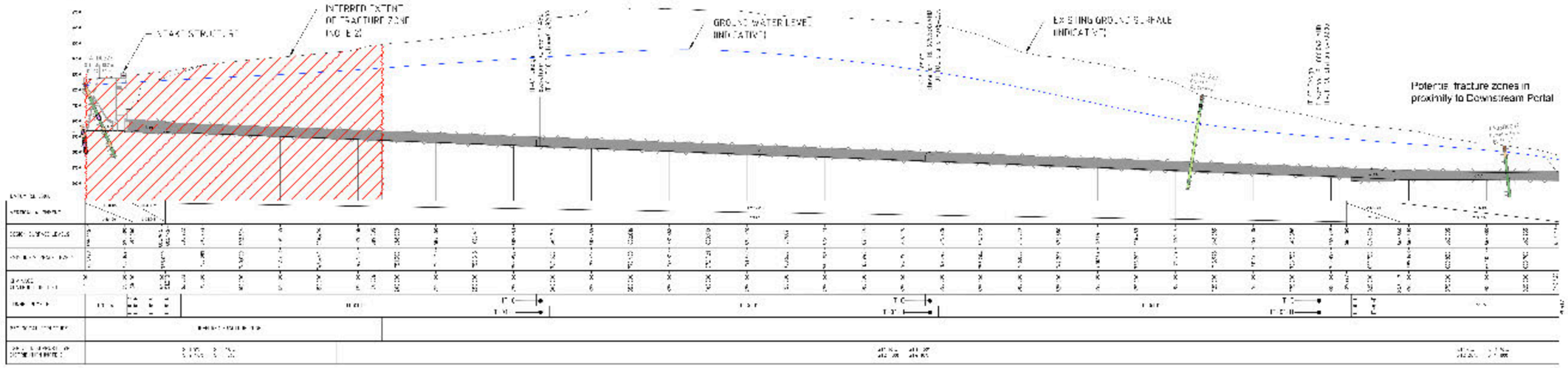
CONCEPTUAL ROCK MASS AND STRUCTURAL HYDROGEOLOGY - HEADRACE TUNNEL - S2

PSM4346-115R | Figure 17



PLAN

Tunnel ground conditions interpreted to be predominantly D1 and D2 rock mass with localised rock mass reduction associated with fracture zones, faults and shears aligned with regional joint orientations.



LONG SECTION

NOTES:
Fracture zone may indicate increased occurrence of fault affected ground conditions

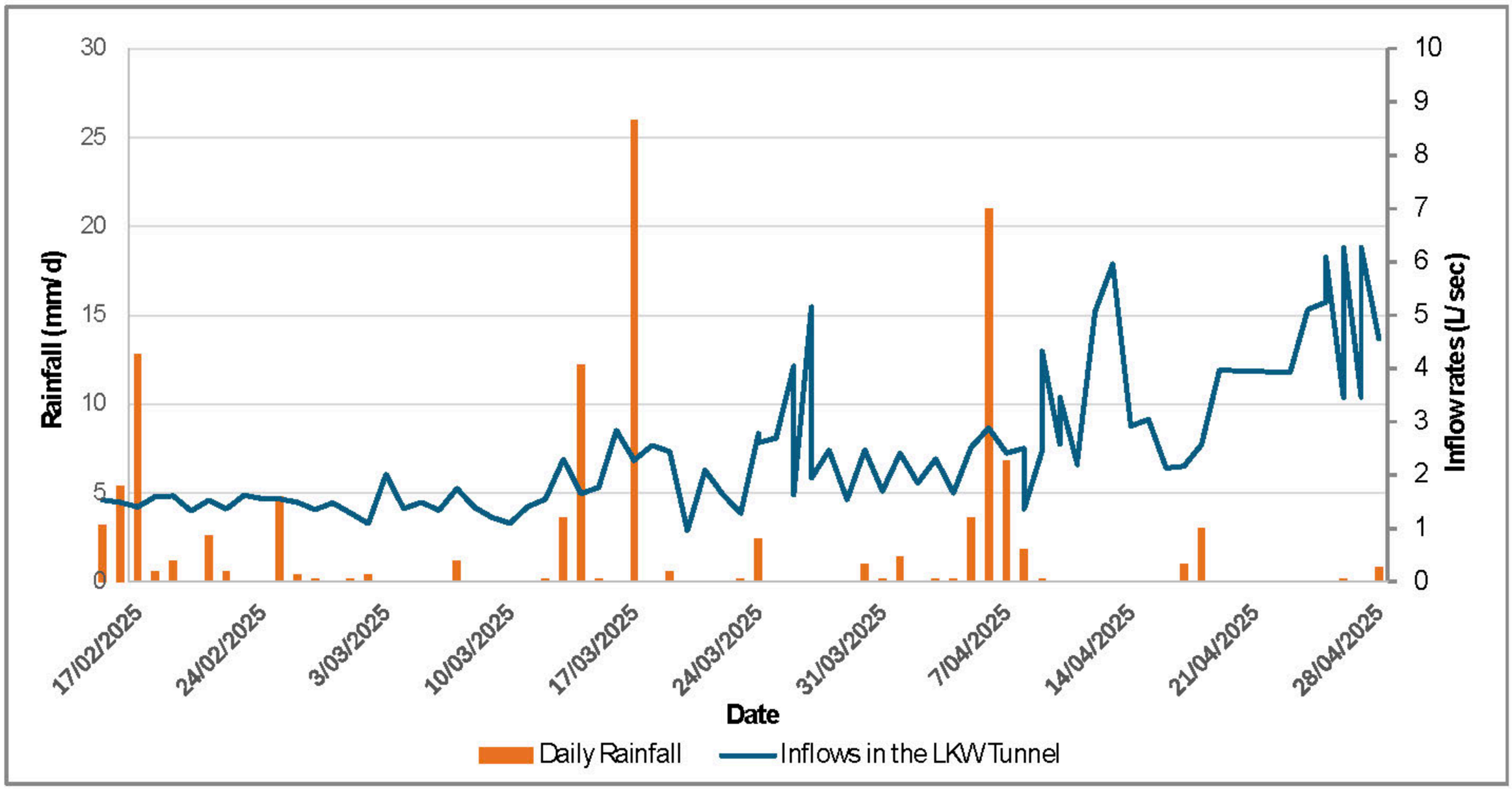
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 09 May 2025	Page Size: A3	PSM4346-115R	Figure 18

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

LAKE KING WILLIAM TUNNEL
PLAN AND LONG SECTION

C:\Work\PSM4346\003_Figures\PSM4346-115R Rev2\Figure 18 Lake King William Tunnel Plan and Long Section.mxd



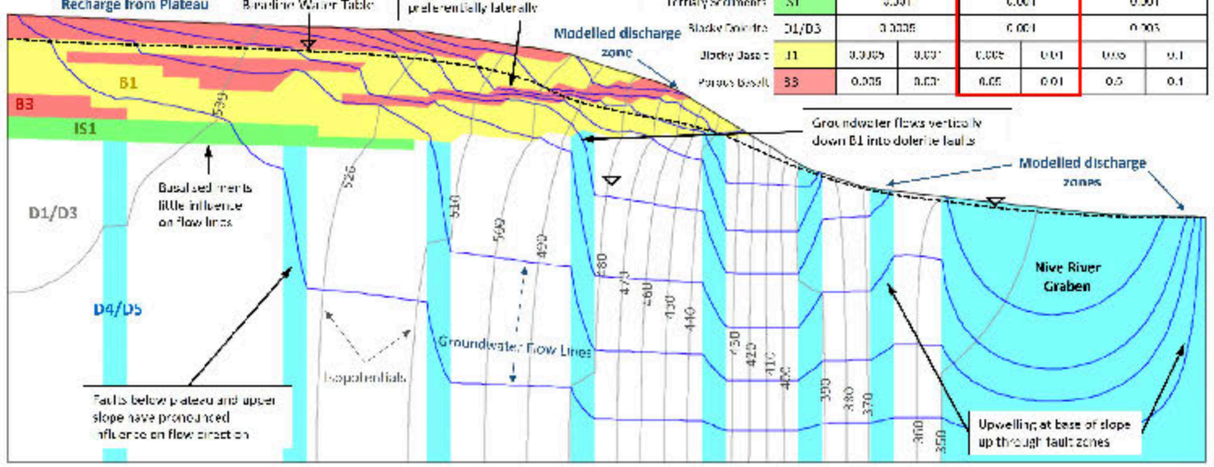
C:\Acad\PSM\4346\03_Figures\PSM4346-115R Rev 2\Figure 19 Rainfall and Inflows at Lake King William Tunnel.dwg

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report RAINFALL AND INFLOWS TO LAKE KING WILLIAM TUNNEL
	Date: 09 May 2025	Page Size: A3	PSM4346-115R | Figure 19

(a)

Power Tunnel Section: BaseCase Flow Net interpretation geometry

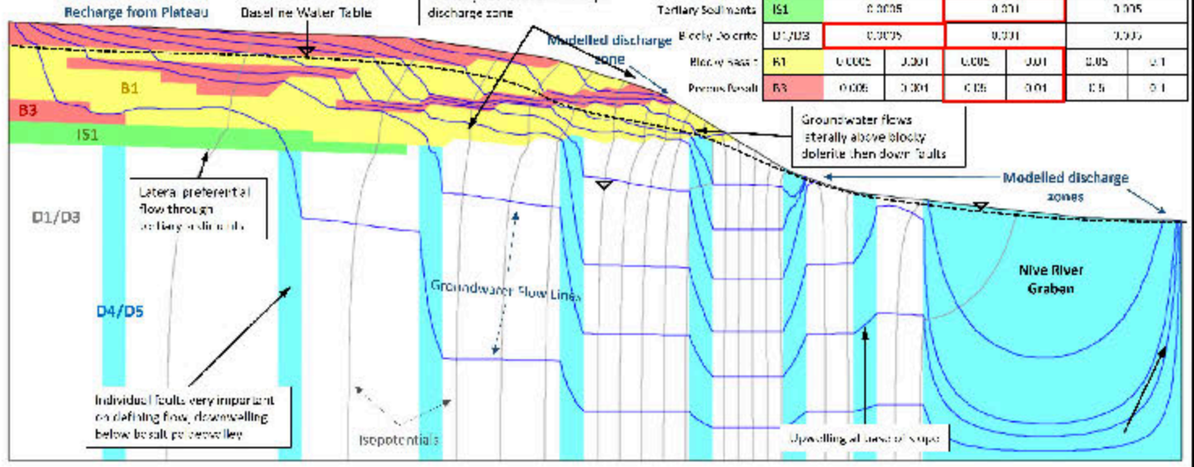
Palaeovalley aquifer cuts top part of Tarraleah Hillside
Non-continuous sediments at base of palaeovalley
Dolerite below with vertical faulting



HRMU		Lower Bound		Base Case		Upper Bound	
		Kx=Ky	Kz	Kx=Ky	Kz	Kx=Ky	Kz
Dolerite fault zone	D4/D5	0.015		0.05		0.01	
Tertiary Sediments	IS1	0.001		0.001		0.001	
Blocky Dolerite	D1/D3	0.0005		0.001		0.005	
Blocky Basalt	B1	0.0005	0.001	0.005	0.01	0.05	0.1
Porous basalt	B3	0.005	0.01	0.05	0.01	0.5	0.1

(c)

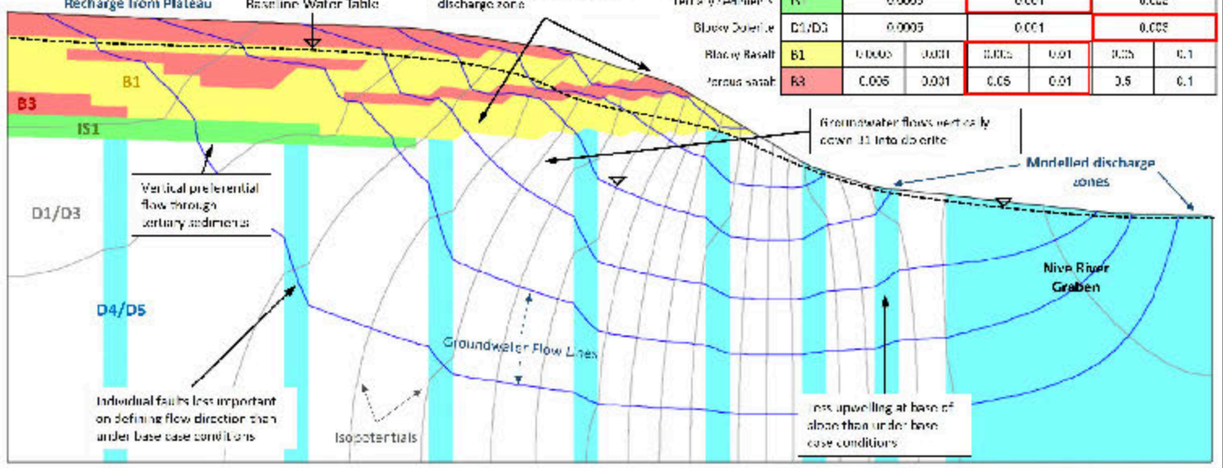
Power Tunnel Section: Scenario 2
- Upper Bound Dolerite Fault Zones
- Lower Bound Blocky Dolerite



HRMU		Lower Bound		Base Case		Upper Bound	
		Kx=Ky	Kz	Kx=Ky	Kz	Kx=Ky	Kz
Dolerite fault zone	D4/D5	0.015		0.05		0.01	
Tertiary Sediments	IS1	0.0005		0.001		0.005	
Blocky Dolerite	D1/D3	0.0005		0.001		0.005	
Blocky Basalt	B1	0.0005	0.001	0.005	0.01	0.05	0.1
Porous basalt	B3	0.005	0.01	0.05	0.01	0.5	0.1

(b)

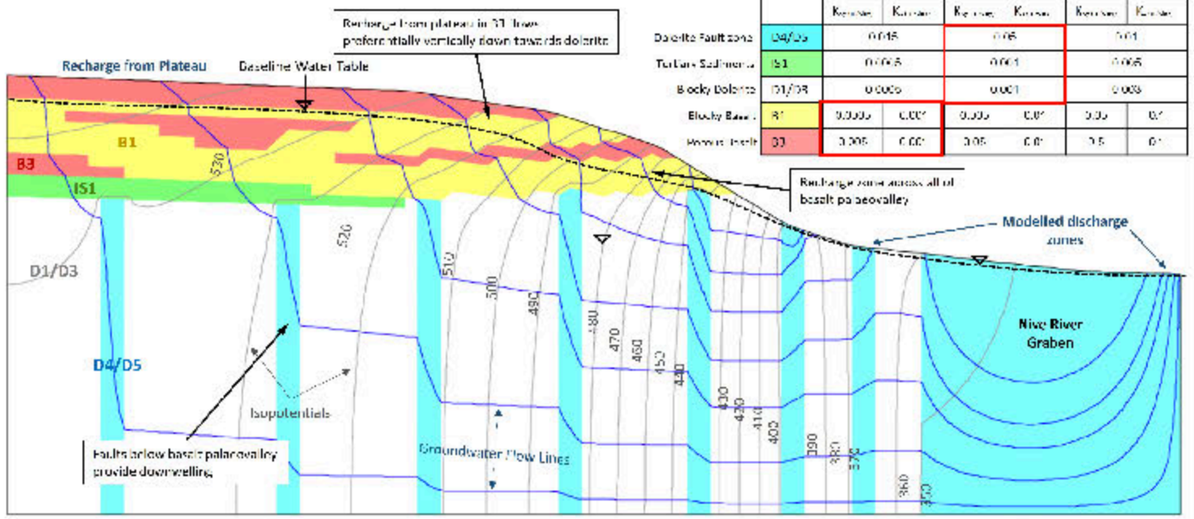
Power Tunnel Section: Scenario 1
- Lower Bound Dolerite Fault Zones
- Upper Bound Blocky Dolerite



HRMU		Lower Bound		Base Case		Upper Bound	
		Kx=Ky	Kz	Kx=Ky	Kz	Kx=Ky	Kz
Dolerite fault zone	D4/D5	0.015		0.05		0.01	
Tertiary Sediments	IS1	0.0005		0.001		0.005	
Blocky Dolerite	D1/D3	0.0005		0.001		0.005	
Blocky Basalt	B1	0.0005	0.001	0.005	0.01	0.05	0.1
Porous basalt	B3	0.005	0.01	0.05	0.01	0.5	0.1

(d)

Power Tunnel Section: Scenario 3
- Lower Bound Basalt Palaeovalley



HRMU		Lower Bound		Base Case		Upper Bound	
		Kx=Ky	Kz	Kx=Ky	Kz	Kx=Ky	Kz
Dolerite fault zone	D4/D5	0.015		0.05		0.01	
Tertiary Sediments	IS1	0.0005		0.001		0.005	
Blocky Dolerite	D1/D3	0.0005		0.001		0.005	
Blocky Basalt	B1	0.0005	0.001	0.005	0.01	0.05	0.1
Porous basalt	B3	0.005	0.01	0.05	0.01	0.5	0.1

Notes:
The 4 schematic sections shown in this figure have been generated to conceptualise different flow scenarios within the Tarraleah Hillside.
Geometries and differentiation of the HRMUs have been simplifed to satasfy the imput parameters of the flow net model.
Potential ranges of grouped HRMU hydraulics are presented for each scenario with attributed hydraulics highlighted in red, the hydraulics are adjusted to produce flow scenarios 1 - 3.
Isopotentials and flow lines are constrained by the local extent of the model.
Upwelling at the base off slope appears to be controlled by the relative difference in hydraulics of the dolerite faults and country rock.
High permeability faults and low permeability country will generate greater upwelling potential.

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SCHEMATIC SECTIONS
FLOW NETS - TARRALEAH HILLSIDE

PSM4346-115R | Figure 20

C:\Arcl\SPSM\4346\R03_Figures\PSM4346-115R Rev 2\Figure 20 Schematic Sections Flow Nets - Tarraleah Hillside.mxd

(a) **Palaeovalley Section: BaseCase Flow Net**

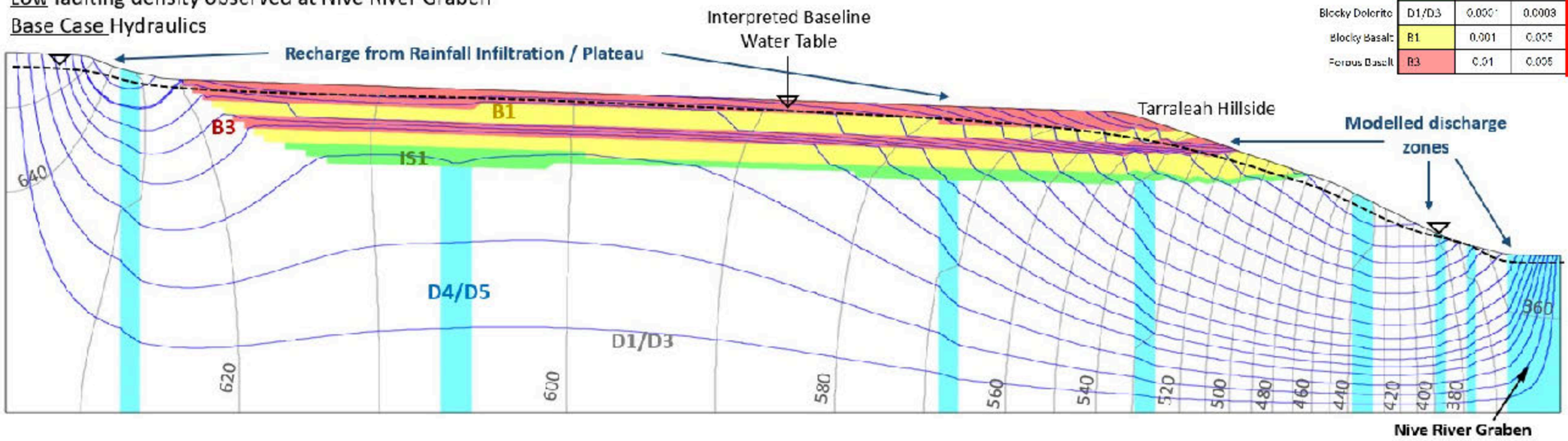
Layered palaeovalley aquifer with porous and blocky flows (continuous to hillside)

Sediments at base of palaeovalley, thin towards valley (continuous to hillside)

Low faulting density observed at Nive River Graben

Base Case Hydraulics

	HRMU	Lower Bound		Base Case		Upper Bound	
		$K_{horizontal}$	$K_{vertical}$	$K_{horizontal}$	$K_{vertical}$	$K_{horizontal}$	$K_{vertical}$
Dolerite Fault zone	D4/D5	0.005		0.05		0.1	
Tertiary Sediments	IS1	0.001		0.01		0.03	
Blocky Dolerite	D1/D3	0.0001	0.0003	0.004	0.02	0.01	0.05
Blocky Basalt	B1	0.001	0.005	0.003	0.015	0.01	0.03
Porous Basalt	B3	0.01	0.005	0.1	0.02	0.5	0.05



(b) **Palaeovalley Section: Lower Bound Flow Net**

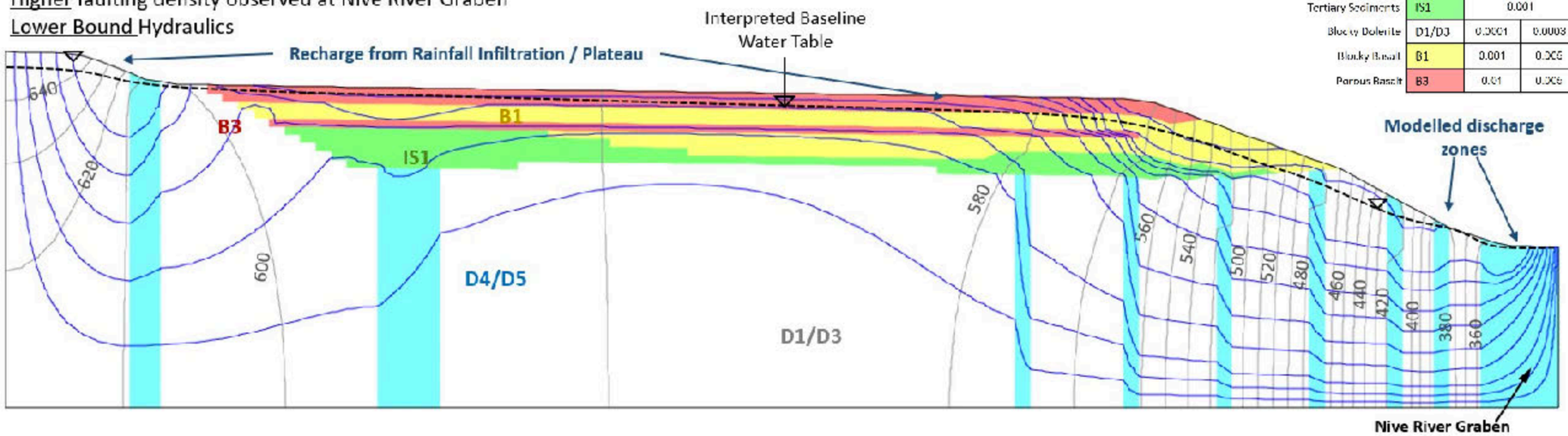
Layered palaeovalley aquifer with porous and blocky flows (non-continuous to hillside)

Sediments at base of palaeovalley, thin towards valley (non-continuous to hillside)

Higher faulting density observed at Nive River Graben

Lower Bound Hydraulics

	HRMU	Lower Bound		Base Case		Upper Bound	
		$K_{horizontal}$	$K_{vertical}$	$K_{horizontal}$	$K_{vertical}$	$K_{horizontal}$	$K_{vertical}$
Dolerite Fault zone	D4/D5	0.005		0.05		0.1	
Tertiary Sediments	IS1	0.001		0.01		0.03	
Blocky Dolerite	D1/D3	0.0001	0.0003	0.004	0.02	0.01	0.05
Blocky Basalt	B1	0.001	0.005	0.003	0.015	0.01	0.03
Porous Basalt	B3	0.01	0.005	0.1	0.02	0.5	0.05



Notes:
- The schematic sections shown in this figure have been generated to conceptualise different flow scenarios within the Palaeovalley Aquifer.
- Geometries and differentiation of the HRMUs have been simplifed to satasfy the imput parameters of the model.
- Isopotentials and flow lines are constrained by the local extent of the model.
- The section location is alinged with the power tunnel, from the surge shaft near No. 2 Pond to the outlet at the Power Station.
- Base Case and Lower Bound flow net have the same hydraulics but different HRMU geometries to assess the effects of faulting below the palaeovalley.
- Outcrop of permeable B3 (red) on the hillside generates hillside discharge, if B3 horizons are non-continuous then flows move preferentially vertically.
- Changing Tertiary Sediment thicknesses do not appear to significantly influence the groundwater flow pathways.
- Higher faulting density at the Nive River Graben enhances vertical groundwater movement through downwelling bellow the palaeovalley.

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Revision: 2

Date: 09 May 2025

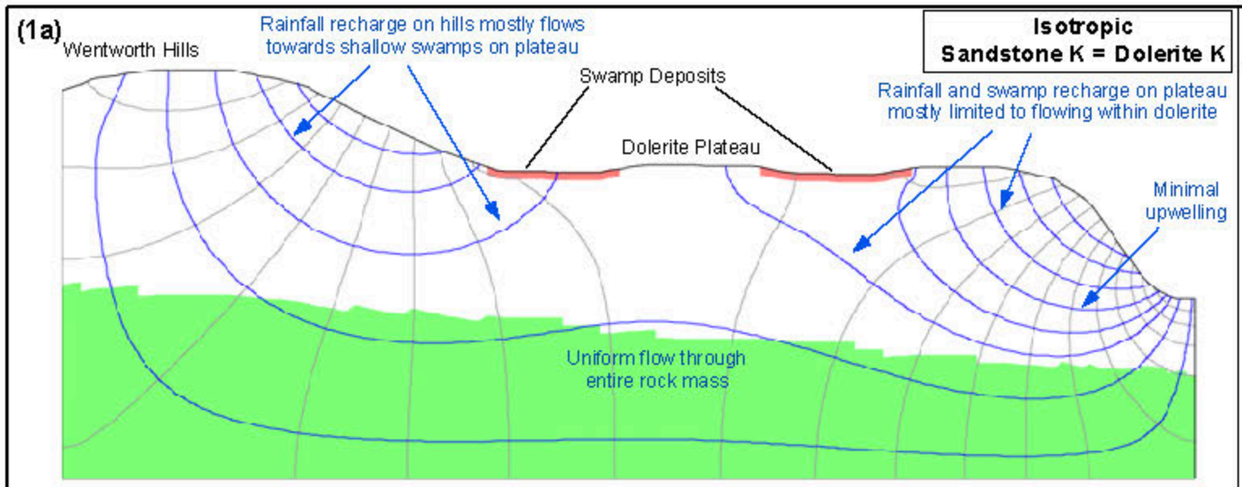
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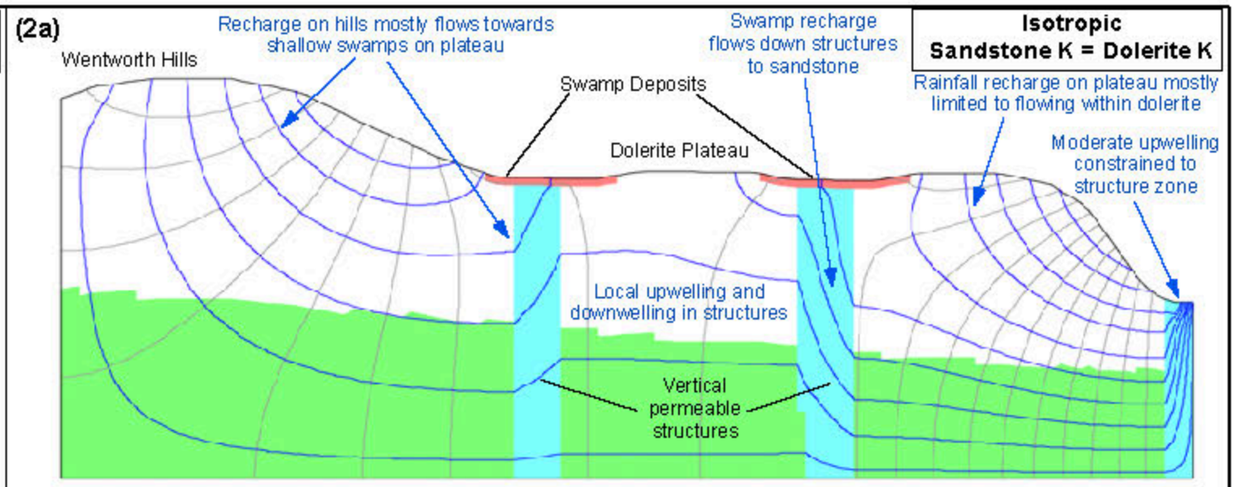
Hydro Tasmania
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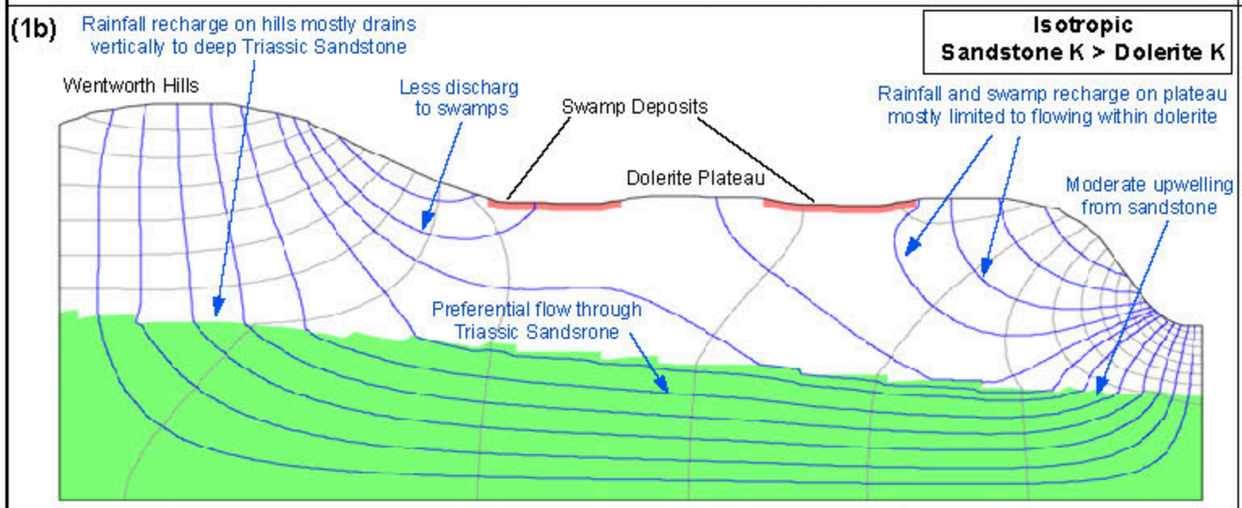
SCHEMATIC SECTIONS
FLOW NETS - PALAEOVALLEY

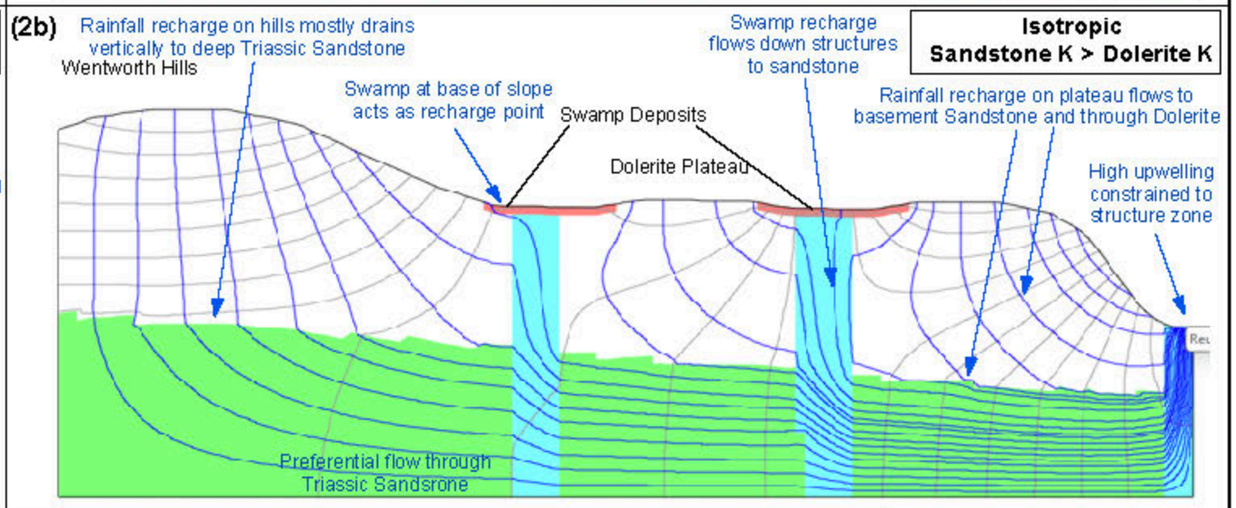
PSM4346-115R

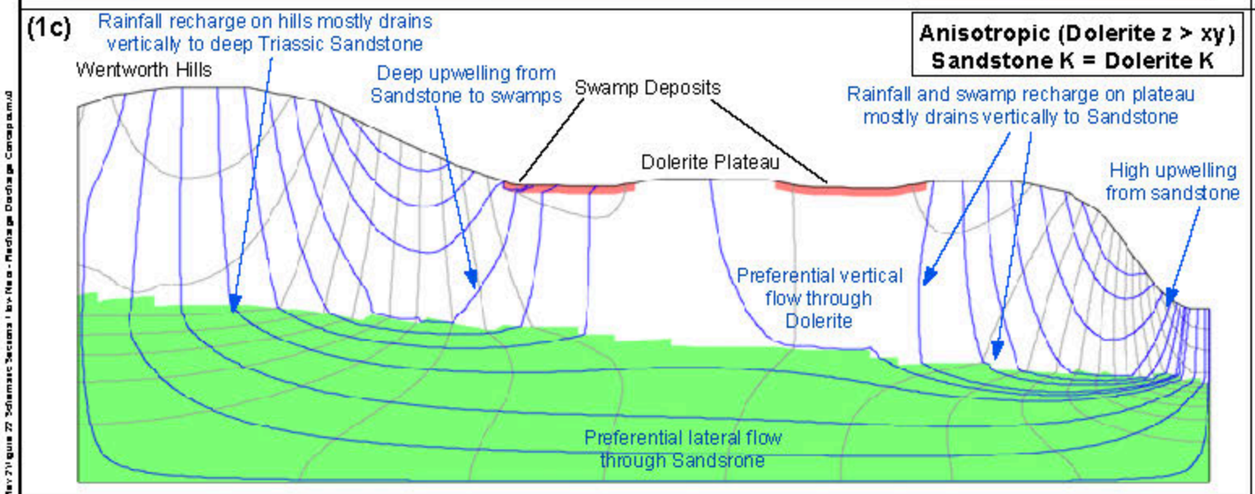
Figure 21

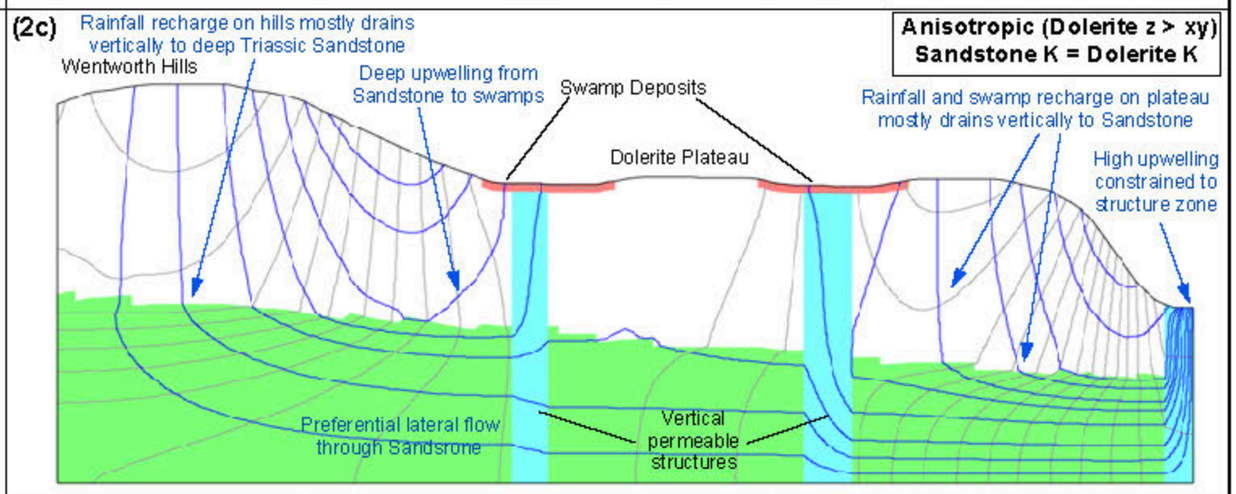












Notes:
The 6 schematic sections shown in this figure have been generated to conceptualise recharge and discharge across the groundwater model.
Geometries and topography are of a typical type section of the model, with the Wentworth Hills in the NE and River Derwent in the SW.
Isopotentials and flow lines are constrained by the local extent of the model.
Geometry 1 does not consider the presence of structure zones, geometry 2 has structure zones below swamp deposits and the river valley.
Thin red horizons on the dolerite plateau represent low permeability swamp deposits.
Scenarios a - c represent 3 likely scenarios for general rock mass hydraulics within the model.

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Hydro Tasmania
Tarraleah Revelopment Project
Hydrogeological Interpretative Report
SCHEMATIC SECTIONS
FLOW NETS
RECHARGE DISCHARGE CONCEPTS

PSM4346-115R | Figure 22

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R\Rev 2\Figure 22 Schematic Sections Flow Nets - Recharge Discharge Concepts.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

TA-DC247

TA-DC207

Dolerite ; pH (11);
SO_4 (5.6 mg/L); Al (720 µg/L)

TA-DC241

TA-DC242

Dolerite; TDS (186 mg/L); EC (339 µScm);
SO_4 (6.5 mg/L); P (0.073 mg P/L)

INSET - Lake King William Outlet

Scale 1:20,000
0 125 250 500 750 m

INSET - Tarraleah Hillside

TA-DC214 TA-DC215 TA-DC218

Dolerite ; NO_3 (1.59 mg N/L)

TA-DC238
TA-DC243
TA-DC237
TA-DC234
TA-DC235

Dolerite ; NO_3 (1.64 mg N/L)

Dolerite; TDS (190 mg/L);
EC (295 µScm); SO_4 (5.4 mg/L);
NO_3 (0.08 mg N/L)

PW20d_S
PW20d_D

PW20(D) Dolerite; TSS (4130 mg/L);
P (1.8 mg P/L)

Scale 1:7,500
0 50 100 200 300 m

TA-DC218
TA-DC214 TA-DC215
TA-DC234
TA-DC235
PW20d_D PW20d_S

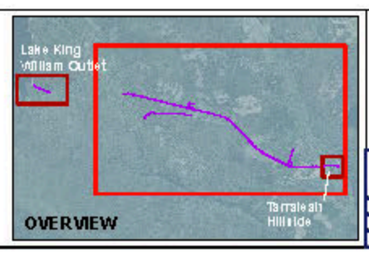
SEE INSET Tarraleah Hillside

Legend

Ground Water Quality Class
- Outlier
- Typical
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel

Interpreted Faults (PGSS)
- Concealed
- Inferred
- Defined
- Sphagnum Peatland TEC

NOTE:
Outliers are defined as analyte concentrations that significantly deviate from the typical qualities across groundwater samples. These outliers are not necessarily indicative of concern.



N
Scale 1:33,000
0 0.3 0.6 1.2 1.8 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 14 May 2025	Page Size: A3	GROUNDWATER QUALITY OUTLIERS
			PSM4346-115R | Figure 23(a)

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R\Rev2\Figure 23(a) Groundwater Quality Outliers.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

156.3

Dolerite; Fe (570 µg/L)

SW-P5

SW-P1

SW-P6

SW-P4

INSET - Tarraleah Hillside

SW-P7

Dolerite; TDS (124 mg/L); SO_4 (1.8 mg/L); NO_3 (1.05 mg N/L);Cr (2 µg N/L)

S_SP2

SW-P8

SO_4 (1.6 mg/L); NO_3 (1.1 mg N/L);Cr (3 µg N/L)

Scale 1:7,500
0 50 100 200 300 m

SW-P7

S_SP2 SW-P8

SEE INSET Tarraleah Hillside

Scale 1:20,000
0 125 250 500 750 m

128.4

INSET - Lake King William Outlet

444000 446000 448000 450000 452000 454000

Legend

Surface Water Quality Class
- Outlier
- Typical
- Tarraleah Redevelopment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel

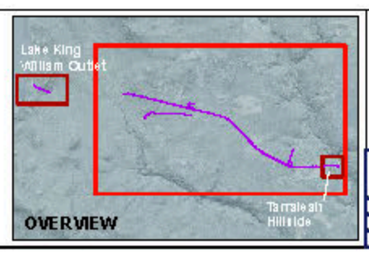
Interpreted Faults (PGSS)
- Concealed
- Inferred
- Defined

Sphagnum Peatland TEC

Lake

NOTE:

· Outliers are defined as analyte concentrations that significantly deviate from the typical qualities across surface water samples.These outliers are not necessarily indicative of concern.



N

Scale 1:33,000
0 0.3 0.6 1.2 1.8 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SURFACE WATER QUALITY OUTLIERS

PSM4346-115R | Figure 23(b)

C:\ArcGIS\PSM\4346\03_Figures\PSM4346-115R_Rev2\Figure 23(b) Surface Water Quality Outliers.mxd

447000 448000 449000 450000 451000 452000

5319000

5318000

5317000

Typical release of 9 m^3/sec to surface water environment

Mossy Marsh

Mossy Marsh Pond

Nick Pond

447000 448000 449000 450000 451000 452000

Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Perennial Wetlands
- Perennial Ponds and Storages
- Groundwater Discharge Zones
- Perennial Wetlands
- Perennial Watercourses
- Groundwater Discharge Zones

Bedrock Geology
- Basalt
- Dolerite

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Fracture Zones - Outcrops and Subcrops
- Fracture Zones - Beneath Tertiary Palaeochannel

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Horne's Creek Canal

OVERVIEW

Queenstown Campbell town Bothwell HOBART

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 09 May 2025	Page Size: A3	GEOLOGY AND STRUCTURE IN MOSSY MARSH TEC SETTING	
		PSM4346-115R	Figure 24(a)

C:\Projects\PSM4346\GIS\Figures\PSM4346-115R\Rev2\Figure 24(a) Geology and Structure in Mossy Marsh TEC Setting.mxd

444000 445000 446000 447000 448000 449000

5322000 5321000 5319000

Wentworth Hills

Northern TEC

Typical release of 9 m^3/sec to surface water environment

Home's Dam

Mossy Marsh

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Perennial Wetlands
- Perennial Ponds and Storages
- Groundwater Discharge Zones
- Perennial Wetlands
- Perennial Watercourses
- Groundwater Discharge Zones

Bedrock Geology
- Basalt
- Dolerite

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Interpreted Joints
- Fracture Zones - Outcrops and Subcrops
- Fracture Zones - Beneath Tertiary Palaeochannel

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Home's Creek Canal
- Concrete-Lined Canals

OVERVIEW

Queenstown, Campbell town, Bothwell, HOBART

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

GEOLOGY AND STRUCTURE IN NORTHERN TEC SETTING

PSM4346-115R | Figure 24(b)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 24(b) Geology and Structure in Northern TEC Setting.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

TA-DC247
TA-DC249B
TA-MB301
TA-DC250
TA-MB312
TA-DC252
TA-DC252
TA-DC208
TA-DC241
TA-DC263
TA-MB311
TA06DC013
TA-MB308
TA-DC276
TA-DC242

Legend

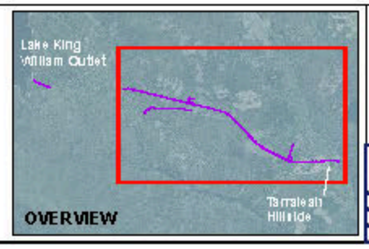
Tarraleah Redevelopment Alignment

Monitoring Bores

- Standpipe Monitoring Bore
- Vibrating Wire Piezometer
- Standpipe and VWP

Interpreted Faults (PGSS)

- Concealed
- Inferred
- Defined



N

Scale 1:30,000

0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 09 May 2025	Page Size: A3	PROJECT MONITORING BORES
			PSM4346-115R | Figure 25

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Typical release of 9 m^3/sec to surface water environment

2.1 (4/11/2024)

5 (4/11/2024)

4.3 (27/05/2024)

1.1 (1/10/2024)

1.7 (20/03/2024)

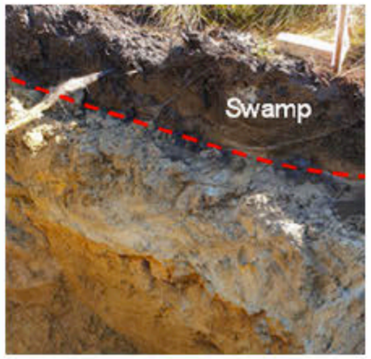
1.3 (25/06/2024)

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

Headrace Tunnel – Surface Water to Groundwater Interactions – Mossy Marsh TEC - Basalt Palaeovalley over Dolerite Terrain.



Inset 3: Test pit – peat profile



Photo 1: Core from TA-DC246, palaeo-sols (H-B3 HRMU)



Photo 2: Core from TA-DC262, porous basalt (H-B3 HRMU)



Photo 3: Core from TA06DC016, sheared dolerite (H-D5 HRMU)

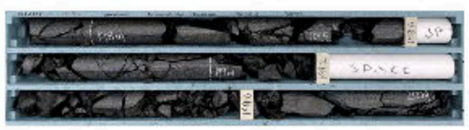


Photo 4: Core from TA-MB308, fractured dolerite (H-D4 HRMU)

447000 448000 449000 450000 451000 452000

5319000 5318000 5317000

Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

- Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Horne's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones
- Basalt over Dolerite Terrain Surface Water to Groundwater Interaction Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
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FRACTURED ROCK AQUIFER PROFILES IN BASALT/DOLERITE TERRAINS AT MOSSY MARSH TEC

PSM4346-115R | Figure 26

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R_Fig 21_Fractured Rock Aquifer Profiles in Basalt-Dolerite Terrains at Mossy Marsh.mxd

447000 448000 449000 450000 451000 452000

5319000 5318000 5317000

Typical release of 9 m^3/sec to surface water environment

2.1 (4/11/2024)

5 (4/11/2024)

4.3 (27/05/2024)

0.4 (1/10/2024)

1.7 (20/03/2024)

1.3 (25/06/2024)

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

Headrace Tunnel – Surface Water to Groundwater Interactions – Mossy Marsh TEC

1. Dolerite Terrain.



Photo 5:Core from TA-DC267, near surface dolerite (H-D2 HRMU)



Photo 6:Core from TA06DC016, sheared dolerite (H-D5 HRMU)

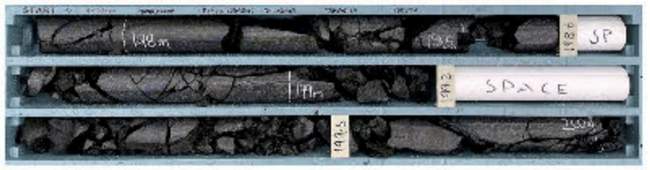


Photo 7:Core from TA-MB308, fractured dolerite (H-D4 HRMU)

Legend

Surface Water
- Mossy Marsh Sphagnum Peatland
- Wetland
- Lake
- Streams

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

- Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Home's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones
- Basalt over Dolerite Terrain Surface Water to Groundwater Interaction Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Date. 09 May 2025	Page Size. A3	FRACTURED ROCK AQUIFER PROFILES IN DOLERITE TERRAIN AT MOSSY MARSH TEC
		PSM4346-115R | Figure 27

C:\Kod\15\PSM4346\23_Figures\PSM4346-115R Rev 2\Figure 27 Fractured Rock Aquifer Profiles in Dolerite Terrain at Mossy Marsh.mxd

444000 445000 446000 447000 448000 449000

5321000 5320000 5319000

Wentworth Hills

90 (1/05/2024)

1.8 (20/03/2024)

1 (1/05/2024)

Mossy Marsh

Typical release of 9 m^3/sec
to surface water environment

Headrace Tunnel – Surface Water to Groundwater Interactions – Northern TEC - Dolerite Terrain.



Photo 8: Core from TA-DC267, near surface dolerite (H-D2 HRMU)

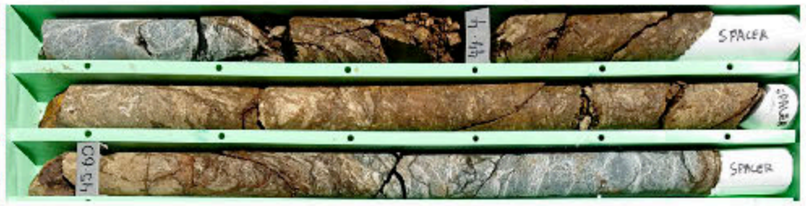


Photo 9: Core from TA06DC016, sheared dolerite (H-D5 HRMU)

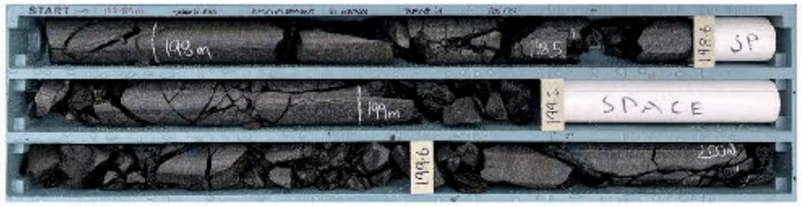


Photo 10: Core from TA-MB308, fractured dolerite (H-D4 HRMU)

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Depth to Baseline Water Table (m)
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Home's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones
- Dolerite Terrain Surface Water to Groundwater Interaction Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

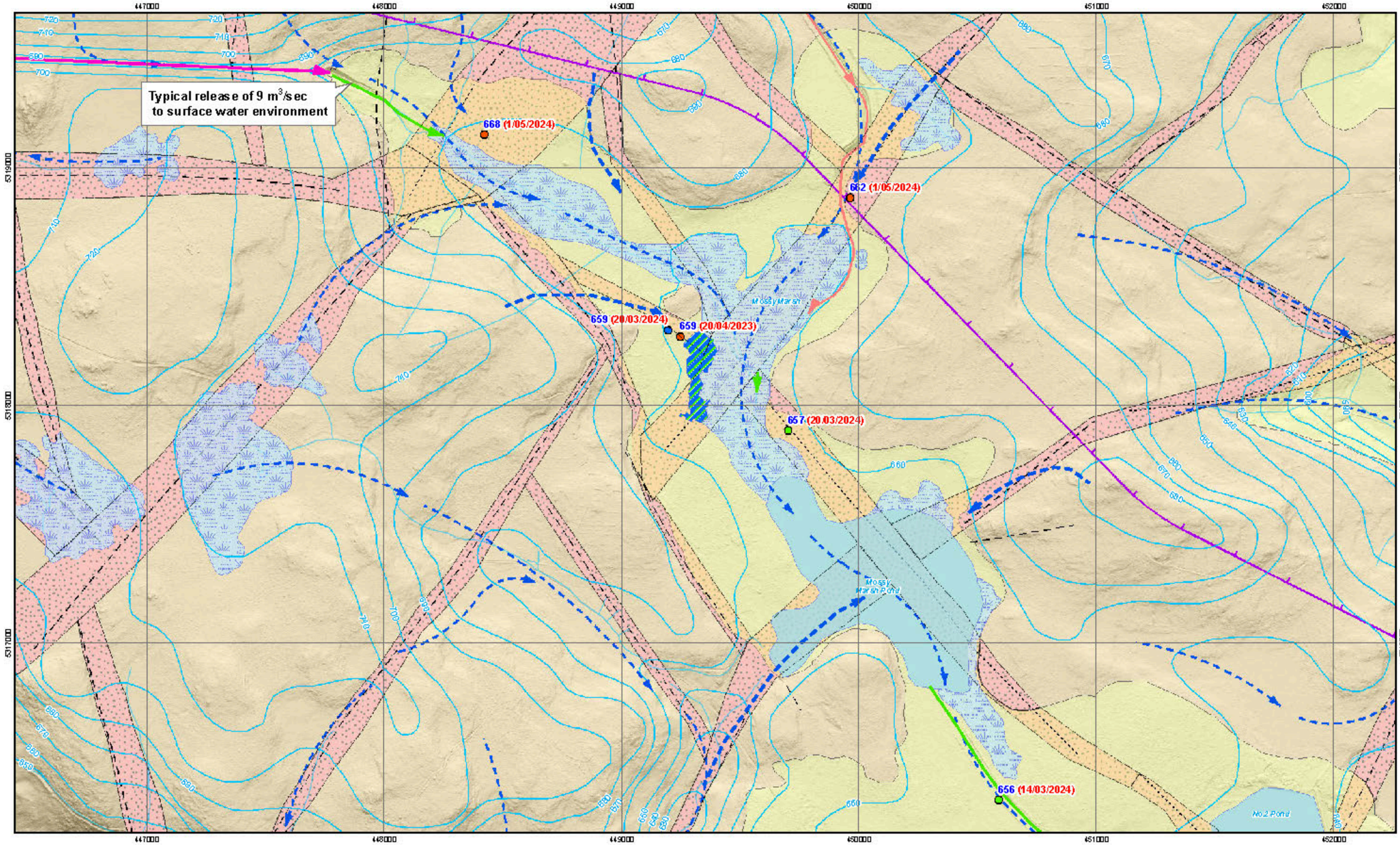
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FRACTURED ROCK AQUIFER PROFILES IN DOLERITE TERRAIN AT NORTHERN TEC

PSM4346-115R | Figure 28

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 28 Interpreted Rock Aquifer Profiles in Dolerite Terrain at the Northern TEC.mxd



Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake

Groundwater Head Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Interpreted Baseline Groundwater Flow Lines
- Interpreted Baseline Groundwater Heads (m AHD)

Tarraleah Infrastructure
- Tarraleah Redevelopment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Home's Creek Canal

Bedrock Geology
- Basalt
- Dolerite

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones - Outcrops and Subcrops
- Fracture Zones - Beneath Tertiary Palaeochannel

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

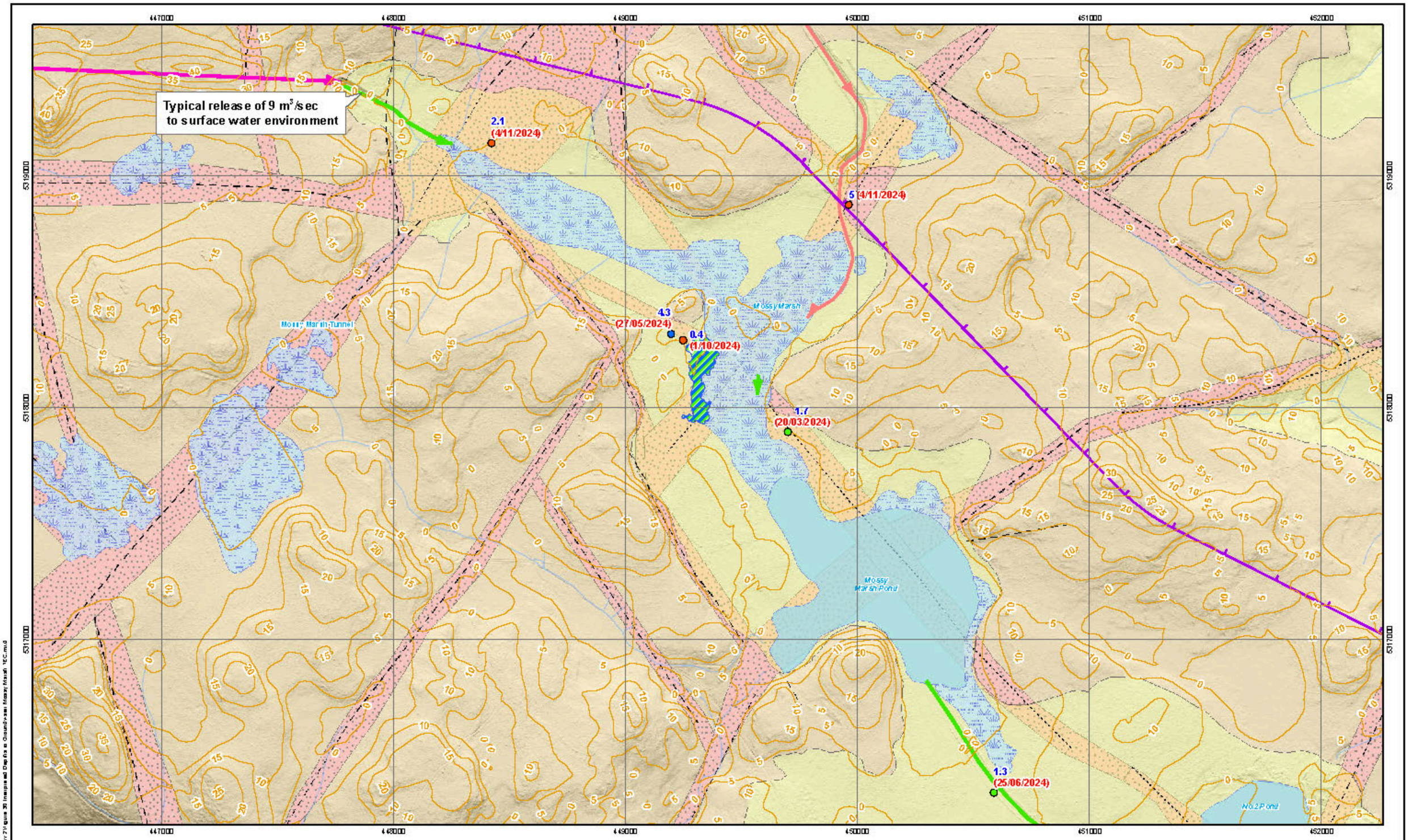
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Date: 09 May 2025	Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INTERPRETED BASELINE GROUNDWATER HEADS MOSSY MARSH TEC

PSM4346-115R | Figure 29

C:\MxdFiles\PSM4346\R2_Figures\PSM4346-115R Rev 2\Figure 29 Interpreted Baseline Groundwater Heads Mossy Marsh TEC.mxd



Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Horne's Creek Canal

Bedrock Geology
- Dolerite
- Triassic Sand
- Basalt

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

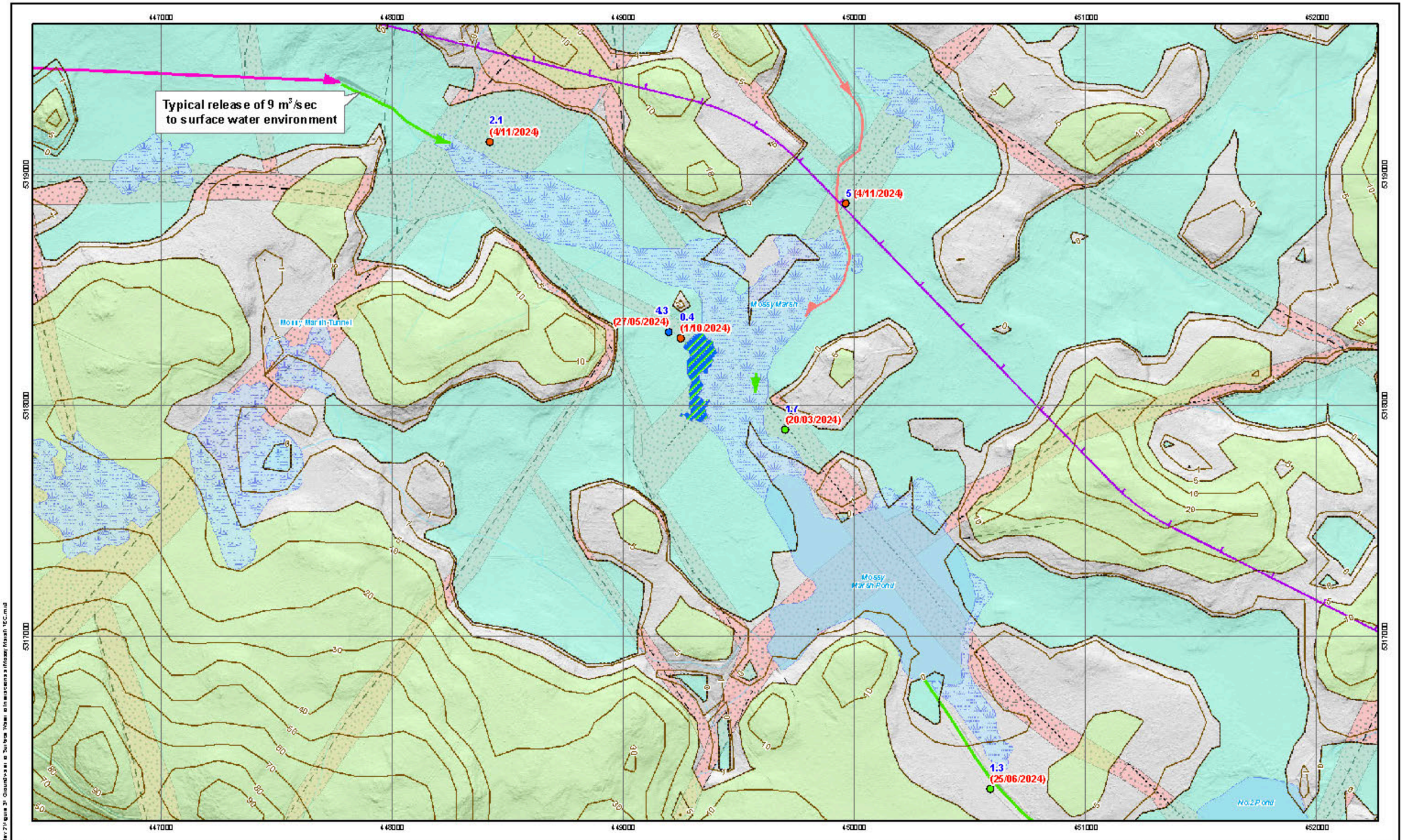
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Date: 09 May 2025		Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INTERPRETED DEPTHS TO GROUNDWATER MOSSY MARSH TEC

PSM4346-115R | Figure 30

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R\Rev 2\Figure 30 Interpreted Depths to Groundwater Mossy Marsh TEC.mxd



Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Depth to Groundwater
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Horne's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones

N

Scale 1:15,000

0 150 300 600 900 m

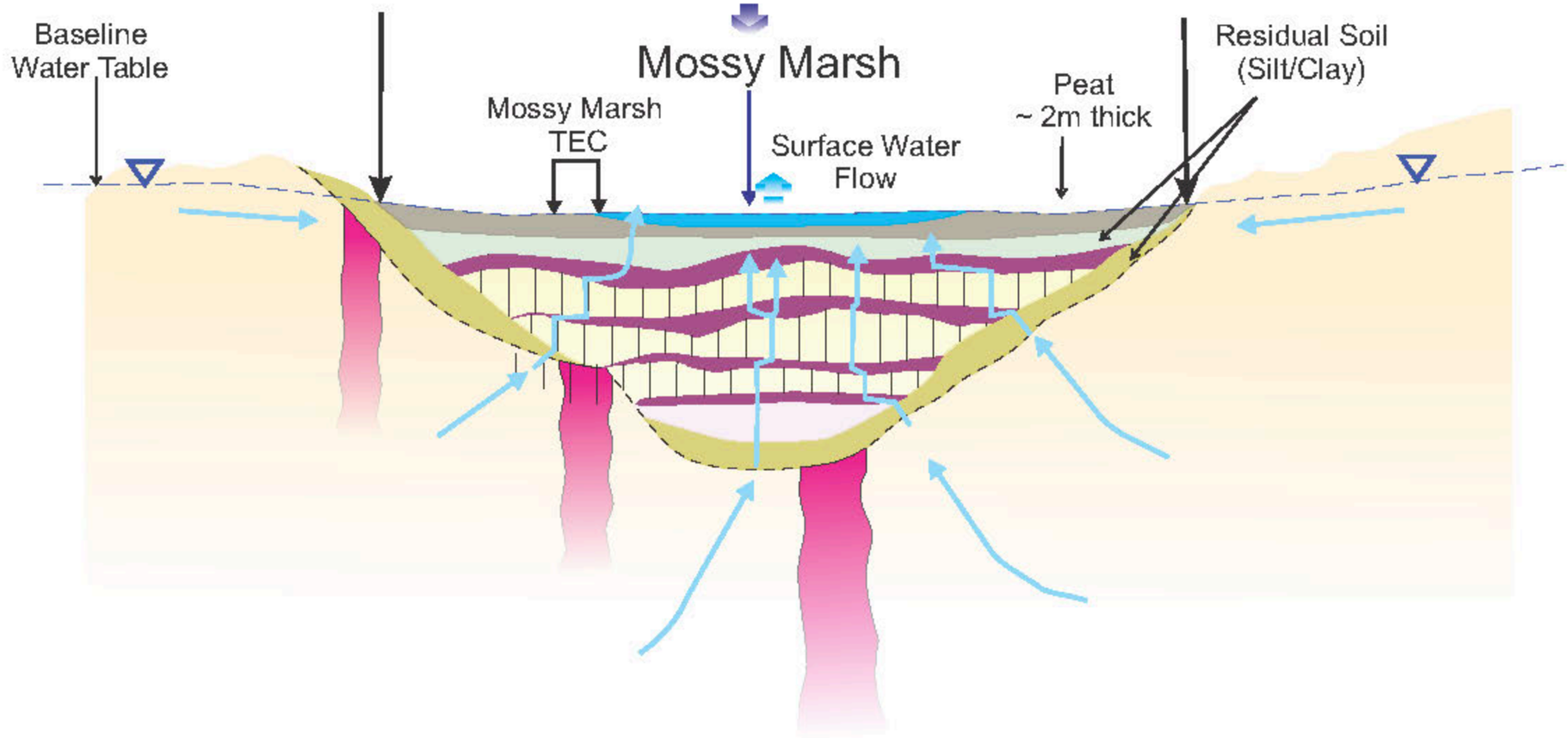
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Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 09 May 2025	Page Size: A3	GROUNDWATER TO SURFACE WATER INTERACTIONS AT MOSSY MARSH TEC	
		PSM4346-115R	Figure 31

C:\Arcgis\PSM4346-115R_Figure 31 Groundwater to Surface Water Interactions at Mossy Marsh TEC.mxd

Artificial Recharge 9 m³/sec
from Mossy Marsh Canal

Groundwater To Surface Water Interactions



Legend

- Baseline Water Table
- Weathering Profile
- Mossy Marsh Pond

Hydrogeological Units

- Dolerite - Country Rocks (H-D1 HRMV)
- Massive and Blocky Basalt (H-B1 HRMV) and vertical columnar joints
- Residual Soil (Silt/Clay)
- Tertiary Sediments (H-IS1 HRMV)
- Peat Beds
- Tertiary Palaeovalley Profile
- Fracture Zones (H-D3, H-D4 and H-D5 HRMV's)
- Groundwater Discharge Fluxes
- Basalt Flow Margin (H-B3 HRMV)
- H-B1 HRMV and Vertical Columnar Joints

Diagram not to scale

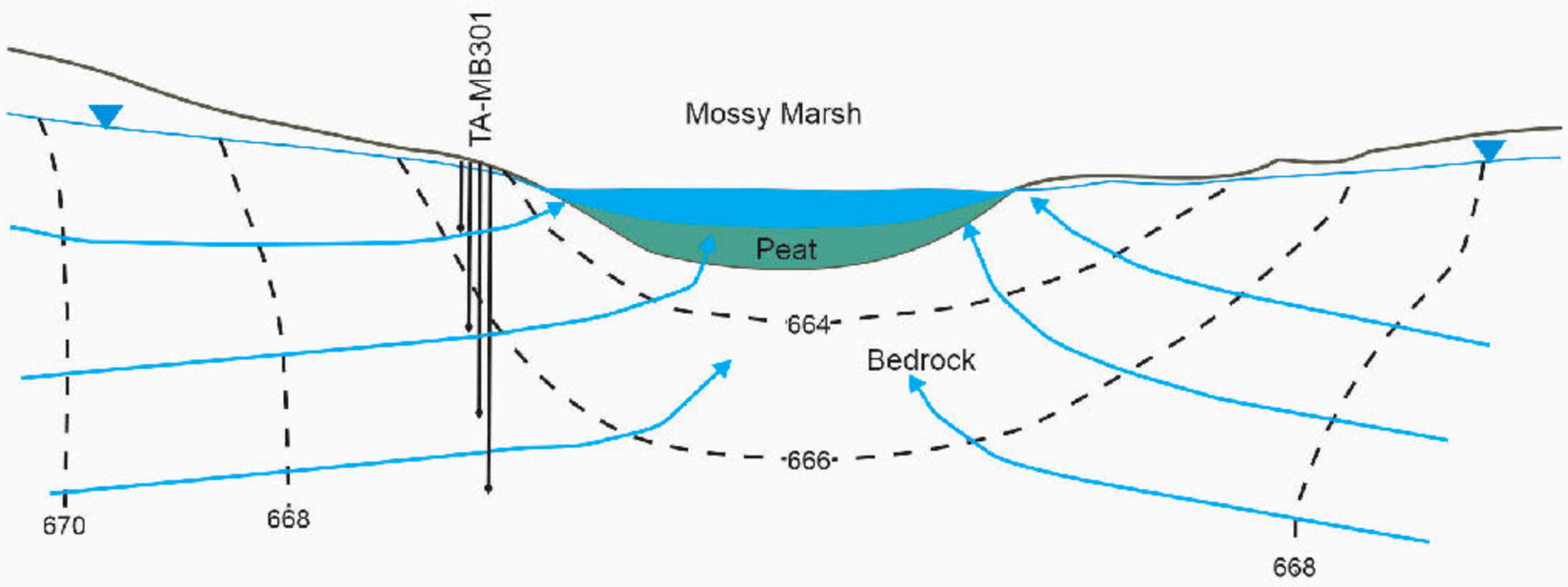
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	Date: 28 Jan 2025	Page Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
RFI Response - Surface Water and Groundwater Impacts
HYDROGEOLOGY SCHEMATIC OF MOSSY MARSH TEC GROUNDWATER TO SURFACE WATER INTERACTIONS

PSM4346-115R | Figure 32

C:\Arc\SIS\PSM4346\003 Figures\PSM4346-115R Rev 2\Figure 32 Hydrogeology Schematic of Mossy Marsh TEC Groundwater to Surface Water Interactions.cdr

Section Schematic



Legend

- Peat
- 664 Isopotentials (m AHD)
- Groundwater Flow Lines
- Water Table

Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report			
FLOW NET SCHEMATIC OF MOSSY MARSH FLOW-THROUGH SYSTEM	Created By: VC	Revision: 2	
	Date: 12 May 2025	Page Size: A3	
PSM4346-115R	Figure 33		

C:\Acad\PSM4346\03_Figures\PSM4346-115R\Rev 2\Figure 33 Flow Net Schematic of Mossy Marsh Flow-Through System.mxd

444000 445000 446000 447000 448000 449000

5321000 5320000 5319000

Wentworth Hills

678
(20/11/2024)

679
(23/07/2024)

667
(4/11/2024)

Typical release of 9 m^3/sec
to surface water environment

Horne's Dam

Mossy Marsh

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Groundwater Head Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Interpreted Baseline Groundwater Flow Lines
- Interpreted Baseline Groundwater Heads (m AHD)

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Horne's Creek Canal

Bedrock Geology
- Basalt
- Dolerite
- Sandstone

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Created By: VC

Revision: 2

Date: 12 May 2025

Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INTERPRETED BASELINE GROUNDWATER HEADS NORTHERN TEC

PSM4346-115R

Figure 34

C:\Work\PSM4346\002_Figures\PSM4346-115R Rev 2\Figure 34 Interpreted Baseline Groundwater Heads Northern TEC.mxd

444000 445000 446000 447000 448000 449000

5321000 5320000 5319000

Wentworth Hills

Horne's Dam

Mossy Marsh

102.1
(20/11/2024)

2 (23/07/2024)

2.1
(4/11/2024)

Release of 9 m³/sec to surface water environment

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Subcatchment

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Horne's Creek Canal

Bedrock Geology
- Dolerite
- Triassic Sand
- Basalt

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Created By: VC

Revision: 2

Date: 12 May 2025

Page Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INTERPRETED DEPTHS TO GROUNDWATER NORTHERN TEC

PSM4346-115R | Figure 35

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 35 Interpreted Depths to Groundwater Northern TEC.mxd

444000 445000 446000 447000 448000 449000

5321000

5320000

5319000

Wentworth Hills

102.1
(20/11/2024)

2 (23/07/2024)

Typical release of 9 m³/sec
to surface water environment

2.1
(4/11/2024)

Home's Dam

Mossy Marsh

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams

Depth to Groundwater
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

Depth to Baseline Water Table (m)

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Home's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones

N

Scale 1:15,000

0 150 300 600 900 m

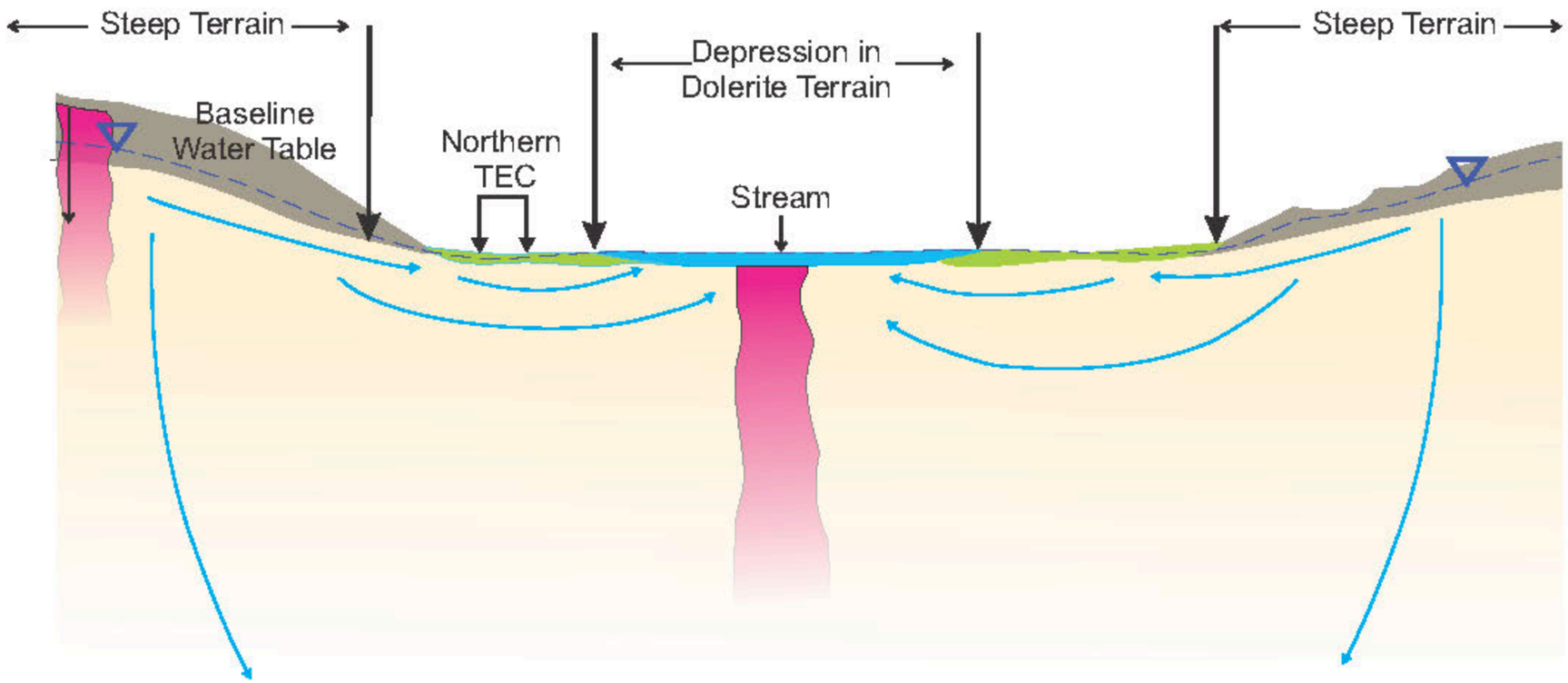
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Grid: GDA2020 MGA Zone 55

Created By. VC	Revision. 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date. 12 May 2025	Page Size. A3	GROUNDWATER TO SURFACE WATER INTERACTIONS AT NORTHERN TEC	
		PSM4346-115R	Figure 36

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R\Rev 2\Figure 36 Groundwater to Surface Water Interactions at Northern TEC.mxd

Water table in this zone is just below the ground surface (0.2m)

Groundwater To Surface Water Connection



Legend

- Baseline Water Table
- Groundwater Discharge Fluxes

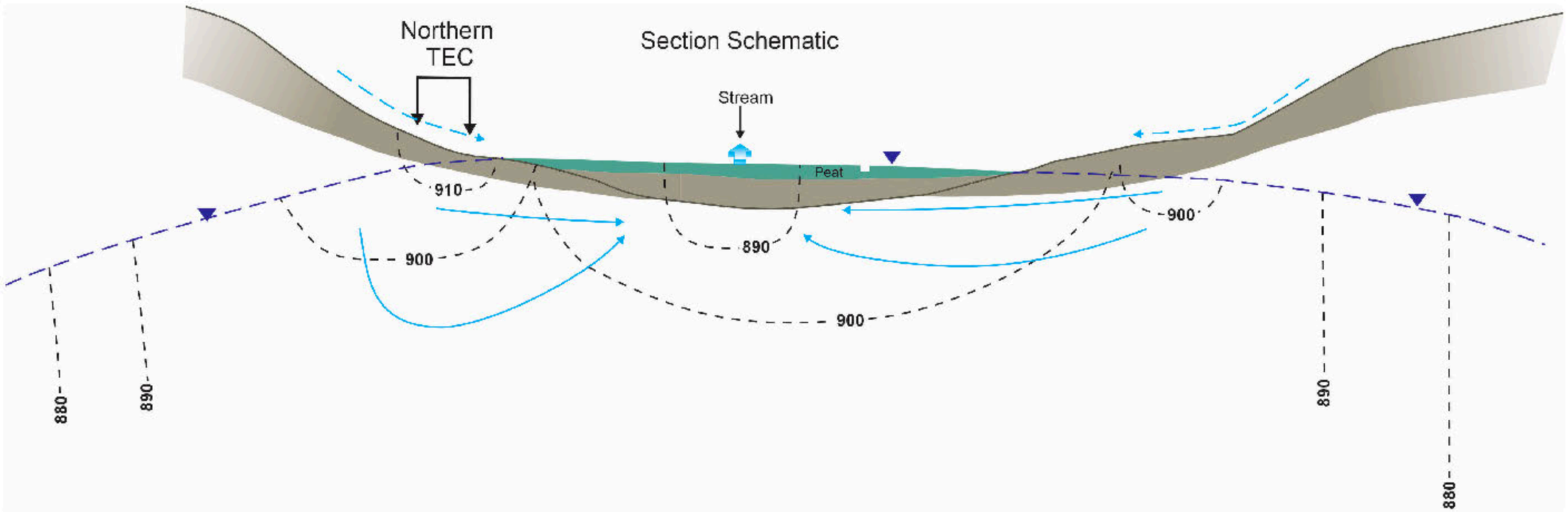
Hydrogeological Units

- Dolerite - Country Rocks (H-D1 HRMV)
- Weathered Dolerite
- Glacial Soil and Weather Dolerite (SGI, H-D3, and H-D4 HRMV's)
- Fracture Zones (H-D3, H-D4 and H-D5 HRMV's)

Diagram not to scale

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report HYDROGEOLOGY SCHEMATIC OF NORTHERN TEC GROUNDWATER TO SURFACE WATER INTERACTIONS
	Date: 28 Jan 2025	Page Size: A3	PSM4346-247R / Figure 37

C:\ArcGIS\PSM4346\03 Figures\PSM4346-115R Rev2\Figure 37 Hydrogeology Schematic of Northern TEC Groundwater to Surface Water Interactions.cdr

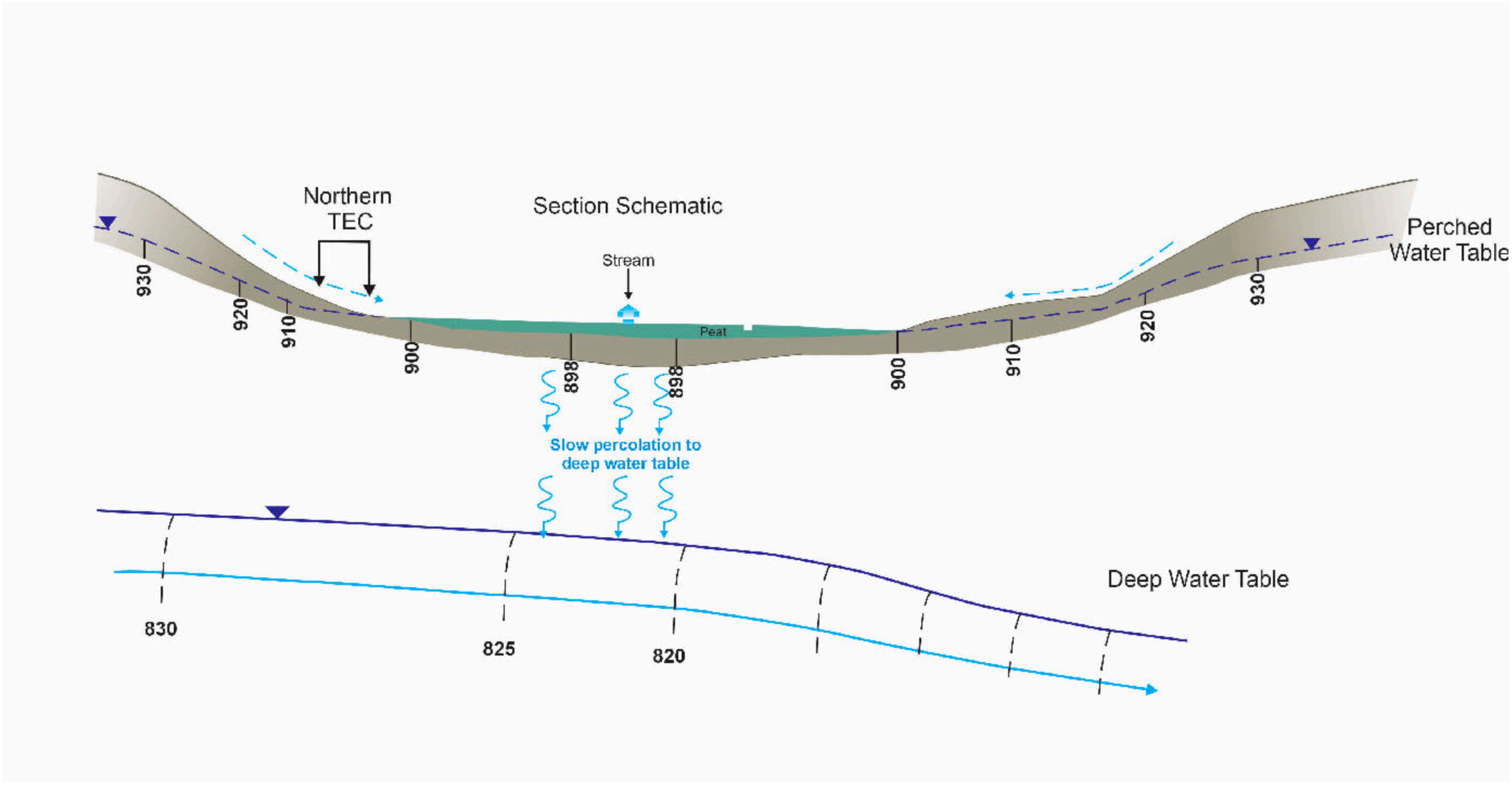


Legend

- Weathered Dolerite
- Peat
- Baseline Water Table
- Groundwater Flow Lines
- 960 Isopotentials (m AHD)
- Water Shedding on Ground Surface

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report FLOW NET SCHEMATIC OF NORTHERN TEC FLOW-THROUGH SYSTEM
	Date: 12 May 2025	Page Size: A3	PSM4346-115R | Figure 38

C:\Arcgis\PSM4346\03_figures\PSM4346-115R Rev 2\Figure 38 Flow Net Schematic of Northern TEC Flow-Through System.mxd



Legend

- Weathered Dolerite
- Peat
- Baseline Water Table
- Groundwater Flow Lines
- —960 Isopotentials (m AHD)
- Water Shedding on Ground Surface

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report ALTERNATIVE CONCEPT MODEL FLOW NET SCHEMATIC OF NORTHERN TEC FLOW-THROUGH SYSTEM
	Date: 12 May 2025	Page Size: A3	PSM4346-115R | Figure 39

C:\Acad\PSM\4346\03_Figures\PSM4346-115R Rev 2\Figure 39 Alternative Conceptual Model Flow Net Schematic of Northern TEC Flow-Through System.mxd

West Stockpile

Mid Point Stockpile

Paddy's Quarry Stockpile

679 (23/07/2024)

678 (20/11/2024)

667 (4/11/2024)

576 (24/07/2024)

Tarraleah Canal No.1

Tarraleah Canal No.2

River Dastport

Mossy Marsh Tunnel

Mossy Marsh

Legend

- Tarraleah Redevelopment Alignment
- Groundwater Head Observations, m AHD (Date/Period)
  - Open Hole / Drilling Observation
  - Standpipe
  - VWP
- Interpreted Baseline Groundwater Flow Lines
- Baseline_Watertable_Contou...
- Mossy Marsh Tunnel
- Surface Water Aspects
  - Lake
  - Wetland
  - Rivers
- Sphagnum Peatland TEC
- Bedrock Geology
  - Dolerite
  - Permian Sediments
  - Triassic Sand
  - Basalt
- Interpreted Faults (PGSS)
  - Concealed
  - Inferred
  - Defined

N

Scale 1:7,500

0 0.0325 0.065 0.13 0.195 0.26 0.325 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 12 May 2025	Page Size: A3	PSM4346-115R	Figure 40

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

WATER TABLE ELEVATIONS IN STOCKPILE SETTINGS

West Stockpile

Mid Point Stockpile

Paddy's Quarry Stockpile

102.1 (20/11/2024)

2 (23/07/2024)

5.1 (24/07/2024)

2.1 (4/11/2024)

Tarraleah Canal No.1

Tarraleah Canal No.2

River Derwent

Mossy Marsh Canal

Mossy Marsh

Legend

- Tarraleah Redevelopment Alignment
- Subcatchment Divide

Groundwater Head Observations, m AHD (Date/Period)

- Open Hole / Drilling Observation
- Standpipe
- VWP

- Interpreted Baseline Groundwater Flow Lines
- Baseline_Watertable_Contours_V3
- Mossy Marsh Tunnel

Surface Water

- Lake
- Wetland
- Rivers

- Sphagnum Peatland TEC

Quaternary Geology

- Alluvium
- Colluvium
- Peat
- Glacial

Bedrock Geology

- Dolerite
- Basalt

Interpreted Faults (PGSS)

- Concealed
- Inferred
- Defined

N

Scale 1:7,500

0 0.03 0.065 0.13 0.195 0.26 0.325 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 12 May 2025	Page Size: A3	DEPTHS TO GROUNDWATER IN STOCKPILE SETTINGS
			PSM4346-115R | Figure 41

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Horses Gate

Tarraleah Canal No.4

Horses Creek

Horses Dam

M 055 y Marsh

Mossy Marsh Pond

Mossy Marsh Creek

Mossy Marsh Canal

No.2 Pond

No.1 Pond

Tarraleah Spill No.5

Nive River

Tarraleah Creek

William Creek

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500

0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000

0 100 200 400 600 m

Legend

- Model Domain

Project Works LEGEND

Tarraleah Tunnels
- Headrace Tunnel
- Power Tunnel
- Intersection support / Distributor
- Mid Access
- Surge Access
- Surge Shaft and Chamber
- Penstock Tunnel No. 1
- Penstock Tunnel No. 2
- Stockpile Cuddies

Lake King William Tunnel
- Tarraleah Upgrade Works - Lake King William Tunnel
- Stockpile Cuddies

Mossy Marsh Tunnel
- MossyMarsh Tunnel

Surface Water Aspects
- Waterbodies
- Wetland
- Streams / canals

Interpreted Faults (P 2023)
- Concealed
- Inferred
- Defined

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000

0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

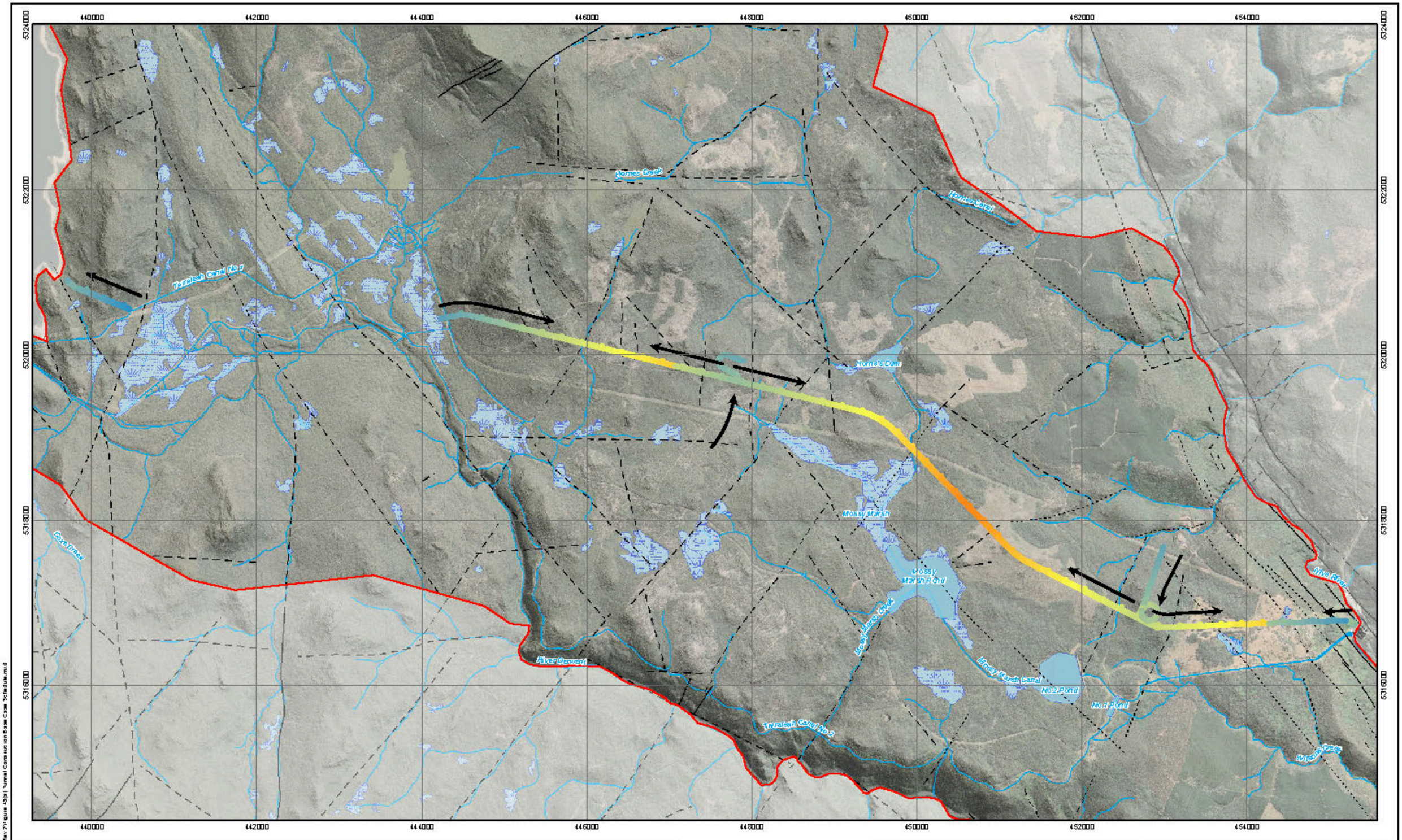
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED PROJECT WORKS

PSM4346-115R | Figure 42

C:\Arcd\15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 42 Simulated Project Works.mxd



Legend

Months Relative to Construction Start
1
30
61

Construction Direction
Model Domain

Surface Water Aspects
Waterbodies
Wetland
Streams / canals

Interpreted Faults (PGSS, Jun 2023)
Concealed
Inferred
Defined



N

Scale 1:42,000

0 0.25 0.5 1 1.5 2 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

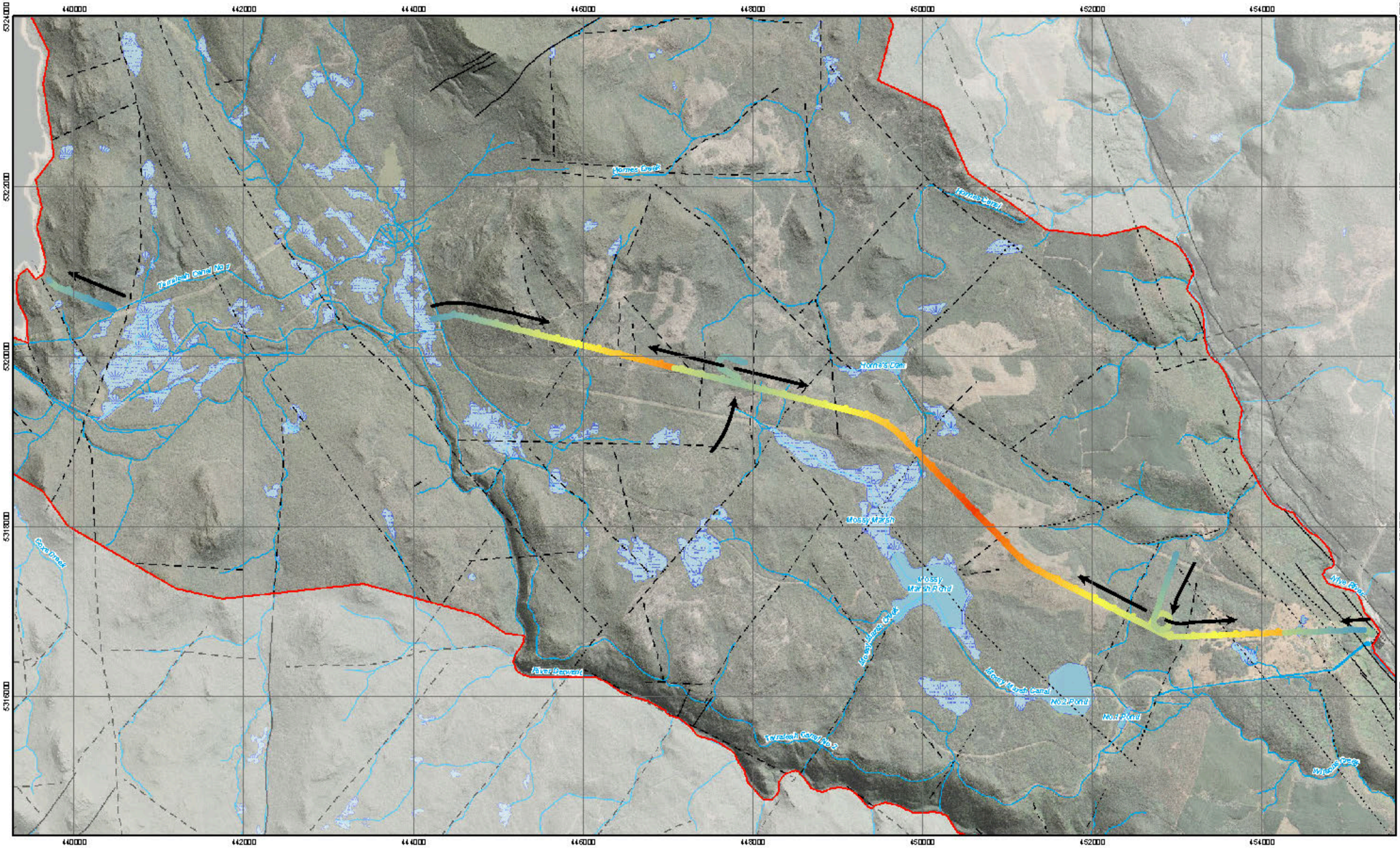
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TUNNEL CONSTRUCTION BASE CASE SCHEDULE

PSM4346-115R | Figure 43(a)

C:\Arcgis\PSM4346\R03_Figures\PSM4346-115R\Rev2\Figure 43(a) Tunnel Construction Base Case Schedule.mxd



Legend

Months Relative to Construction Start
1
30
61

Construction Direction
Model Domain

Surface Water Aspects
Waterbodies
Wetland
Streams / canals

Interpreted Faults (PGSS, Jun 2023)
---- Concealed
– – Inferred
—— Defined

OVERVIEW

N

Scale 1:42,000
0 0.25 0.5 1 1.5 2 Km

Map Projection : Transverse Mercator
Horizontal Datum : GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By. VC	Revision. 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report TUNNEL CONSTRUCTION P90 SCHEDULE
	Date. 12 May 2025	Page Size. A3	PSM4346-115R | Figure 43(b)

C:\Arcgis\PSM4346\PSM4346_115R\Figure 43(b) Tunnel Construction P90 Schedule.mxd

448000 450000 452000 454000 456000

5322000 5320000 5318000 5316000 5314000 5312000

Legend

Tarraleah Redevelopment Alignment

Sphagnum Peatland TEC

Tertiary Palaeochannel Interpreted Thickness (m)

- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100
- 100 - 120
- 120 - 140
- 140 - 160

Interpretation of Basalt Domain

Bedrock Geology

- Dolerite
- Permian Sediments
- Triassic Sand
- Basalt

Interpreted Faults (PGSS, Jun 2023)

Interpreted Joints (PGSS, Jun 2023)

Fracture Zones (PGSS, Jun 2023)

Model Domain

Mossy Marsh Tunnel

N

Scale 1:35,000

0 0.25 0.5 1 1.5 2 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Created By: VC

Revision: 2

Date: 12 May 2025

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED TERTIARY PALAEOCHANNEL THICKNESS

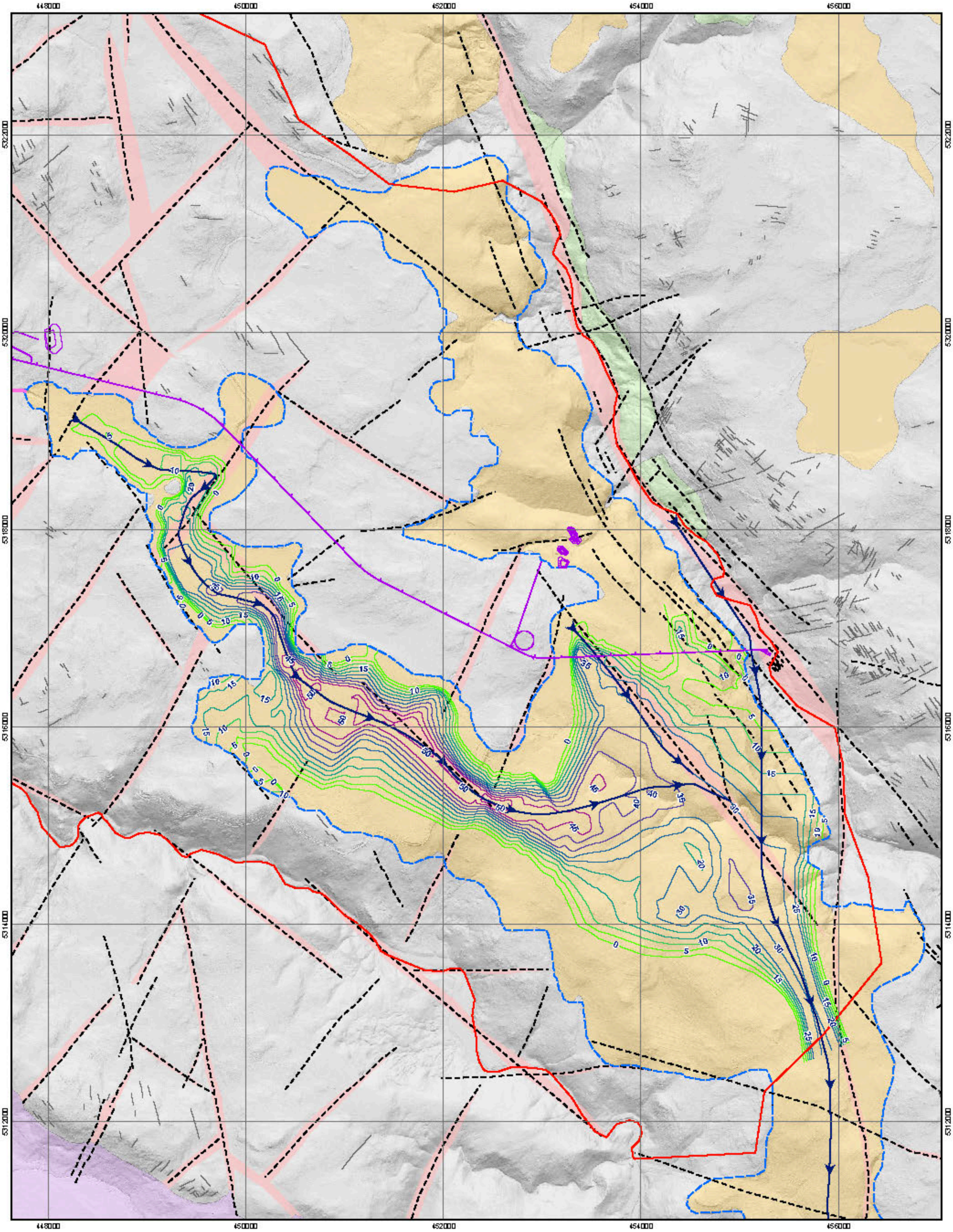
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Figure 44

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448000 450000 452000 454000 456000

5322000 5320000 5318000 5316000 5314000 5312000



Legend

- Tarraleah Redevelopment Alignment
- Interpreted Palaeochannel Thalweg (PGSS, Jun 2023)

Tertiary Sediments IS1 Interpreted Thickness (m)

- 0 - 5
- 5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 75
- Interpretation of Basalt Domain

Bedrock Geology

- Dolerite
- Permian Sediments
- Triassic Sand
- Basalt
- Interpreted Faults (PGSS, Jun 2023)
- Interpreted Joints (PGSS, Jun 2023)
- Fracture Zones (PGSS, Jun 2023)
- Model Domain
- Mossy Marsh Tunnel

N

Scale 1:35,000

0 0.25 0.5 1 1.5 2 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED TERTIARY SEDIMENTS THICKNESS

PSM4346-115R | Figure 45

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 45 Simulated Tertiary Sediments Thickness.mxd

436000 440000 444000 448000 452000 456000 460000

532400 532000 531600 531200

Legend

- Constant Head Boundary
- Seepage Boundary
- Cauchy Boundary (Lined Watercourse)
- Cauchy Boundary (Soil and Unlined Watercourse)
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Mossy Marsh Tunnel
- Simulated Structures in Jurassic Dolerite
- Simulated Fracture Zones in Jurassic Dolerite
- Model Domain



N

Scale 1:65,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

GROUNDWATER MODEL DOMAIN AND BOUNDARY CONDITIONS

Figure 46

C:\Arc\GIS\PSM\4346\R3_Figures\PSM4346-115R Rev 2\Figure 46 Groundwater Model Domain and Boundary Conditions.mxd

444000
448000
452000
5320000
5316000

Legend

- Tarraleah Redevelopment Alignment
- Recharge Zones
  - Basalt
  - Colluvium and Alluvium
  - Dolerite
  - Glacial Deposit
  - North TCE Extended
  - Sandstone
  - Steep Areas
  - Swamp Deposit
- Model Domain
- Mossy Marsh Tunnel



N

Scale 1:30,000

0 250 500 1,000 1,500 M

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

GROUNDWATER MODEL
RECHARGE ZONES

PSM4346-115R | Figure 47

C:\Arcgis\PSM4346-115R_Figure 47 Groundwater Model Recharge Zones.mxd

444000
446000
448000
450000
452000
454000
5322000
5320000
5318000
5316000

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

Mossy Marsh
Mossy Marsh Pond
No.2 Pond

Legend

- Tarraleah Redevelopment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)

Calibration Residual (m)

- < -5
- -5 to -1
- -1 to 1
- 1 to 5
- > 5

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Note:
Positive residuals = Over predicted
Negative residuals = Under predicted

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

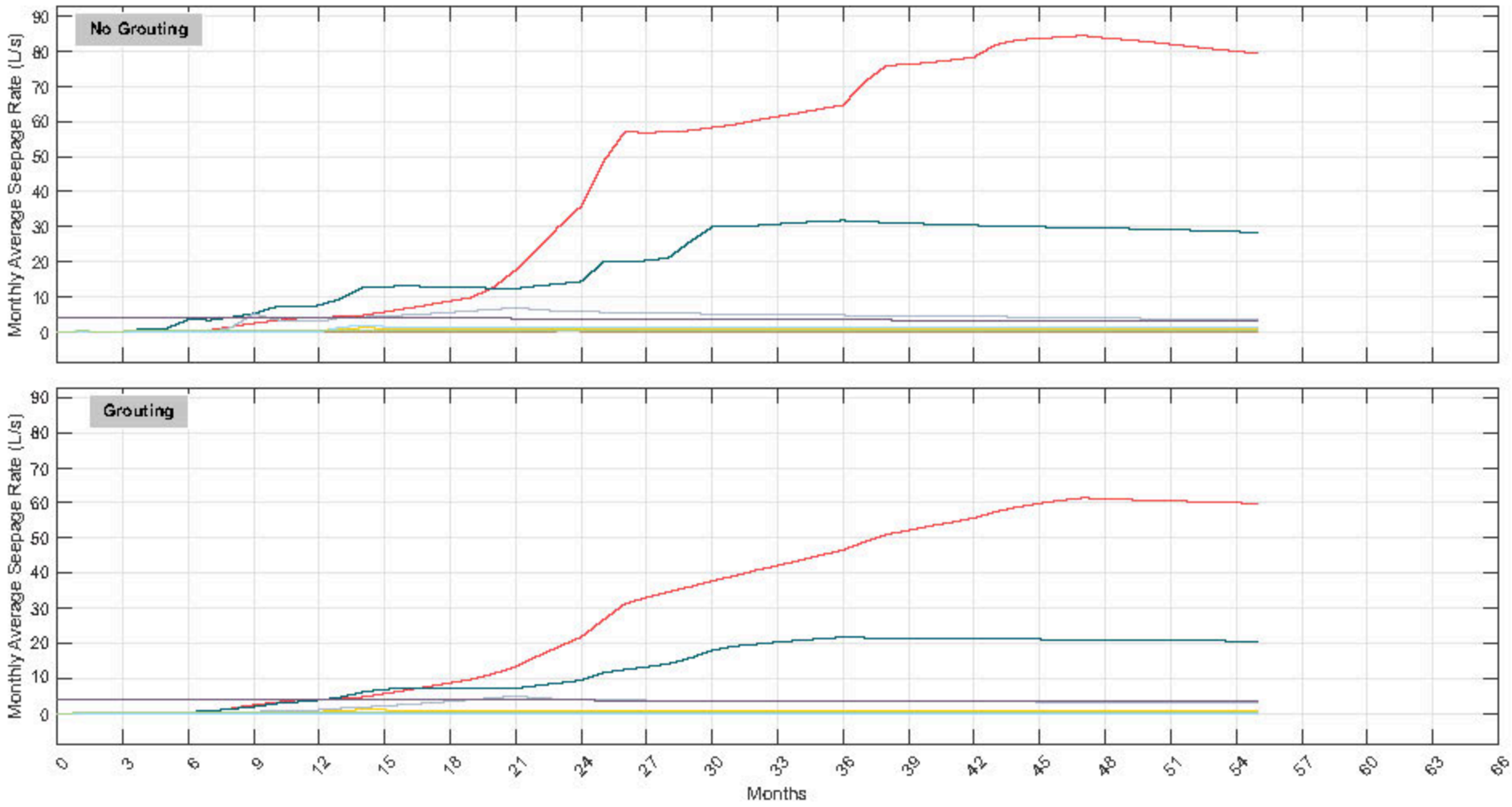
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Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By. VC	Revision. 2	
	Date. 12 May 2025	Page Size. A3	PSM4346-115R	Figure 48

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED STEADY-STATE CALIBRATION RESIDUALS

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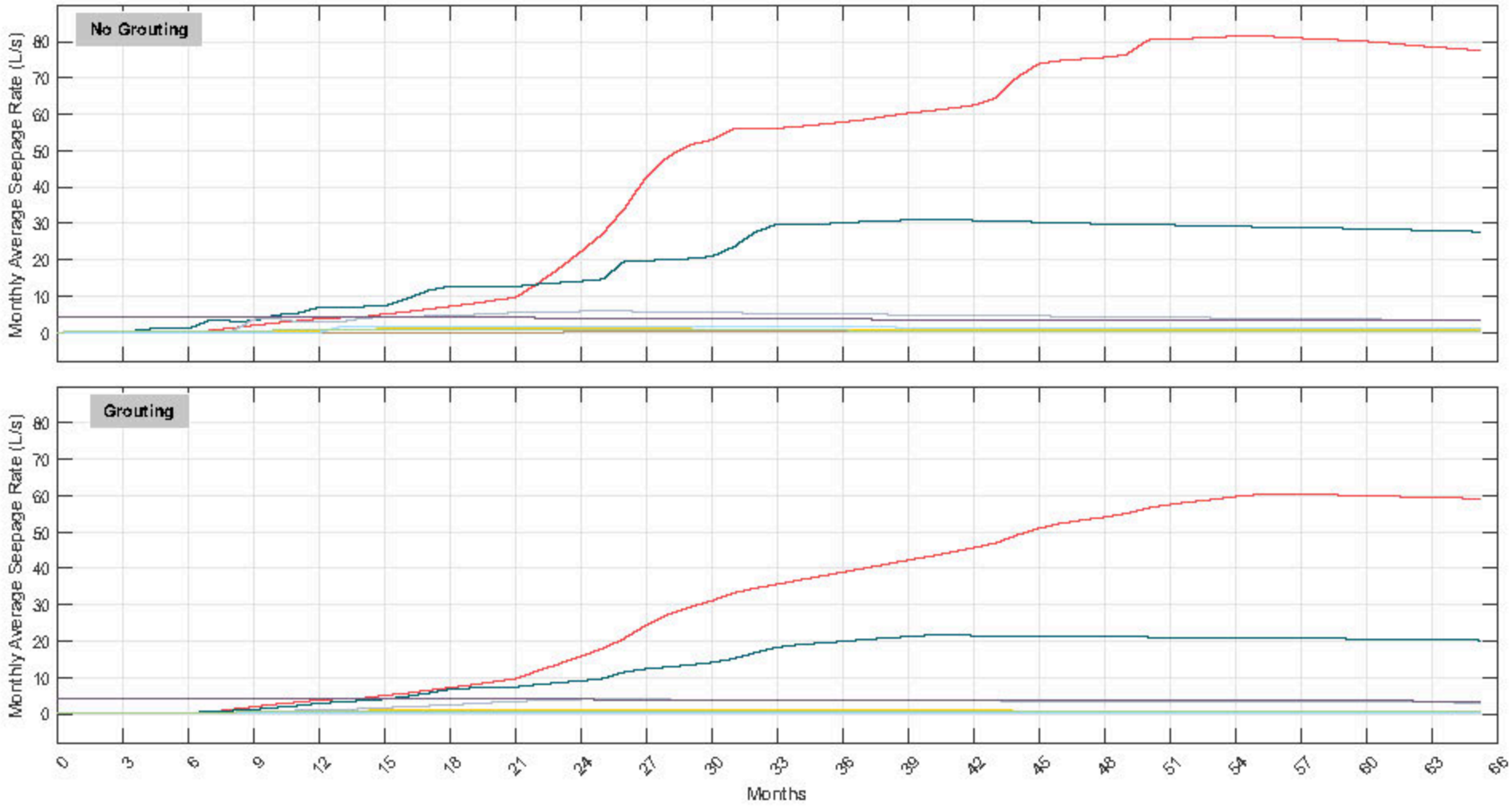


Headrace Tunnel
Surge Shaft and Chamber
Power Tunnel
Penstock Tunnels
Mid Access Tunnel
Lake King William Tunnel
Surge Access Tunnel
Mossy Marsh Tunnel

Notes:

P S M	Created by: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 12 May 2025	Paper Size: A4	SIMULATED BASE CASE SEEPAGE BASE SCHEDULE
			PSM4346-115R | Figure 49(a)

C:\Work\PSM\PSM4346\003_Figures\PSM4346-115R\Rev 2\Figure 49(a) Simulated Base Case Seepage Base Schedule.cdr



Headrace Tunnel
Surge Shaft and Chamber
Power Tunnel
Penstock Tunnels
Mid Access Tunnel
Lake King William Tunnel
Surge Access Tunnel
Mossy Marsh Tunnel

Notes:

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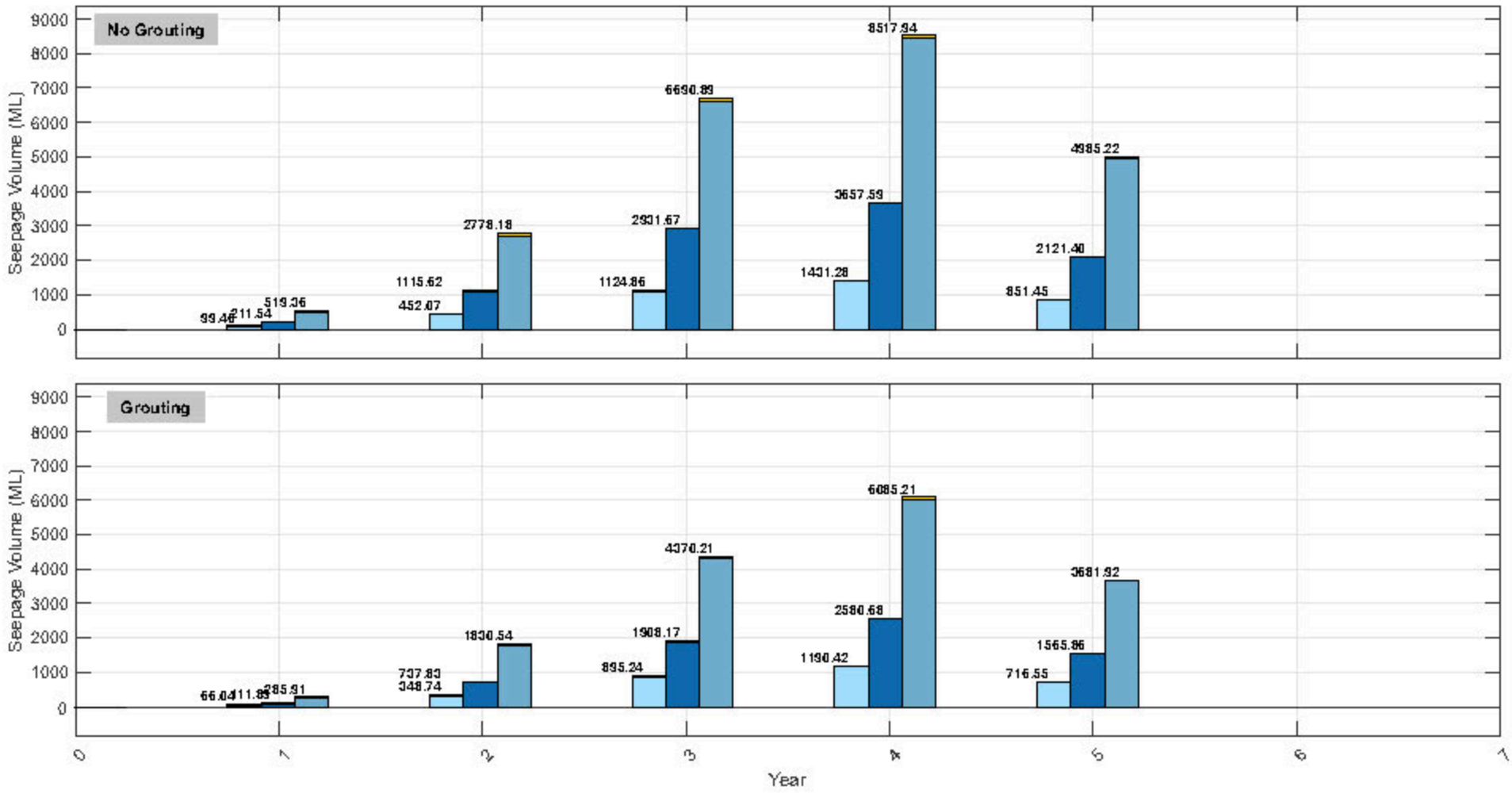
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Revision: 2
Date: 12 May 2025
Paper Size: A4

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Tarraleah Redevelopment Project
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SIMULATED BASE CASE SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure 49(b)

C:\Work\3\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 49(b) Simulated Base Case Seepage P90 Schedule.cdr



Lower Bound

Tarraleah Tunnels

Lake King William Tunnel

Base Case

Tarraleah Tunnels

Lake King William Tunnel

Upper Bound

Tarraleah Tunnels

Lake King William Tunnel

Notes:

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Revision: 2

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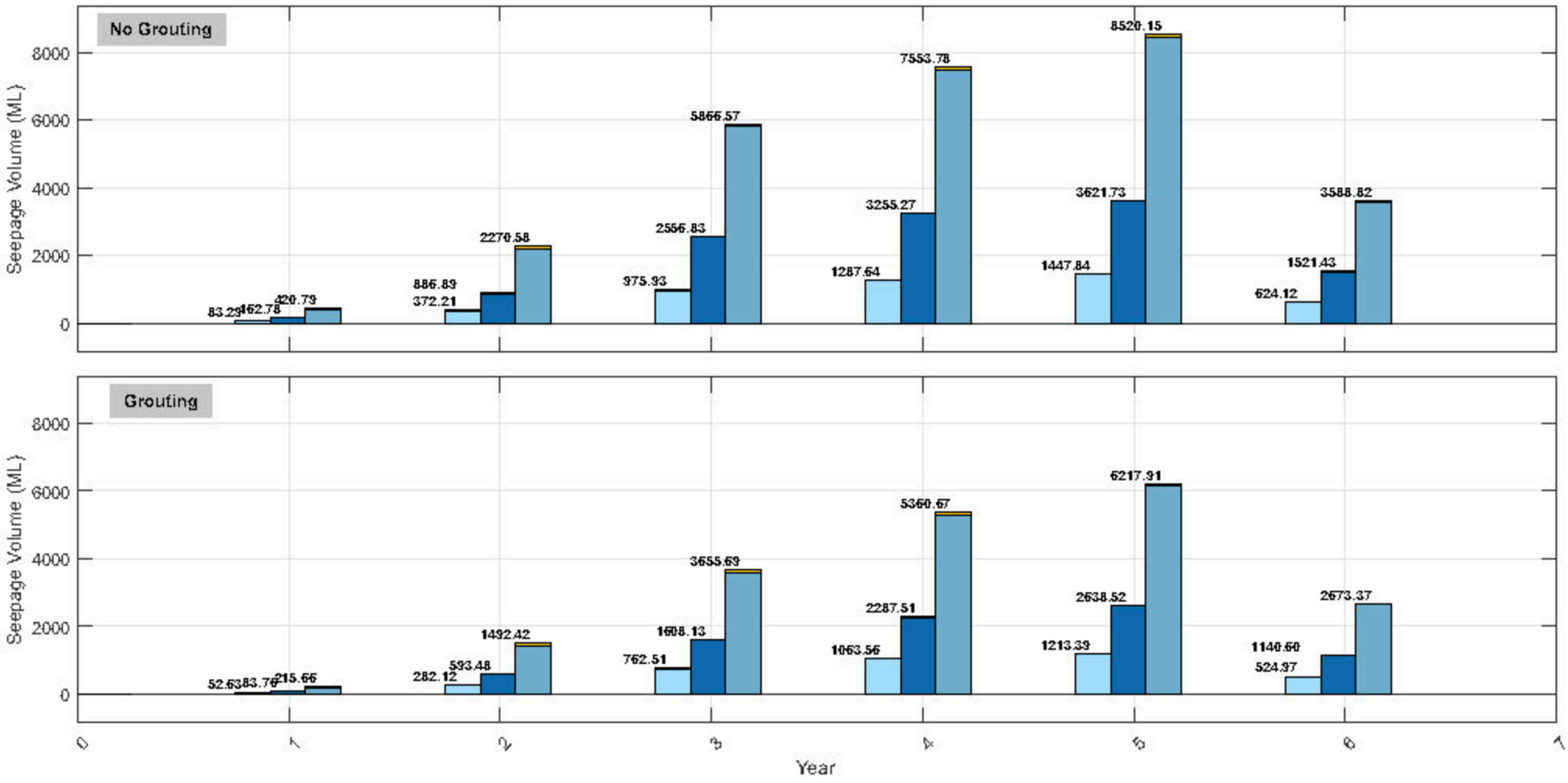
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED ANNUAL WATER TAKE
BASE SCHEDULE

PSM4346-115R

Figure 50(a)

N:\PSM4346\Eng\12 Groundwater\3 Numerical Modelling\04_Post\Processing\Model 2024\Results Charts\Construction Stage - Seepage Assessment\Figure 50 (a)_B.plt



Lower Bound

Tarraleah Tunnels

Lake King William Tunnel

Base Case

Tarraleah Tunnels

Lake King William Tunnel

Upper Bound

Tarraleah Tunnels

Lake King William Tunnel

Notes:

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED ANNUAL WATER TAKE
P90 SCHEDULE

PSM4346-115R | Figure 50(b)

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444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Hums Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
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SIMULATED BASE CASE WATER TABLE PRIOR TO STEEL LINING BASE SCHEDULE

PSM4346-115R | Figure 51(a)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 51(a) Simulated Base Case Water Table Prior to Steel Lining Base Schedule.mxd

444000
446000
448000
450000
452000
454000
5322000
5320000
5318000
5316000

Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond
Hynes Dam

INSET - Tarraleah Power Station
Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet
Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE WATER TABLE PRIOR TO STEEL LINING BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 51(b)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Hums Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE WATER TABLE PRIOR TO STEEL LINING P90 SCHEDULE

C:\Projects\PSM4346-115R\Figures\Figure 52(a) Simulated Base Case Water Table Prior to Steel Lining P90 Schedule.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

Scale 1:7,500
0 50 100 200 300 m

INSET - Tarraleah Power Station

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE WATER TABLE PRIOR TO STEEL LINING P90 SCHEDULE - GROUTING

PSM4346-115R | Figure 52(b)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Hamish's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
SIMULATED BASE CASE DRAWDOWN PRIOR TO STEEL LINING BASE SCHEDULE

PSM4346-115R | Figure 53(a)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
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SIMULATED BASE CASE DRAWDOWN PRIOR TO STEEL LINING BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 53(b)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Mossy Marsh Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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SIMULATED BASE CASE DRAWDOWN PRIOR TO STEEL LINING P90 SCHEDULE

PSM4346-115R | Figure 54(a)

C:\Projects\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 54(a) Simulated Base Case Drawdown Prior to Steel Lining P90 Schedule.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Mossy Marsh Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE DRAWDOWN PRIOR TO STEEL LINING P90 SCHEDULE - GROUTING

PSM4346-115R | Figure 54(b)

C:\Arcd015\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 54(b) Simulated Base Case Drawdown Prior to Steel Lining P90 Schedule - Grouting.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Hums Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table Prior to Steel Lining Completion (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- > 6

- Model Domain
- Mossy Marsh Tunnel

- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE CAPTURE ZONES DURING CONSTRUCTION BASE SCHEDULE

PSM4346-115R | Figure 55(a)

C:\Projects\PSM4346-115R\Rev2\Figure 55(a) Simulated Base Case Capture Zones During Construction Base Schedule.mxd

444000
446000
448000
450000
452000
454000
5322000
5320000
5318000
5316000

Mossy Marsh
Mossy Marsh Pond
Mossy Marsh Pond
Mossy Marsh Pond
No.2 Pond
No.2 Pond
No.1 Pond
No.1 Pond
Hurrah's Dam
Hurrah's Dam

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET
Tarraleah
Power Station

Legend
- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

SIMULATED BASE CASE WATER TABLE
PRIOR TO STEEL LINING
BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 55(b)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Harris's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
  - 1 - 2
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Particle Pathlines (Years)
  - 0 - 1
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE CAPTURE ZONES DURING CONSTRUCTION P90 SCHEDULE

PSM4346-115R | Figure 56(a)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R\Rev 2\Figure 56(a) Simulated Base Case Capture Zones During Construction P90 Schedule.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Hums Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
- Particle Pathlines (Years)
  - 0 - 1
  - 1 - 2
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

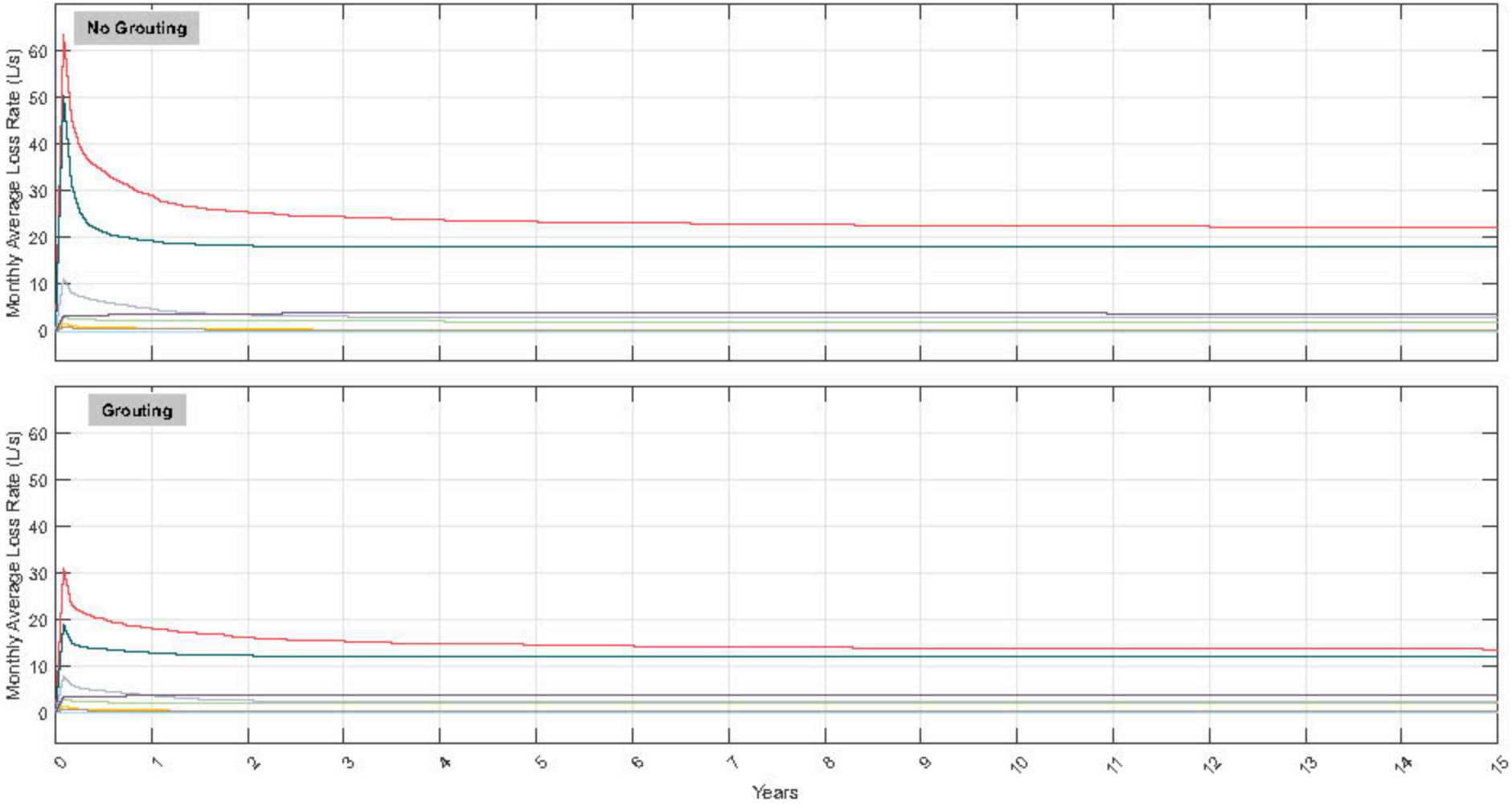
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
SIMULATED BASE CASE CAPTURE ZONES DURING CONSTRUCTION P90 SCHEDULE - GROUTING

PSM4346-115R | Figure 56(b)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 56(b) Simulated Base Case Capture Zones During Construction P90 Schedule - Grouting.mxd

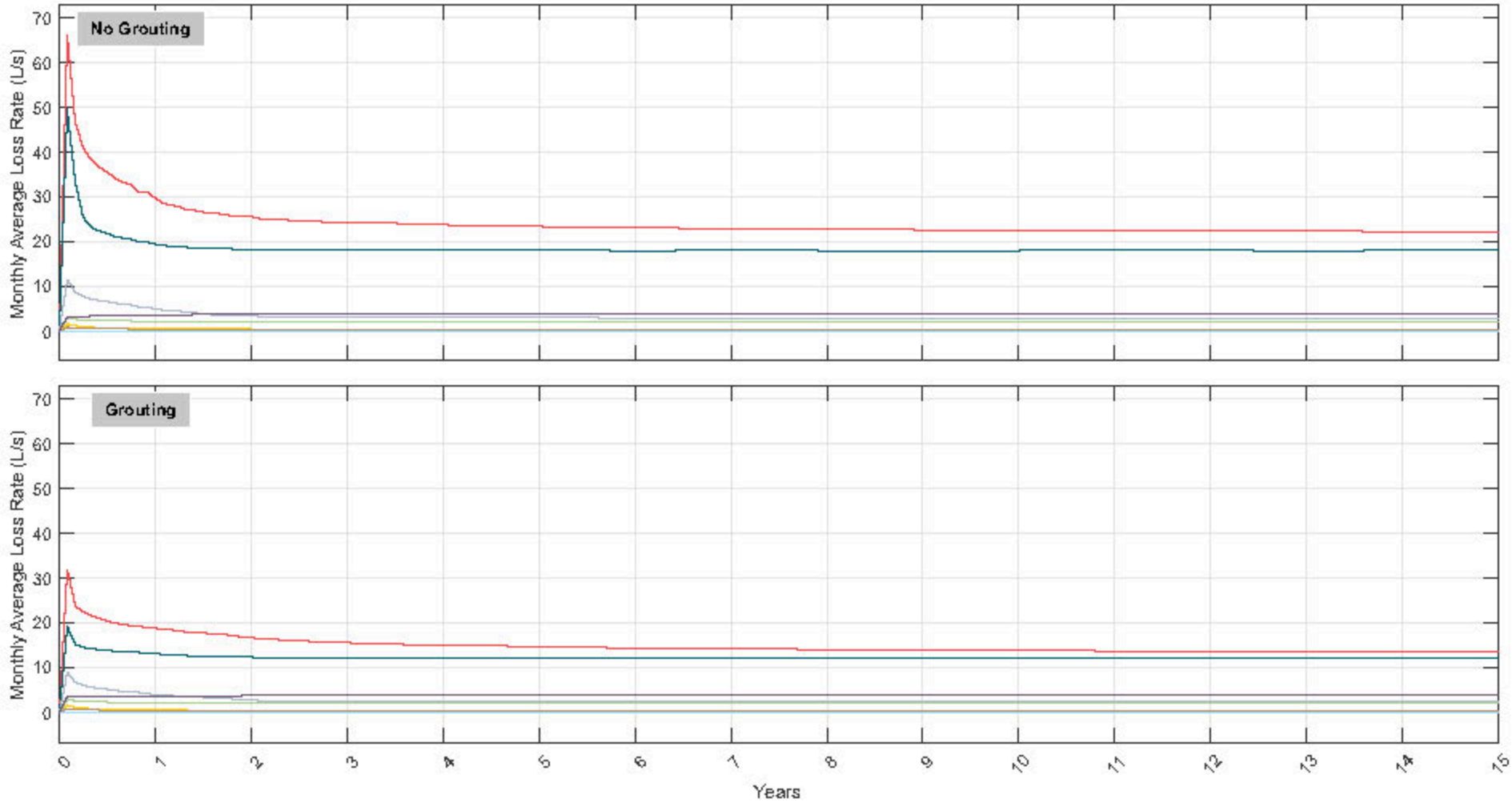


Headrace Tunnel
Surge Shaft and Chamber
Power Tunnel
Penstock Tunnels
Mid Access Tunnel
Lake King William Tunnel
Surge Access Tunnel
Massy Marsh Tunnel

Notes:

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	Date: 05 Jan 2025	Paper Size: A4	SIMULATED BASE CASE WATER LOSS RATES BASE SCHEDULE
			PSM4346-115R | Figure 57(a)

C:\Jobs\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 57(a) Simulated Base Case Water Loss Rates Base Schedule.cdr



Headrace Tunnel
Surge Shaft and Chamber
Power Tunnel
Penstock Tunnels
Mid Access Tunnel
Lake King William Tunnel
Surge Access Tunnel
Mossy Marsh Tunnel

Notes:

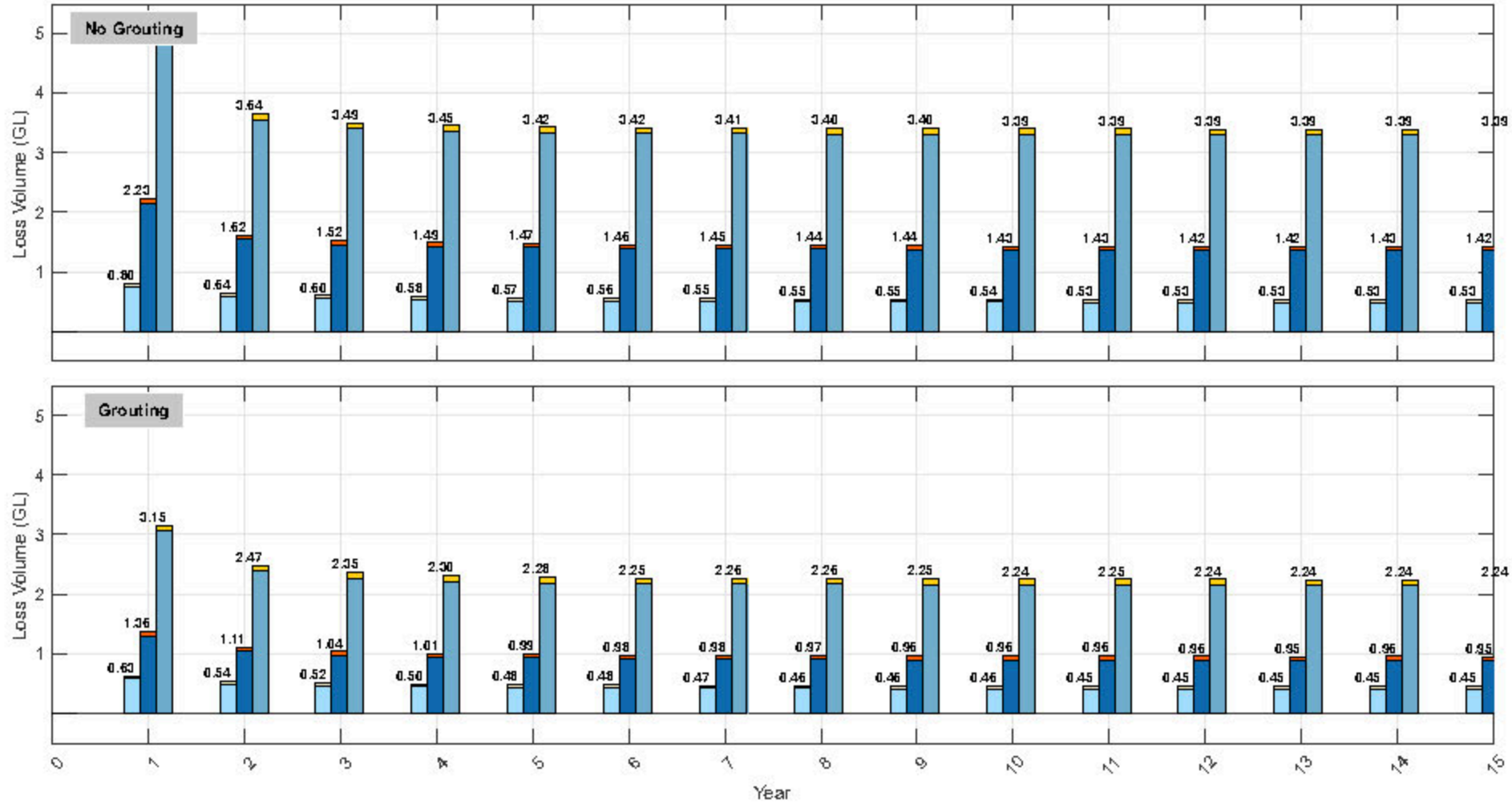
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE
WATER LOSS RATES
P90 SCHEDULE

PSM4346-115R | Figure 57(b)

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Lower Bound

Tarraleah Tunnels

Lake King William Tunnel

Base Case

Tarraleah Tunnels

Lake King William Tunnel

Upper Bound

Tarraleah Tunnels

Lake King William Tunnel

Notes:

P S M

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Date: 12 May 2025

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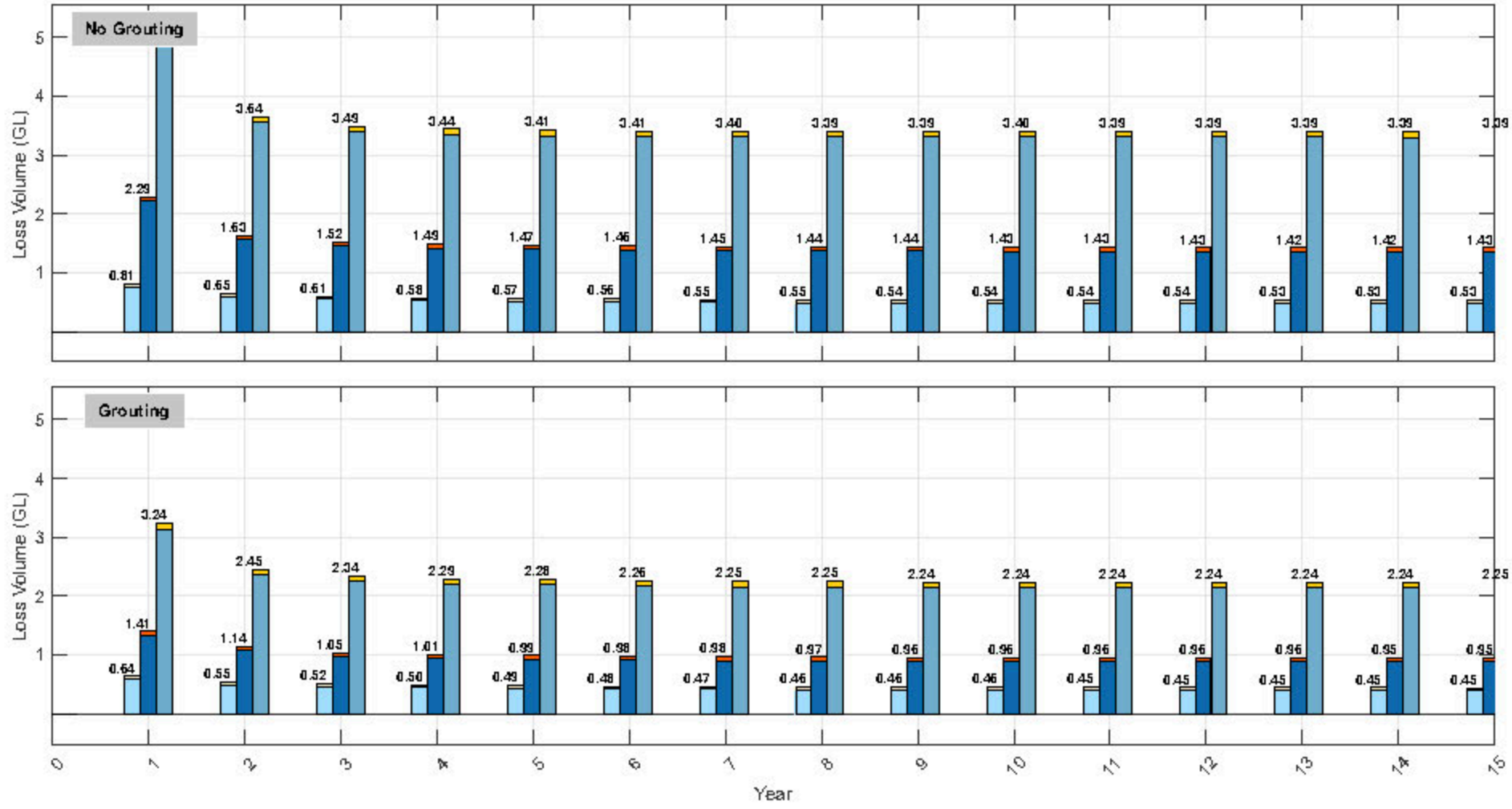
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE
WATER LOSS VOLUMES
BASE SCHEDULE

PSM4346-115R

Figure 58(a)

C:\Work\S\PSM4346\03_Figures\PSM4346-115R_Rev 2\Figure 58(a) Simulated Base Case Water Loss Volumes Base Schedule.cdr



Lower Bound

Tarraleah Tunnels

Lake King William Tunnel

Base Case

Tarraleah Tunnels

Lake King William Tunnel

Upper Bound

Tarraleah Tunnels

Lake King William Tunnel

Notes:

P S M	Created by: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 12 May 2025	Paper Size: A4	SIMULATED BASE CASE WATER LOSS VOLUMES P90 SCHEDULE
			PSM4346-115R — Figure 58(b)

C:\Work\S\PSM4346\WB_Figures\PSM4346-115R_Rev 2\Figure 58(b) Simulated Base Case Water Loss Volumes P90 Schedule.cdr

436000 440000 444000 448000 452000 456000 460000

532400 532000 531600 531200

Mossy Marsh Tunnel

Mossy Marsh Pond

Wolf Pond

Wolf Pond

Legend

- Tarraleah Redevelopment
- Tarraleah Upgrade Works - Lake King William Tunnel

Discharge Tracking Zones

- Lake King William
- Landslide Zone
- Tarraleah Tunnels
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:65,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

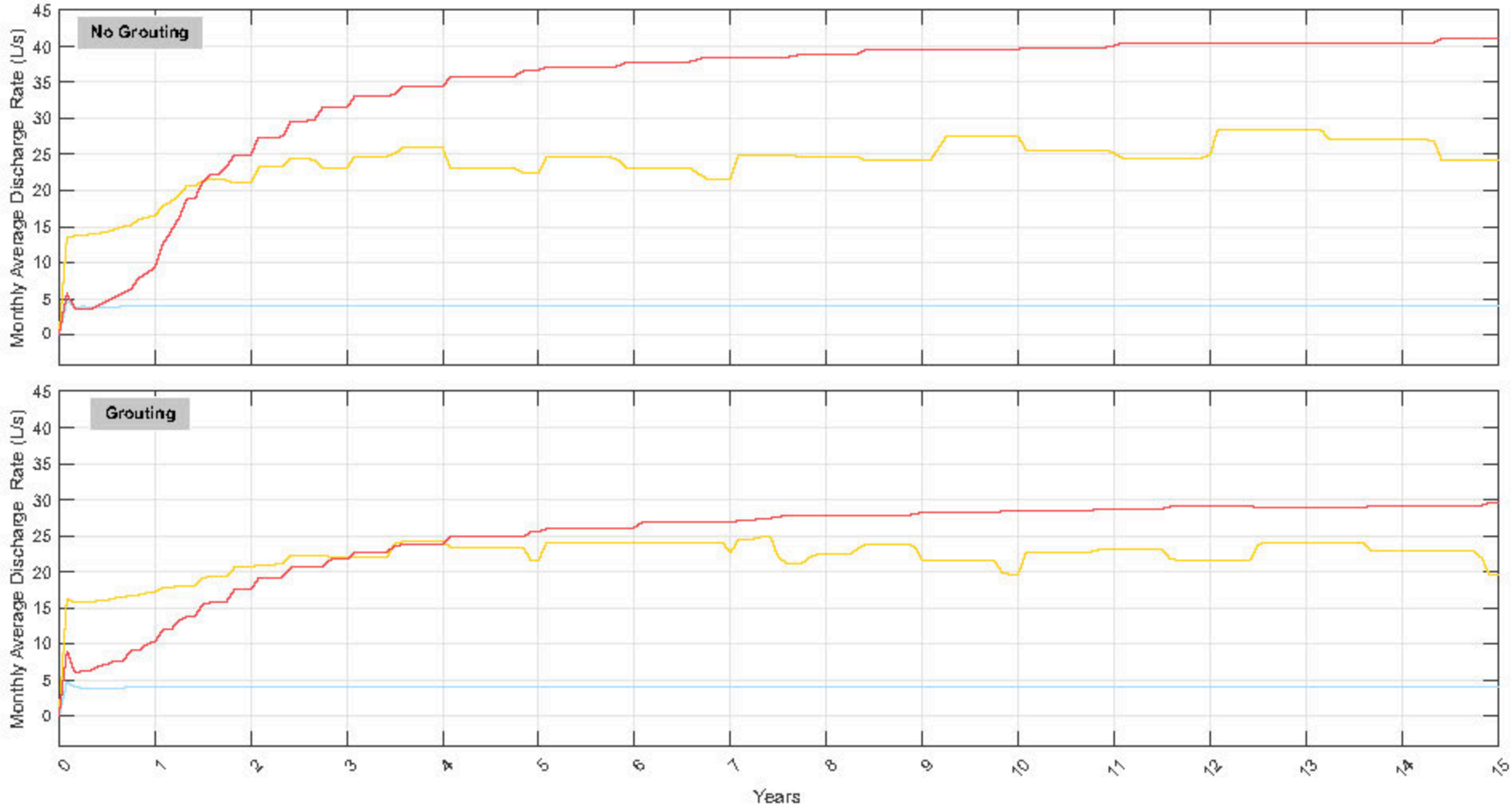
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TRACKING ZONES FOR DISCHARGE ONTO GROUND SURFACES

PSM4346-115R | Figure 59

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 59 Tracking Zones for Discharge onto Ground Surfaces.mxd



Lake King William

Tarraleah Hillside

Tarraleah Tunnels

Notes:

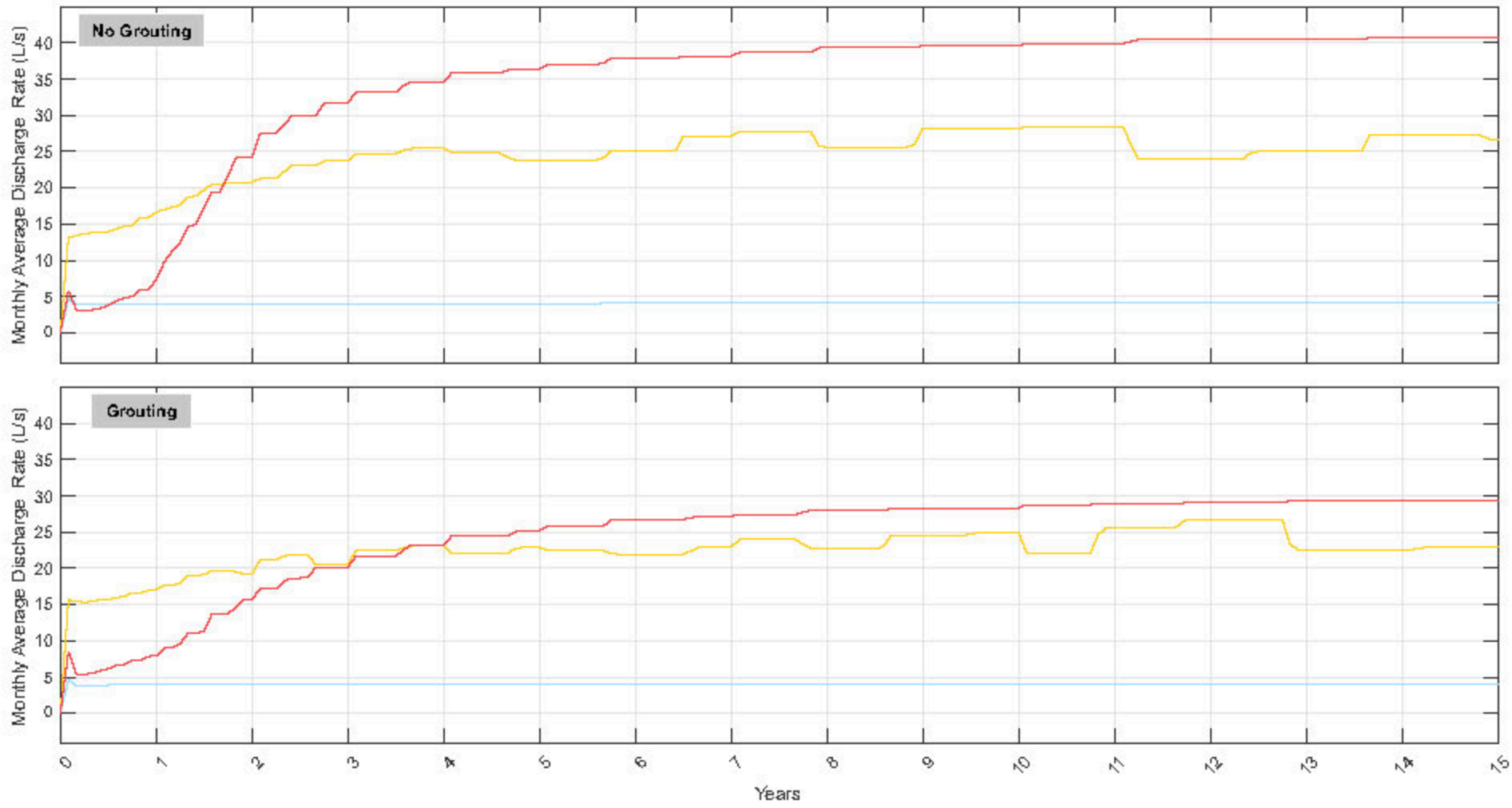
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SIMULATED BASE CASE
NET SURFACE DISCHARGE RATES
BASE SCHEDULE

PSM4346-115R | Figure 60(a)

C:\MyGS\PSM\4346\103_Figures\PSM4346-115R\Rev 2\Figure 60(a) Simulated Base Case Net Surface Discharge Rates Base Schedule.pdf



Lake King William

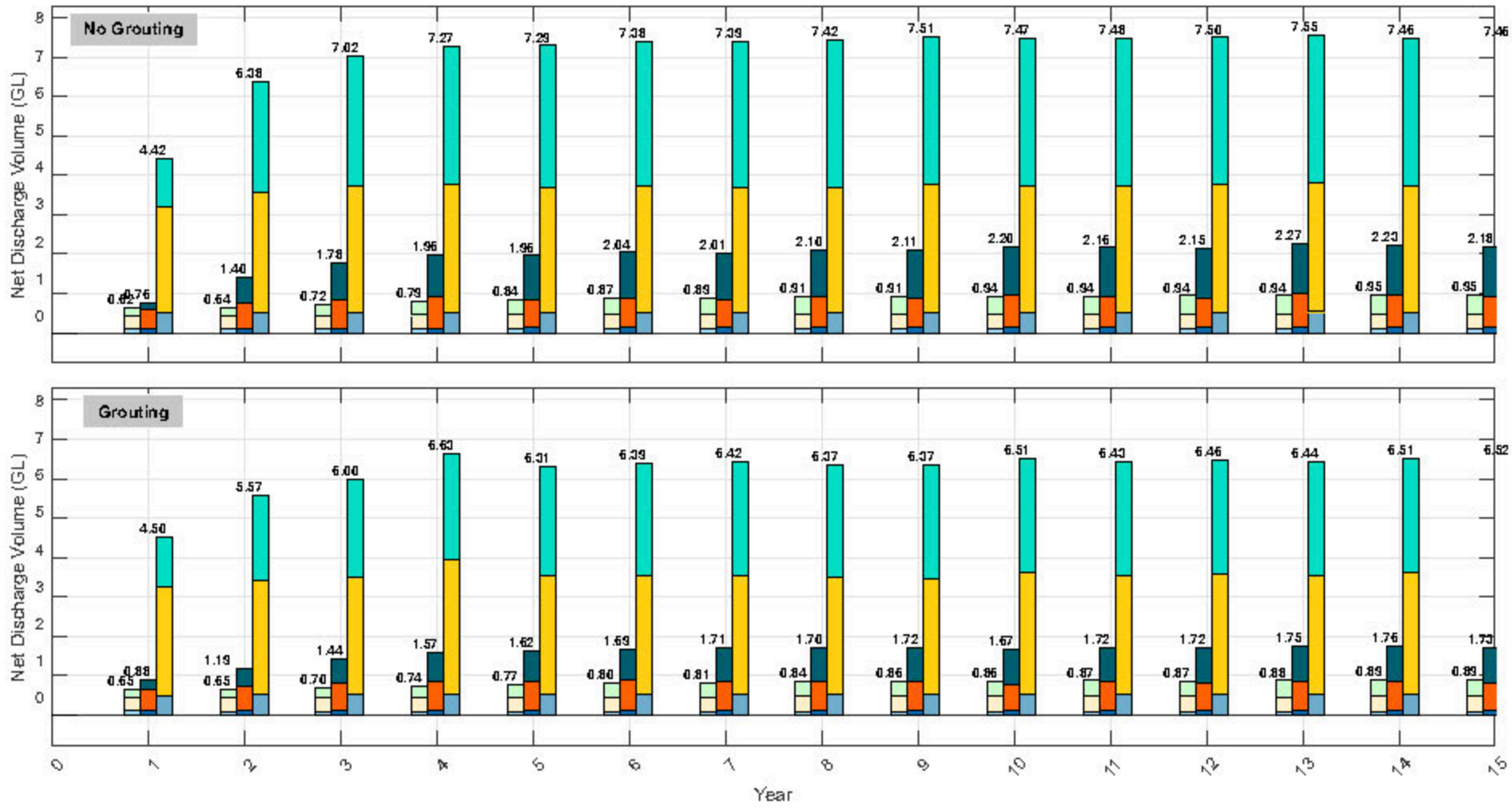
Tarraleah Hillside

Tarraleah Tunnels

Notes:

P S M	Created by: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report SIMULATED BASE CASE NET SURFACE DISCHARGE RATES P90 SCHEDULE
	Date: 12 May 2025	Paper Size: A4	PSM4346-115R / Figure 60(b)

C:\Work\SKP\PSM4346-115R_Rev 2\Figure 60(b) Simulated Base Case Net Surface Discharge Rates P90 Schedule.cdr



Lower Bound
- Lake King William
- Tarraleah Hillside
- Tarraleah Tunnels

Base Case
- Lake King William
- Tarraleah Hillside
- Tarraleah Tunnels

Upper Bound
- Lake King William
- Tarraleah Hillside
- Tarraleah Tunnels

Notes:

P S M

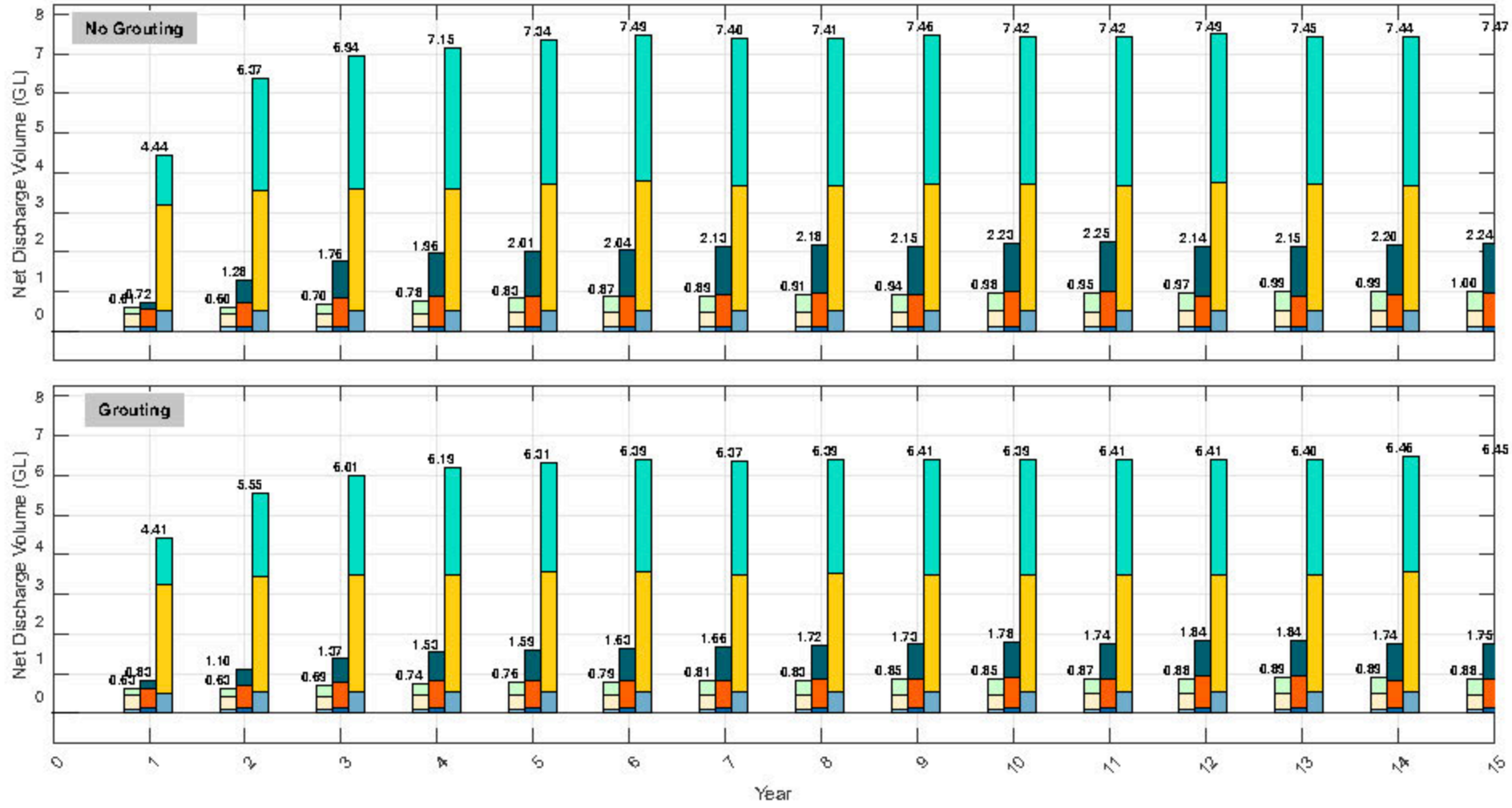
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Revision: 2
Date: 12 May 2025
Paper Size: A4

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE ANNUAL SURFACE DISCHARGE VOLUMES BASE SCHEDULE

PSM4346-115R | Figure 61(a)

C:\MyG SIPSM4346\WB_Figures\PSM4346-115R_Rev 2\Figure 61(a) Simulated Base Case Annual Surface Discharge Volumes Base Schedule.cdr



Lower Bound	Base Case	Upper Bound
Lake King William	Lake King William	Lake King William
Tarraleah Hillside	Tarraleah Hillside	Tarraleah Hillside
Tarraleah Tunnels	Tarraleah Tunnels	Tarraleah Tunnels

Notes:

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	Date: 12 May 2025	Paper Size: A4	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE ANNUAL SURFACE DISCHARGE VOLUMES P90 SCHEDULE

PSM4346-115R | Figure 61 (b)

C:\Work\3\PSM4346\R\3_Figures\Figure 61(b) Simulated Base Case Annual Surface Discharge Volumes P90 Schedule.cdr

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgraded Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 12 May 2025	Page Size: A3	PSM4346-115R	Figure 62(a)

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
SIMULATED BASE CASE
OPERATING WATER TABLE
80 YEARS BASE SCHEDULE

C:\Work\PSM\4346\03_Figures\PSM4346-115R Rev2\Figure 62(a) Simulated Base Case Operating Water Table 80 Years Base Schedule.mxd

444000
446000
448000
450000
452000
454000
5322000
5320000
5318000
5316000

Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond
Hynns Dam

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table (m AHD)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	
	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE
OPERATING WATER TABLE
80 YEARS BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 62(b)

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Mossy Marsh Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgraded Works - Lake King William Tunnel
- Simulated Pressurisation Increased Pore Pressures (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
SIMULATED BASE CASE OPERATIONS
PRESSURISATION CONTOURS
80 YEARS
BASE SCHEDULE

PSM4346-115R | Figure 63(a)

C:\Arcd\15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 63(a) Simulated Base Case Operations Pressurisation Contours 80 Years Base Schedule.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Mossy Marsh Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

Scale 1:7,500
0 50 100 200 300 m

INSET - Tarraleah Power Station

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgraded Works - Lake King William Tunnel
- Simulated Pressurisation Increased Pore Pressures (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

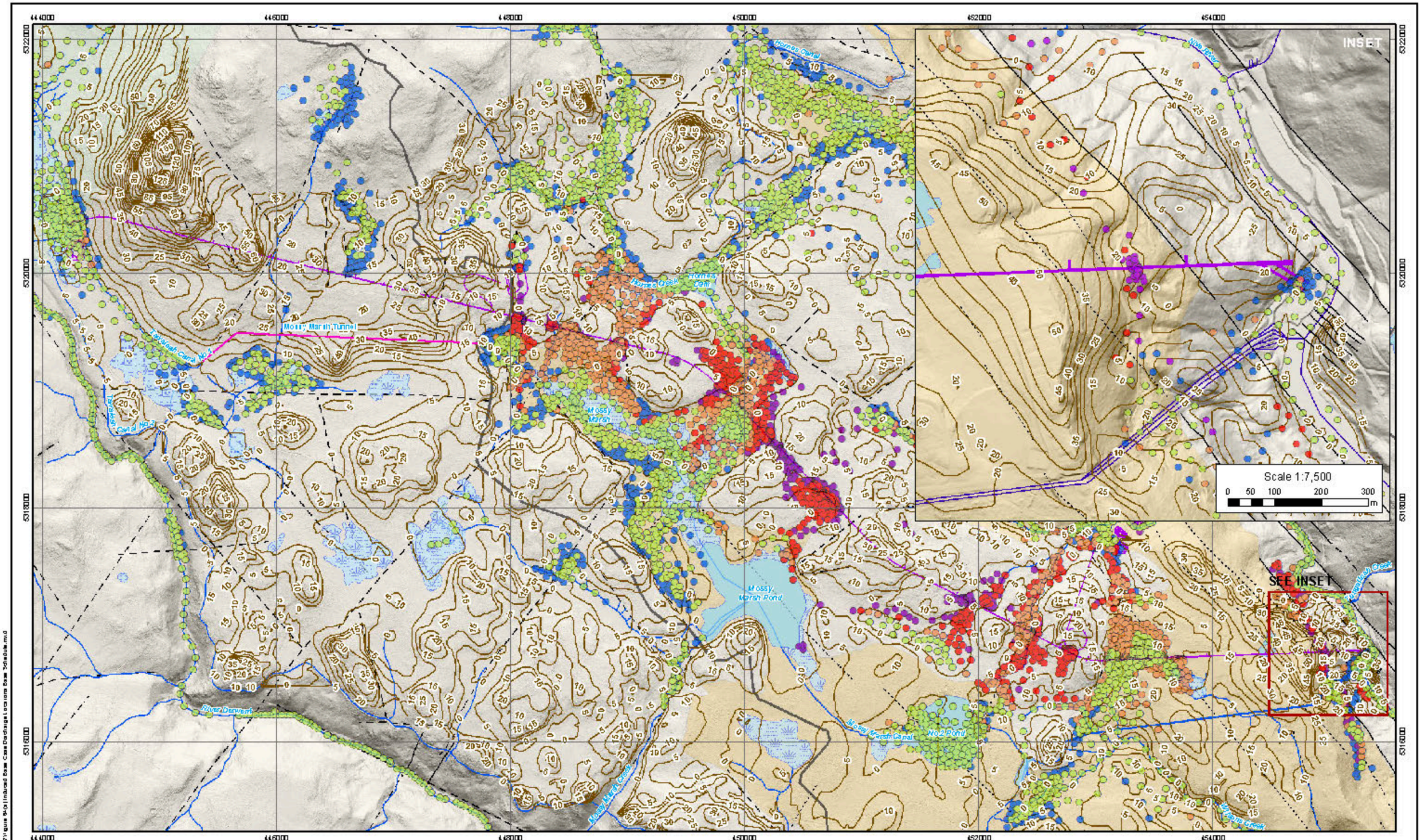
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Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
SIMULATED BASE CASE OPERATIONS
PRESSURISATION CONTOURS
80 YEARS
BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 63(b)

C:\Arcd\15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 63(b) Simulated Base Case Operations Pressurisation Contours 80 Years Base Schedule - Grouting.mxd



Legend

Induced Discharge Locations
- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Depth to water table
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel

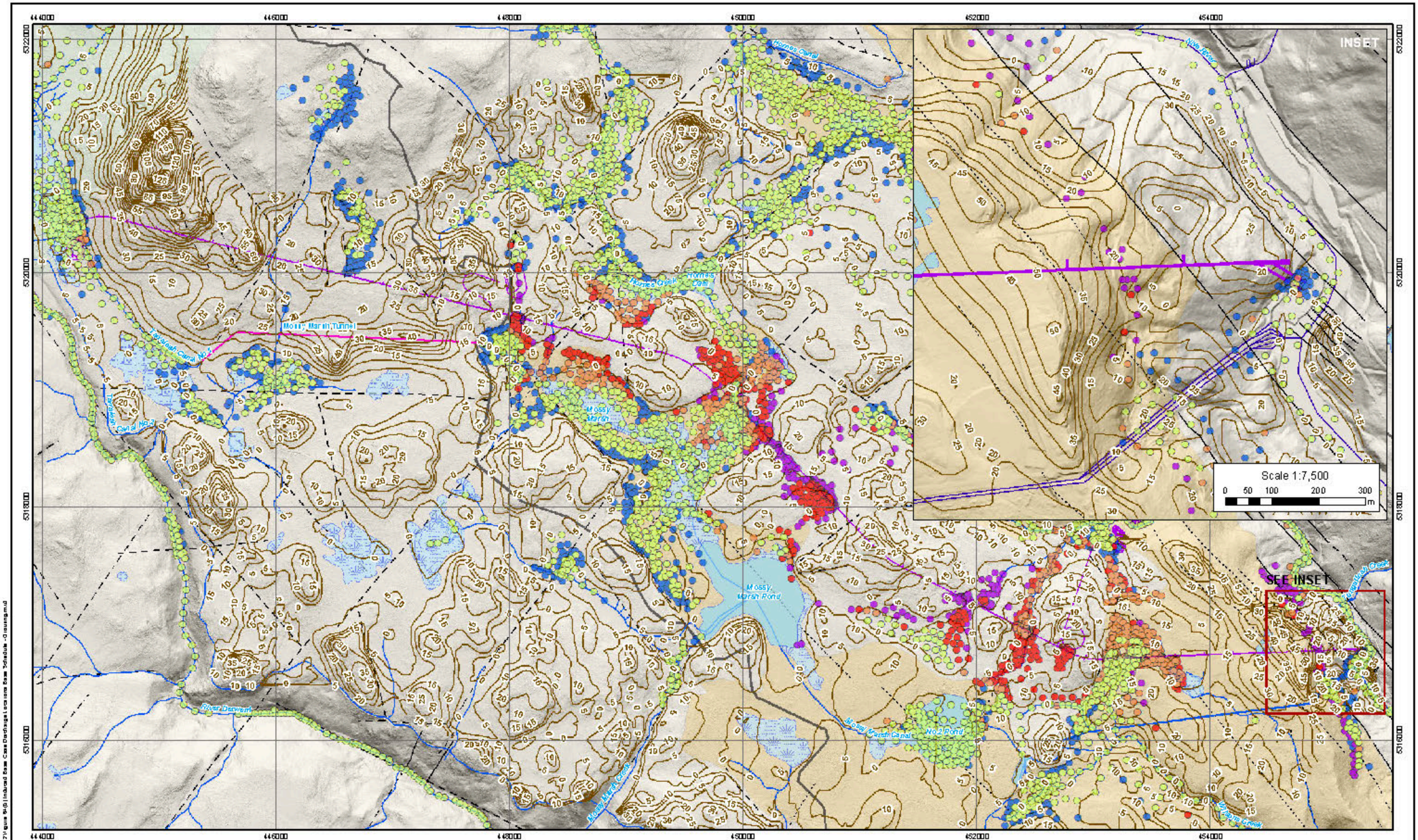
Surface Water Aspects
- Lake
- Wetland
- Rivers
- Subcatchments

Bedrock Geology
- Jurassic Dolerite
- Triassic Sandstone
- Tertiary Basalt

Interpreted Faults (PGSS, Jun 2023)
- Concealed
- Inferred
- Defined

Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 15 May 2025	Page Size: A3	INDUCED BASE CASE DISCHARGE LOCATIONS BASE SCHEDULE	
		PSM4346-115R	Figure 64(a)

C:\Arcd15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 64(a) Induced Base Case Discharge Locations Base Schedule.mxd



Legend

Induced Discharge Locations
- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Depth to water table
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel

Surface Water Aspects
- Lake
- Wetland
- Rivers
- Subcatchments

Bedrock Geology
- Jurassic Dolerite
- Triassic Sandstone
- Tertiary Basalt

Interpreted Faults (PGSS, Jun 2023)
- Concealed
- Inferred
- Defined

Created By: VC	Revision: 2
Date: 15 May 2025	Page Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED BASE CASE
DISCHARGE LOCATIONS
BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 64(b)

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 64(b) Induced Base Case Discharges Locations Base Schedule - Grouting.mxd

INSET

SEE INSET

Scale 1:7,500
0 50 100 200 300 m

Scale 1:30,000
0 250 500 1,000 1,500 Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

N

Legend

Induced Discharge Locations
- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Depth to water table
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel

Surface Water Aspects
- Lake
- Wetland
- Rivers
- Subcatchments

Bedrock Geology
- Jurassic Dolerite
- Triassic Sandstone
- Tertiary Basalt

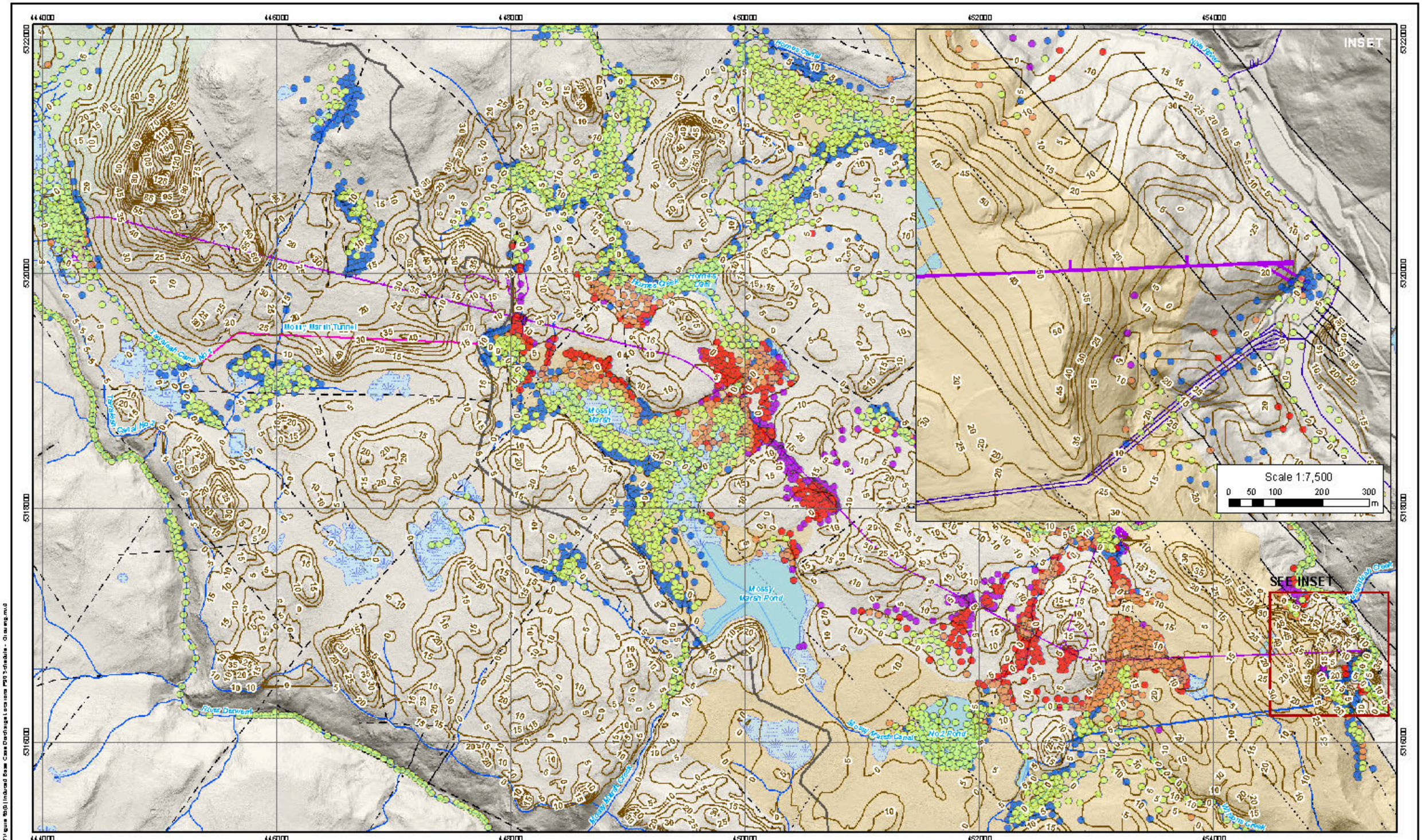
Interpreted Faults (PGSS, Jun 2023)
- Concealed
- Inferred
- Defined

P S M	Created By: VC	Revision: 2	
	Date: 15 May 2025	Page Size: A3	PSM4346-115R	Figure 65(a)

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED BASE CASE
DISCHARGE LOCATIONS
P90 SCHEDULE

C:\Work\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 65(a) Induced Base Case Discharge Locations P90 Schedule.mxd



Legend

Induced Discharge Locations
- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Depth to water table
- Tarraleah Redevelopment
- Mossy Marsh Tunnel

Surface Water Aspects
- Lake
- Wetland
- Rivers
- Subcatchments

Bedrock Geology
- Jurassic Dolerite
- Triassic Sandstone
- Tertiary Basalt

Interpreted Faults (PGSS, Jun 2023)
- Concealed
- Inferred
- Defined

N

Scale 1:30,000

0 250 500 1,000 1,500 Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

PSM	Created By: VC	Revision: 2
	Date: 15 May 2025	Page Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED BASE CASE
DISCHARGE LOCATIONS
P90 SCHEDULE - GROUTING

PSM4346-115R | Figure 65(b)

C:\Projects\PSM4346-115R_Tarraleah_Redevelopment_Hydrogeological_Interpretative_Report\Figures\Figure 65(b)_Induced Base Case Discharge Locations - P90 Schedule - Grouting.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Mossy Marsh
Mossy Marsh Pond
No.2 Pond

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table for 80 Years (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report SIMULATED BASE CASE FORWARD PATHLINES BASE SCHEDULE
	Date: 12 May 2025	Page Size: A3	PSM4346-115R | Figure 66(a)

C:\Revit\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 66(a) Simulated Base Case Forward Pathlines Base Schedule.mxd

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table for 80 Years (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 12 May 2025	Page Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE FORWARD PATHLINES BASE SCHEDULE - GROUTING

PSM4346-115R | Figure 66(b)

C:\Projects\PSM4346-115R\Figure 66(b) Simulated Base Case Forward Pathlines Base Schedule - Grouting.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Hermits Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table for 80 Years (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By. VC	Revision. 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report SIMULATED BASE CASE FORWARD PATHLINES P90 SCHEDULE
	Date. 12 May 2025	Page Size. A3	PSM4346-115R | Figure 67(a)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R_Fig 67(a) Simulated Base Case Forward Pathlines P90 Schedule.mxd

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Hynds Dam
Mossy Marsh
Mossy Marsh Pond
No2 Pond
No1 Pond

Legend

- Tarraleah Redevelopment Alignment
- Tarraleah Upgrade Works - Lake King William Tunnel
- Simulated Water Table for 80 Years (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

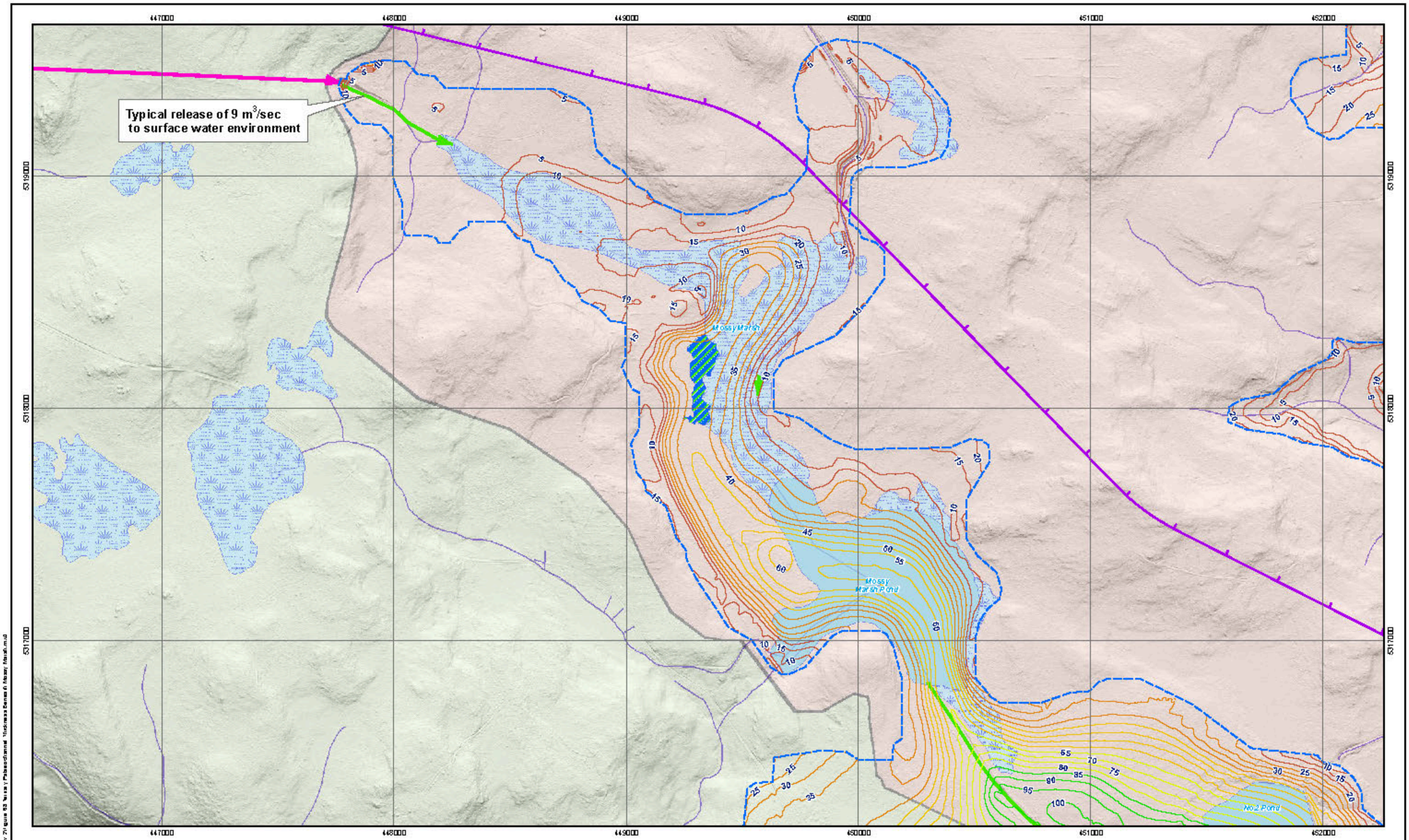
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED BASE CASE FORWARD PATHLINES P90 SCHEDULE - GROUTING

PSM4346-115R | Figure 67(b)

C:\Projects\PSM4346\GIS\MXD\PSM4346-115R Rev2\Figure 67(b) Simulated Base Case Forward Pathlines P90 Schedule - Grouting.mxd



Legend

Surface Water Aspects

- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Mossy Marsh Canal
- Mossy Marsh Tunnel
- Tarraleah Redevelopment

Upper Derwent Sub-Catchments

- Lower Nive
- Upper Derwent (incl. Beech)

Tertiary Palaeochannel Interpreted Thickness (m)

- 0 - 20
- 20 - 40
- 40 - 60
- 60 - 80
- 80 - 100
- 100 - 120
- 120 - 140
- 140 - 160
- Interpretation of Basalt Domain

N

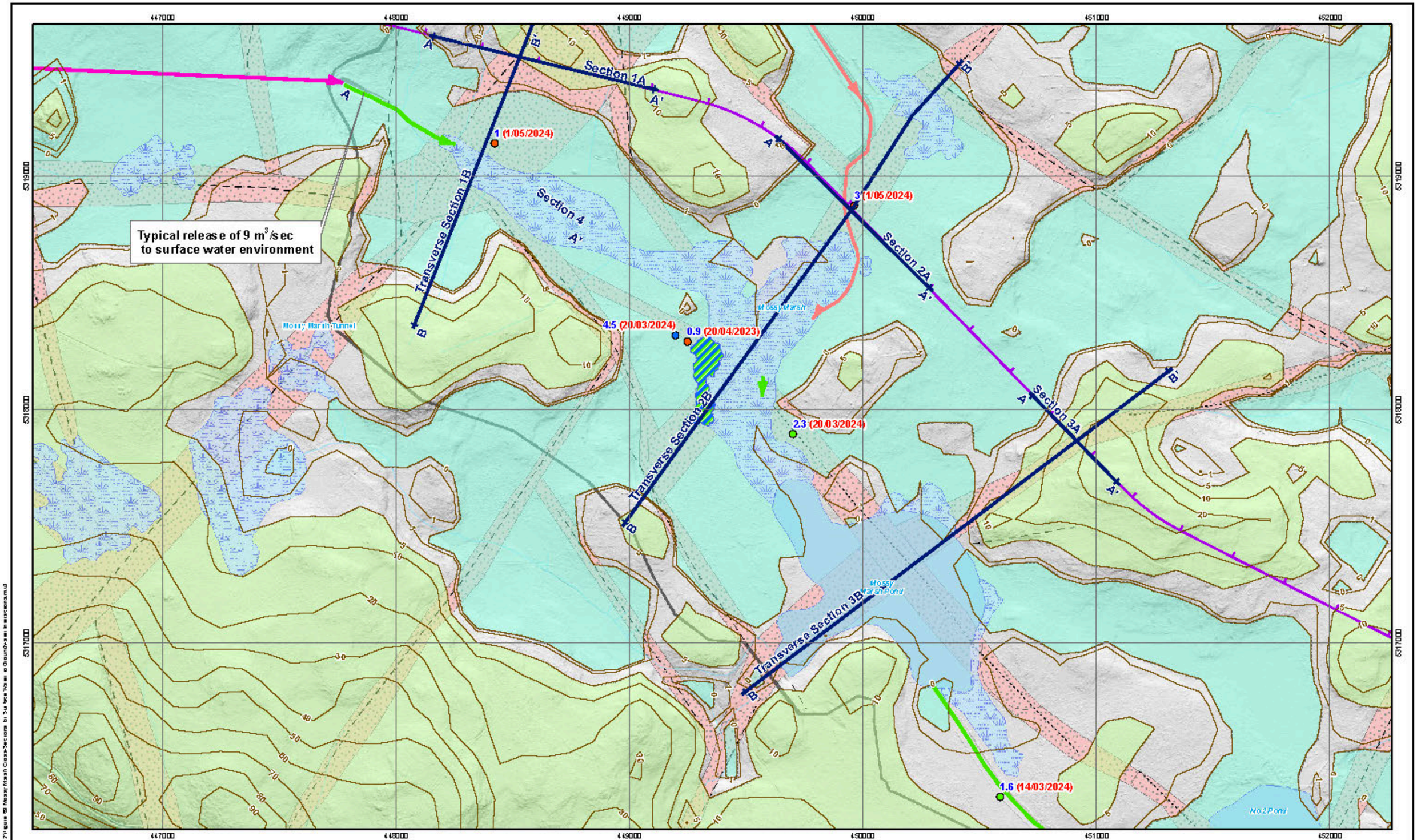
Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 12 May 2025	Paper Size: A3	TERTIARY PALAEOCHANNEL THICKNESS BENEATH MOSSY MARSH	
		PSM4346-115R	Figure 68

C:\Vec\GIS\PSM4346\R0_Figures\PSM4346-115R Rev 2\Figure 68 Tertiary Palaeochannel Thickness Beneath Mossy Marsh.mxd



Legend

Surface Water Aspects
- Mossy Marsh Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Subcatchment

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Depth to Baseline Water Table (m)
- Groundwater Discharge Zones

- Potential Groundwater Recharge Zones

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Home's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones
- Section lines

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Revision: 2
Date: 12 May 2025
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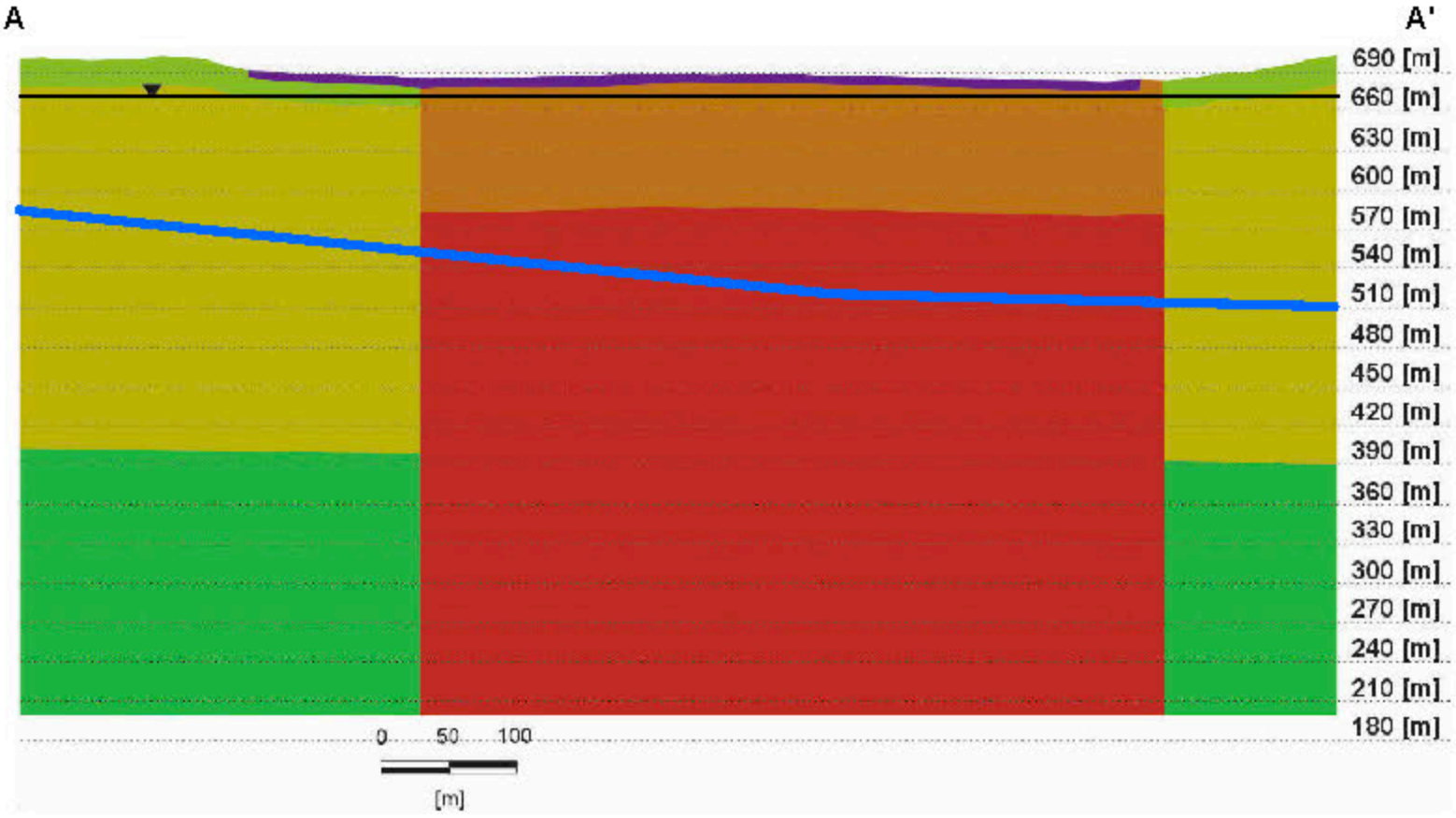
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

MOSSY MARSH CROSS-SECTIONS FOR SURFACE WATER TO GROUNDWATER INTERACTIONS

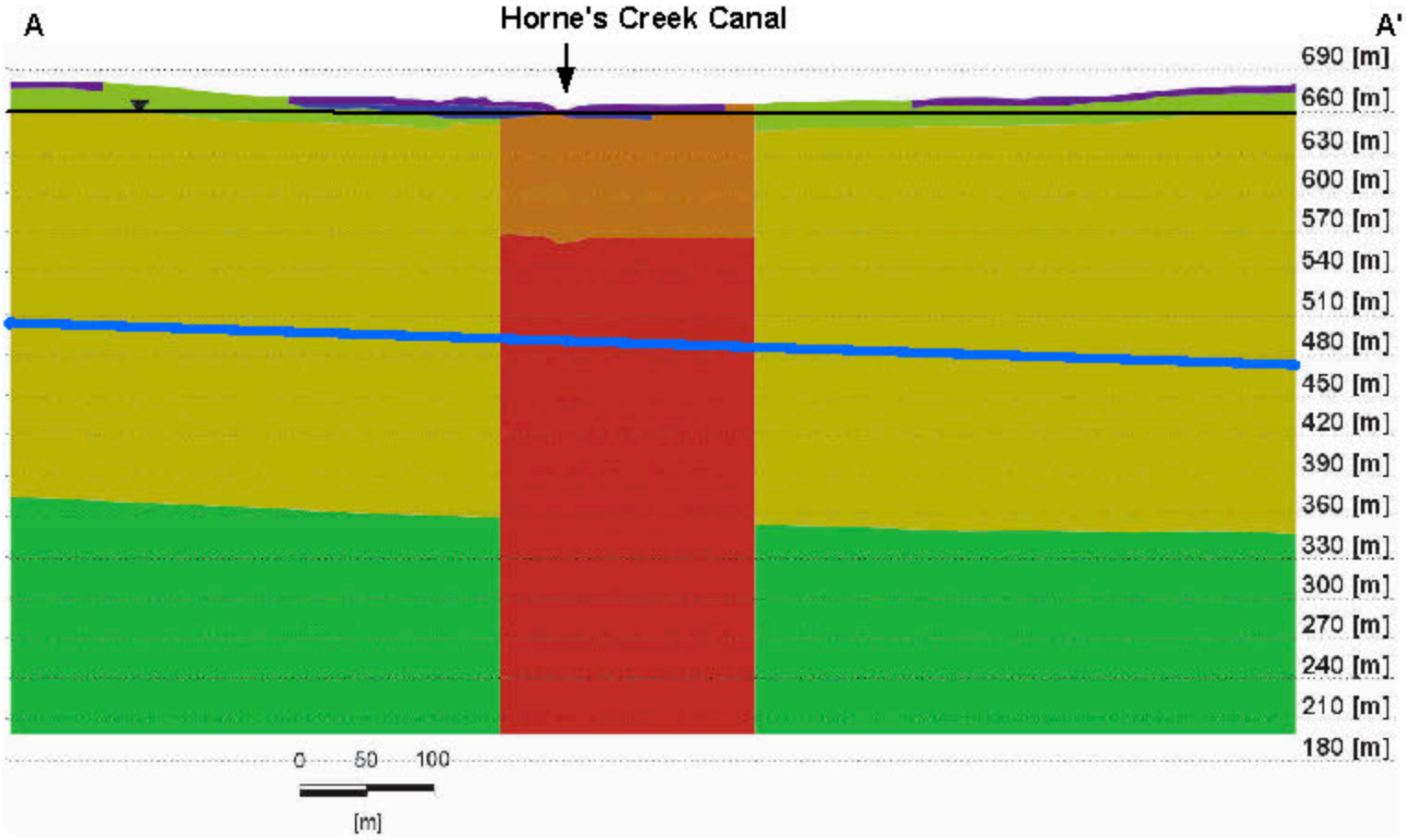
PSM4346-115R | Figure 69

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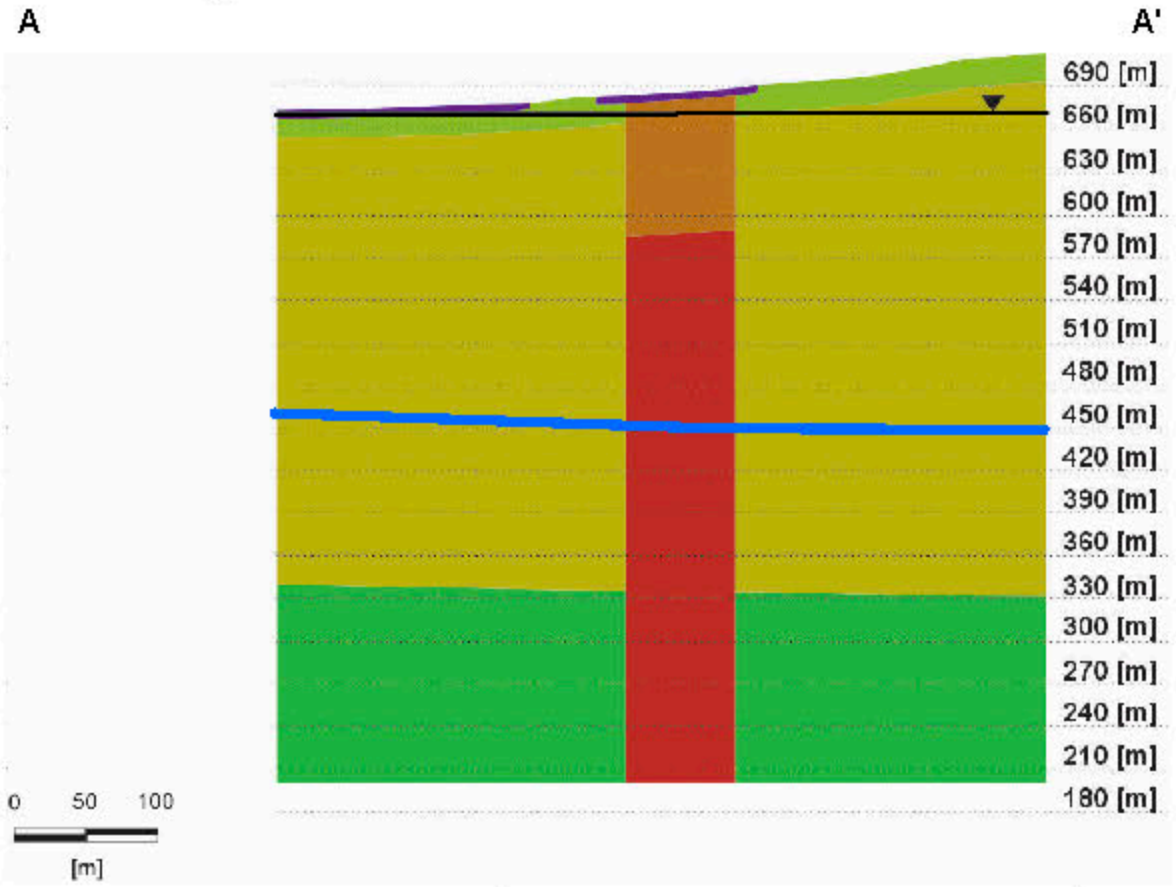
Section 1A



Section 2A



Section 3A



Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
- Dolerite D1 - Massive
- Dolerite D6 - Weathered
- Triassic Sandstone
- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Depsit/Swamp Deposit
- Tunnel Alignment
- Baseline Water Table

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Created By: VC

Revision: 2

Date: 12 May 2025

Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

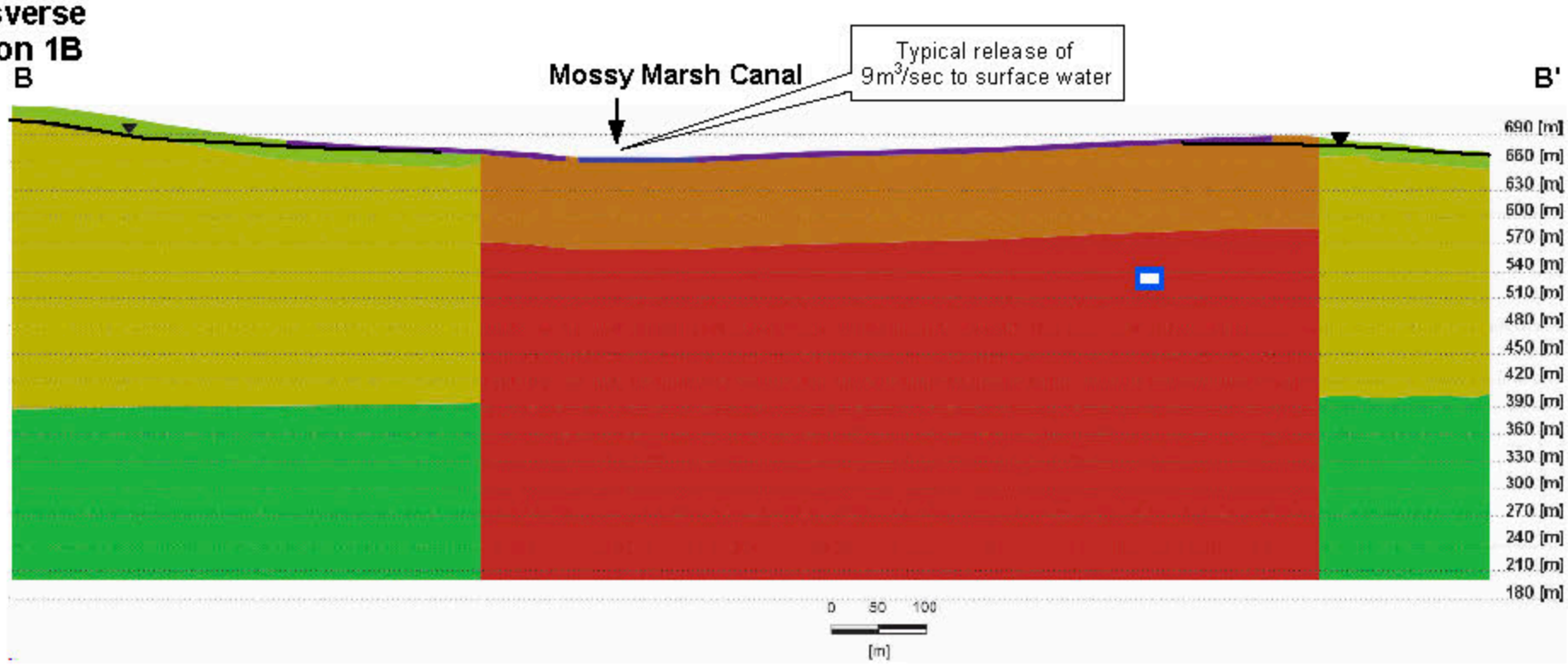
BASELINE MOSSY MARSH SECTIONS OF TUNNEL INTERSECTIONS WITH FRACTURE ZONES

PSM4346-115R

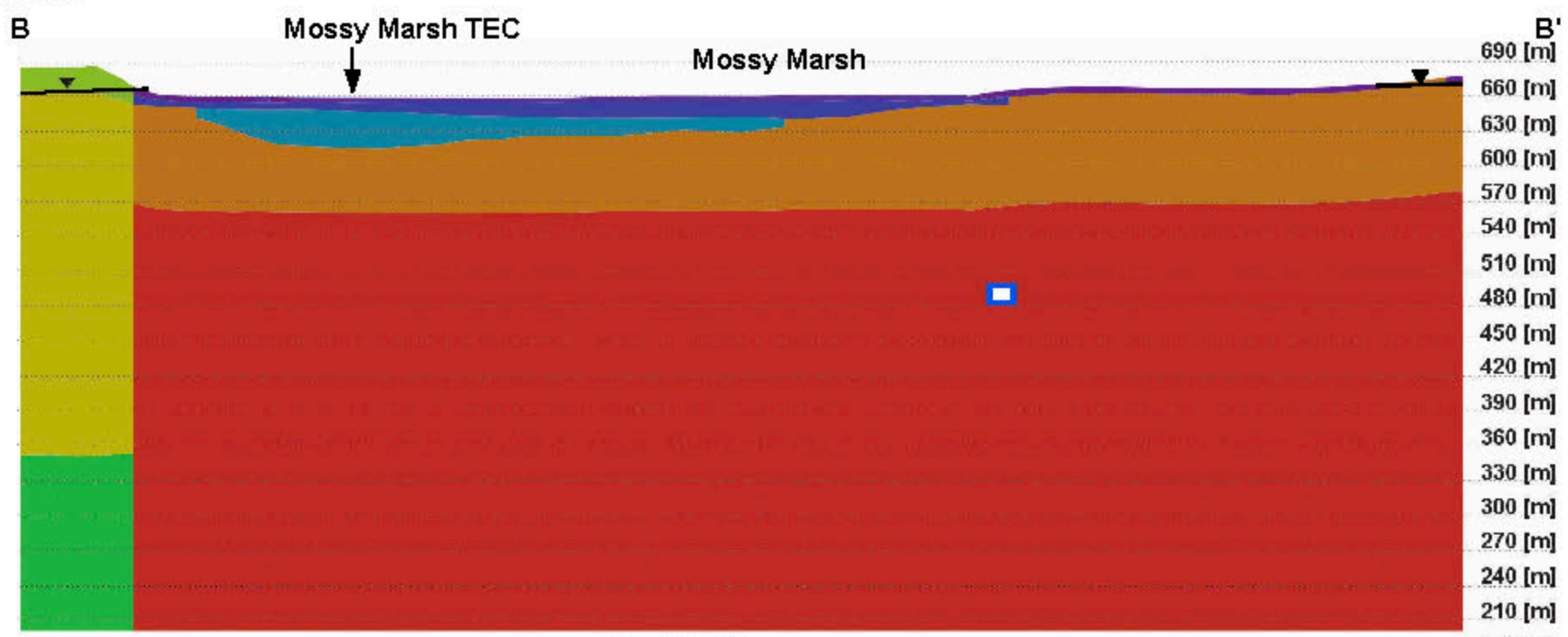
Figure 70

C:\Arcd15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 70 Baseline Mossy Marsh Sections of Tunnel Intersections with Fracture Zones.mxd

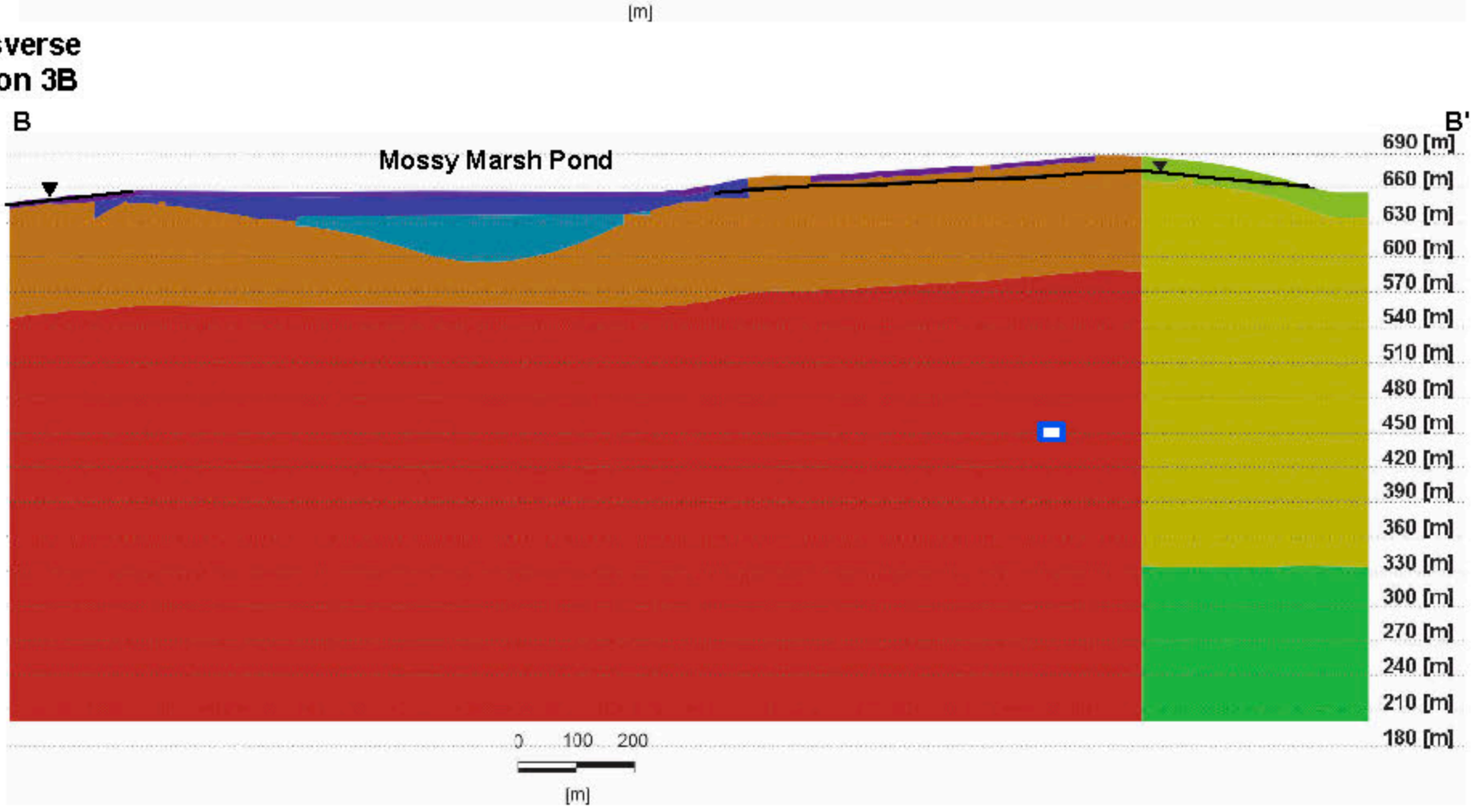
Transverse Section 1B



Transverse Section 2B



Transverse Section 3B



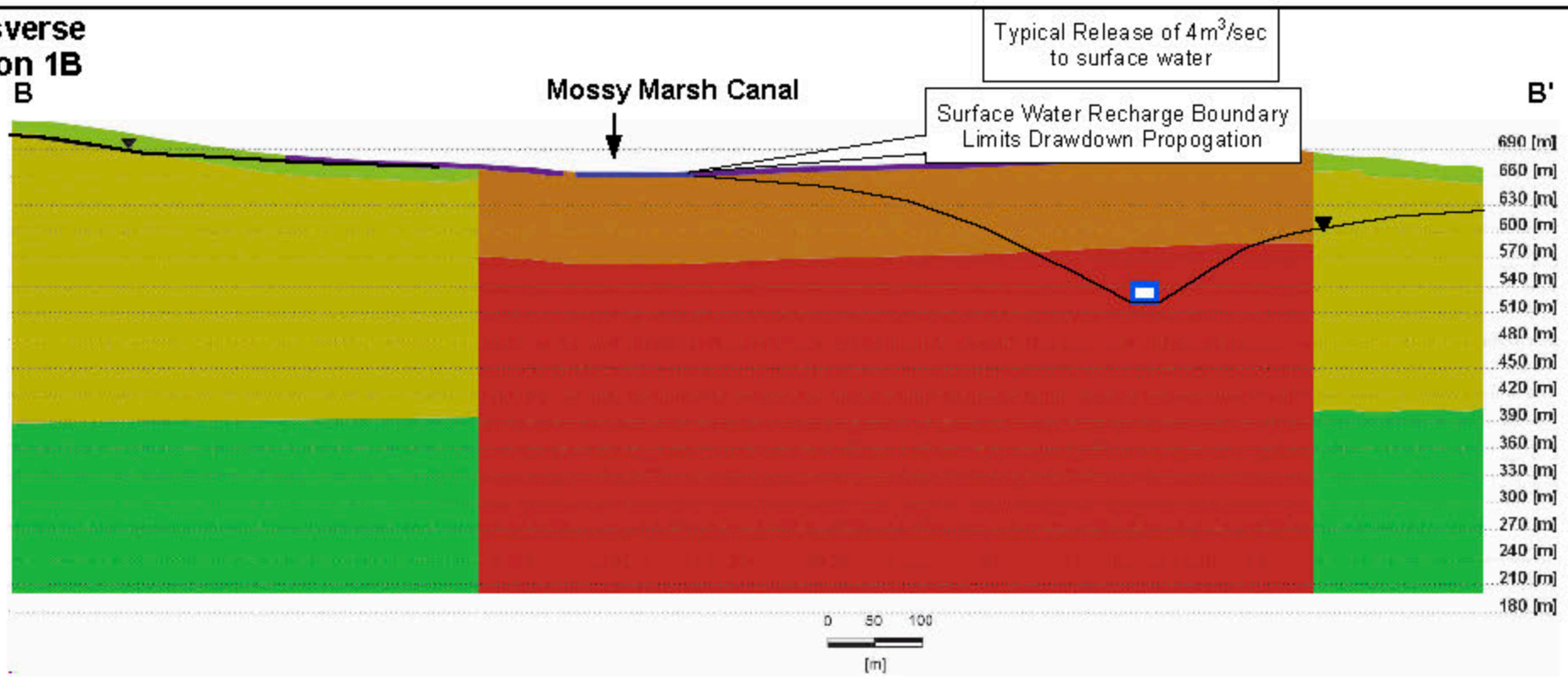
Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
- Dolerite D1 - Massive
- Dolerite D6 - Weathered
- Triassic Sandstone
- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Depsit/Swamp Deposit
- Tunnel Alignment
- Baseline Water Table

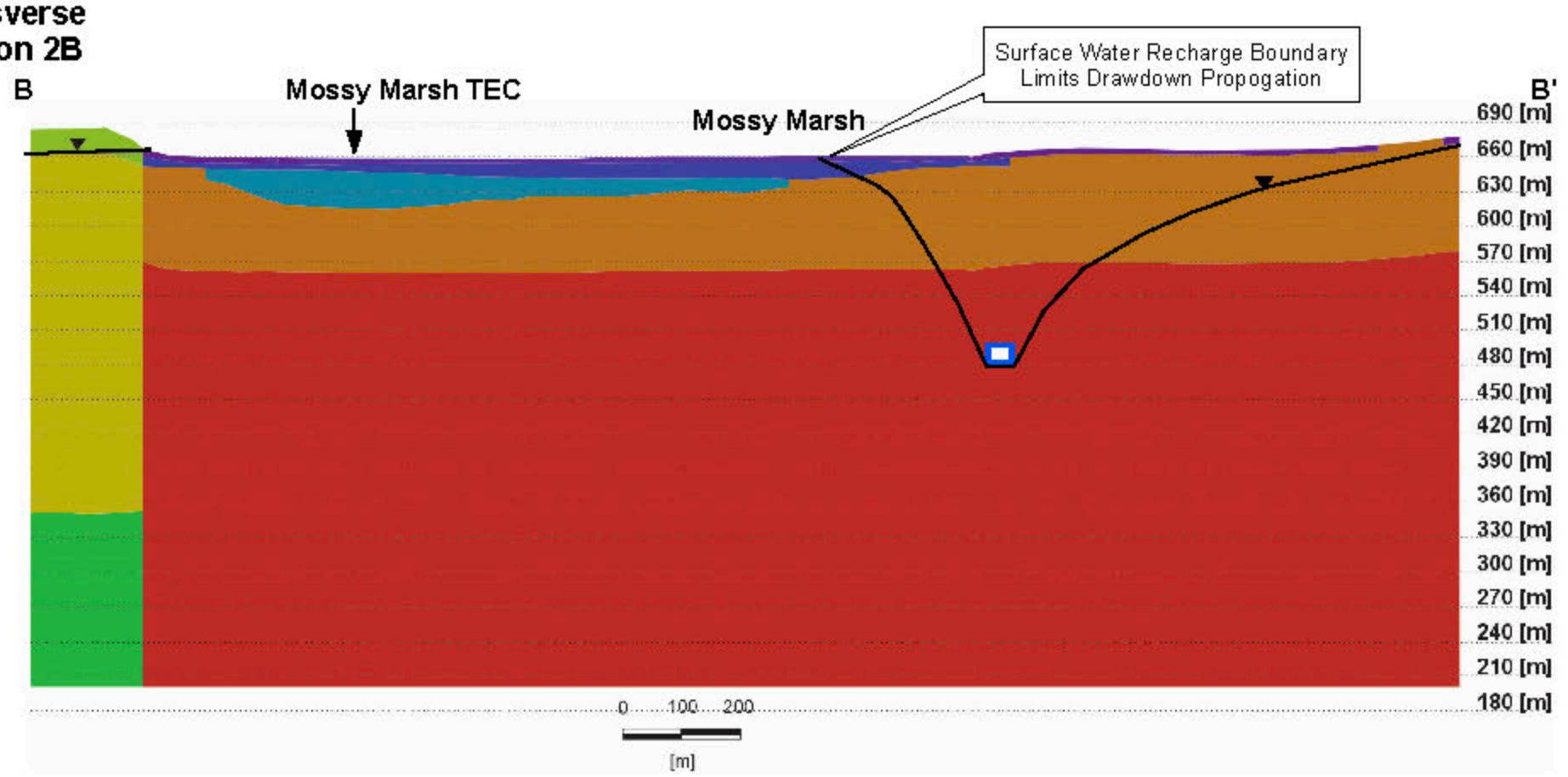
P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report
	Date: 12 May 2025	Paper Size: A3	BASELINE MOSSY MARSH TRANSVERSE SECTIONS
			PSM4346-115R | Figure 71

C:\Arcd15\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 71 Baseline Mossy Marsh Transverse Sections.mxd

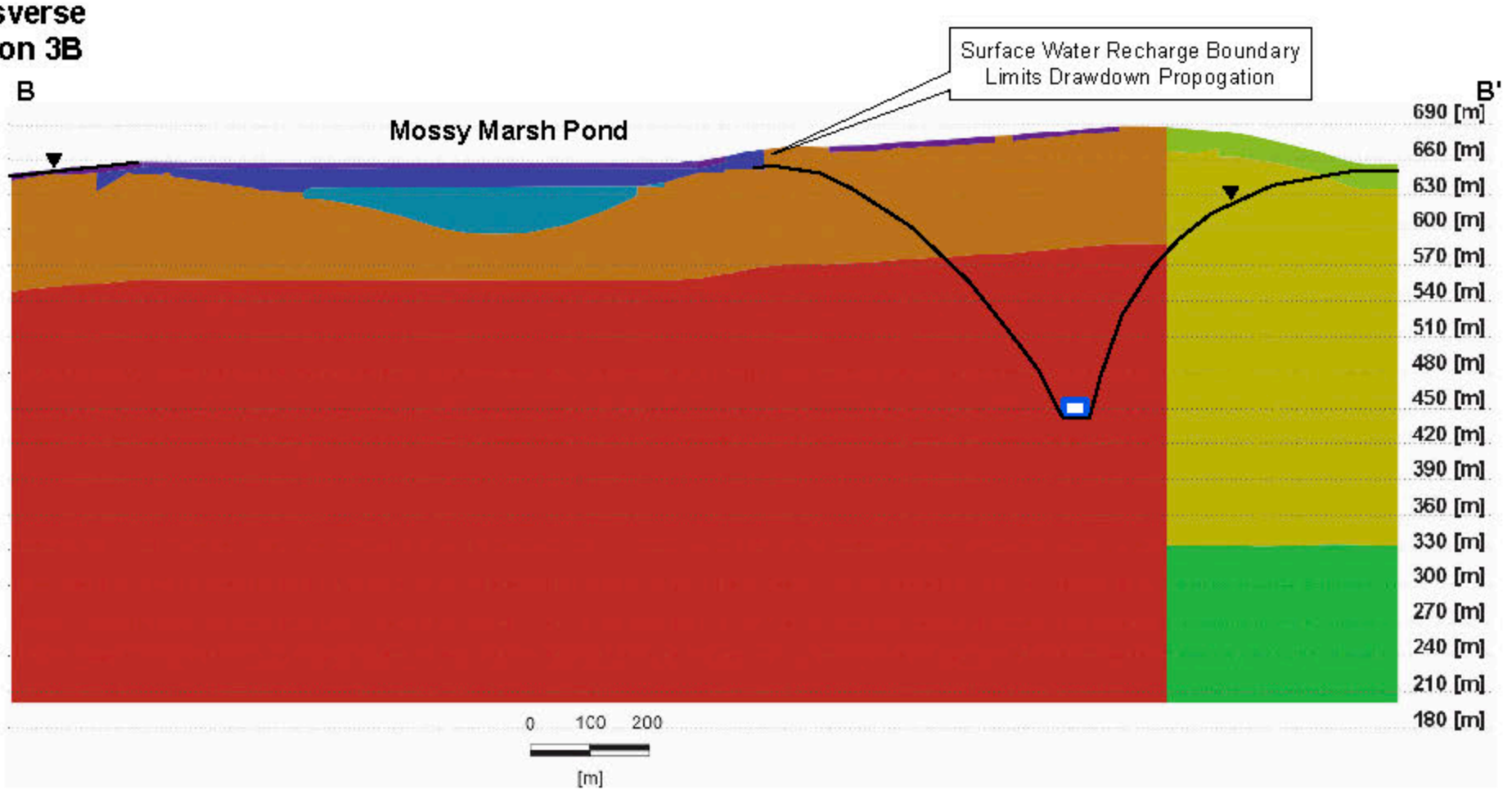
Transverse Section 1B



Transverse Section 2B



Transverse Section 3B



Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
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- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Depsit/Swamp Deposit
- Tunnel Alignment
- Water Table

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Tarraleah Redevelopment Project
RFI Response - Surface Water and Groundwater Impacts

CONSTRUCTION STAGE MOSSY MARSH TRANSVERSE SECTIONS

PSM4346-115R | Figure 72

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444000 445000 446000 447000 448000 449000

5321000 5320000 5319000

Wentworth Hills

A A' Section 6

A B Transverse Section 5B

Section 5A A'

90 (1/05/2024)

1.8 (20/03/2024)

Typical release of 9 m^3/sec to surface water environment

1 (1/05/2024)

Horne's Dam

Mossy Marsh

Legend

Surface Water Aspects
- Northern Sphagnum Peatland TEC
- Wetland
- Lake
- Streams
- Subcatchment

Depth to Groundwater Observations, (Date/Period)
- Open Hole / Drilling Observation
- Standpipe
- VWP
- Depth to Baseline Water Table (m)
- Groundwater Discharge Zones
- Potential Groundwater Recharge Zones

Tarraleah Infrastructure
- Tarraleah Redevelopment Alignment
- Mossy Marsh Tunnel
- Mossy Marsh Canal
- Tarraleah Canal No 1
- Horne's Creek Canal

Interpreted Faults (Stuart-Smith 2023)
- Concealed
- Inferred
- Defined
- Fracture Zones
- Section lines

N

Scale 1:15,000

0 150 300 600 900 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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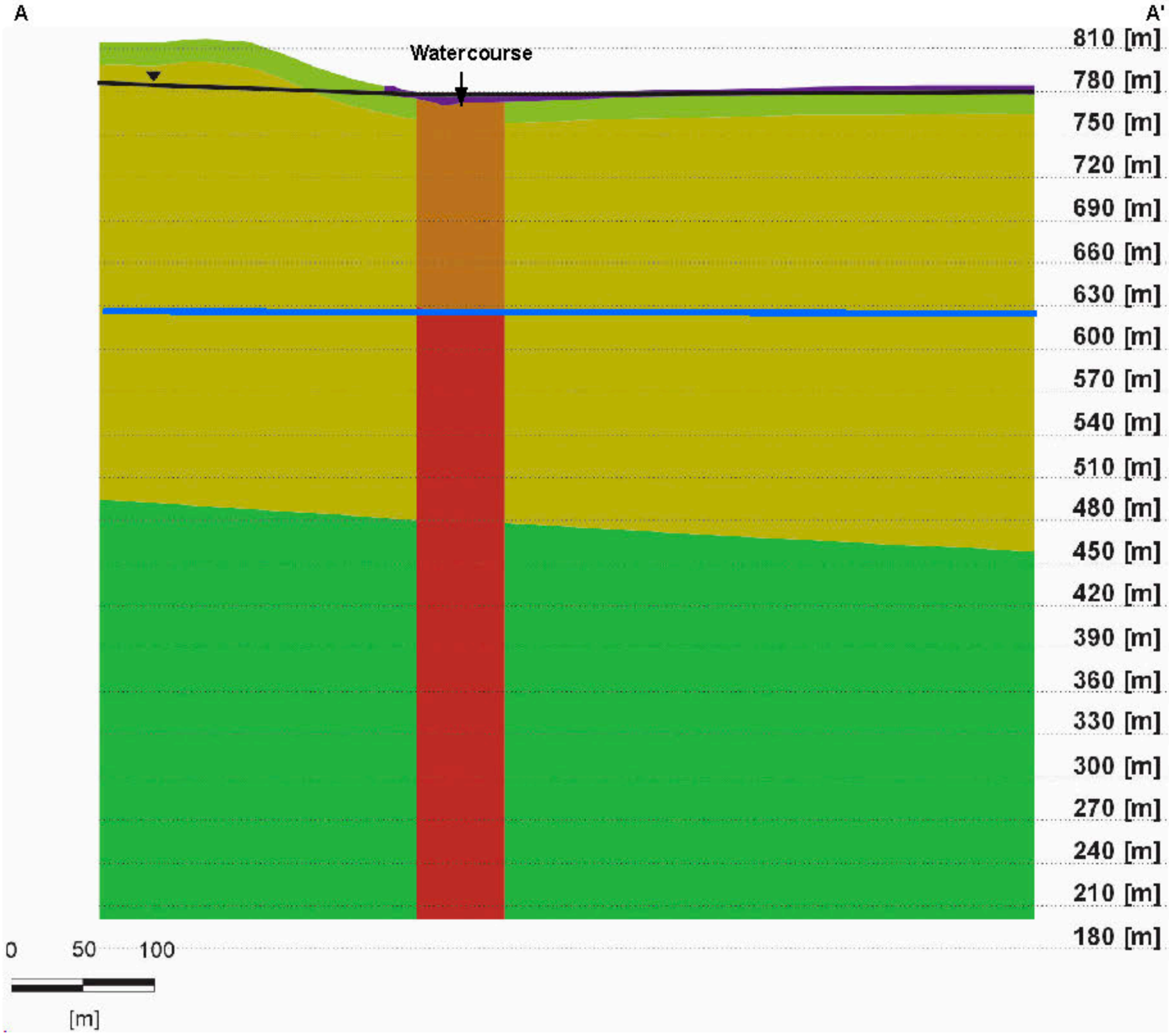
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

NORTHERN TEC CROSS-SECTIONS FOR SURFACE WATER TO GROUNDWATER INTERACTIONS

PSM4346-115R | Figure 73

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Section 5A



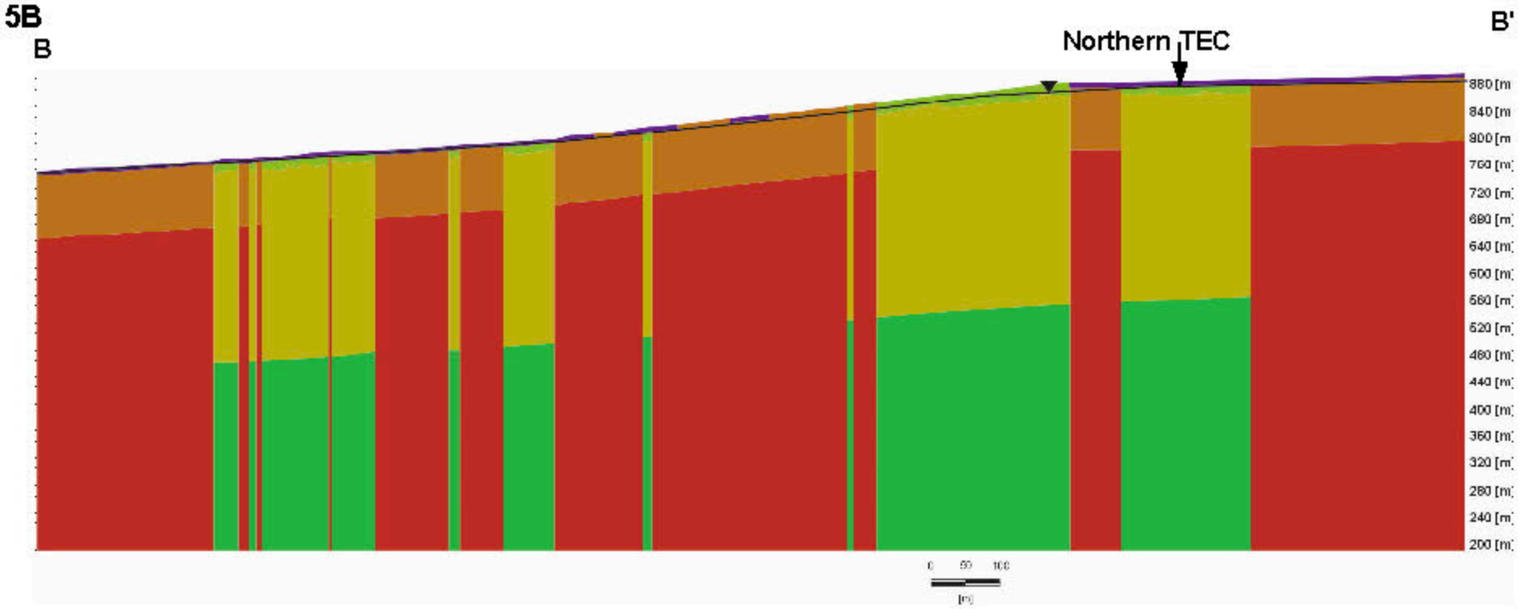
Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
- Dolerite D1 - Massive
- Dolerite D6 - Weathered
- Triassic Sandstone
- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Deposit/Swamp Deposit
- Tunnel Alignment
- Water Table

P S M	Created By: VC	Revision: 2	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report BASELINE NORTHERN TEC SECTION OF TUNNEL INTERSECTIONS WITH FRACTURE ZONES
	Date: 12 May 2025	Paper Size: A3	PSM4346-115R | Figure 74

C:\Arcdata\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 74 Baseline Northern TEC Section of Tunnel Intersections with Fracture Zones.mxd

Transverse Section 5B



Legend

- Tertiary Sediments
- Dolerite D2/D4/D5 - Fracture Zone; Deep
- Dolerite D2/D4/D5 - Fracture Zone; Shallow
- Dolerite D1 Massive
- Dolerite D6 - Weathered
- Triassic Sandstone
- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Deposit/Swamp Deposit
- Tunnel Alignment
- Baseline Water Table

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

BASELINE NORTHERN TEC
TRANSVERSE SECTION

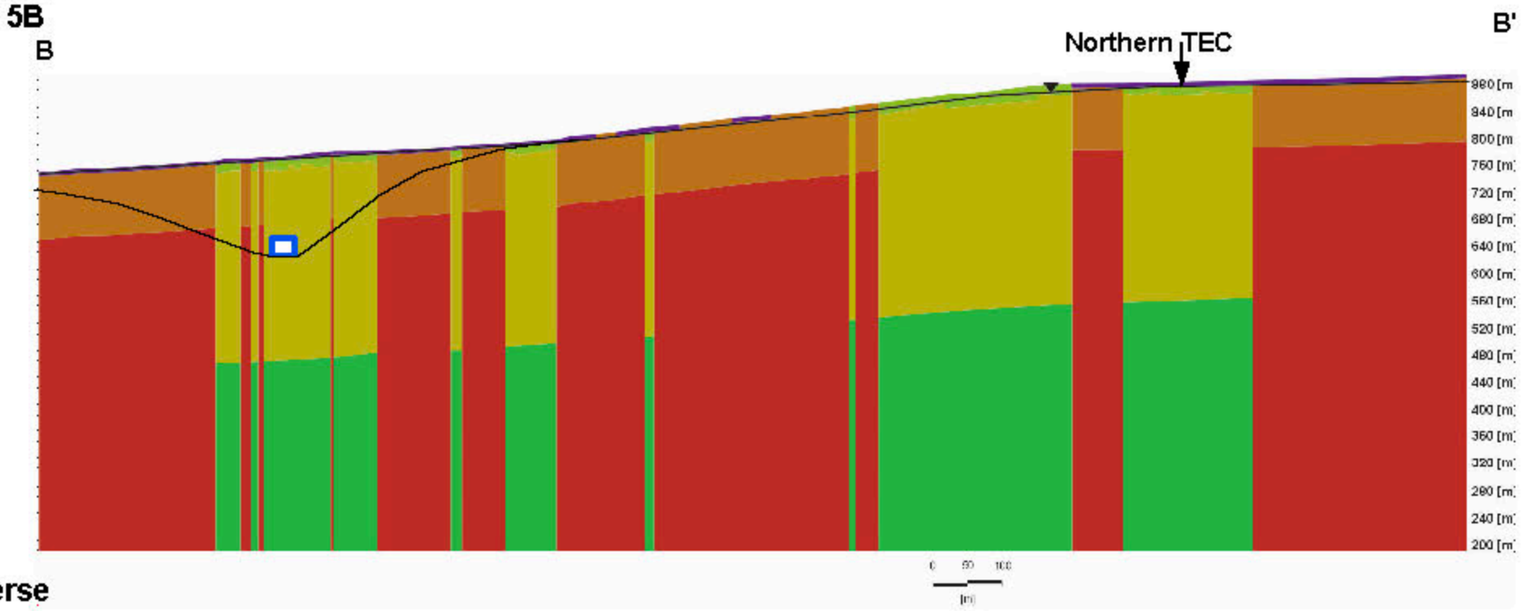
PSM4346-115R

Figure 75

C:\Arcl15\PSM4346\03_Figures\PSM4346-115R Rev 2\Figure 75 Baseline Northern TEC Transverse Section.mxd

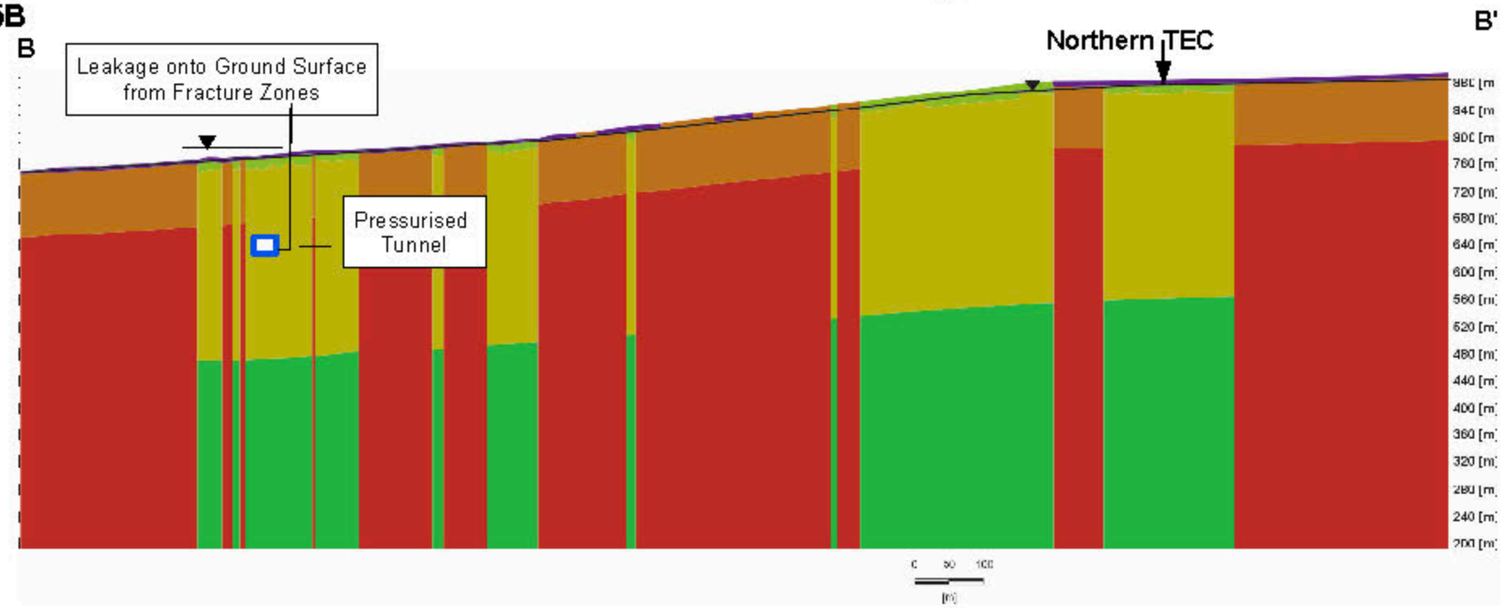
Transverse Section 5B

Construction Stage



Transverse Section 5B

Operations Stage



Legend

- Tertiary Sediments
- Dolerite D2/D4/D5 - Fracture Zone; Deep
- Dolerite D2/D4/D5 - Fracture Zone; Shallow
- Dolerite D1 Massive
- Dolerite D6 - Weathered
- Triassic Sandstone
- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Deposit/Swamp Deposit
- Tunnel Alignment
- Water Table

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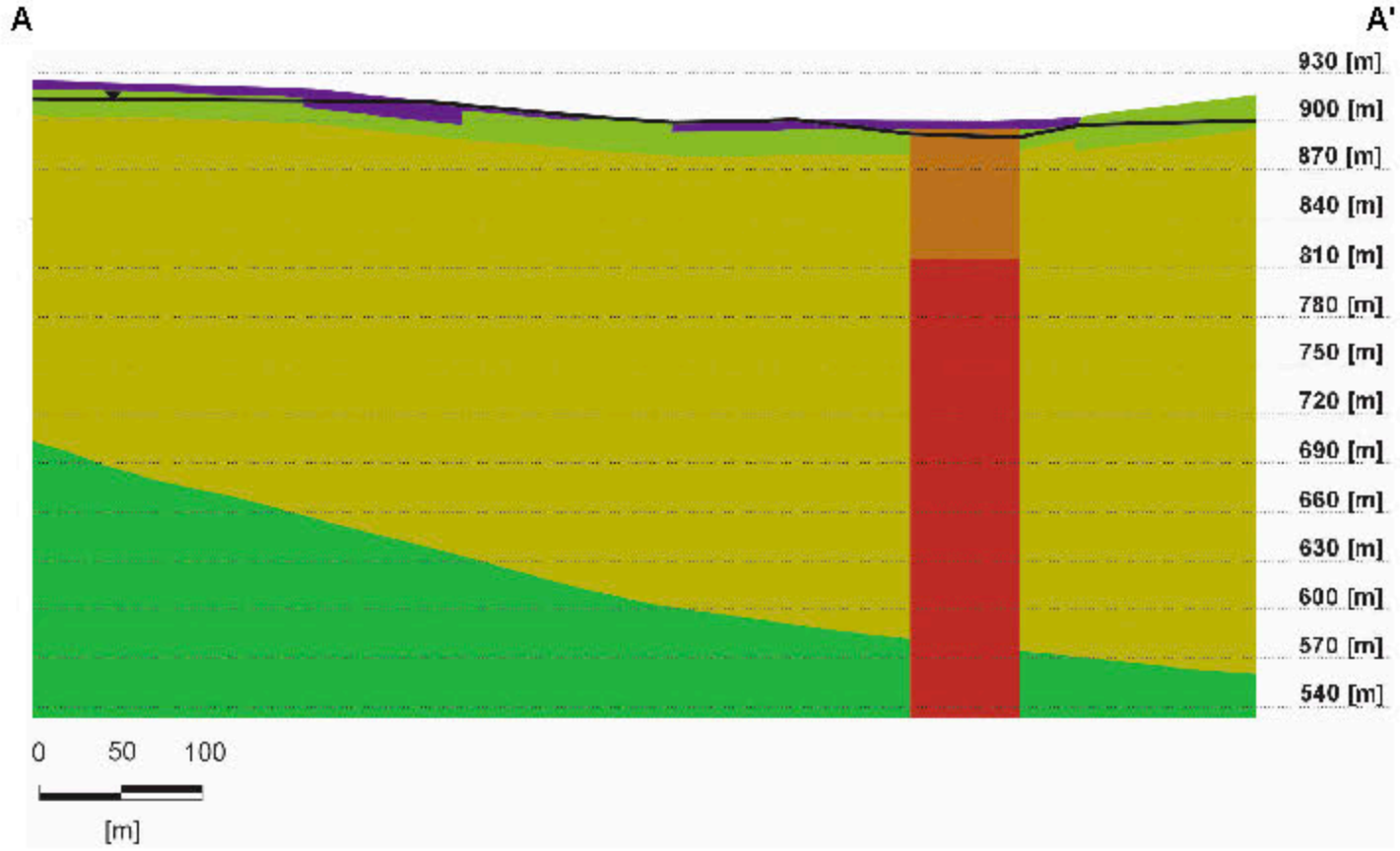
Date: 12 May 2025 | Page Size: A3

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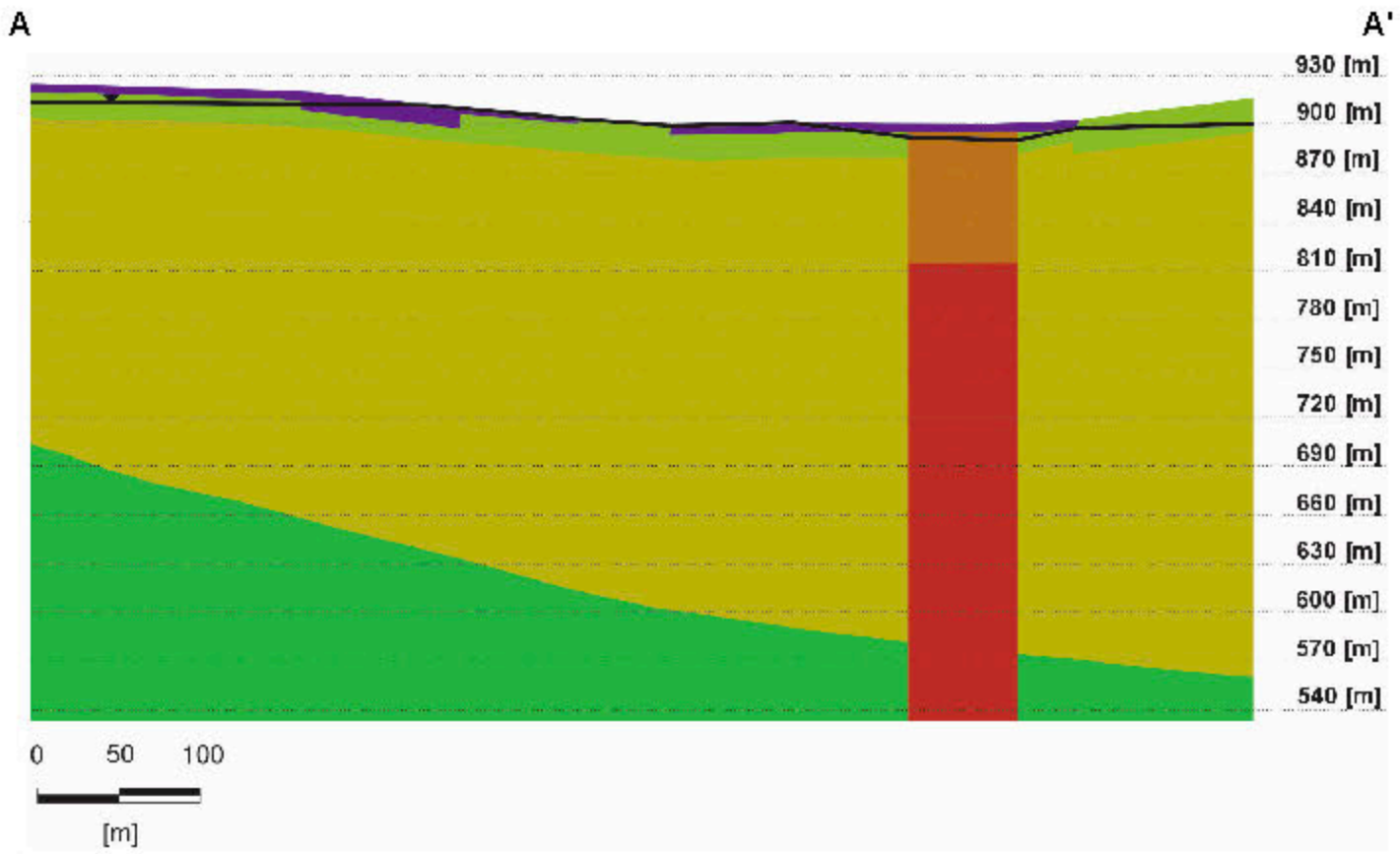
CONSTRUCTION AND OPERATIONS NORTHERN TEC TRANSVERSE SECTIONS

PSM4346-115R | Figure 76

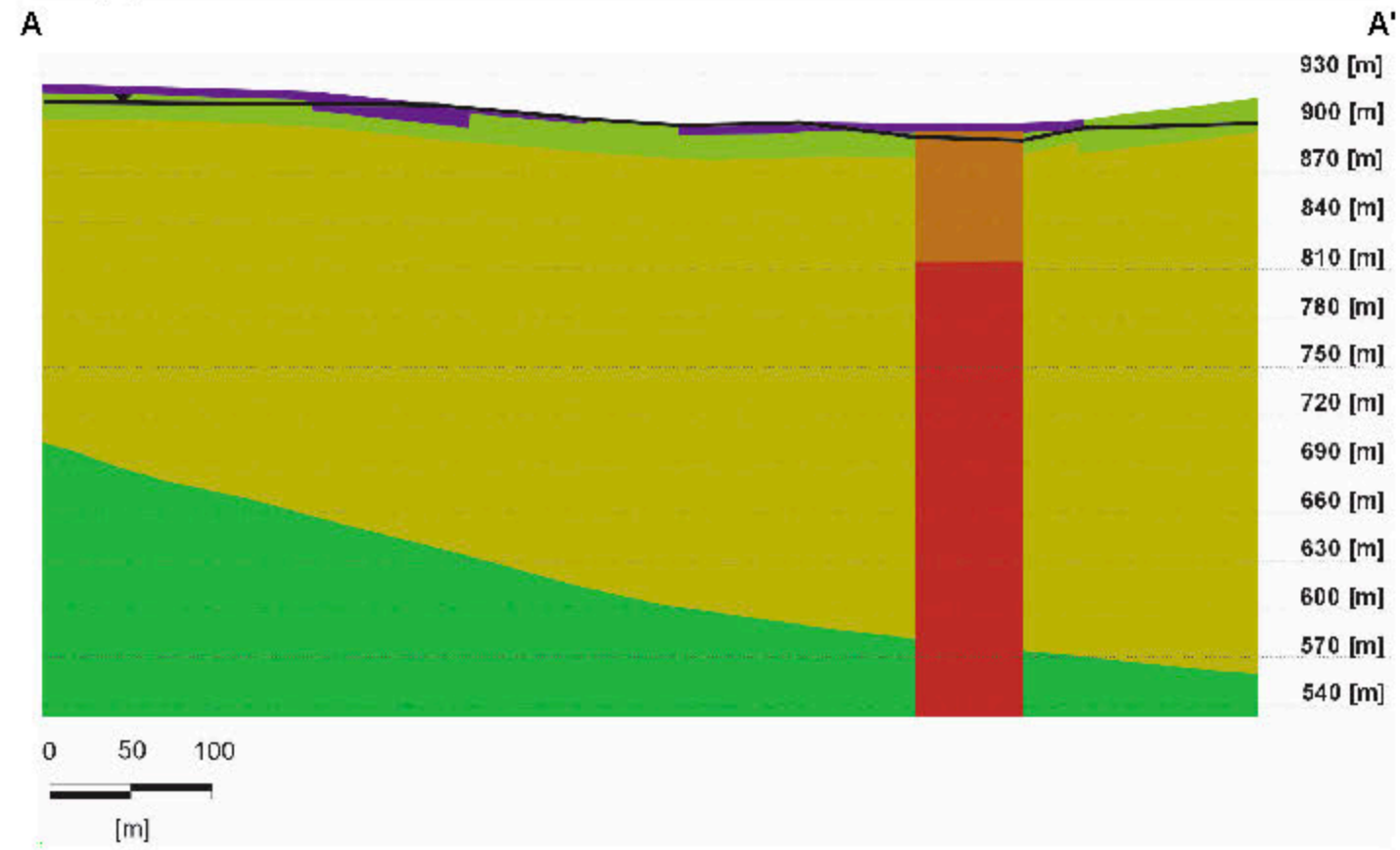
Section 6 - Baseline



Section 6 - Construction Stage



Section 6 - Operations Stage



Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
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- Dolerite D6 - Weathered
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- Basalt
- Glacial deposit/Swamp Deposit
- Alluvium/Glacial Deposit/Swamp Deposit
- Water Table

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Hydrogeological Interpretative Report

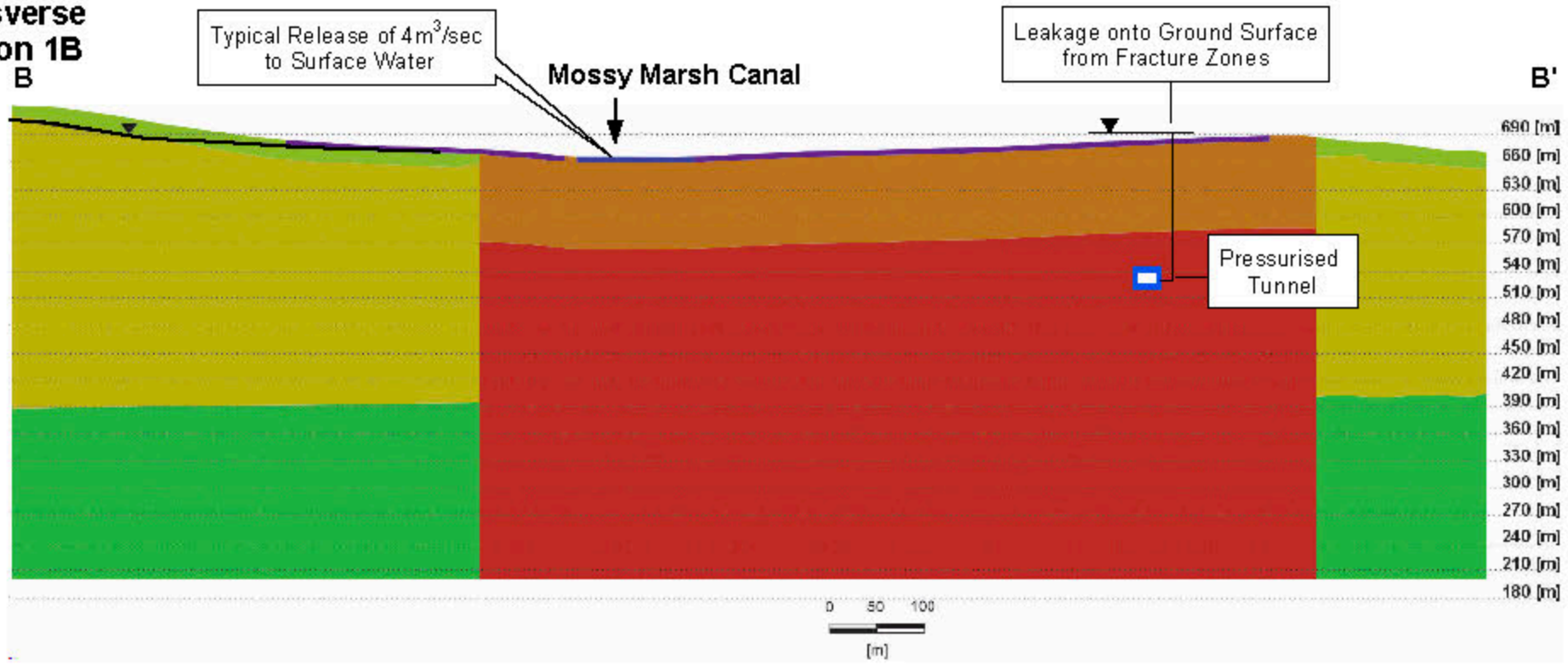
BASELINE, CONSTRUCTION STAGE AND OPERATIONS STAGE NORTHERN TEC SECTION

PSM4346-115R

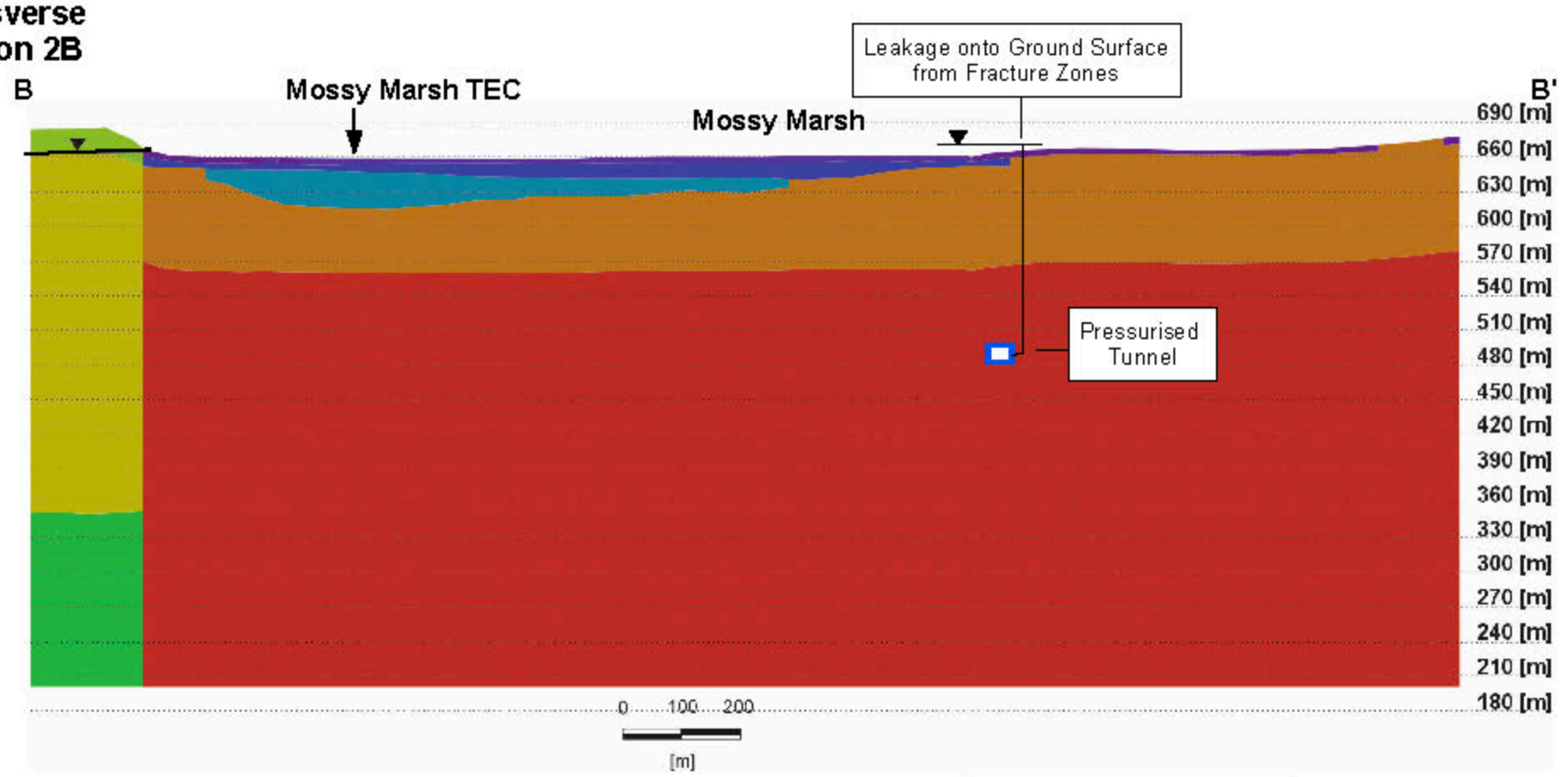
Figure 77

C:\Acad\PSM4346\03_Figures\PSM4346-115R Rev2\Figure 77 Baseline, Construction Stage and Operations Stage Northern TEC Section.mxd

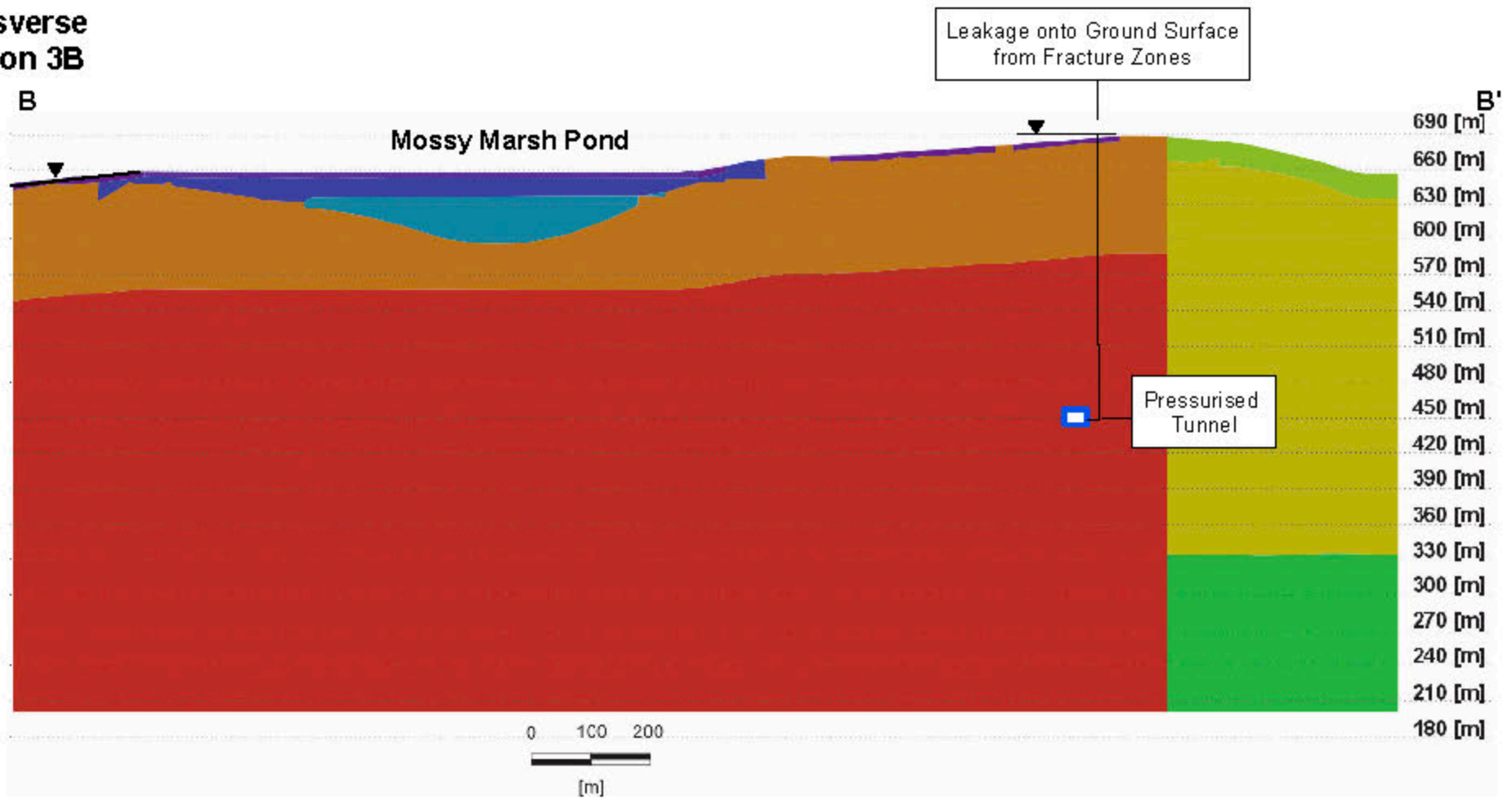
Transverse Section 1B



Transverse Section 2B



Transverse Section 3B



Legend

- Tertiary Sediments
- Dolerite D3/D4/D5 - Fracture Zone: Deep
- Dolerite D3/D4/D5 - Fracture Zone: Shallow
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- Water Table

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Hydrogeological Interpretative Report

OPERATIONS STAGE MOSSY MARSH TRANSVERSE SECTIONS

PSM4346-115R

Figure 78

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Appendix A
Boreholes and Piezometers

- Table A1 – Summary of Standpipe Installations by Locations
- Table A2 – Summary of Vibrating Wire Piezometers by Locations

Table A1 – Summary of Standpipe Installations by Locations

BHID	Location	Status	Easting (m)	Northing (m)	Elevation (mAHD)	Hole Depth (m)	Date Installed	Incline Angle	Dip Direction (TN)	Screen Depth (m)		Screen Elevation (m AHD)		Gravel Pack (m AHD)		Water Quality Monitoring Bore	Transient Head Monitoring Target
										From	To	From	To	From	To		
Q-SP1	Tarraleah Hillside	VWP	454844	5316329	588.71	45.5	27/04/2017	-90	-	-	-	-	-	-	-	-	-
S-SP1		VWP	454994	5316463	487.48	14.2	27/04/2017	-90	-	-	-	-	-	-	-	-	-
S-SP2		VWP	454979	5316480	488.89	17.3	27/04/2017	-90	-	-	-	-	-	-	-	Yes	-
S-SP5		VWP	454973	5316503	488.19	15	27/04/2017	-90	-	-	-	-	-	-	-	-	-
R-SP1		VWP	454942	5316461	495	17.9	27/04/2017	-90	-	-	-	-	-	-	-	-	-
TA-DC212		Active	454705	5317128	469.0	140.1	-	-70	236	-	-	-	-	-	-	-	-
TA-DC214		Active	454894	5317170	401.3	25.7	14/04/2022	-80	243	18.7	24.7	382.8	376.9	384.0	375.9	Yes	-
TA-DC215		Active	455016	5317169	370.7	41.0	-	-76	260	34	40	337.7	331.9	338.7	331.9	Yes	-
TA-DC216		Active	455022	5317215	359.2	30.1	11/02/2022	-70	266	21	30	339.4	331.0	340.4	330.9	-	-
TA-DC217		Active	455025	5317248	347.6	26.1	-	-81	233	-	-	-	-	-	-	-	-
TA-DC218		Active	455122	5317150	345.9	26.1	8/04/2022	-79	214	19.1	25.1	327.1	321.2	328.1	320.2	Yes	-
TA-DC219		Active	455049	5317189	357.9	32.5	3/03/2022	-80	8	10	32.5	348.0	325.9	349.0	325.9	-	-
TA-DC225		Active	455250	5316791	379.2	120.2	14/06/2023	-80	270	6	18	373.2	361.2	373.2	361.2	-	Yes
TA-DC234		Active	455289	5316706	344.2	39.7	20/04/2023	-75	308	9	15	335.5	329.7	341.3	-	Yes	-
TA-DC235		Active	455317	5316689	344.0	41.3	21/03/2023	-80	41	-	-	-	-	-	324.9	Yes	-
TA-DC237		Active	455341	5316729	345.3	41.3	30/03/2023	80	239	17	20	362.1	365.0	358.6	365.0	Yes	-
TA-DC238		Active	455331	5316773	345.9	39.7	20/04/2023	-85	242	9	15	336.9	330.9	342.9	-	Yes	-
TA-DC243		Active	455294	5316780	353.2	39.8	10/04/2023	-80	261	39.8	33.5	313.4	319.7	-	-	Yes	-
TAHS2019-PW20		Active	5E+05	5E+06	488.4	80.0	-	-90	-	14	20	474.4	468.4	-	-	Yes	-
										23	32	465.4	456.4	-	-	Yes	-
TA-DC241	Power Tunnel	Active	453032	5317608	580.6	35.1	-	-71	210	-	-	-	-	-	-	Yes	Yes
TA-DC263		Active	452921	5316684	662.6	315.4	-	-76	214	-	-	-	-	-	-	-	-
TA-DC207	Lower Headrace Tunnel	Active	449256	5318287	659.8	77.1	2/02/2024	-87	118	35.2	44.2	695.0	704.0	693.7	707.0	Yes	Yes
TA-DC208		Active	449702	5317896	659.3	176.1	-	-68	234	-	-	-	-	-	-	-	-
TA-DC252		VWP	449248	5318291	659.9	4.9	9/11/2022	-90	-	0.7	4.2	660.6	664.1	660.6	664.1	Yes	-
TA-MB312		Active	449198	5318318	663.5	44.0	31/01/2024	-90	-	29	38	692.5	701.5	688.9	707.5	Yes	-
TA-DC247	Upper Headrace Tunnel	Active	444282	5320452	680.8	50.6	-	-75	228	-	-	-	-	-	-	Yes	-

Table A2 – Summary of Vibrating Wire Piezometers by Locations

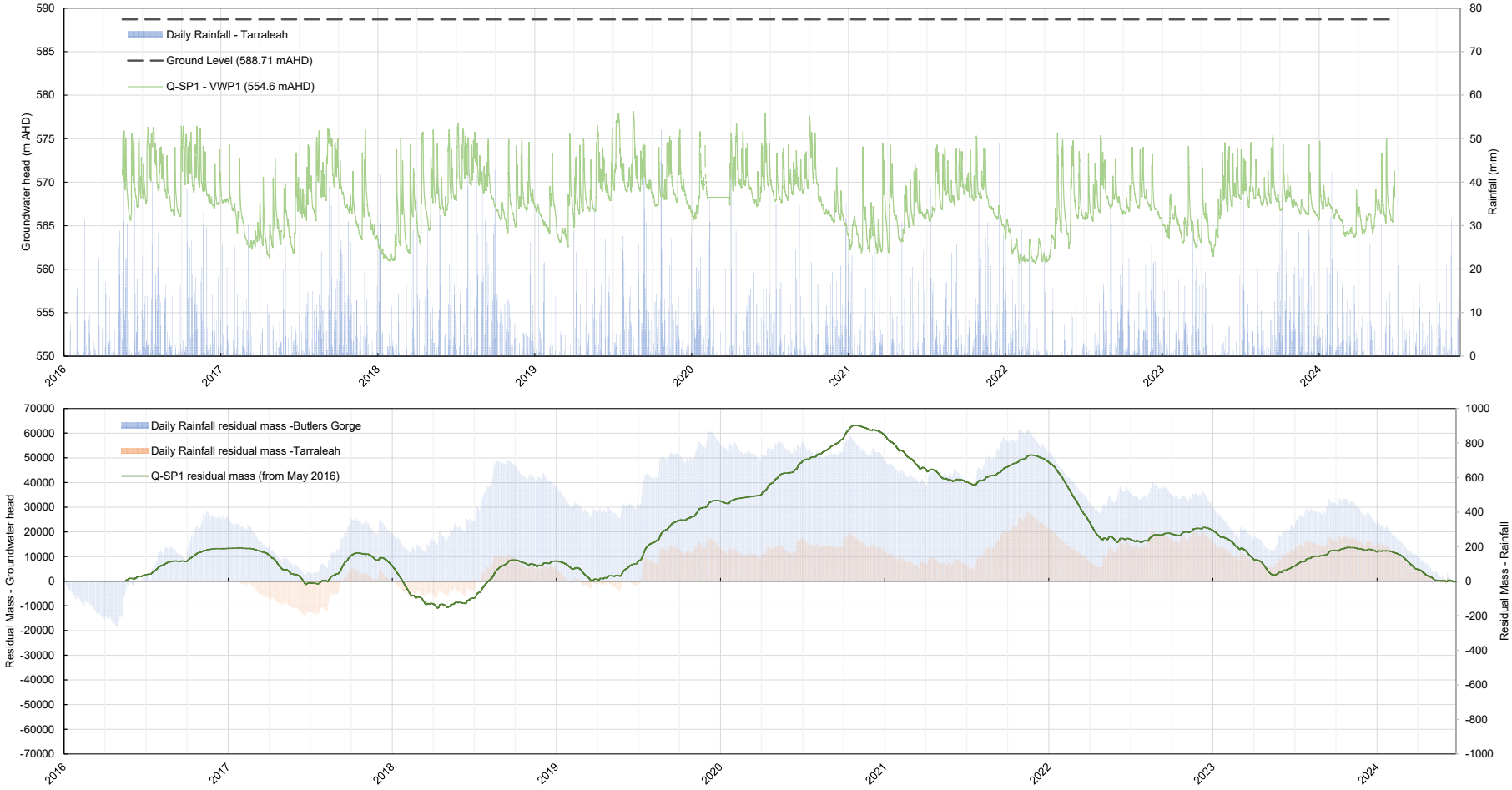
Domain	Borehole ID	VWP No.	Collar Easting (m)	Collar Northing (m)	Ground Elevation (mAHD)	Hole Depth (m)	Year	Data Logger Installed	Monitoring Frequency	Incline Angle	Dip Direction (TN)	Tip Depth * (m downhole)	Tip Elevation (m AHD)
Tarraleah Hillside	Q-SP1	1	454843.7	5316329.3	588.7	45.5	2017	Yes	Daily	-90	-	34.1	554.6
	S-SP1	1	454993.5	5316463.2	487.5	14.2	2017			-90	-	14.2	473.3
	S-SP2	1	454979.0	5316479.6	488.9	17.3	2017			-90	-	17.7	471.2
	S-SP5	1	454973.5	5316502.8	488.2	15.0	2017			-90	-	14.7	473.5
	R-SP1	1	454941.6	5316461.1	495.0	17.9	2017			-90	-	18.6	476.4
	TA-DC268	1	455216.0	5316781.0	388.0	60.7	2023		10 minute	-64	288	57.7	336.1
		2										34.7	356.8
	TA-DC269	1	455168.6	5316780.0	404.0	86.3	2023			-70	285	84.0	325.1
		2										60.0	347.6
		3										35.0	371.1
	TA-DC270	1	455248.3	5316796.0	380.0	61.3	2023			-65	53	59.0	326.5
		2										30.0	352.8
	TA-DC271	1	455122.0	5316827.0	408.0	86.3	2023	No	-	-75	280	70.0	340.4
		2										48.5	361.2
	TA-MB309	1	454905.5	5316760.0	514.0	180.3	2024	Yes	10 minute	-90	-	160.5	353.5
		2										82.0	432.0
		3										40.0	474.0
	TA06DC012	1	454856.4	5317024.5	462.9	100.0	2019		30 minute	-80	296	21.5	441.7
Power Tunnel	TA-MB308	1	454600.0	5316760.0	588.0	240.8	2024		Unknown	-90	-	226.0	362.0
		2										125.0	463.0
		3										90.0	498.0
		4										55.0	533.0
	TA-MB311	1							Unknown	-80	260		
		2											
		3											
		4											
	TA06DC013	1	454015.2	5316624.9	608.8	181.0	2019		30 minute	-80	70	179.0	432.6
		2										113.0	497.6
		3										52.0	557.6
Lower Headrace Tunnel	TA-DC252	1	449247.8	5318291.1	659.9	4.9	2022		15 minute	-90	-	3.6	656.3
	TA-DC250	1	449962.9	5318873.6	665.0	321.5	2023	Yes	10 minute	-74	312	200.0	472.7
		2										93.0	575.6
		3										16.5	649.1
	TA-MB301	1	448423	5319141	669.0	87.6	2024	Yes		-80	315	83.0	588.8
		2										53.0	617.8
		3										30.0	640.0
		4										7.0	662.2
Upper Headrace Tunnel	TA-DC275	1	444702.0	5320532.0	781.0	400.0	2024	Yes		-70	270	173.0	618.4
		2										145.2	644.6

(1) * The depth along borehole axis.

Appendix B
Groundwater Hydrographs

- Figure 1 – Hydrographs and Residual Mass Plots Q-SP1 May 2016 to June 2024
- Figure 2 – Hydrographs and Residual Mass Plots R-SP1 May 2016 to June 2024
- Figure 3 – Hydrographs and Residual Mass Plots S-SP1 May 2016 to June 2024
- Figure 4 – Hydrographs and Residual Mass Plots S-SP2 May 2016 to June 2024
- Figure 5 – Hydrographs and Residual Mass Plots S-SP5 May 2016 to June 2024
- Figure 6 – Hydrographs and Residual Mass Plots TA06DC012 December 2019 to May 2022
- Figure 7 – Hydrographs and Residual Mass Plots TA06DC013 December 2019 to May 2023
- Figure 8 – Hydrographs and Residual Mass Plots TA-DC252 December 2022 to September 2024
- Figure 9 – Hydrograph TA-DC250 January 2024 to August 2024
- Figure 10 – Hydrograph TA-DC268 January 2024 to August 2024
- Figure 11 – Hydrograph TA-DC269 January 2024 to August 2024
- Figure 11 – Hydrograph TA-DC270 January 2024 to August 2024
- Figure 11 – Hydrograph TA-DC275 January 2024 to August 2024
- Figure 12 – Hydrograph TA-MB301 January 2024 to August 2024
- Figure 13 – Hydrograph TA-MB308 January 2024 to August 2024
- Figure 14 – Hydrograph TA-MB309 January 2024 to August 2024
- Figure 15 – Hydrograph TA-MB311 July 2024

Hydro Tasmania



Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

Top Graph

Q-SP1, with VWP at 34.1 m depth shows a clear correlation between rainfall and groundwater level, the head in the basalt aquifer is responsive to rainfall recharge. Head responses from rainfall are up to 9.8 m (from a 62 mm 2-day rain event on 6-May-2022).

An annual cyclic pattern is observed with lower groundwater levels during the late summer months and higher groundwater levels in the late winter months.

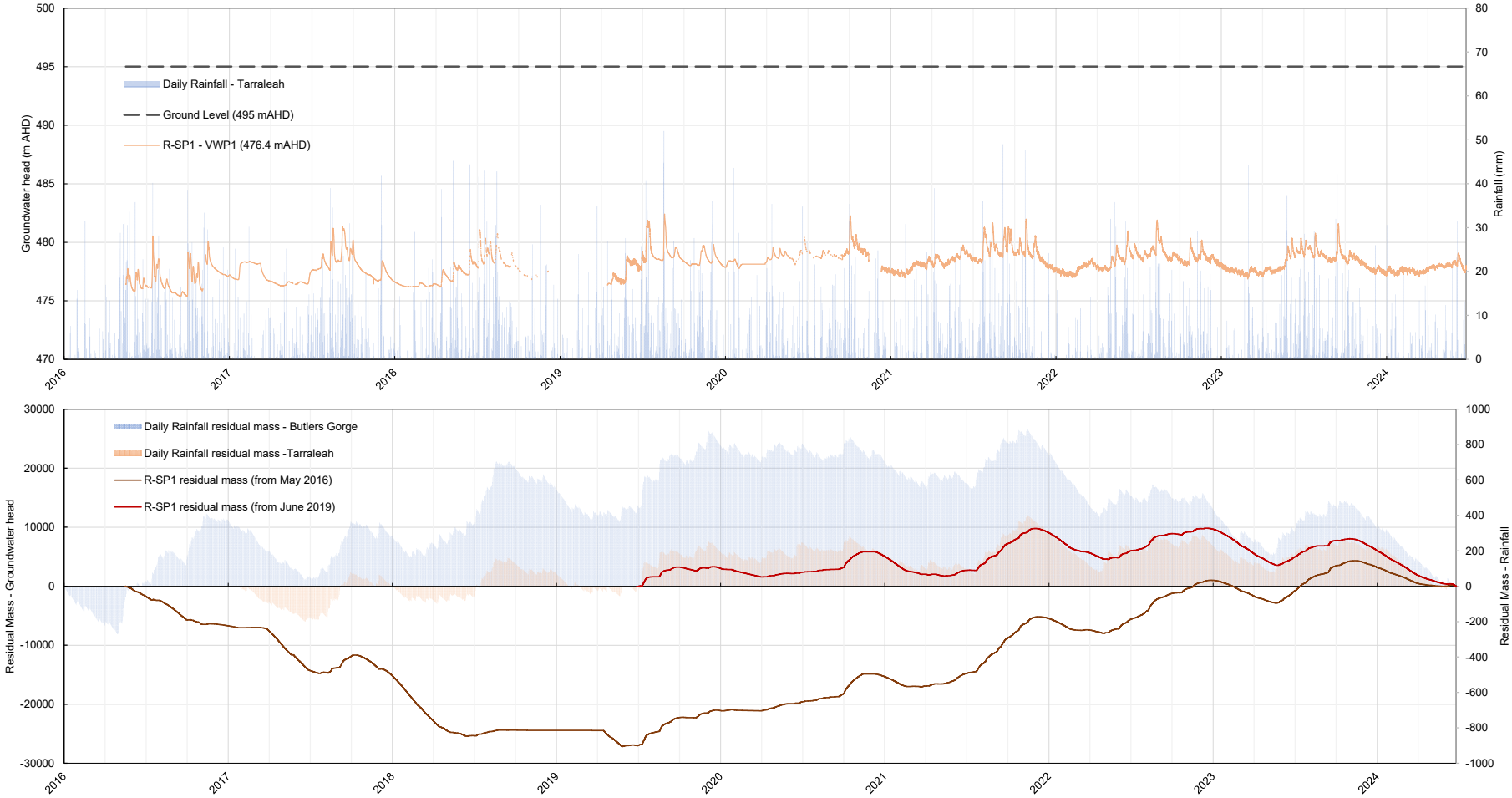
Bottom Graph

Daily Rainfall at Tarraleah (Sewage Ponds) began recording on 25/01/2017, after recording of piezometer had already begun

Q-SP1 residual mass and rainfall residual mass are closely correlated over the seasonal scale

Residual mass response changes (invert of trends between rainfall and groundwater head) have a delay of ~15 days

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania
Hydrographs and Residual Mass Plots Q-SP1 May 2016 to June 2024
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Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

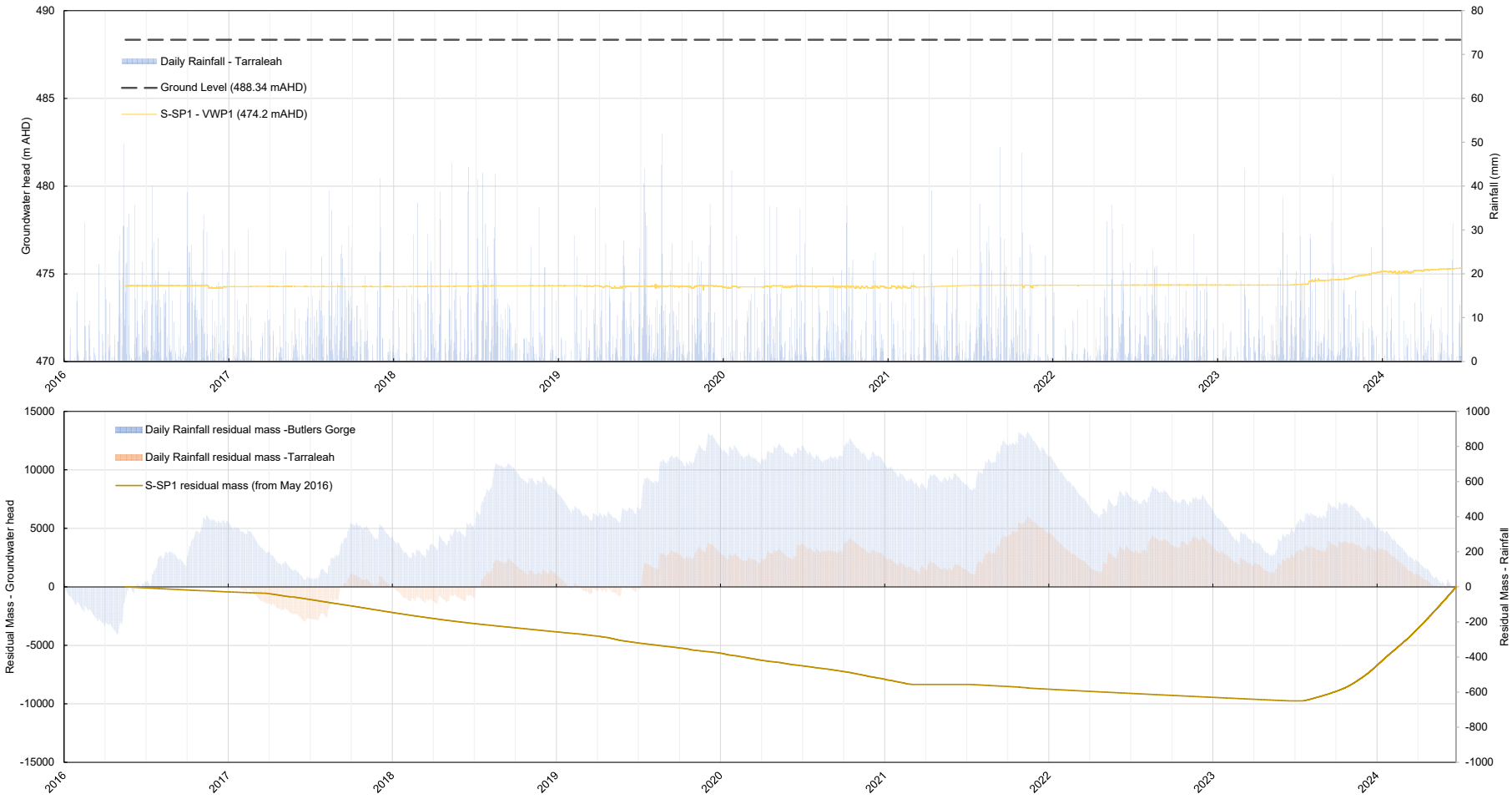
Top Graph

R-SP1, with VWP at 18.6 m depth shows a less clear correlation than Q-SP1, however groundwater levels do still show a response to rainfall recharge.
Head responses from rainfall are up to 4 m (from a 91 mm 3-day rain event on 20-Aug-2019).

Bottom Grpah

R-SP1 residual mass from June 2019 is plotted to better observe the correlation between the piezometer heads and rainfall
Daily Rainfall at Tarraleah began recording on 25/01/2017, after recording of piezometer had begun

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrographs and Residual Mass Plots R-SP1 May 2016 to June 2024	
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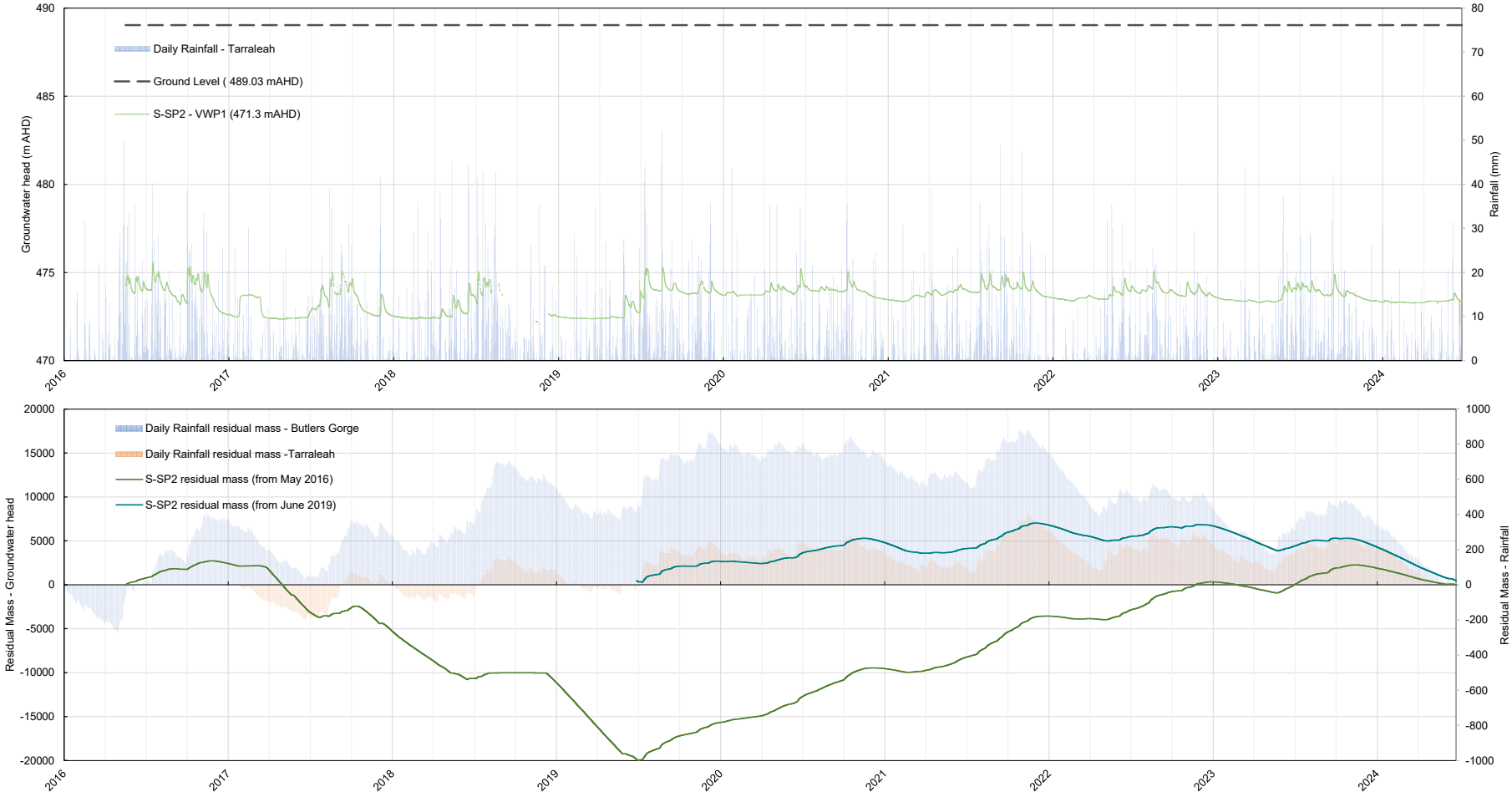
Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

S-SP1, with VWP at 14.1 m depth is atypical of expected groundwater trends and shows very little pressure variation, changes observed in the residual mass plot are weakly correlated. Groundwater within this borehole is non-responsive to rainfall.

Daily Rainfall at Tarraleah began recording on 25/01/2017, after recording of piezometer had begun

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania
Hydrographs and Residual Mass Plots S-SP1 May 2016 to June 2024
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Notes:

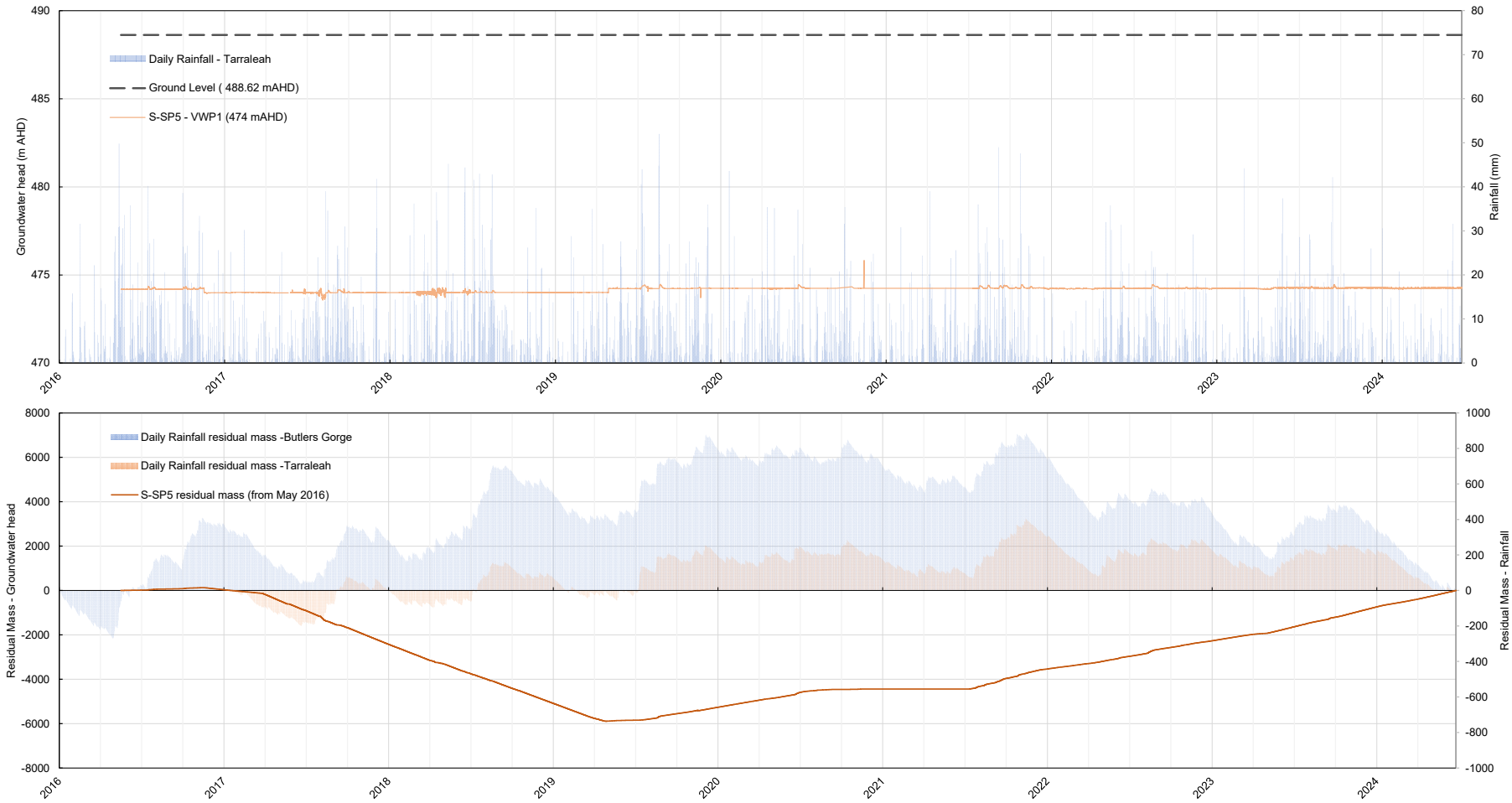
To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

S-SP2, with VWP at 17.7 m depth shows a correlation similar to R-SP1 with periods of missing data during rainfall events which influencing the cummulative mean value. The groundwater pressure is observable as weaky responsive to rainfall recharge.

S-SP2 residual mass from June 2019 is plotted to better observe the correlation between the piezometer heads and rainfall

Daily Rainfall at Tarraleah began recording on 25/01/2017, after recording of piezometer had begun

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania
Hydrographs and Residual Mass Plots S-SP2 May 2016 to June 2024
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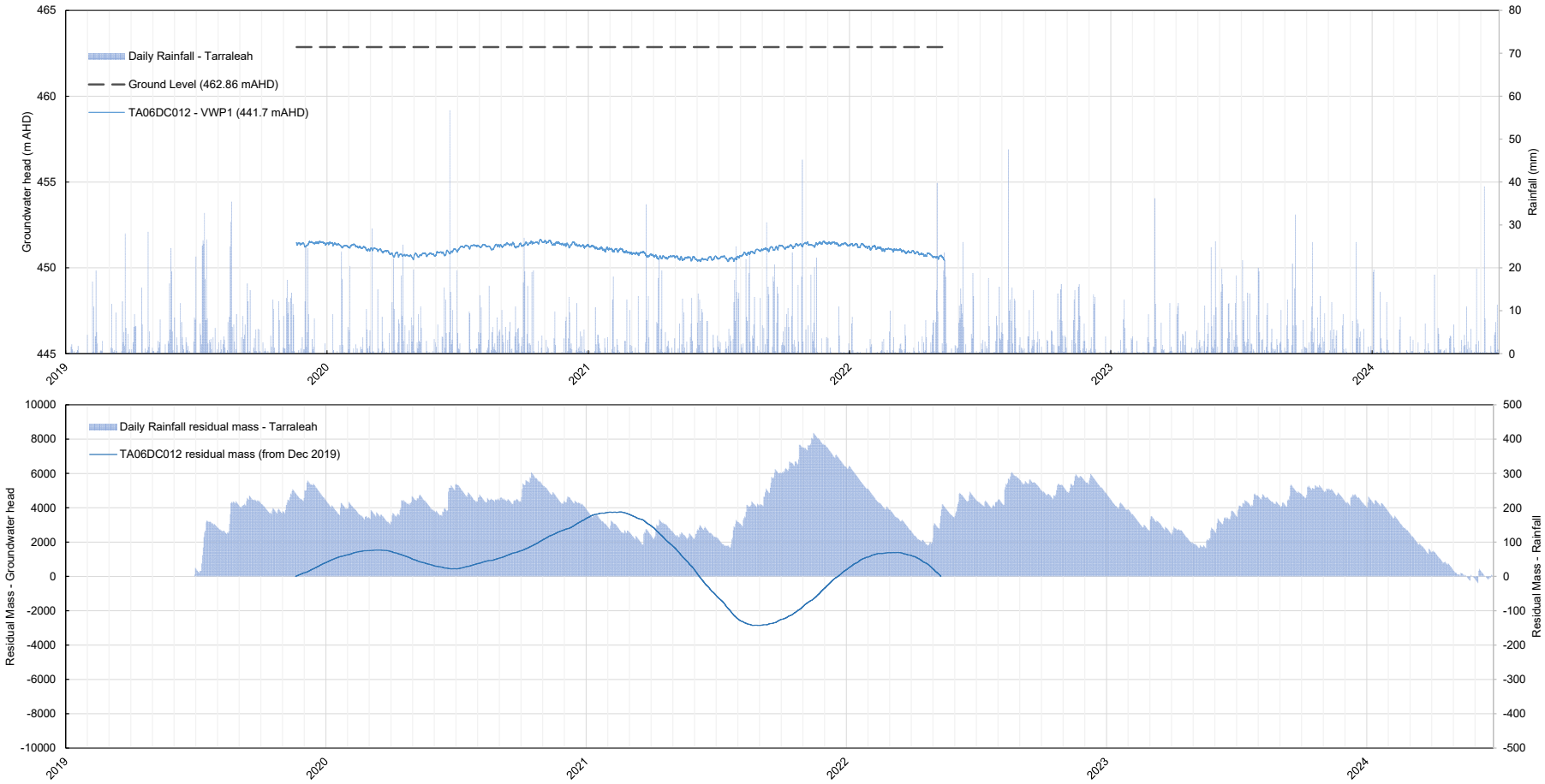
Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

S-SP5, with VWP at 14.7 m depth is atypical of expected groundwater trends and shows very little pressure variation, changes observed in the residual mass plot are weakly correlated. Groundwater within this borehole is non-responsive to rainfall.

Daily Rainfall at Tarraleah began recording on 25/01/2017, after recording of piezometer had begun

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrographs and Residual Mass Plots S-SP5 May 2016 to June 2024	
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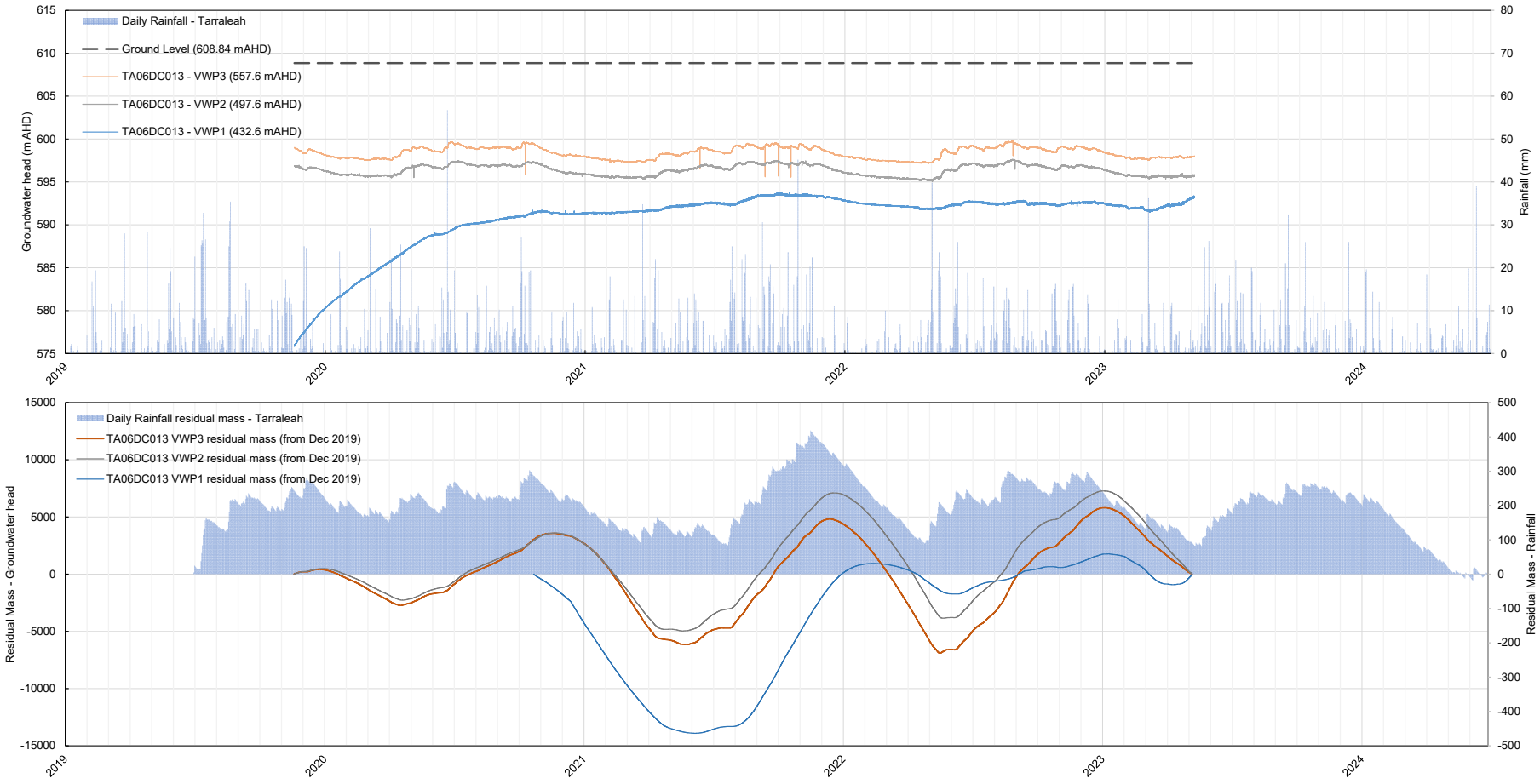
Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

Hydrograph (Top) Interpretation

Residual Mass (Bottom) Interpretation

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania
Hydrographs and Residual Mass Plots TA06DC012 Dec 2019 to May 2022
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Notes:

To assess the relationship between groundwater behaviour and rainfall, the raw data, shown graphically as head and rainfall (top), can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the plots as deviation over time from the average. The residual mass plot shows periods when long term rainfall is above the average (positive) and below average (negative). An upward trend in residual mass represents a wetter period than average, while a downward trend represents a drier period than average.

Hydrograph (Top) Interpretation

VWP2 and VWP3 are positioned withi the basalt palaeovelley aquifer and record a near instantaneous baseline stablisation whereas VWP1 in the dolerite takes up to 2 years to reach stable baseline.

Groundwater head declines with depth (VWP13> VWP2 > VWP1) which suggests a component of downward vertical flux.

All sensors report a head range of 1-2 m over a seasonal variation change

All sensors show a response to rainfall recharge, the degree of response appears to be correlated to size and duration of rainfall event.

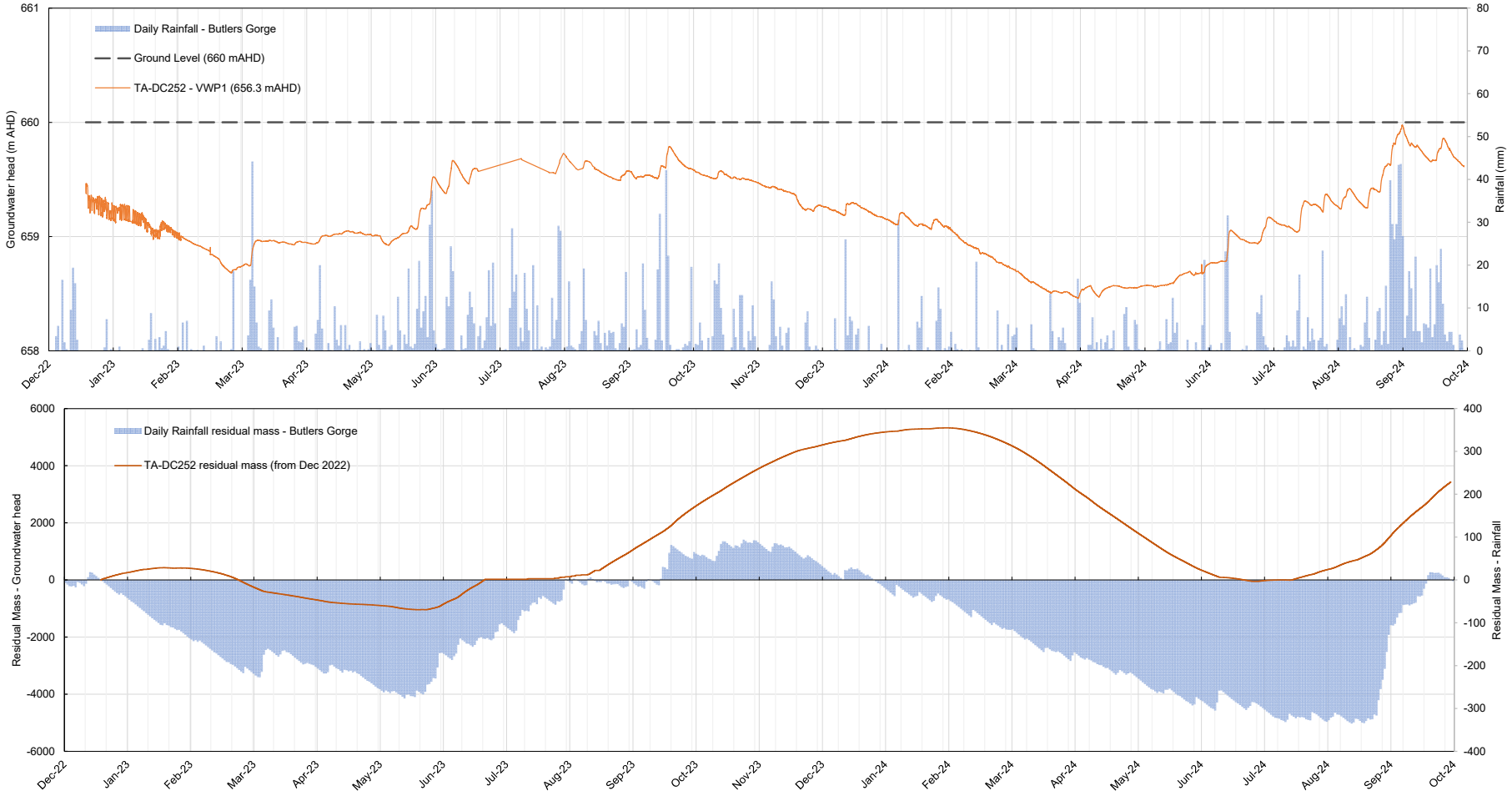
Residual Mass (Bottom) Interpretation

Groundwater heads for all sensors are closely tied to rainfall with a correlation observed between both increasing and decreasing averages.

The change in average for basalt sensors has a 1 month delay while the change in average of the dolerite sensor has a 1.5 month delay.

The dolerite sensor displays a lower residual mass variation (change in average) which means it is has a lower seasonal head range

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrographs and Residual Mass Plots TA06DC013 Dec 2019 to May 2023	
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Notes:

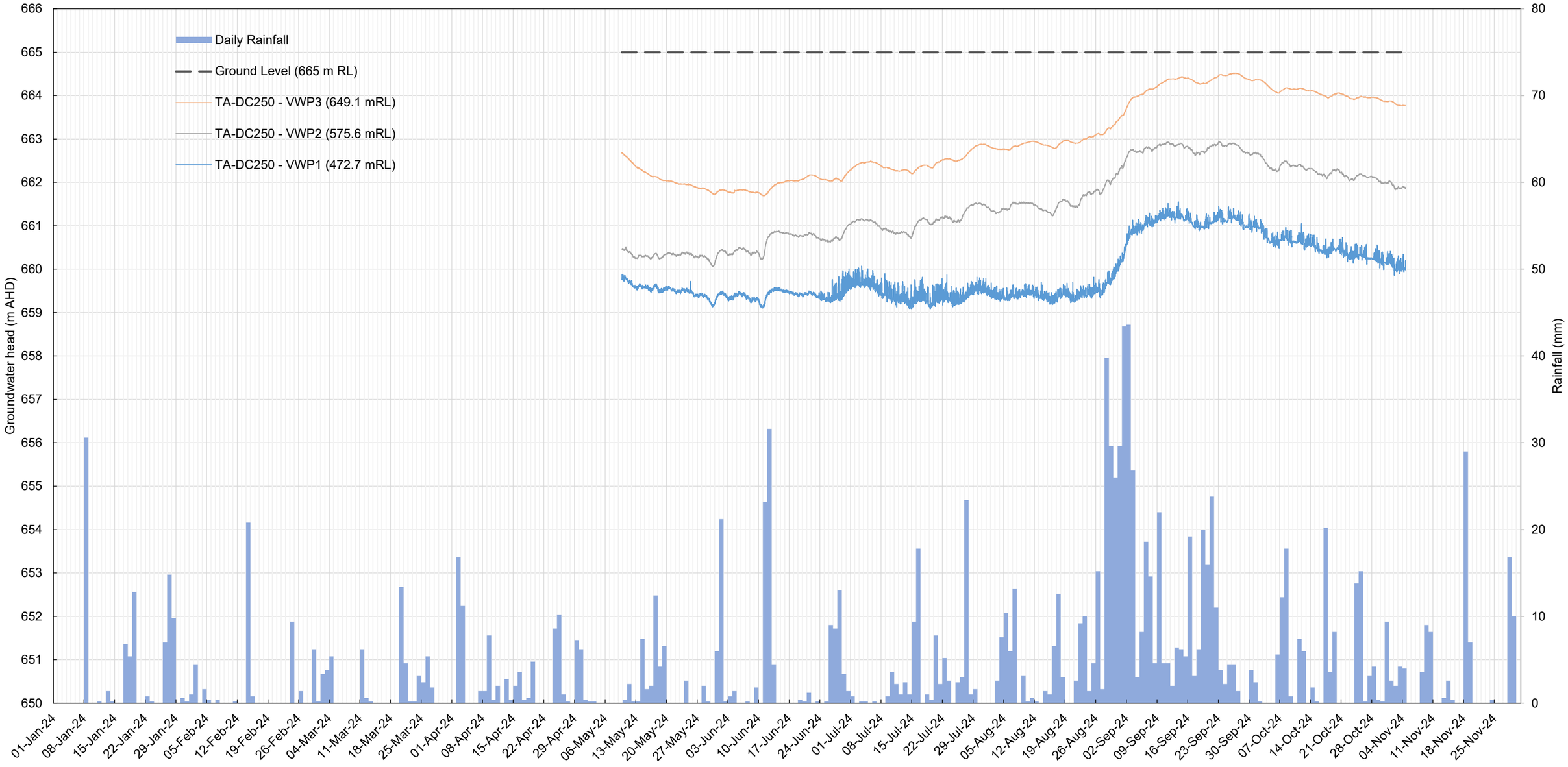
Top Graph

The data shows and overall seasonal fluctuation of 1.0 m between summer dry minimum and winter wet maximum.

Overprinted on the seasonal variation are singlar response peaks which correspond to single-day and multi-day rainfall events, eg a high groundwater head response of 0.16 m occuring on 01/06/2023 following a cumulative 67 mm (2 day) rain event.

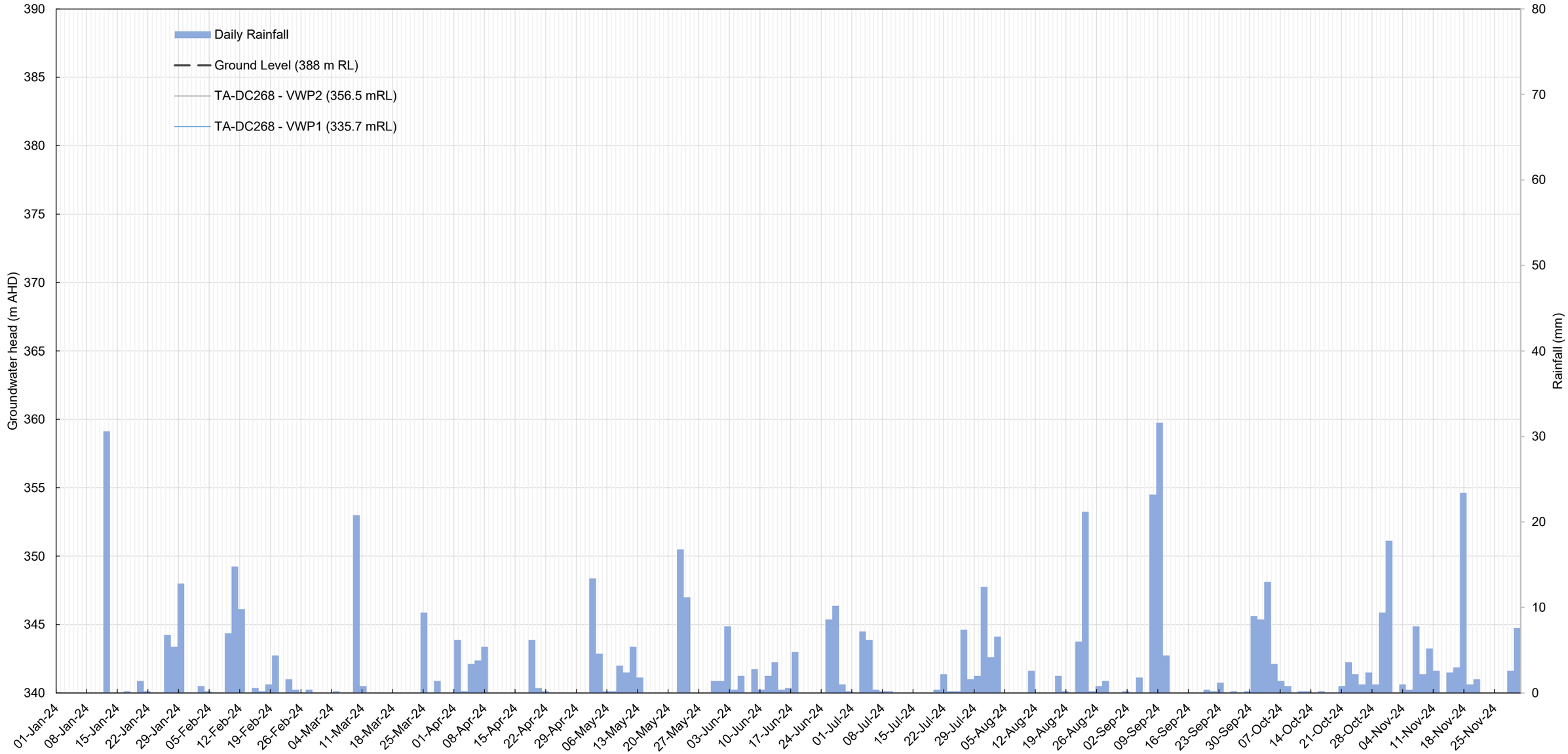
To assess the relationship between groundwater behaviour and rainfall, the raw data shown graphically as head vs rainfall (left) can be represented in a form that more clearly shows data patterns. Converting the data to the cumulative deviation from the mean (residual mass) for both data sets shows the data as trends over time from the average. The residual mass curves show periods when rainfall is above the average (on upward trending plot) and below average (a downward trending plot).

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Hydrographs and Residual Mass Plots TA-DC252 Dec-22 to Sept-24
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Notes:

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrograph TA-DC250 Jan 2024 - Aug 2024	
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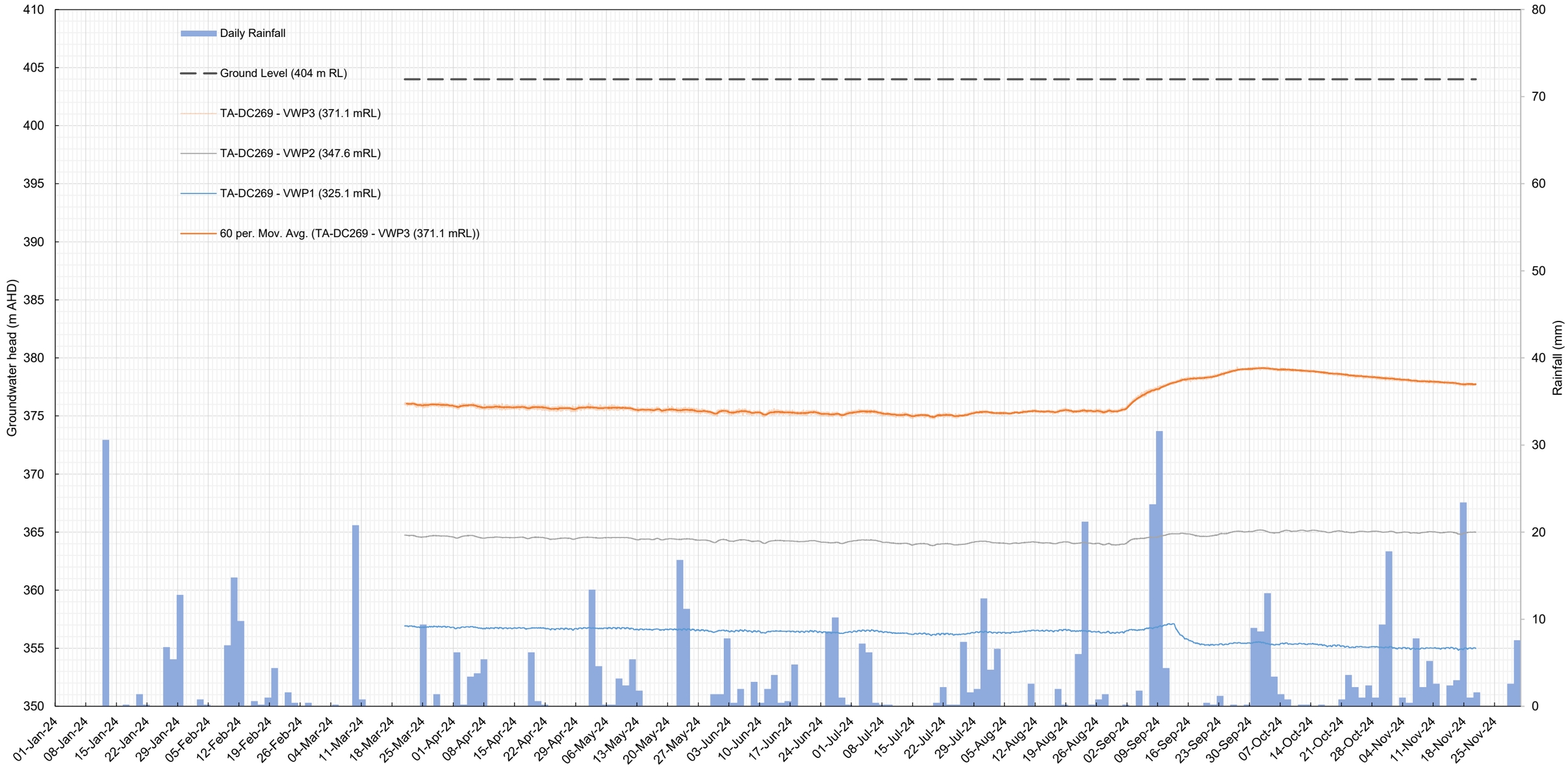


Notes:

Hydro Tasmania
Tarraleah Redevelopment Project
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Hydrograph
TA-DC268
Jan 2024 - Aug 2024

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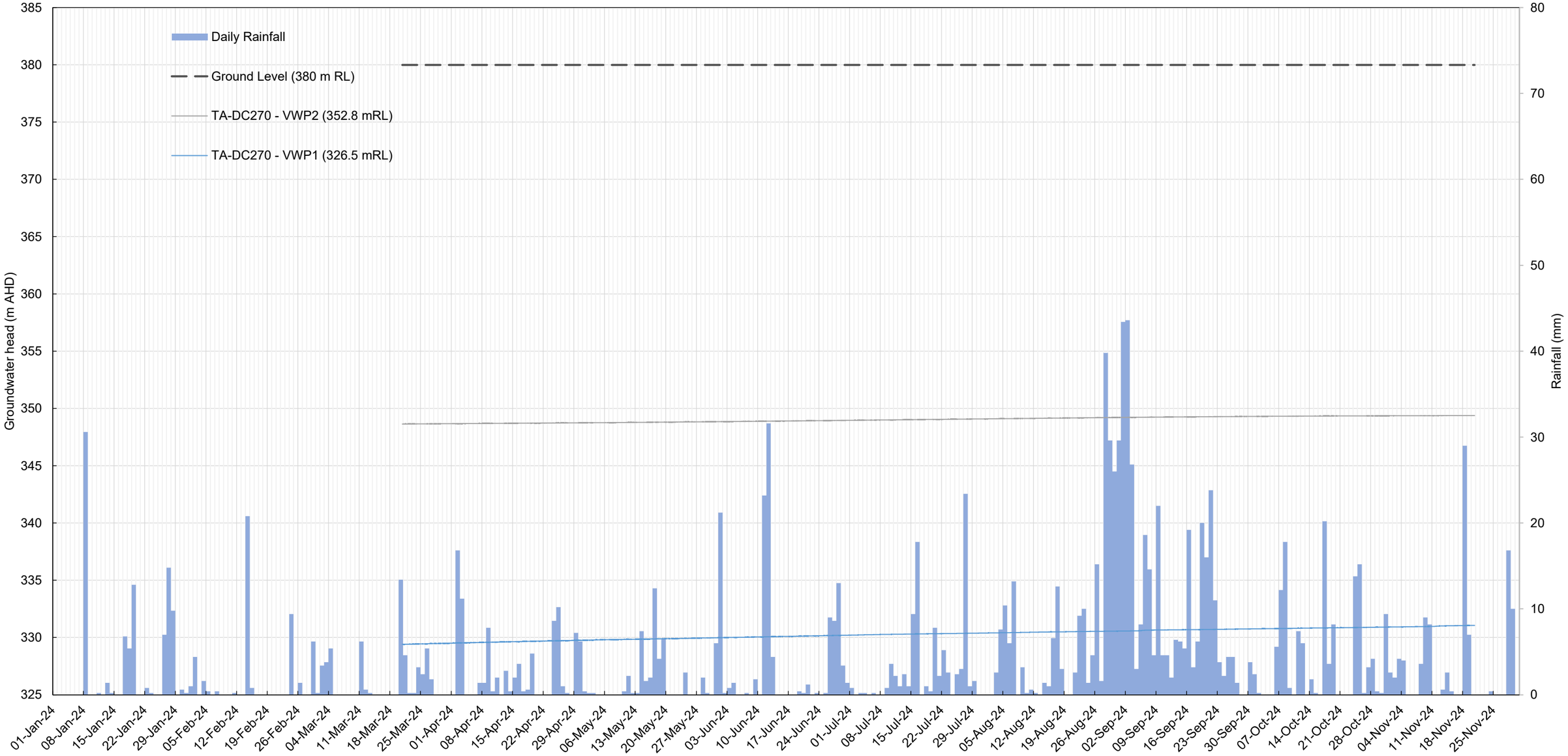


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Hydro Tasmania
Tarraleah Redevelopment Project
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Hydrograph
TA-DC269
Jan 2024 - Aug 2024

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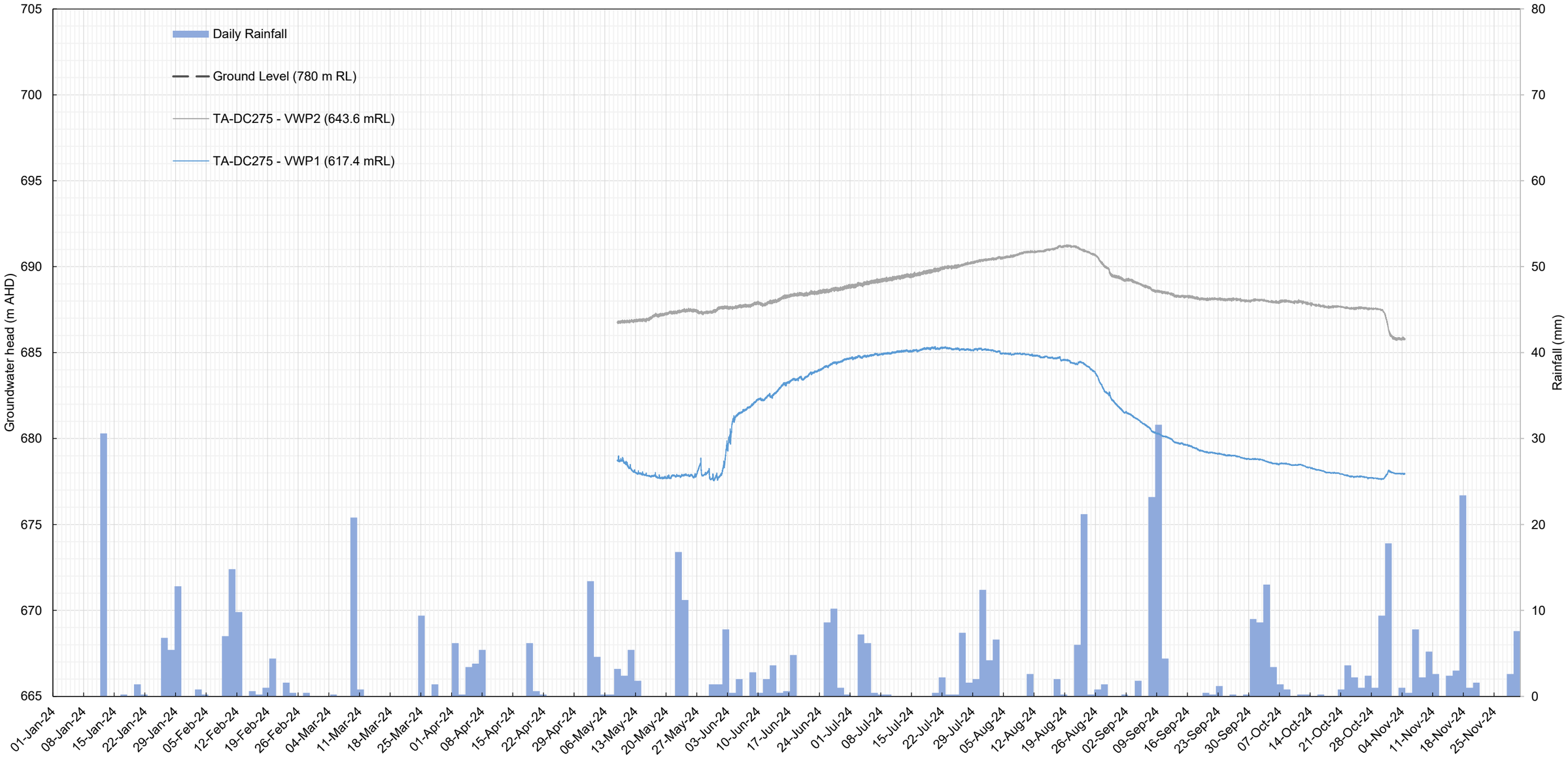


Notes:

Hydro Tasmania
Tarraleah Redevelopment Project
Tarraleah, Tasmania

Hydrograph
TA-DC270
Jan 2024 - Aug 2024

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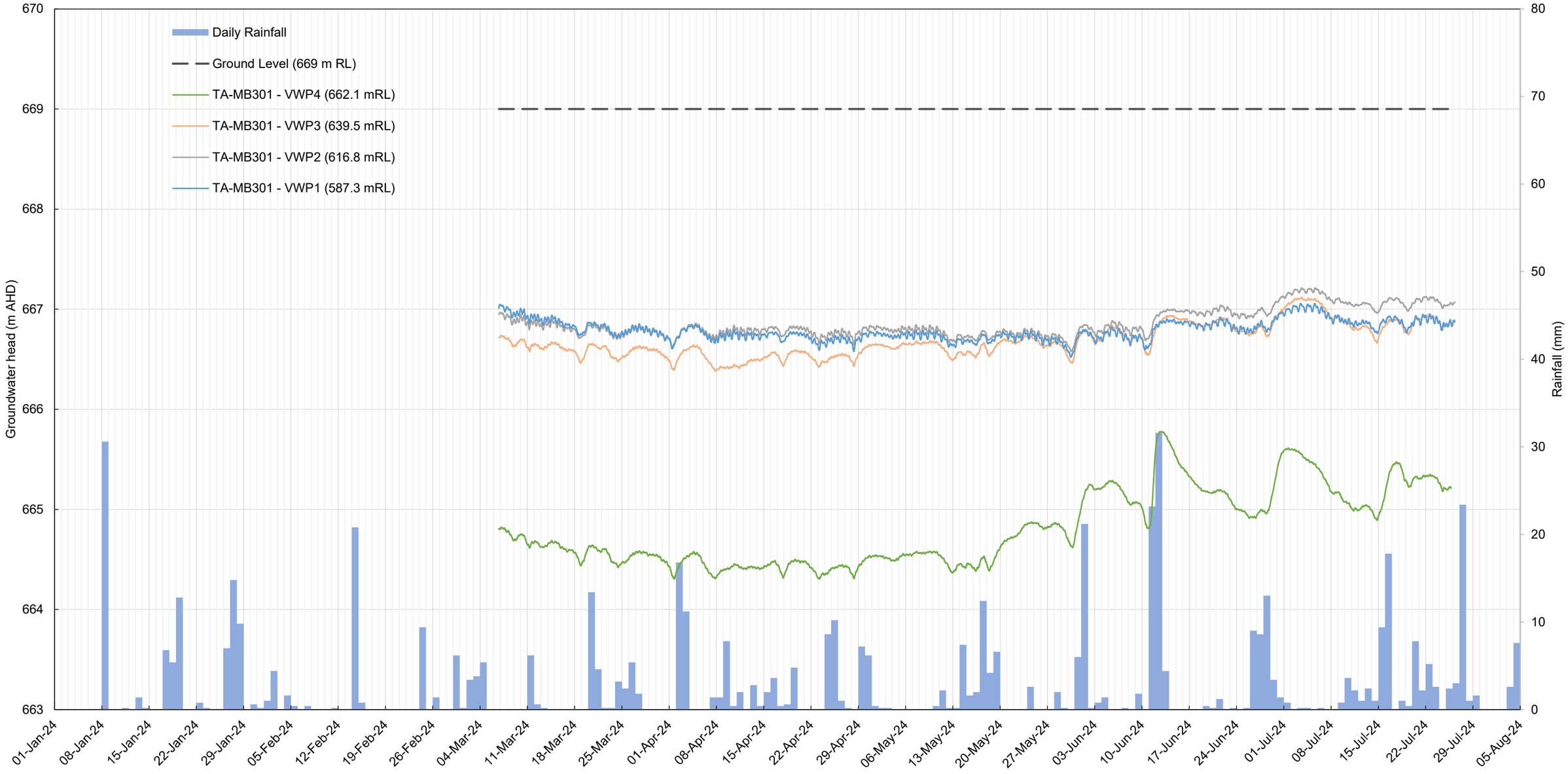


Notes:

Hydro Tasmania
Tarraleah Redevelopment Project
Tarraleah, Tasmania

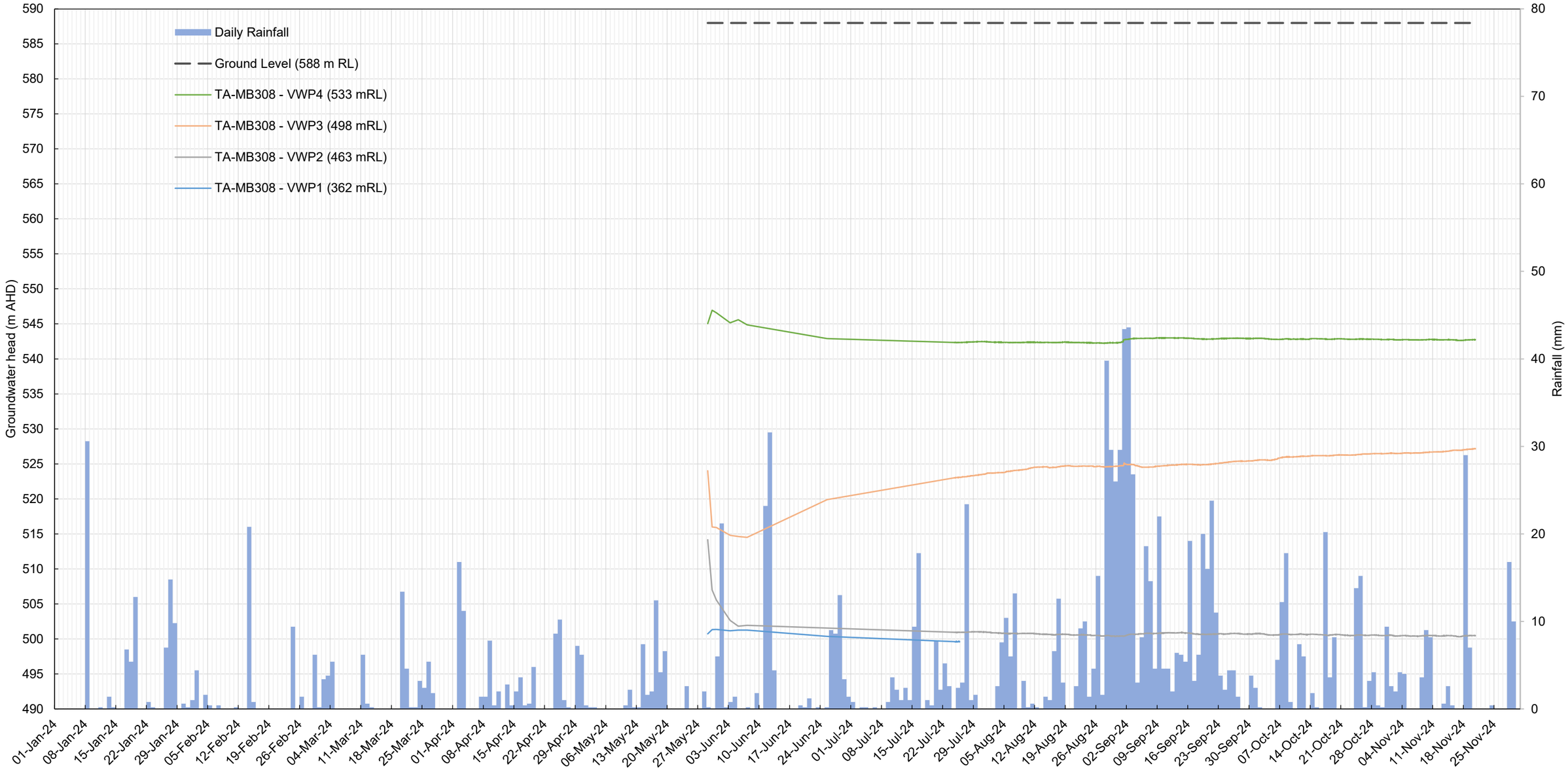
Hydrograph
TA-DC275
Jan 2024 - Aug 2024

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Notes:

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrograph TA-MB301 Jan 2024 - August 2024	
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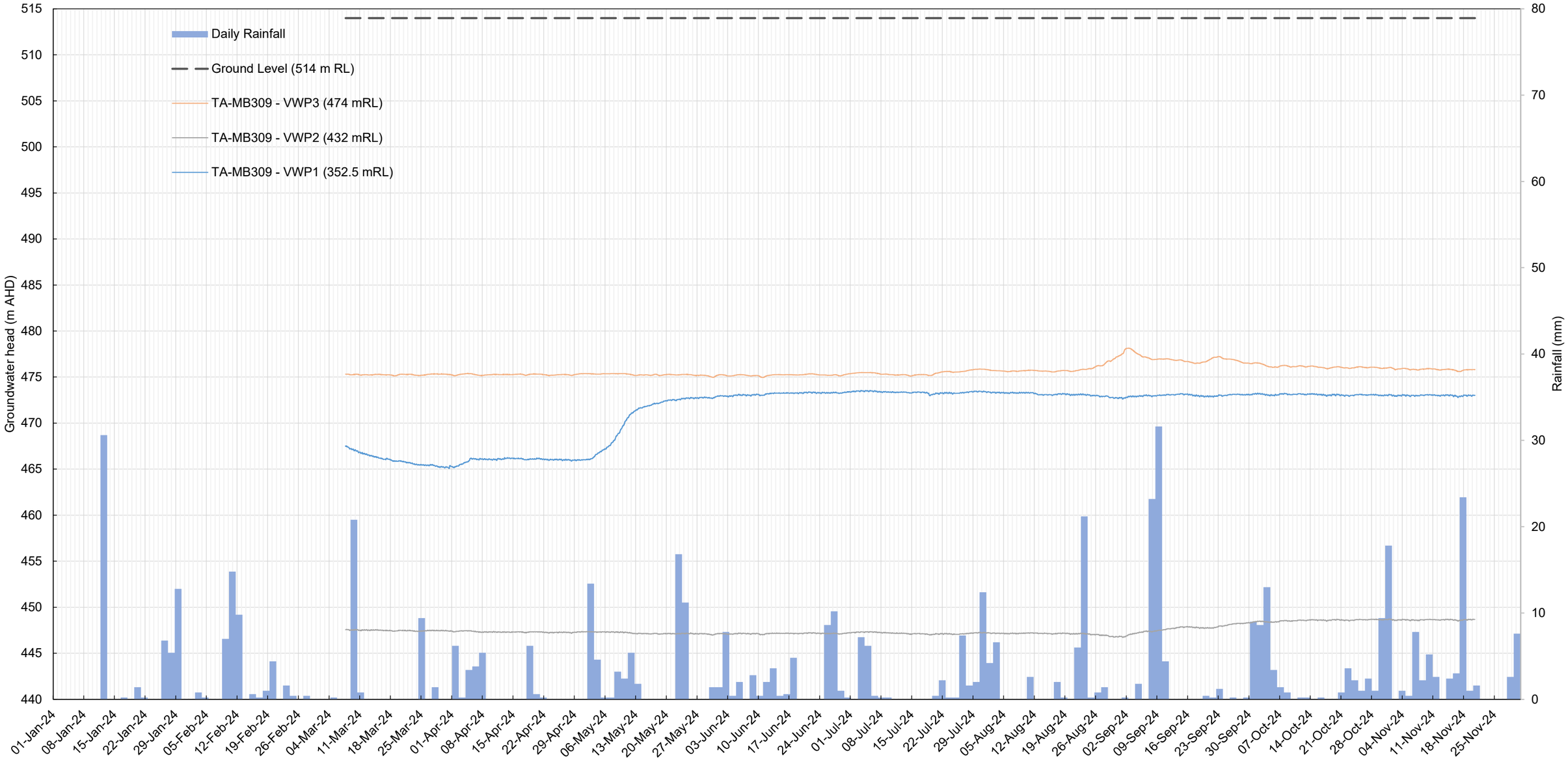


Notes:

Hydro Tasmania
Tarraleah Redevelopment Project
Tarraleah, Tasmania

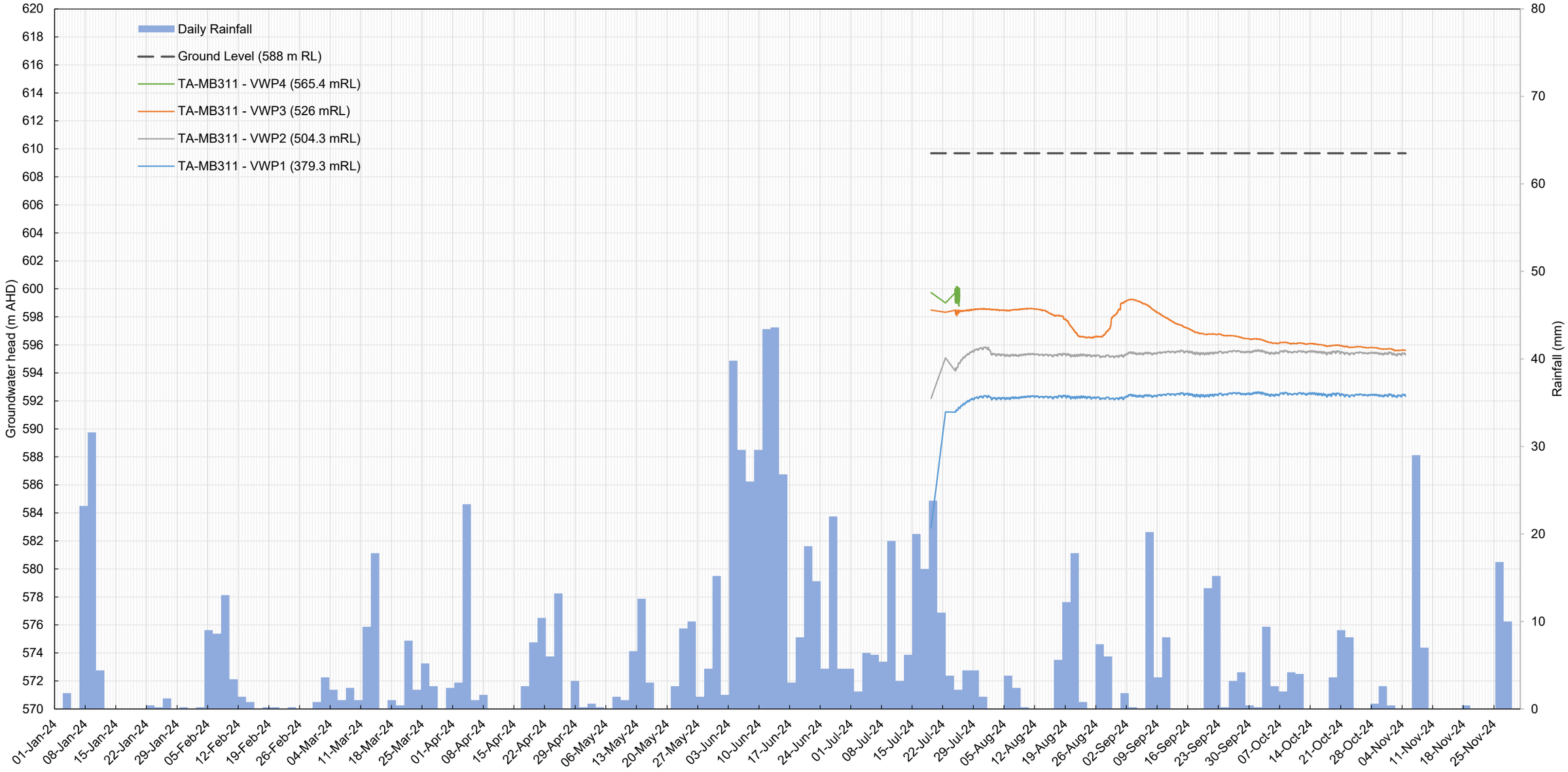
Hydrograph
TA-MB308
Jan 2024 - August 2024

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Notes:

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrograph TA-MB309 Jan 2024 - August 2024	
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Notes:

Hydro Tasmania Tarraleah Redevelopment Project Tarraleah, Tasmania	
Hydrograph TA-MB311 July 2024	
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Appendix C
Water Qualities

Analyte	Units	PW20D(D)													PW20D(S)										S-SP2								
Water Quality Record Month-Year		23-Jan-24	3-2024	07-May-24	26-Jun-24	23-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	26-Nov-24	19-Dec-24	23-Jan-25	20-Feb-25	19-Mar-25	23-Jan-24	3-2024	26-Jun-24	24-Jul-24	28-Aug-24	25-Sep-24	19-Dec-24	23-Jan-25	20-Feb-25	19-Mar-25	23-Jan-24	07-May-24	26-Jun-24	24-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	23-Jan-25	14-Mar-25
Field Water Quality Parameters																																		
Field DO	%	47.2	65.4	65.4	70.2	73.1	83.7	83	71.5	56.8	-	47.2	62.5	63.3	80.5	88.2	-	-	-	99.3	-	80.5	78.3	75.3	80.4	81.4	81.8	94.1	95.7	99	98.1	2.1	32.2
Field EC	µS/cm	204	207	207	211	211	195	214	209	4	-	204	209	216	156.9	133.3	-	-	-	126.8	-	156.9	122.6	120.5	123.8	118.9	117.3	115.5	103	116.4	117.4	146.8	283
Field pH		7.88	8.14	8.14	8.18	8.26	8.16	8.11	8.09	8.183	-	7.88	8.008	7.92	6.52	6.98	-	-	-	7.08	-	6.52	6.641	6.74	6.69	6.68	6.66	6.71	6.86	6.56	6.99	8.81	11.08
Field Temp	°C	11.9	10	10	9.6	9.7	9.3	10	16.9	17.2	-	11.9	11	10.3	11.1	10.1	-	-	-	9.6	-	11.1	10.4	10.9	11.3	10.9	9.9	10.6	10.6	10.4	12.1	9.2	11.5
Field Turbidity	NTU	-	>999	>999	>999	>999	>999	>999	>999	999	-	?	999	1000	9.8	80.9	-	-	-	56.7	-	9.77	133	61.7	3.59	0.82	8.65	2.3	3.85	1.68	9.84	12.8	15.9
Laboratory Water Quality Results																																		
Alkalinity Bicarbonate	mg $CaCO_3$/L	107	92	50	97	98	100	98	-	91	-	99	100	109	60	50	47	43	41	40	-	50	45	44	42	43	38	37	35	33	-	59	16
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	36
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	12
Alkalinity Total	mg $CaCO_3$/L	108	93	50	98	99	101	99	-	91	-	99	100	110	60	50	47	43	41	40	-	50	45	44	42	43	38	37	35	33	-	61	65
Aluminium Dissolved	µg/L	14	8	9	13	8	8	8	-	8	-	8	8	8	11	9	11	8	8	< 8	-	8	8	8	< 8	< 8	8	9	8	8	-	10	967
Aluminium Total	µg/L	52800	47800	5330	114000	145000	131000	101000	-	-	-	-	-	-	31400	5330	48500	7760	10300	6890	-	-	-	-	120	100	79	151	271	106	-	535	1470
Ammonia	mg-N/L	<0.005	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	-	0.05	-	0.05	0.05	0.05	0.012	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	<0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.051	0.105
Arsenic Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	-	< 1	2
Arsenic Total	µg/L	6	4	< 1	4	7	7	4	-	-	-	-	-	-	10	< 1	5	< 1	< 1	< 1	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	-	< 1	2
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	0.1	0.1	< 0.1	< 0.1	0.1	0.1	0.1	< 0.1	-	0.1	0.1	0.1	< 0.1	< 0.1	0.1	0.1	0.1	0.1	-	< 0.1	< 0.1
Cadmium Total	µg/L	0.2	< 0.1	< 0.1	0.2	0.5	0.5	0.2	-	-	-	-	-	-	0.2	< 0.1	0.2	0.1	0.1	< 0.1	-	-	-	-	< 0.1	< 0.1	0.1	0.1	0.1	0.1	-	< 0.1	< 0.1
Calcium Dissolved	mg/L	14.7	15	9.1	15.1	15	14.7	15.1	-	15.2	-	14.6	15.6	16.3	9.94	9.1	7.89	8.66	7.95	7.94	-	8.16	8.08	7.6	7.59	7.63	7.23	7.02	6.77	6.85	-	10.9	33.8
Calcium Total	mg/L	30.3	22.1	10.5	33.5	35	32.7	29.2	-	-	-	-	-	-	96.2	10.5	27	11.1	12.8	11	-	-	-	-	7.85	7.44	7.28	7.2	7.03	7	-	11.4	34.9
Chloride	mg/L	6.17	7.43	5.99	7.25	7.32	7.75	7.62	-	7.1	-	6.92	7.53	7.93	5.86	5.99	6.1	5.6	6.38	7.66	-	7.04	6.37	5.97	5.24	5.42	5.2	4.84	5.05	6.57	-	6.05	9
Chromium Dissolved	µg/L	< 1	< 1	2	< 1	< 1	< 1	< 1	-	1	-	1	1	1	< 1	2	2	2	2	2	-	2	2	2	3	2	3	4	4	4	-	< 1	7
Chromium Total	µg/L	126	136	19	208	357	363	250	-	-	-	-	-	-	97	19	84	28	31	22	-	-	-	-	5	3	3	5	5	4	-	< 1	10
Conductivity	µS/cm	192	208	132	163	206	206	209	-	202	205	202	207	213	155	132	101	136	130	124	127	136	124	119	109	116	85	112	111	110	-	138	231
Copper Dissolved	µg/L	< 1	< 1	2	< 1	< 1	< 1	< 1	-	1	-	1	1	1	< 1	2	3	2	2	< 1	-	1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	-	2	< 1
Copper Total	µg/L	54	56	12	83	161	137	90	-	-	-	-	-	-	56	12	61	17	24	13	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	-	2	2
Fluoride	mg/L	0.06	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.08	0.35
Iron Dissolved	µg/L	< 20	< 20	< 20	< 20	< 20	< 20	1460	-	20	-	20	20	20	36	< 20	< 20	< 20	< 20	< 20	-	20	20	20	< 20	< 20	< 20	< 20	< 20	< 20	-	55	< 20
Iron Total	µg/L	73000	70300	5330	176000	231000	202000	156000	-	-	-	-	-	-	42600	5330	61700	10000	13000	9030	-	-	-	-	128	58	72	126	193	85	-	2240	452
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5
Lead Total	µg/L	42.8	28.9	7.1	38.4	48.7	43.8	28.2	-	-	-	-	-	-	56.8	7.1	39	9.6	19	7.2	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	0.6
Magnesium Dissolved	mg/L	9.6	9.88	5.55	9.72	9.46	9.48	9.67	-	9.18	-	10.1	9.76	10.3	6.47	5.55	4.85	5.26	4.87	4.72	-	5.33	5.01	4.72	4.64	4.97	4.54	4.42	4.15	4.07	-	4.48	0.55
Magnesium Total	mg/L	19.3	19.1	6.52	29.2	37.8	35.7	28.5	-	-	-	-	-	-	56.1	6.52	18	6.93	8.51	6.86	-	-	-	-	4.96	4.96	4.56	4.52	4.41	4.17	-	4.85	0.7
Manganese Dissolved	µg/L	4	< 1	3	3	3	2	5	-	1	-	17	1	216	36	3	15	4	4	3	-	2	6	41	< 1	< 1	< 1	< 1	< 1	< 1	-	18	< 1
Manganese Total	µg/L	4110	2430	124	4300	6740	5340	4020	-	-	-	-	-	-	946	124	887	224	346	209	-	-	-	-	2	< 1	< 1	< 1	2	< 1	-	38	8
Nickel Dissolved	µg/L	< 0.5	< 0.5	2.1	0.6	0.8	< 0.5	0.7	-	0.5	-	0.5	0.5	0.5	0.9	2.1	1.1	1.1	0.7	0.7	-	0.6	0.6	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	< 0.5	< 0.5
Nickel Total	µg/L	85.4	93.5	11	136	284	256	161	-	-	-	-	-	-	49.1	11	45.4	15.4	18.4	11.6	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	1.1	1.4
Nitrate	mg N/L	0.44	0.423	0.437	0.446	0.41	0.42	0.46	-	0.47	-	0.45	0.47	0.4	0.95	0.437	1.07	1.42	1.5	1.16	-	1.17	1.03	0.88	1.8	1.01	1.73	2.44	2.24	2.34	-	<0.002	< 0.02
Nitrite	mg N/L	0.005	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	-	0.026	0.02	0.02	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	<0.002	< 0.02
pH		7.9	7.9	7	7.9	7.9	8	7.9	-	7.9	8	7.8	7.8	7.9	6.8	7	6.9	7	7.1	6.9	6.9	6.8	6.8	6.7	6.9	6.8	6.8	6.8	6.8	6.8	-	8.4	10.4
Phosphorus Total	mg P/L	1.36	0.992	0.099	1.37	2.03	2.46	1.2	-	0.919	-	2.1	2.15	1.8	0.774	0.099	0.57	0.214	0.284	0.125	-	0.271	0.18	0.131	0.025	0.022	0.025	0.029	0.027	0.026	-	0.069	0.025
Potassium Dissolved	mg/L	2.65	1.84	1.14	2	1.95	1.77	2.17	-	1.82	-	1.87	1.86	2	1.12	1.14	1.24	1.25	1.08	1.17	-	1.05	1	0.92	0.94	0.94	0.9	0.96	0.9	0.93	-	1.2	3.34
Potassium Total	mg/L	3.64	3.35	1.49	4.58	5.87	5.48	4.9	-	-	-	-	-	-	2.53	1.49	2.36	1.59	1.46	1.47	-	-	-	-	1.01	0.93	0.91	0.98	0.96	0.95	-	1.18	3.46
Selenium Dissolved	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	< 2
Selenium Total	µg/L	7	3	< 2	9	10	10	6	-	-	-	-	-	-	6	< 2	< 2	< 2	< 2	< 2	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	-	< 2	< 2
Silica, Molybdate Reactive	mg/L	23.4	24.6	33.3	25.3	24.3	24.9	25.1	-	-	-	23.6	24.6	24.2	33.2	33.3	32.9	34.1	34.4	34.5	-	33.1	33.4	32.9	35.5	33.4	35.3	36.4	37.6	39.6	-	10.9	11.6
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	2.1	2.2	3.3	2.4	2.2	2.4	2.6	-	1.9	-	1.8	2	2.4	4.6	3.3	2.6	9.1	6.5	4.8	-	2.6	3.7	3.1	1.9	1.8	1.9	1.7	1.8	1.8	-	2.3	39.3
TDS	mg/L	158	131	121	157	138	114	151	-	130	160	159	148	146	132	121	125	122	102	109	108	120	107	95	106	110	98	109	99	108	-	100	182
TSS	mg/L	3480	662	214	3130	2320	2870	2870	-	1400	-	2920	-	4130	3080	214	2540	153	132	124	-	679	-	515	< 2	< 2	< 2	< 2	< 2	< 2	-	13	16
Zinc Dissolved	µg/L	15	< 2	16	< 2	< 2	< 2	< 2	-	2	-	2	2	2	3	16	10	18	18	18	-	15	12	9	< 2	< 2	< 2	< 2	< 2	< 2	-	4	< 2
Zinc Total	µg/L	169	226	53	262	460	370	270	-	-	-	-	-	-	147	53	149	77	90	68	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	-	4	20

Analyte	Units	TA-DC207											
Water Quality Record Month-Year		08-May-24	30-May-24	25-Jun-24	23-Jul-24	27-Aug-24	24-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	19-Mar-25
Field Water Quality Parameters													
Field DO	%	30.3	-	28.2	28.2	14.7	31.9	51.6	45.2	-	-	32.4	37.7
Field EC	µS/cm	195.3	-	575	324	568	519	652	379	-	-	411	381
Field pH		10.77	-	11.4	11.19	11.89	11.37	11.84	11.4	-	-	11.45	11.215
Field Temp	°C	9.7	-	9.4	9.6	10.7	10.2	10.5	12.3	-	-	9.3	11.1
Field Turbidity	NTU	13.8	-	12.4	24.5	3.18	3.26	32.6	2.43	-	-	1.58	0.8
Laboratory Water Quality Results													
Alkalinity Bicarbonate	mg $CaCO_3$/L	17	17	3	11	3	3	-	9	6	4	-	5
Alkalinity Carbonate	mg $CaCO_3$/L	34	39	51	58	54	49	-	60	72	55	-	51
Alkalinity Hydroxide	mg $CaCO_3$/L	11	12	93	27	100	85	-	34	63	77	-	59
Alkalinity Total	mg $CaCO_3$/L	62	69	147	96	156	137	-	104	141	136	-	115
Aluminium Dissolved	µg/L	1600	1090	1100	741	841	661	-	527	673	666	-	720
Aluminium Total	µg/L	2250	2080	2260	1720	994	754	-	-	-	-	-	-
Ammonia	mg-N/L	0.341	0.303	0.293	0.24	0.31	0.24	-	0.23	0.2	0.194	-	0.2
Arsenic Dissolved	µg/L	2	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1
Arsenic Total	µg/L	2	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	0.1	0.1	-	0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-
Calcium Dissolved	mg/L	19.3	21.8	49.3	33.1	63.4	49.5	-	37.1	48.7	44.8	-	38
Calcium Total	mg/L	20.7	23.9	51.1	34.1	63.2	50.5	-	-	-	-	-	-
Chloride	mg/L	8.02	7.8	7.3	7.52	7.3	7.16	-	6.94	6.74	6.76	-	6.91
Chromium Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1
Chromium Total	µg/L	6	3	4	4	< 1	< 1	-	-	-	-	-	-
Conductivity	µS/cm	179	158	395	266	514	435	-	297	435	425	348	350
Copper Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1
Copper Total	µg/L	2	3	6	3	< 1	< 1	-	-	-	-	-	-
Fluoride	mg/L	0.39	0.31	0.34	0.33	0.33	0.32	-	0.26	0.26	0.21	-	0.25
Iron Dissolved	µg/L	< 20	22	< 20	< 20	< 20	< 20	-	20	20	20	-	20
Iron Total	µg/L	410	915	1110	1450	146	88	-	-	-	-	-	-
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5
Lead Total	µg/L	< 0.5	0.6	0.7	0.6	< 0.5	< 0.5	-	-	-	-	-	-
Magnesium Dissolved	mg/L	0.38	0.5	0.36	0.24	0.34	0.28	-	0.36	0.41	0.51	-	0.37
Magnesium Total	mg/L	0.82	0.6	0.81	0.54	0.49	0.39	-	-	-	-	-	-
Manganese Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1
Manganese Total	µg/L	7	17	20	62	3	< 1	-	-	-	-	-	-
Nickel Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5
Nickel Total	µg/L	1.2	1.5	1.8	1.8	< 0.5	0.6	-	-	-	-	-	-
Nitrate	mg N/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	-	0.02
Nitrite	mg N/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	-	0.02
pH		10.3	10.4	11.3	10.7	11.3	11.2	-	10.8	11.1	11.2	11	11.1
Phosphorus Total	mg P/L	0.054	0.044	0.049	0.052	0.038	0.037	-	0.046	0.038	0.05	-	0.046
Potassium Dissolved	mg/L	1.46	1.46	1.83	1.47	2.72	2.48	-	1.61	2.09	1.92	-	1.63
Potassium Total	mg/L	1.62	1.47	1.86	1.49	2.72	2.53	-	-	-	-	-	-
Selenium Dissolved	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2
Selenium Total	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-
Silica, Molybdate Reactive	mg/L	8.1	7.9	9.4	8	8.2	8	-	-	9	8.5	-	9.2
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	12.3	8.3	7.8	7.3	8.4	8	-	7.3	6.6	6.2	-	5.6
TDS	mg/L	139	118	199	148	211	192	-	122	186	183	154	150
TSS	mg/L	18	14	31	20	5	3	-	3	4	2	-	2
Zinc Dissolved	µg/L	< 2	2	< 2	< 2	< 2	< 2	-	2	2	2	-	2
Zinc Total	µg/L	8	15	13	50	3	6	-	-	-	-	-	-

Analyte	Units	TA-DC214													TA-DC215													T					
Water Quality Record Month-Year		14-Mar-24	08-May-24	30-May-24	25-Jun-24	24-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	23-Jan-25	19-Feb-25	18-Mar-25	14-Mar-24	08-May-24	30-May-24	25-Jun-24	24-Jul-24	28-Aug-24	25-Sep-24	23-Oct-24	28-Nov-24	18-Dec-24	23-Jan-25	19-Feb-25	18-Mar-25	14-Mar-24	08-May-24	30-May-24	25-Jun-24	24-Jul-24	28-Aug-24
Field Water Quality Parameters																																		
Field DO	%	84.5	74.7	71.4	63	61	62.3	88.9	76.6	75.3	-	-	65.9	62.6	96.4	78.2	79.3	87.4	68.5	78	72.3	78.2	-	-	-	78.7	74.5	51.9	40.6	26.3	63.8	33.4	65.4
Field EC	µS/cm	222	229	224	225	226	214	227	224	233	-	-	226	227	325	219	319	295	308	316	316	302	-	-	-	318	305	470	379	346	337	316	305
Field pH		6.92	7.21	7.33	7.15	7.15	7.07	7.38	7.29	7.43	-	-	7.169	7.19	7.3	8.03	7.43	7.52	7.36	7.44	7.43	7.65	-	-	-	7.375	7.45	7.88	7.91	8.15	8.23	8	8.36
Field Temp	°C	16.3	11.5	12.4	11	11.3	11.2	9.5	12.5	16.8	-	-	11.6	13	13	11.2	12.5	10.9	11.7	7.8	11.2	11.7	-	-	-	12.1	12	14.7	11.9	12	11.1	11.3	9.7
Field Turbidity	NTU	228	20.2	194	72	14.8	83.2	97.4	35.1	97.3	-	-	13.2	17.4	8.16	78.5	3.74	49	21.8	2.2	41.4	17.1	-	-	-	3.15	9.99	31.4	23.8	3.13	34.7	10.1	1.57
Laboratory Water Quality Results																																		
Alkalinity Bicarbonate	mg $CaCO_3$/L	92	101	92	89	90	91	93	-	90	91	94	-	92	136	102	134	118	126	136	132	-	125	132	136	-	133	188	150	145	136	127	127
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity Total	mg $CaCO_3$/L	92	101	92	89	90	91	93	-	90	91	94	-	92	137	102	135	118	126	136	132	-	125	132	136	-	134	189	152	146	138	128	129
Aluminium Dissolved	µg/L	< 8	< 8	< 8	< 8	< 8	< 8	< 8	-	8	8	8	-	8	13	< 8	< 8	< 8	12	< 8	< 8	-	8	8	8	-	8	41	22	24	1< 8	21	< 8
Aluminium Total	µg/L	8350	5770	6280	3310	478	5350	11500	-	-	-	-	-	-	606	3750	899	3330	802	112	1650	-	-	-	-	-	-	2640	1230	80	996	305	54
Ammonia	mg-N/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	-	0.05	0.05	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	0.093	0.08	0.013	< 0.05	< 0.05	< 0.05
Arsenic Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	2	2	2	< 1	< 1	< 1
Arsenic Total	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	3	3	2	2	< 1	< 1
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	0.1	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	0.1	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Calcium Dissolved	mg/L	15	14.9	14.6	14.4	14.2	14.3	14.6	-	15.2	14	14.6	-	14.9	25.6	20.2	24.9	23.3	24.9	25.5	24.7	-	24.9	24.5	25	-	25.7	30.4	23.6	20	18.8	17.1	17.3
Calcium Total	mg/L	19.1	16.7	17.5	15.9	14.4	16.3	18.4	-	-	-	-	-	-	27.7	21.5	25.6	25.1	25.5	26.1	25.8	-	-	-	-	-	-	32.6	23.8	20.2	19.4	17.4	17.8
Chloride	mg/L	11.6	12.2	11.1	11.1	10.9	11.1	11.1	-	11.3	11.2	11.4	-	12	15.7	10.9	15.2	13.5	14.7	16.2	15.5	-	14.9	15.5	15.8	-	16.2	18.7	17.3	15.8	15	12.1	13.2
Chromium Dissolved	µg/L	2	< 1	2	2	2	2	2	-	2	2	2	-	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	3	< 1	< 1	< 1	< 1	< 1
Chromium Total	µg/L	10	7	7	6	3	7	12	-	-	-	-	-	-	< 1	6	< 1	5	2	< 1	3	-	-	-	-	-	-	5	3	< 1	2	< 1	< 1
Conductivity	µS/cm	205	243	211	207	218	218	222	-	221	218	220	220	221	290	247	277	232	306	319	311	-	302	312	313	308	314	422	370	304	251	312	309
Copper Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	2	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	2	4	< 1	< 1	3	< 1
Copper Total	µg/L	20	14	13	9	2	14	24	-	-	-	-	-	-	2	9	2	8	2	< 1	4	-	-	-	-	-	-	16	8	2	5	4	< 1
Fluoride	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	0.06	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iron Dissolved	µg/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	20	20	20	-	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	20	20	20	-	20	324	69	63	44	24	< 20
Iron Total	µg/L	8310	5330	5720	3320	578	5370	10700	-	-	-	-	-	-	357	3520	783	3450	778	113	1630	-	-	-	-	-	-	2780	1280	144	868	210	43
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead Total	µg/L	2.3	2.9	1.4	2	< 0.5	2.7	2.6	-	-	-	-	-	-	0.9	1.2	< 0.5	0.9	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	1.8	1.3	< 0.5	1.1	< 0.5	< 0.5
Magnesium Dissolved	mg/L	12	11.5	10.7	11.6	11.2	11.3	11.2	-	11	10.7	11.7	-	11.3	15.4	10.8	14.6	13.8	14.9	15.6	14.9	-	14	14.2	15.3	-	15	18.5	14.2	10.9	11	11.4	10.4
Magnesium Total	mg/L	13.5	12.5	12.3	12.1	11.3	12	12.5	-	-	-	-	-	-	16.7	11.9	14.9	14.9	15	15.8	15.7	-	-	-	-	-	-	20	14	11	11	11.7	10.7
Manganese Dissolved	µg/L	31	< 1	< 1	7	3	4	2	-	1	1	1	-	2	3	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	109	< 1	30	26	13	23
Manganese Total	µg/L	177	84	108	81	14	99	188	-	-	-	-	-	-	11	49	12	52	14	3	32	-	-	-	-	-	-	140	66	32	55	22	24
Nickel Dissolved	µg/L	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	1.8	1.7	0.7	< 0.5	2.1	< 0.5
Nickel Total	µg/L	7.2	5.8	5.3	3.5	1.1	5.1	8.8	-	-	-	-	-	-	< 0.5	3.5	0.7	3	1	< 0.5	1.2	-	-	-	-	-	-	4.4	3.1	0.6	1.7	2.4	< 0.5
Nitrate	mg N/L	0.396	0.371	0.41	0.458	0.39	0.39	0.44	-	0.43	0.41	0.402	-	0.41	0.88	0.926	0.786	0.866	0.79	0.76	0.8	-	0.83	0.78	0.751	-	0.76	0.021	0.135	0.305	0.524	0.39	0.58
Nitrite	mg N/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.002	-	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.002	-	0.02	< 0.02	0.031	0.037	< 0.02	< 0.02	< 0.02
pH		7	7.2	7.1	7.1	7.1	7.2	7.2	-	7.2	7.2	7.2	7.2	7.2	7.4	7.8	7.3	7.4	7.4	7.4	7.3	-	7.4	7.3	7.3	7.3	7.3	7.8	7.9	8	8.1	7.9	8.2
Phosphorus Total	mg P/L	0.192	0.102	0.138	0.108	0.066	0.129	0.166	-	0.145	0.1	0.108	-	0.076	0.047	0.058	0.048	0.084	0.049	0.04	0.051	-	0.048	0.04	0.043	-	0.141	0.104	0.055	0.031	0.068	0.023	0.014
Potassium Dissolved	mg/L	1	0.5	0.58	0.57	0.6	0.56	0.71	-	0.52	0.53	0.69	-	0.79	0.84	0.51	0.54	0.45	0.52	0.46	0.48	-	0.44	0.48	0.48	-	0.48	1.59	0.96	0.86	0.85	1.05	0.78
Potassium Total	mg/L	1.22	0.75	0.86	0.76	0.66	0.75	0.89	-	-	-	-	-	-	0.73	0.8	0.58	0.64	0.57	0.49	0.6	-	-	-	-	-	-	1.5	1.08	0.88	0.88	1.06	0.8
Selenium Dissolved	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2
Selenium Total	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2
Silica, Molybdate Reactive	mg/L	54	50.1	54.5	29	55.1	55.8	55.7	-	-	55.8	54.5	-	55	46	43.2	46	43.3	46	47.1	46.7	-	-	47.2	46.3	-	45.2	19.3	25.5	28.1	29.2	30.6	33.2
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	1.7	3	1.8	1.8	1.8	1.8	1.9	-	1.7	1.6	1.6	-	1.7	2	3	2.1	2.3	2.1	1.9	2.8	-	2.1	1.9	1.9	-	2	20.2	10.2	6.8	5.9	7.9	5
TDS	mg/L	177	220	168	178	168	163	167	-	149	166	175	169	165	216	194	207	210	203	206	213	-	203	208	211	207	198	324	252	222	214	206	202
TSS	mg/L	188	109	208	68	12	122	224	-	175	116	87	-	19	14	130	40	148	22	< 2	42	-	33	5	4	-	267	52	24	< 2	32	7	< 2
Zinc Dissolved	µg/L	13	7	4	5	9	12	18	-	5	5	5	-	17	16	4	< 2	< 2	< 2	3	3	-	2	3	2	-	2	15	8	3	3	6	< 2
Zinc Total	µg/L	42	37	22	27	16	39	43	-	-	-	-	-	-	11	20	3	13	3	4	8	-	-	-	-	-	-	72	35	4	18	10	< 2

Analyte	Units	A-DC218							TA-DC234											
Water Quality Record Month-Year		25-Sep-24	23-Oct-24	28-Nov-24	18-Dec-24	23-Jan-25	19-Feb-25	18-Mar-25	14-Mar-24	07-May-24	25-Jun-24	23-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	18-Mar-25
Field Water Quality Parameters																				
Field DO	%	75.8	78.8	-	-	-	61.2	86.3	69.8	63.9	58.3	58.3	51.3	77	78.2	77.2	-	-	78.1	63.7
Field EC	µS/cm	284	298	-	-	-	309	309	215	209	208	208	200	215	215	216	-	-	218	217
Field pH		8.56	8.56	-	-	-	8.354	8.438	7.3	7.12	7.15	7.15	7.03	7.3	7.41	7.46	-	-	7.192	7.216
Field Temp	°C	12.2	12	-	-	-	12.5	13.7	13.8	12.5	11.9	11.9	12	12.2	13.4	13.6	-	-	13.2	13.2
Field Turbidity	NTU	2.62	4.36	-	-	-	1.1	2.56	11	0.25	4.89	4.89	1.38	1.42	0.96	4.69	-	-	0.28	0.44
Laboratory Water Quality Results																				
Alkalinity Bicarbonate	mg $CaCO_3$/L	116	-	124	129	132	-	131	83	81	80	84	81	85	-	82	-	87	-	86
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Alkalinity Total	mg $CaCO_3$/L	118	-	126	131	134	-	133	83	81	80	84	81	85	-	82	-	87	-	86
Aluminium Dissolved	µg/L	9	-	8	8	8	-	8	< 8	< 8	< 8	< 8	< 8	< 8	-	8	-	8	-	8
Aluminium Total	µg/L	102	-	-	-	-	-	-	116	8	169	649	54	54	-	-	-	-	-	-
Ammonia	mg-N/L	< 0.05	-	0.05	0.05	0.05	-	0.05	0.062	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05
Arsenic Dissolved	µg/L	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Arsenic Total	µg/L	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-
Cadmium Dissolved	µg/L	< 0.1	-	0.1	0.1	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	-	0.1
Cadmium Total	µg/L	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-
Calcium Dissolved	mg/L	15.1	-	16.2	15.7	16.1	-	16.8	18.2	18.3	18	17.8	18.1	17.5	-	18.5	-	18	-	18.4
Calcium Total	mg/L	15.5	-	-	-	-	-	-	18.3	18.7	18	19.5	18	18.4	-	-	-	-	-	-
Chloride	mg/L	12	-	12.5	12.4	12.6	-	12.8	10.1	7.5	7.94	4.93	7.48	10.1	-	8.94	-	9.69	-	8.57
Chromium Dissolved	µg/L	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Chromium Total	µg/L	< 1	-	-	-	-	-	-	< 1	< 1	< 1	2	< 1	< 1	-	-	-	-	-	-
Conductivity	µS/cm	278	-	298	301	302	303	303	192	202	160	200	203	210	-	211	208	213	215	212
Copper Dissolved	µg/L	< 1	-	1	1	1	-	1	4	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Copper Total	µg/L	< 1	-	-	-	-	-	-	5	< 1	< 1	6	< 1	< 1	-	-	-	-	-	-
Fluoride	mg/L	< 0.05	-	0.05	0.05	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05
Iron Dissolved	µg/L	< 20	-	20	20	20	-	20	< 20	< 20	< 20	< 20	< 20	< 20	-	20	-	20	-	20
Iron Total	µg/L	67	-	-	-	-	-	-	112	< 20	116	606	43	40	-	-	-	-	-	-
Lead Dissolved	µg/L	< 0.5	-	0.5	0.5	0.5	-	0.5	2.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5
Lead Total	µg/L	< 0.5	-	-	-	-	-	-	4.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-
Magnesium Dissolved	mg/L	8.88	-	9.24	9.05	9.76	-	9.78	9.66	9.57	8.98	8.11	9.22	9.6	-	9.27	-	10.2	-	9.61
Magnesium Total	mg/L	9.13	-	-	-	-	-	-	9.74	9.75	8.99	8.6	9.23	10.1	-	-	-	-	-	-
Manganese Dissolved	µg/L	18	-	19	15	12	-	10	25	36	15	25	3	< 1	-	4	-	2	-	7
Manganese Total	µg/L	21	-	-	-	-	-	-	60	50	414	2660	142	123	-	-	-	-	-	-
Nickel Dissolved	µg/L	< 0.5	-	0.5	0.5	0.5	-	0.5	1.3	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5
Nickel Total	µg/L	< 0.5	-	-	-	-	-	-	3.8	< 0.5	0.7	3.9	< 0.5	< 0.5	-	-	-	-	-	-
Nitrate	mg N/L	0.57	-	0.66	0.68	0.65	-	0.66	1.51	1.08	1.46	1.33	1.36	1.32	-	1.45	-	1.3	-	1.64
Nitrite	mg N/L	< 0.02	-	0.02	0.02	0.002	-	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	-	0.02	-	0.02
pH		8.2	-	8.2	8.2	8.2	8.2	8.2	7.2	7.2	7.2	7.2	7.2	7.2	-	7.3	7.4	7.3	7.2	7.2
Phosphorus Total	mg P/L	0.012	-	0.012	0.013	0.013	-	0.013	0.029	0.013	0.029	0.035	0.018	0.024	-	0.024	-	0.026	-	0.023
Potassium Dissolved	mg/L	0.69	-	0.65	0.67	0.67	-	0.7	1.12	0.38	0.34	0.5	0.34	0.33	-	0.34	-	0.32	-	0.31
Potassium Total	mg/L	0.73	-	-	-	-	-	-	1.2	0.47	0.34	0.59	0.34	0.37	-	-	-	-	-	-
Selenium Dissolved	µg/L	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Selenium Total	µg/L	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-
Silica, Molybdate Reactive	mg/L	33.4	-	-	32.8	32.9	-	33.5	38	36.2	38.5	32.7	36.9	41.1	-	-	-	41.1	-	38.3
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	4.1	-	4.1	3.8	3.9	-	3.7	2.6	2.9	2.7	3.5	2.9	2.3	-	2.2	-	2	-	2.4
TDS	mg/L	191	-	192	196	200	200	191	165	154	146	148	143	155	-	153	154	153	155	151
TSS	mg/L	< 2	-	4	10	12	-	5	< 2	< 2	6	11	< 2	< 2	-	2	-	2	-	2
Zinc Dissolved	µg/L	< 2	-	2	3	2	-	2	65	< 2	< 2	8	< 2	< 2	-	2	-	2	-	2
Zinc Total	µg/L	< 2	-	-	-	-	-	-	75	< 2	< 2	18	< 2	< 2	-	-	-	-	-	-

Analyte	Units	TA-DC235													TA-DC237												TA-DC238						
Water Quality Record Month-Year		23-Jan-24	14-Mar-24	07-May-24	25-Jun-24	23-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	18-Mar-25	14-Mar-24	07-May-24	25-Jun-24	23-Jul-24	27-Aug-24	25-Sep-24	22-Oct-24	25-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	18-Mar-25	14-Mar-24	07-May-24	30-May-24	25-Jun-24	23-Jul-24	28-Aug-24	25-Sep-24
Field Water Quality Parameters																																		
Field DO	%	85.1	77	80.8	73.4	38.8	74.7	80.2	81.4	80.9	-	-	79.5	74.5	19.6	40.5	91	71.9	36.8	78.7	69.9	104.7	-	-	75.2	117.1	60.3	69	57.6	55.1	73.2	57.1	57.5
Field EC	µS/cm	221	224	224	225	203	217	226	227	230	-	-	230	230	1775	591	1572	819	1782	295	289	283	-	-	279	295	260	262	261	254	248	250	258
Field pH		7.53	7.49	7.37	7.49	7.11	7.35	7.59	7.71	7.73	-	-	7.476	7.46	7.93	8.12	8.06	8.22	8.01	8.37	8.44	8.24	-	-	8.142	8.115	7.13	7.26	7.19	7.17	7.24	7.13	7.33
Field Temp	°C	13.2	13.7	12.8	12.3	12.3	12.5	12.6	13.8	13.9	-	-	13.3	14	14.2	12.9	11.2	12.7	10.8	12.7	14.3	18.1	-	-	14.2	15	12.7	12.4	12.3	11.8	12.4	11.9	12.3
Field Turbidity	NTU	10.8	3.6	0.99	16.2	12.7	11	3.58	5.03	58.1	-	-	0.63	2.02	52.7	18.9	442	301	285	7.49	11.7	7.77	-	-	6.42	4.76	59.5	3.66	5.09	18.9	12.1	5.24	1.56
Laboratory Water Quality Results																																		
Alkalinity Bicarbonate	mg $CaCO_3$/L	94	-	91	92	92	96	95	-	94	-	98	-	97	189	132	176	155	224	120	-	118	-	122	-	121	107	108	111	104	102	93	107
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	-	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	-	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Alkalinity Total	mg $CaCO_3$/L	94	-	92	93	92	96	95	-	94	-	98	-	97	191	134	178	156	226	122	-	119	-	124	-	123	107	108	112	105	102	93	107
Aluminium Dissolved	µg/L	< 8	61	< 8	< 8	< 8	< 8	< 8	-	8	-	8	-	8	15	< 8	< 8	< 8	< 8	< 8	-	8	-	8	-	8	< 8	< 8	< 8	< 8	< 8	< 8	< 8
Aluminium Total	µg/L	748	95	83	905	466	200	223	-	-	-	-	-	-	754	829	15100	4170	1720	1110	-	-	-	-	-	-	5070	454	555	1100	577	19	178
Ammonia	mg-N/L	<0.005	0.009	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.15	< 0.05	-	0.05	-	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	3	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic Total	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	2	< 1	5	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Calcium Dissolved	mg/L	16.8	2.35	18.1	17.8	17.3	17.8	17.9	-	18.7	-	18.3	-	18.2	99.8	25.5	24.1	21.6	189	22.4	-	22.7	-	21.8	-	23.4	19.7	20.3	19.3	18.8	17.6	18.2	19.1
Calcium Total	mg/L	17.5	2.36	18.1	18.2	18.1	18.2	18.6	-	-	-	-	-	-	105	28	81.6	42.3	224	29.7	-	-	-	-	-	-	23.3	20.8	20	19.4	18.1	18.3	19
Chloride	mg/L	7.07	-	8	7.95	8.02	8.2	8.29	-	8.12	-	8.25	-	8.8	47.8	9.24	10.4	20.9	140	7.09	-	6.85	-	6.79	-	6.74	8.31	8.69	8.57	8.36	8.28	9.76	8.74
Chromium Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium Total	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	2	3	3	2	< 1	< 1	-	-	-	-	-	-	3	< 1	< 1	< 1	< 1	< 1	< 1
Conductivity	µS/cm	181	-	218	167	224	222	221	-	224	221	224	224	234	1650	581	444	911	4810	289	-	276	282	270	271	276	235	257	230	192	246	227	252
Copper Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Copper Total	µg/L	2	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	4	3	6	3	3	2	-	-	-	-	-	-	14	< 1	2	3	2	< 1	< 1
Fluoride	mg/L	< 0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05	0.42	0.39	0.32	0.5	1.35	0.09	-	0.05	-	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iron Dissolved	µg/L	< 20	103	< 20	< 20	< 20	< 20	< 20	-	20	-	20	-	20	< 20	< 20	< 20	< 20	211	< 20	-	20	-	20	-	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Iron Total	µg/L	622	150	53	494	293	107	110	-	-	-	-	-	-	678	374	5990	1870	1200	554	-	-	-	-	-	-	2700	217	307	626	325	< 20	90
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead Total	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	1.6	0.8	12	5.4	3.5	1.5	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Magnesium Dissolved	mg/L	9.35	1.45	10.1	10.2	9.47	9.98	9.65	-	9.61	-	10.2	-	9.86	31.9	5.16	5.95	5.22	13.8	7.95	-	8.15	-	9	-	8.89	10.4	11	9.51	9.72	9.22	9.85	10
Magnesium Total	mg/L	9.93	1.46	10.4	10.4	9.71	10.1	10.1	-	-	-	-	-	-	32.4	5.53	9.02	7.03	15	8.3	-	-	-	-	-	-	11.3	11.2	9.65	9.77	9.47	9.89	10.1
Manganese Dissolved	µg/L	< 1	15	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1	310	75	66	48	652	24	-	21	-	15	-	23	17	7	8	6	4	24	3
Manganese Total	µg/L	12	17	2	6	9	2	2	-	-	-	-	-	-	340	86	427	181	797	73	-	-	-	-	-	-	114	21	26	33	20	25	7
Nickel Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5	< 0.5	0.8	< 0.5	< 0.5	1.8	< 0.5	-	0.5	-	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.8	< 0.5
Nickel Total	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	1.8	1.4	2.9	1.7	2.9	< 0.5	-	-	-	-	-	-	1.8	0.6	< 0.5	< 0.5	< 0.5	0.8	< 0.5
Nitrate	mg N/L	1.1	0.008	1.18	1.18	1.08	1.08	1.09	-	1.12	-	1.06	-	1.09	0.076	0.157	0.614	0.61	0.21	0.91	-	1.01	-	1.29	-	1.02	1.85	1.46	1.65	1.82	1.74	1.68	1.83
Nitrite	mg N/L	<0.002	< 0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	-	0.02	-	0.02	< 0.02	0.174	< 0.02	0.05	0.03	0.08	-	0.07	-	0.02	-	0.08	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
pH		7.6	-	7.5	7.5	7.6	7.5	7.5	-	7.6	7.6	7.5	7.5	7.5	7.9	8	8	8	8	8.1	-	8.1	8.1	8.1	8	8.1	7.4	7.3	7.3	7.5	7.4	6.8	7.2
Phosphorus Total	mg P/L	0.037	< 0.01	0.027	0.039	0.037	0.033	0.032	-	0.061	-	0.029	-	0.031	0.061	0.033	0.374	0.12	0.102	0.086	-	0.036	-	0.044	-	0.038	0.08	0.033	0.041	0.045	0.036	0.024	0.036
Potassium Dissolved	mg/L	0.33	0.13	0.24	0.29	0.39	0.29	0.32	-	0.3	-	0.29	-	0.29	2.54	1.23	0.92	0.89	3.74	0.66	-	0.57	-	0.53	-	0.66	0.46	0.37	0.46	0.41	0.4	0.36	0.4
Potassium Total	mg/L	0.38	0.14	0.34	0.33	0.4	0.3	0.36	-	-	-	-	-	-	2.59	1.58	2.24	1.54	4.54	0.87	-	-	-	-	-	-	0.59	0.54	0.47	0.44	0.44	0.36	0.4
Selenium Dissolved	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Selenium Total	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	3	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Silica, Molybdate Reactive	mg/L	41.4	-	42.4	44	42.9	43.6	43.6	-	-	-	40.9	-	42.4	26.2	37.9	36.2	35.6	17.8	39.8	-	-	-	43.1	-	40	45.3	44.2	44	43	41.5	53.8	44.6
Sodium Dissolved	mg/L	-	3.68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	3.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	1.8	-	1.9	1.9	1.9	1.9	2.1	-	1.9	-	1.8	-	1.8	634	134	100	267	2150	13.3	-	6.1	-	4.2	-	5.4	1.9	1.8	1.8	1.8	1.9	1.5	1.9
TDS	mg/L	158	-	184	157	164	152	155	-	140	160	166	163	164	1390	423	363	642	3920	207	-	181	204	196	192	190	189	199	187	182	173	168	180
TSS	mg/L	14	< 2	< 2	19	9	4	4	-	58	-	2	-	2	80	28	516	357	123	83	-	9	-	34	-	7	74	5	9	18	8	< 2	< 2
Zinc Dissolved	µg/L	< 2	< 2	< 2	< 2	5	< 2	< 2	-	2	-	2	-	2	4	4	< 2	< 2	< 2	< 2	-	2	-	3	-	7	5	< 2	< 2	< 2	< 2	< 2	< 2
Zinc Total	µg/L	4	< 2	< 2	< 2	7	< 2	< 2	-	-	-	-	-	-	295	19	24	14	10	6	-	-	-	-	-	-	8	< 2	< 2	< 2	< 2	< 2	< 2

Analyte	Units	TA-DC241																	
Water Quality Record Month-Year		25-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	18-Mar-25	22-Oct-24	23-Jan-24	07-May-24	30-May-24	25-Jun-24	24-Jul-24	27-Aug-24	26-Sep-24	23-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	19-Mar-25
Field Water Quality Parameters																				
Field DO	%	70.2	-	-	63.5	65.8	75.5	45.6	61.3	43	36.2	53.1	61.2	84.5	76.4	63.5	-	-	52.6	50.7
Field EC	µS/cm	262	-	-	255	253	261	169.8	186.6	187	184.7	121.5	64	156	82.2	106.9	-	-	176.9	179.8
Field pH		7.27	-	-	7.28	7.18	7.52	6.41	6.69	6.6	6.57	6.34	5.93	6.33	6.43	6.42	-	-	6.558	6.58
Field Temp	°C	13	-	-	12.7	12.8	14	10.2	9.9	10.2	9.8	9.8	9.8	8.2	10.4	10.9	-	-	9.9	10.4
Field Turbidity	NTU	2.8	-	-	1.95	2.72	7.05	-	>999	792	789	223	163	156	193	0	-	-	754	619
Laboratory Water Quality Results																				
Alkalinity Bicarbonate	mg $CaCO_3$/L	106	108	111	-	106	-	70	77	79	76	42	24	26	-	35	-	39	-	75
Alkalinity Carbonate	mg $CaCO_3$/L	2	2	2	-	2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Alkalinity Hydroxide	mg $CaCO_3$/L	2	2	2	-	2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Alkalinity Total	mg $CaCO_3$/L	107	108	111	-	106	-	70	77	79	76	42	24	26	-	35	-	39	-	75
Aluminium Dissolved	µg/L	8	8	8	-	8	-	< 8	< 8	< 8	< 8	< 8	< 8	< 8	-	8	-	8	-	8
Aluminium Total	µg/L	-	-	-	-	-	-	160000	98000	64200	50900	8880	6910	9520	-	-	-	-	-	-
Ammonia	mg-N/L	0.05	0.05	0.05	-	0.05	-	0.009	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05
Arsenic Dissolved	µg/L	1	1	1	-	1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Arsenic Total	µg/L	-	-	-	-	-	-	4	2	5	5	< 1	< 1	< 1	-	-	-	-	-	-
Cadmium Dissolved	µg/L	0.1	0.1	0.1	-	0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	-	0.1
Cadmium Total	µg/L	-	-	-	-	-	-	0.2	0.2	0.5	0.5	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-
Calcium Dissolved	mg/L	19.4	18.8	19.2	-	18.3	-	12.4	14.6	14.8	14.7	7.11	4.37	4.97	-	7.23	-	7.09	-	13.8
Calcium Total	mg/L	-	-	-	-	-	-	66.6	48.7	31.6	25.3	8.48	5.51	6.89	-	-	-	-	-	-
Chloride	mg/L	8.87	8.77	8.92	-	9.02	-	7.35	8.73	8.69	8.45	5.87	4.48	4.92	-	5.51	-	5.78	-	9.05
Chromium Dissolved	µg/L	1	1	1	-	1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Chromium Total	µg/L	-	-	-	-	-	-	229	108	72	42	12	9	12	-	-	-	-	-	-
Conductivity	µS/cm	254	253	255	248	248	-	138	181	163	129	110	67	74	-	94	78	99	171	177
Copper Dissolved	µg/L	1	1	1	-	1	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	-	1	-	1
Copper Total	µg/L	-	-	-	-	-	-	371	197	97	69	21	15	19	-	-	-	-	-	-
Fluoride	mg/L	0.05	0.05	0.05	-	0.05	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05
Iron Dissolved	µg/L	20	20	20	-	20	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	20	-	20	-	20
Iron Total	µg/L	-	-	-	-	-	-	170000	75300	53200	44300	9220	6550	8860	-	-	-	-	-	-
Lead Dissolved	µg/L	0.5	0.5	0.5	-	0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5
Lead Total	µg/L	-	-	-	-	-	-	17.9	9.3	4.1	3.1	1.1	0.7	0.8	-	-	-	-	-	-
Magnesium Dissolved	mg/L	9.48	9.6	10.3	-	9.35	-	6.78	8.01	7.16	7.53	3.81	2.42	2.66	-	3.55	-	4.02	-	7.11
Magnesium Total	mg/L	-	-	-	-	-	-	29.3	19.6	13.7	12.2	4.5	3.1	3.5	-	-	-	-	-	-
Manganese Dissolved	µg/L	2	2	2	-	1	-	24	25	4	8	4	2	2	-	3	-	8	-	4
Manganese Total	µg/L	-	-	-	-	-	-	2540	1120	425	310	86	65	84	-	-	-	-	-	-
Nickel Dissolved	µg/L	0.5	0.5	0.5	-	0.5	-	0.6	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5
Nickel Total	µg/L	-	-	-	-	-	-	154	81.9	47.7	30.3	9.8	6.8	8.7	-	-	-	-	-	-
Nitrate	mg N/L	1.81	1.77	1.69	-	1.59	-	0.11	0.104	0.116	0.135	0.16	0.17	0.16	-	0.13	-	0.138	-	0.12
Nitrite	mg N/L	0.02	0.02	0.02	-	0.02	-	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	-	0.02	-	0.02
pH		7.3	7.3	7.3	7.4	7.4	-	6.5	6.6	6.6	6.6	6.4	6.2	6.1	-	6.3	6.2	6.2	6.5	6.6
Phosphorus Total	mg P/L	0.036	0.032	0.035	-	0.036	-	0.782	0.421	0.157	0.217	0.048	0.036	0.05	-	0.065	-	0.146	-	0.204
Potassium Dissolved	mg/L	0.38	0.41	0.38	-	0.37	-	0.47	0.49	0.6	0.52	0.31	0.23	0.27	-	0.29	-	0.29	-	0.47
Potassium Total	mg/L	-	-	-	-	-	-	1.48	1.78	2.04	1.08	0.4	0.28	0.41	-	-	-	-	-	-
Selenium Dissolved	µg/L	2	2	2	-	2	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	-	2	-	2
Selenium Total	µg/L	-	-	-	-	-	-	25	7	10	10	< 2	< 2	< 2	-	-	-	-	-	-
Silica, Molybdate Reactive	mg/L	-	43.3	43.3	-	41	-	40.2	47.8	48.5	49.8	31.9	20.2	23.8	-	-	-	31.2	-	48.2
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	1.7	1.6	1.7	-	1.8	-	1.2	1.1	1.2	1.1	1.1	1.1	1.1	-	1	-	1	-	1.2
TDS	mg/L	176	184	181	180	171	-	147	172	154	148	93	55	68	-	85	76	99	138	133
TSS	mg/L	3	3	2	-	4	-	3270	2590	1200	970	255	168	279	-	308	-	733	-	757
Zinc Dissolved	µg/L	2	2	2	-	2	-	3	< 2	3	< 2	7	4	5	-	3	-	4	-	3
Zinc Total	µg/L	-	-	-	-	-	-	225	126	71	50	26	16	19	-	-	-	-	-	-

Analyte	Units	TA-DC242														TA-DC243																
Water Quality Record Month-Year		23-Jan-24	14-Mar-24	08-May-24	30-May-24	25-Jun-24	24-Jul-24	27-Aug-24	24-Sep-24	23-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	20-Feb-25	18-Mar-25	23-Jan-24	14-Mar-24	07-May-24	30-May-24	25-Jun-24	23-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	22-Jan-25	19-Feb-25	18-Mar-25	23-Jan-24	08-May-24	30-May-24	25-Jun-24
Field Water Quality Parameters																																
Field DO	%	17.1	15.8	33.3	23.8	2.7	13.9	3.2	8.7	31.7	23.2	-	-	31.3	26.8	77.8	80.9	77.7	74.6	67.3	66.1	65.3	72	78.7	79.2	-	-	78.7	75.9	81.9	84.4	82.3	66.8
Field EC	µS/cm	314	310	312	312	316	318	302	304	311	316	-	-	330	339	199.1	197.9	199.7	204	215	219	225	225	218	212	-	-	210	212	110.2	120	113.6	108.1
Field pH		6.57	6.61	6.7	6.63	6.618	6.58	6.48	6.66	6.73	6.8	-	-	6.652	6.7	6.85	7.01	6.74	6.7	6.78	6.83	6.74	6.87	7.13	7.05	-	-	6.839	6.83	7.03	7.3	7.28	6.98
Field Temp	°C	10.2	10	10.3	10.6	10.1	10.1	10	9.8	10.2	11	-	-	10.2	10.2	12.5	12.7	12	12	11.7	12	11.8	11.7	12.5	13.3	-	-	12.5	12.6	11.5	11.2	11.2	9.7
Field Turbidity	NTU	46.2	38.1	61	23.8	348	30.3	13.4	5.35	9.94	13	-	-	17.6	15.3	3.49	1.9	0.47	0.5	0.66	1.39	0.24	0.39	0.47	0.63	-	-	0.46	0.24	191	151	113	23.8
Laboratory Water Quality Results																																
Alkalinity Bicarbonate	mg $CaCO_3$/L	128	128	139	136	104	113	132	140	-	138	149	147	-	157	83	82	81	85	85	87	93	89	-	83	86	86	-	85	38	42	40	36
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2
Alkalinity Total	mg $CaCO_3$/L	128	128	139	136	104	113	132	140	-	139	149	147	-	158	83	82	81	85	85	87	93	89	-	83	86	86	-	85	38	42	40	36
Aluminium Dissolved	µg/L	< 8	< 8	< 8	< 8	< 8	14	10	< 8	-	8	8	8	-	8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	< 8	-	8	8	8	-	8	< 8	< 8	< 8	< 8
Aluminium Total	µg/L	2050	3770	4290	1660	8080	1130	293	123	-	-	-	-	-	-	< 8	92	50	8	31	12	19	8	-	-	-	-	-	-	5130	5830	6050	1470
Ammonia	mg-N/L	0.12	0.12	0.149	0.126	0.15	0.15	0.11	0.09	-	0.08	0.08	0.08	-	0.07	0.006	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	0.019	< 0.05	< 0.05	< 0.05
Arsenic Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1
Arsenic Total	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	0.1	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	0.1	0.1	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1
Calcium Dissolved	mg/L	11.3	12.2	11.1	10.6	10.6	14.5	15.2	15.2	-	17.5	17.1	18.5	-	19.6	14.9	16.1	16.3	16	16.8	16.8	18.2	17.6	-	16.9	16.6	16.3	-	16.9	7.56	9.03	8.36	7.91
Calcium Total	mg/L	12.4	13.3	11.9	11.3	12	14.6	15.4	15.9	-	-	-	-	-	-	15.2	16.1	16.1	16.2	17.1	17	18.3	18.3	-	-	-	-	-	-	8.33	9.86	9.07	8.24
Chloride	mg/L	3.29	3.73	3.85	3.78	3.97	8.11	5.16	4.37	-	4.39	4.23	4.57	-	5.44	6.22	6.88	6.88	7.17	7.91	8.46	9.76	9.26	-	8.54	9.01	8.74	-	9	8.29	9.19	9.5	9.02
Chromium Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1
Chromium Total	µg/L	7	13	13	6	33	6	2	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	9	14	12	3
Conductivity	µS/cm	220	239	184	243	178	270	283	279	-	289	300	295	287	326	161	180	194	180	164	216	227	218	-	206	212	206	206	208	90	116	99	82
Copper Dissolved	µg/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	1	1	1	-	1	< 1	< 1	< 1	< 1
Copper Total	µg/L	8	16	12	5	46	6	2	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	-	-	-	-	-	-	33	37	36	11
Fluoride	mg/L	0.13	0.13	0.14	0.15	0.11	0.06	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05	-	0.05	0.05	0.05	-	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Iron Dissolved	µg/L	36300	33700	5030	42300	45700	23400	18800	18400	-	15900	13900	12800	-	10500	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	-	20	20	20	-	20	< 20	< 20	< 20	< 20
Iron Total	µg/L	42100	49800	49200	46000	90000	27100	20600	19800	-	-	-	-	-	-	< 20	95	59	< 20	65	< 20	< 20	< 20	-	-	-	-	-	-	9180	9000	11600	2470
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	0.5	0.5	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Lead Total	µg/L	0.6	0.8	0.8	< 0.5	2.3	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	2.1	2.9	2.1	0.6
Magnesium Dissolved	mg/L	11.5	12.7	12	10.4	10.8	14	14.9	15.6	-	16.7	17.7	19.8	-	19.8	8.1	8.84	9.17	8.02	9.09	9.22	9.85	9.51	-	8.46	8.79	8.93	-	9.02	3.82	4.22	3.67	3.79
Magnesium Total	mg/L	13.1	15.3	13.6	11.4	14.1	14.3	15.2	16.4	-	-	-	-	-	-	8.22	9.17	8.88	8.19	9.14	9.22	9.89	9.91	-	-	-	-	-	-	3.96	4.64	4.02	3.9
Manganese Dissolved	µg/L	894	976	777	767	692	1530	1740	1780	-	2130	2220	2340	-	2440	32	37	26	28	28	27	24	21	-	20	18	18	-	18	28	2	5	4
Manganese Total	µg/L	991	1050	844	835	794	1550	1740	1820	-	-	-	-	-	-	33	43	30	29	32	27	25	21	-	-	-	-	-	-	416	485	544	116
Nickel Dissolved	µg/L	10	10.5	10.9	11	12.3	11.7	10	8.6	-	8.1	7.2	7.6	-	7.1	0.7	0.8	1	0.7	0.7	0.9	0.8	0.6	-	0.6	0.6	0.6	-	0.7	1.7	1.6	0.8	1
Nickel Total	µg/L	16.7	28.9	26.9	16.6	46.5	16.1	11.3	9.2	-	-	-	-	-	-	0.9	1.1	1.1	0.7	0.8	0.9	0.8	0.6	-	-	-	-	-	-	11.9	13	11.9	4.1
Nitrate	mg N/L	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	-	0.02	1.2	1.28	1.38	1.29	1.54	1.58	1.68	1.5	-	1.47	1.49	1.52	-	1.55	0.039	0.032	0.016	< 0.02
Nitrite	mg N/L	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	-	0.02	<0.002	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	-	0.02	0.02	0.02	-	0.02	<0.002	< 0.02	< 0.02	< 0.02
pH		6.5	6.5	6.5	6.5	6.4	6.5	6.6	6.5	-	6.6	6.6	6.6	6.5	6.7	6.9	7	6.8	6.8	6.9	6.9	6.8	6.8	-	6.8	6.8	6.8	6.8	6.9	7	7.2	7	6.9
Phosphorus Total	mg P/L	0.266	0.33	0.352	0.307	0.918	0.09	0.062	0.056	-	0.07	0.055	0.063	-	0.073	0.021	0.027	0.025	0.027	0.026	0.026	0.024	0.031	-	0.031	0.027	0.029	-	0.029	0.092	0.065	0.178	0.025
Potassium Dissolved	mg/L	0.87	0.89	0.78	0.85	0.78	1.08	1.03	1.09	-	1.15	1.15	1.23	-	1.23	0.36	0.46	0.35	0.39	0.37	0.38	0.36	0.37	-	0.33	0.35	0.32	-	0.35	0.54	0.49	0.5	0.42
Potassium Total	mg/L	0.98	1.1	0.97	0.96	1.07	1.16	1.07	1.14	-	-	-	-	-	-	0.37	0.45	0.39	0.41	0.39	0.39	0.36	0.39	-	-	-	-	-	-	0.76	1.03	0.81	0.53
Selenium Dissolved	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	< 2	< 2	< 2	< 2
Selenium Total	µg/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2
Silica, Molybdate Reactive	mg/L	24.7	26.3	25.5	24.2	23.9	29.5	31.8	30.5	-	-	30.6	30.9	-	31.5	50	52	51.4	52.4	54.4	52.4	53.8	53.7	-	-	52.9	52.3	-	52.4	22.5	21.7	24.1	24.1
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sulphate	mg/L	< 0.1	< 0.1	< 0.1	< 0.1	0.3	8.8	6.6	2.1	-	2.8	2.8	3.7	-	6.5	1.5	1.5	1.6	1.5	1.6	1.6	1.5	1.5	-	1.3	1.2	1.3	-	1.3	0.9	1	1	0.9
TDS	mg/L	157	191	159	160	160	169	174	188	-	179	185	196	185	186	154	166	175	162	141	164	168	176	-	147	178	165	167	156	89	114	88	79
TSS	mg/L	165	144	110	90	748	134	28	9	-	31	21	16	-	36	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	156	112	94	24
Zinc Dissolved	µg/L	4	< 2	< 2	< 2	< 2	4	4	3	-	3	3	2	-	2	< 2	5	< 2	< 2	< 2	< 2	< 2	< 2	-	2	2	2	-	2	4	< 2	< 2	< 2
Zinc Total	µg/L	8	14	13	6	30	9	5	4	-	-	-	-	-	-	< 2	6	4	< 2	< 2	< 2	< 2	< 2	-	-	-	-	-	-	13	19	11	4

Analyte	Units	TA-DC247									SW_P1									
Water Quality Record Month-Year		23-Jul-24	27-Aug-24	24-Sep-24	22-Oct-24	26-Nov-24	18-Dec-24	21-Jan-25	19-Feb-25	19-Mar-25	26-Jun-24	24-Jul-24	27-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24	21-Jan-25	20-Feb-25	05-Mar-25
Field Water Quality Parameters																				
Field DO	%	90.4	104.7	89.8	103.4	96.4	-	-	-	62.7	-	-	-	-	103.5	101.4		0		
Field EC	µS/cm	114.2	109	114.7	114.1	115.4	-	-	-	103.3	-	-	-	-	29.8	28.9		0		
Field pH		7.11	7.02	7.12	7.24	7.03	-	-	-	6.965	-	-	-	-	7.03	6.65		0		
Field Temp	°C	9.4	10.1	9.3	12.5	10.7	-	-	-	15.1	-	-	-	-	9.6	11.2		0		
Field Turbidity	NTU	50.9	5.1	1.47	9.62	2.37	-	-	-	9.23	-	-	-	-	1.74	1.89		0		
Laboratory Water Quality Results																				
Alkalinity Bicarbonate	mg $CaCO_3$/L	39	37	39	-	38	-	44	-	36	-	7	6	5	5		6		4	4
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	< 2	< 2	-	2	-	2	-	2	-	< 2	< 2	< 2	2		2		2	2
Alkalinity Hydroxide	mg $CaCO_3$/L	< 2	< 2	< 2	-	2	-	2	-	2	-	-	-	-						2
Alkalinity Total	mg $CaCO_3$/L	39	38	39	-	38	-	44	-	36	-	7	6	5	5		6		4	4
Aluminium Dissolved	µg/L	32	< 8	< 8	-	8	-	8	-	61	33	103	133	94	56		52		33	27
Aluminium Total	µg/L	236	157	49	-	-	-	-	-	-	80	163	235	160	105		98		72	58
Ammonia	mg-N/L	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05	< 0.005	< 0.05	< 0.05	< 0.005	0.006		0.006		0.007	0.005
Arsenic Dissolved	µg/L	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	1		1		1	1
Arsenic Total	µg/L	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	1		1		1	1
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	-	0.1	-	0.1	-	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	-	-	-	-	-	-	< 0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	0.1
Calcium Dissolved	mg/L	8.35	8.13	8.57	-	8.61	-	10	-	7.89	1.04	1.58	1.49	1.45	1.02		1.15		1.05	0.99
Calcium Total	mg/L	8.45	8.27	8.69	-	-	-	-	-	-	1.05	1.63	1.56	1.51	1.08		1.19		1.11	1.02
Chloride	mg/L	9.66	9.67	9.91	-	9.87	-	9.09	-	8.6	-	6.2	6.29	7.04	4.84		4.72		4.47	4.46
Chromium Dissolved	µg/L	< 1	< 1	< 1	-	1	-	1	-	1	< 1	< 1	< 1	< 1	1		1		1	1
Chromium Total	µg/L	< 1	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	1		1		1	1
Conductivity	µS/cm	114	111	112	-	112	116	118	116	102	-	41	41	-						27
Copper Dissolved	µg/L	< 1	< 1	< 1	-	1	-	1	-	4	< 1	< 1	< 1	< 1	1		1		1	1
Copper Total	µg/L	2	< 1	< 1	-	-	-	-	-	-	< 1	< 1	< 1	< 1	1		1		1	1
Fluoride	mg/L	< 0.05	< 0.05	< 0.05	-	0.05	-	0.05	-	0.05	-	< 0.05	< 0.05	< 0.05	0.05		0.05		0.05	0.05
Iron Dissolved	µg/L	< 20	< 20	< 20	-	20	-	20	-	120	31	98	106	52	29		46		32	20
Iron Total	µg/L	356	189	72	-	-	-	-	-	-	116	150	181	103	77		106		99	66
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	-	0.5	-	0.5	-	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5
Lead Total	µg/L	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5
Magnesium Dissolved	mg/L	4.08	4.01	4.16	-	3.93	-	3.72	-	3.38	0.73	1.27	1.17	1.01	0.75		0.86		0.74	0.7
Magnesium Total	mg/L	4.12	4.08	4.22	-	-	-	-	-	-	0.74	1.29	1.24	1.02	0.79		0.88		0.75	0.72
Manganese Dissolved	µg/L	2	2	< 1	-	10	-	19	-	25	2	4	3	2	2		7		3	2
Manganese Total	µg/L	15	7	4	-	-	-	-	-	-	8	7	6	4	6		6		11	8
Nickel Dissolved	µg/L	1	< 0.5	< 0.5	-	0.5	-	0.5	-	1.6	< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5
Nickel Total	µg/L	1	0.7	< 0.5	-	-	-	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	0.7		0.5		0.5	0.5
Nitrate	mg N/L	< 0.02	< 0.02	< 0.02	-	0.02	-	0.023	-	0.02	0.013	< 0.02	< 0.02	0.012	0.016		0.016		0.018	0.011
Nitrite	mg N/L	< 0.02	< 0.02	< 0.02	-	0.02	-	0.02	-	0.02	<0.002	< 0.02	< 0.02	<0.002	0.002		0.002		0.002	0.002
pH		7.1	7.1	7	-	7.1	7.2	7.2	7.1	7	-	7	6.8	-						6.7
Phosphorus Total	mg P/L	< 0.01	< 0.01	< 0.01	-	0.01	-	0.036	-	0.022	< 0.01	< 0.01	< 0.01	< 0.01	0.01		0.01		0.01	0.01
Potassium Dissolved	mg/L	0.43	0.38	0.44	-	0.39	-	0.42	-	0.49	0.11	0.11	0.14	0.29	0.12		0.13		0.08	0.11
Potassium Total	mg/L	0.44	0.4	0.45	-	-	-	-	-	-	0.12	0.1	0.18	0.3	0.15		0.13		0.1	0.14
Selenium Dissolved	µg/L	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	2		2		2	2
Selenium Total	µg/L	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	< 2	< 2	2		2		2	2
Silica, Molybdate Reactive	mg/L	24.8	24.3	24.4	-	-	-	21	-	20.2	-	7.1	7.2	6.7	4.1		4.2		3.3	3.1
Sodium Dissolved	mg/L	-	-	-	-	-	-	-	-	-	2.67	-	-	-						
Sodium Total	mg/L	-	-	-	-	-	-	-	-	-	2.78	-	-	-						
Sulphate	mg/L	0.9	0.9	0.9	-	0.8	-	0.9	-	0.8	-	1.1	1.1	1	0.7		0.6		0.7	0.6
TDS	mg/L	88	79	84	-	79	89	93	85	81	-	48	41	39	30	26	29	34	25	39
TSS	mg/L	6	< 2	< 2	-	3	-	20	-	4	3	< 2	< 2	< 2	2		2		2	2
Zinc Dissolved	µg/L	< 2	< 2	< 2	-	2	-	2	-	2	< 2	< 2	< 2	< 2	2		2		2	2
Zinc Total	µg/L	< 2	< 2	< 2	-	-	-	-	-	-	< 2	< 2	3	< 2	2		2		2	2

Analyte	Units	SW_P2								SW_P3									SW_P4									SW_P5					
Water Quality Record Month-Year		24-Jul-24	27-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24	21-Jan-25	18-Feb-25	26-Jun-24	24-Jul-24	27-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24	21-Jan-25	20-Feb-25	24-Jul-24	28-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24	21-Jan-25	19-Feb-25	05-Mar-25	26-Jun-24	24-Jul-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24
Field Water Quality Parameters																																	
Field DO	%	-	-	-	102.3	104.2				-	-	-	-	108.4	107.3				-	-	-	109.1	107.4					-	-	-	105.4		
Field EC	µS/cm	-	-	-	34.6	32.3				-	-	-	-	31.1	31.8				-	-	-	33.1	31.7					-	-	-	44.2		
Field pH		-	-	-	7.04	6.74				-	-	-	-	6.93	6.86				-	-	-	6.77	7					-	-	-	6.69		
Field Temp	°C	-	-	-	18.8	17.5				-	-	-	-	12.6	14.3				-	-	-	14.6	16.7					-	-	-	19.3		
Field Turbidity	NTU	-	-	-	2.01	2.57				-	-	-	-	1.86	1.93				-	-	-	2.11	1.95					-	-	-	2.04		
Laboratory Water Quality Results																																	
Alkalinity Bicarbonate	mg $CaCO_3$/L	7	6	4	5		5	4		-	6	6	5	5		5		4	6	6	5	5		5		4	4	-	6	5	9		8
Alkalinity Carbonate	mg $CaCO_3$/L	< 2	< 2	< 2	2		2	2		-	< 2	< 2	< 2	2		2		2	< 2	< 2	< 2	2		2		2	2	-	< 2	< 2	2		2
Alkalinity Hydroxide	mg $CaCO_3$/L	-	-	-						-	-	-	-						-	-	-						2	-	-	-			
Alkalinity Total	mg $CaCO_3$/L	7	6	4	5		5	4		-	6	6	5	5		5		4	6	6	5	5		5		4	4	-	6	5	9		9
Aluminium Dissolved	µg/L	141	159	116	70		56	29		33	90	131	84	58		47		31	89	121	94	58		48		28	24	61	92	76	59		51
Aluminium Total	µg/L	363	312	244	140		104	64		68	210	238	122	104		85		65	215	241	157	114		97		71	63	95	144	137	101		90
Ammonia	mg-N/L	< 0.05	< 0.05	< 0.005	0.005		0.005	0.005		0.009	< 0.05	< 0.05	< 0.005	0.005		0.005		0.005	< 0.05	< 0.05	< 0.005	0.006		0.005		0.007	0.005	0.009	< 0.05	< 0.005	0.006		0.005
Arsenic Dissolved	µg/L	< 1	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	< 1	< 1	1		1		1	1	< 1	< 1	< 1	1		1
Arsenic Total	µg/L	< 1	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	< 1	< 1	1		1		1	1	< 1	< 1	< 1	1		1
Cadmium Dissolved	µg/L	< 0.1	< 0.1	< 0.1	0.1		0.1	0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	0.1		0.1
Cadmium Total	µg/L	< 0.1	< 0.1	< 0.1	0.1		0.1	0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	< 0.1	< 0.1	< 0.1	0.1		0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	0.1		0.1
Calcium Dissolved	mg/L	1.95	1.84	1.44	1.25		1.21	1.06		1.05	1.64	1.47	1.39	1.15		1.17		1.09	1.55	1.5	1.4	1.19		1.24		1.05	1.03	2.35	1.66	1.3	1.94		1.91
Calcium Total	mg/L	2.07	1.89	1.51	1.32		1.26	1.14		1.07	1.67	1.57	1.4	1.19		1.19		1.15	1.65	1.58	1.45	1.28		1.32		1.12	1.09	2.36	1.83	1.37	1.98		1.93
Chloride	mg/L	5.91	6.49	7.84	5.76		4.95	4.56		-	6.05	6.05	6.27	5		4.7		4.56	6.1	5.88	6.74	5.28		4.92		4.56	4.52	-	5.5	5.68	6.54		5.66
Chromium Dissolved	µg/L	< 1	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	< 1	< 1	1		1		1	1	< 1	< 1	< 1	1		1
Chromium Total	µg/L	< 1	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	2	< 1	1		1		1	1	< 1	< 1	< 1	1		1
Conductivity	µS/cm	42	45	-						-	40	40	-						40	39	-						27	-	38	-			
Copper Dissolved	µg/L	< 1	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	< 1	< 1	1		1		1	1	< 1	< 1	< 1	1		1
Copper Total	µg/L	2	< 1	< 1	1		1	1		< 1	< 1	< 1	< 1	1		1		1	< 1	< 1	< 1	1		1		1	1	< 1	< 1	< 1	2		1
Fluoride	mg/L	< 0.05	< 0.05	< 0.05	0.05		0.05	0.05		-	< 0.05	< 0.05	< 0.05	0.05		0.05		0.05	< 0.05	< 0.05	< 0.05	0.05		0.05		0.05	0.05	-	< 0.05	< 0.05	0.05		0.05
Iron Dissolved	µg/L	380	301	164	89		98	91		41	130	132	72	45		62		58	126	126	91	57		65		74	54	103	83	37	61		59
Iron Total	µg/L	721	515	343	176		178	221		99	301	235	114	97		119		130	284	246	439	120		136		165	133	150	136	95	95		120
Lead Dissolved	µg/L	< 0.5	< 0.5	< 0.5	0.5		0.5	0.5		< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	0.5		0.5
Lead Total	µg/L	< 0.5	< 0.5	< 0.5	0.5		0.5	0.5		< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	0.5		0.5
Magnesium Dissolved	mg/L	1.32	1.25	1.06	0.9		0.89	0.76		0.72	1.17	1.09	0.95	0.84		0.83		0.76	1.13	1.06	0.98	0.87		0.89		0.77	0.71	1.45	1.11	0.9	1.26		1.23
Magnesium Total	mg/L	1.36	1.3	1.1	0.95		0.89	0.8		0.73	1.18	1.16	0.95	0.86		0.85		0.78	1.16	1.14	1.02	0.92		0.95		0.8	0.74	1.46	1.12	0.93	1.31		1.26
Manganese Dissolved	µg/L	24	21	8	8		10	13		4	6	5	4	4		7		8	4	5	5	5		9		10	7	15	4	2	7		5
Manganese Total	µg/L	30	26	12	10		12	18		7	14	10	6	9		10		12	11	10	7	7		13		12	11	17	7	6	8		9
Nickel Dissolved	µg/L	< 0.5	< 0.5	< 0.5	0.5		0.5	0.5		< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	0.5		0.5
Nickel Total	µg/L	0.9	0.6	< 0.5	0.6		0.5	0.5		< 0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	< 0.5	< 0.5	< 0.5	0.5		0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	0.5		0.5
Nitrate	mg N/L	0.05	< 0.02	<0.002	0.003		0.003	0.002		0.013	< 0.02	< 0.02	0.004	0.009		0.009		0.012	0.03	< 0.02	0.005	0.007		0.005		0.005	0.006	0.008	< 0.02	0.003	0.004		0.002
Nitrite	mg N/L	< 0.02	< 0.02	0.003	0.002		0.002	0.002		<0.002	< 0.02	< 0.02	<0.002	0.002		0.002		0.002	< 0.02	< 0.02	<0.002	0.002		0.002		0.002	0.002	<0.002	< 0.02	<0.002	0.002		0.002
pH		6.7	6.7	-						-	6.9	6.9	-						6.9	6.9	-						6.6	-	6.9	-			
Phosphorus Total	mg P/L	0.018	< 0.01	< 0.01	0.01		0.01	0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.01		0.01		0.01	< 0.01	< 0.01	< 0.01	0.01		0.01		0.01	0.01	< 0.01	< 0.01	< 0.01	0.01		0.01
Potassium Dissolved	mg/L	0.14	0.16	0.28	0.14		0.12	0.08		0.13	0.11	0.14	0.24	0.15		0.1		0.08	0.11	0.19	0.28	0.13		0.13		0.08	0.11	0.13	0.11	0.24	0.24		0.15
Potassium Total	mg/L	0.14	0.16	0.3	0.19		0.1	0.11		0.13	0.12	0.17	0.25	0.18		0.12		0.09	0.14	0.23	0.31	0.21		0.13		0.09	0.15	0.14	0.11	0.25	0.29		0.14
Selenium Dissolved	µg/L	< 2	< 2	< 2	2		2	2		< 2	< 2	< 2	< 2	2		2		2	< 2	< 2	< 2	2		2		2	2	< 2	< 2	< 2	2		2
Selenium Total	µg/L	< 2	< 2	< 2	2		2	2		< 2	< 2	< 2	< 2	2		2		2	< 2	< 2	< 2	2		2		2	2	< 2	< 2	< 2	2		2
Silica, Molybdate Reactive	mg/L	7.5	7.9	6.5	5.1		4.2	2.4		-	6.8	6.9	6.1	4.2		3.9		2.9	6.8	6.7	5.8	4.5		4.2		2.6	2.6	-	7.4	6.1	7.9		8.3
Sodium Dissolved	mg/L	-	-	-						2.65	-	-	-						-	-	-							3.68	-	-			
Sodium Total	mg/L	-	-	-						2.75	-	-	-						-	-	-							3.81	-	-			
Sulphate	mg/L	1.6	1.4	1	0.8		0.6	0.6		-	1	1.1	0.9	0.7		0.6		0.7	1	1	0.9	0.7		0.6		0.6	0.6	-	0.9	0.8	0.8		0.5
TDS	mg/L	61	48	44	36	30	32	25		-	47	40	34	24	27	29	33	23	48	40	34	34	24	33	33	25	31	-	41	26	35	38	41
TSS	mg/L	< 2	< 2	< 2	2		2	2		< 2	4	< 2	< 2	2		2		2	< 2	< 2	< 2	2		2		3	2	< 2	< 2	< 2	2		2
Zinc Dissolved	µg/L	< 2	< 2	< 2	2		2	2		< 2	< 2	< 2	< 2	2		2		2	< 2	< 2	< 2	2		2		2	2	< 2	< 2	< 2	2		2
Zinc Total	µg/L	< 2	< 2	< 2	4		2	2		< 2	< 2	< 2	< 2	2		2		2	< 2	4	< 2	2		2		5	2	< 2	< 2	< 2	4		2

Analyte	Units				SW_P6										SW_P7								SW_P8								
Water Quality Record Month-Year		23-Jan-25	20-Feb-25	05-Mar-25	26-Jun-24	24-Jul-24	27-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	18-Dec-24	21-Jan-25	18-Feb-25	05-Mar-25	26-Jun-24	24-Jul-24	28-Aug-24	24-Sep-24	21-Oct-24	21-Nov-24	17-Dec-24	23-Jan-25	20-Feb-25	05-Mar-25	26-Jun-24	24-Jul-24	28-Aug-24	25-Sep-24	22-Oct-24	21-Nov-24	19-Dec-24	23-Jan-25	20-Feb-25
Field Water Quality Parameters																															
Field DO	%	0			-	-	-	-	96.7	100					-	-	-	-	121.7	104.7		0			-	-	-	-	101.5	91.3		0	
Field EC	µS/cm	0			-	-	-	-	30.1	29.2					-	-	-	-	70.7	58.7		0			-	-	-	-	136.5	136.7		0	
Field pH		0			-	-	-	-	6.69	6.77					-	-	-	-	7.01	7.85		0			-	-	-	-	7.43	8.002		0	
Field Temp	°C	0			-	-	-	-	12.4	13.3					-	-	-	-	20.7	20.4		0			-	-	-	-	10.77	14.5		0	
Field Turbidity	NTU	0			-	-	-	-	2.03	2.36					-	-	-	-	2.79	2.58		0			-	-	-	-	0.77	1.34		0	
Laboratory Water Quality Results																															
Alkalinity Bicarbonate	mg $CaCO_3$/L		22	23	-	6	5	4	4	4	4		4	3	-	12	14	14	15	14	14		0	8	-	43	36	< 2	43	45	46		50
Alkalinity Carbonate	mg $CaCO_3$/L		2	2	-	< 2	< 2	< 2	2	2	2		2	2	-	< 2	< 2	< 2	2	2	2		0	2	-	< 2	< 2	< 2	2	2	2		2
Alkalinity Hydroxide	mg $CaCO_3$/L			2	-	-	-	-						2	-	-	-	-						2	-	-	-	-					
Alkalinity Total	mg $CaCO_3$/L		22	23	-	6	5	4	4	4	4		4	3	-	12	14	14	15	14	14		0	8	-	43	36	41	43	45	46		50
Aluminium Dissolved	µg/L		15	13	47	98	152	130	60	56	64		31	28	32	27	31	14	12	17	16		8	11	< 8	< 8	< 8	< 8	8	8	8		8
Aluminium Total	µg/L		22	55	81	161	247	211	113	102	96		96	67	179	140	211	67	83	57	187		153	218	17	69	176	64	27	53	21		41
Ammonia	mg-N/L		0.005	0.009	0.006	< 0.05	< 0.05	0.01	0.005	0.005	0.005		0.005	0.007	0.019	< 0.05	< 0.05	0.007	0.027	0.056	0.066		0.01	0.02	0.012	< 0.05	< 0.05	< 0.005	0.005	0.005	0.005		0.052
Arsenic Dissolved	µg/L		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1
Arsenic Total	µg/L		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1
Cadmium Dissolved	µg/L		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1
Cadmium Total	µg/L		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.1	0.1		0.1
Calcium Dissolved	mg/L		4.14	4.14	1.02	1.54	1.45	1.36	1.02	1.07	1.09		1.04	0.99	1.84	2.75	3.31	4.18	3.48	2.86	2.9		1.95	1.73	9.55	8.68	7.85	8.62	9.15	9.52	9.25		10.3
Calcium Total	mg/L		4.1	4.33	1.06	1.57	1.53	1.47	1.09	1.09	1.16		1.04	1.04	1.88	2.81	3.33	4.19	3.57	2.99	2.92		2.05	1.78	9.65	9.09	7.9	9.13	9.27	9.78	9.44		10.6
Chloride	mg/L		6.6	6.58	-	6.24	6.17	7.24	4.94	4.51	4.52		4.48	4.5	-	6.09	6.31	8.77	7.92	6.76	6.54		0	5.92	-	6.07	5.97	9.29	9.32	8.36	7.92		8.04
Chromium Dissolved	µg/L		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	3	3	3	3	3	3	3		3
Chromium Total	µg/L		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	2	< 1	1	1	1		1	1	3	4	4	4	3	3	3		4
Conductivity	µS/cm			68	-	4< 1	40	-						27	-	57	67	-						42	-	128	114	-					
Copper Dissolved	µg/L		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	1	1		1
Copper Total	µg/L		1	3	< 1	< 1	< 1	< 1	1	1	1		1	1	< 1	< 1	< 1	< 1	1	2	1		1	2	< 1	< 1	< 1	< 1	1	1	1		1
Fluoride	mg/L		0.05	0.05	-	< 0.05	< 0.05	< 0.05	0.05	0.05	0.05		0.05	0.05	-	< 0.05	< 0.05	< 0.05	0.05	0.05	0.05		0	0.05	-	< 0.05	< 0.05	< 0.05	0.05	0.05	0.05		0.05
Iron Dissolved	µg/L		603	570	82	121	169	225	66	67	102		53	56	122	106	128	53	117	432	376		166	148	< 20	< 20	< 20	< 20	20	20	20		20
Iron Total	µg/L		864	946	147	184	242	324	134	142	164		166	125	405	343	393	161	358	681	920		646	568	22	87	138	52	23	60	20		58
Lead Dissolved	µg/L		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5
Lead Total	µg/L		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5
Magnesium Dissolved	mg/L		2.42	2.49	0.72	1.2	1.14	1.01	0.75	0.71	0.79		0.73	0.69	1.24	1.91	2.3	2.87	2.47	1.91	2.02		1.55	1.37	5.07	5.11	4.23	4.98	5.49	5.22	5.48		6.02
Magnesium Total	mg/L		2.45	2.6	0.73	1.21	1.2	1.08	0.79	0.72	0.79		0.76	0.71	1.27	1.93	2.31	2.82	2.55	1.92	2.04		1.59	1.41	5.19	5.36	4.31	5.3	5.54	5.3	5.6		6.11
Manganese Dissolved	µg/L		69	29	12	11	13	31	6	9	15		9	10	16	15	14	9	39	54	44		10	11	< 1	< 1	< 1	< 1	1	1	1		6
Manganese Total	µg/L		93	64	14	11	16	37	10	12	18		15	13	18	17	16	11	46	59	55		19	20	2	4	2	< 1	1	3	1		8
Nickel Dissolved	µg/L		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5
Nickel Total	µg/L		0.5	0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	0.5	0.5		0.5	0.5	< 0.5	< 0.5	0.6	< 0.5	0.7	0.5	0.6		0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	1.5	0.5	0.5		0.5
Nitrate	mg N/L		0.002	0.002	0.011	< 0.02	< 0.02	0.003	0.01	0.01	0.013		0.016	0.008	0.076	0.35	0.66	1.33	0.648	0.028	0.09		0.003	0.004	1.95	2.39	2.04	1.84	1.74	1.83	2.02		1.71
Nitrite	mg N/L		0.002	0.002	<0.002	< 0.02	< 0.02	0.003	0.002	0.002	0.002		0.002	0.002	<0.002	< 0.02	< 0.02	0.003	0.002	0.002	0.002		0.002	0.002	< 0.002	< 0.02	< 0.02	<0.002	0.002	0.002	0.002		0.006
pH				7.1	-	6.8	6.7	-						6.5	-	7	7	-						6.9	-	7.7	7.4	-					
Phosphorus Total	mg P/L		0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.01	0.01		0.01	0.01	< 0.01	< 0.01	0.013	< 0.01	0.01	0.01	0.012		0.014	0.015	0.034	0.084	0.013	0.012	0.011	0.011	0.011		0.013
Potassium Dissolved	mg/L		0.25	0.28	0.13	0.12	0.15	0.27	0.11	0.1	0.15		0.08	0.15	0.26	0.27	0.42	0.35	0.32	0.3	0.41		0.28	0.37	0.99	0.9	0.83	0.86	0.87	1.23	0.81		0.98
Potassium Total	mg/L		0.23	0.34	0.13	0.12	0.19	0.29	0.17	0.11	0.15		0.08	0.2	0.26	0.27	0.42	0.37	0.37	0.34	0.4		0.3	0.41	1.04	0.95	0.84	0.91	0.92	1.29	0.84		1.01
Selenium Dissolved	µg/L		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	< 2	< 2	< 2	< 2	2	2	2		2
Selenium Total	µg/L		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	< 2	< 2	< 2	< 2	2	2	2		2
Silica, Molybdate Reactive	mg/L		8.9	8.8	-	7	7.1	6.1	4	3.8	3.7		3	2.9	-	7.1	8	8.5	4.7	2	3.4		0	1.7	-	33.7	30.5	34	33.5	33.2	32.7		32.5
Sodium Dissolved	mg/L				2.72	-	-	-							3.4	-	-	-							6.99	-	-	-					
Sodium Total	mg/L				2.74	-	-	-							3.55	-	-	-							7.15	-	-	-					
Sulphate	mg/L		0.4	0.4	-	1.1	1	1	0.7	0.6	0.6		0.6	0.6	-	2.5	3	2.9	2.4	1.5	1.6		0	1.1	-	1.7	1.5	1.3	1.6	1.5	1.6		1.8
TDS	mg/L	55	53	63	-	41	47	44	25	24	28	35	24	38	-	46	48	51	40	38	44	42	0	42	-	107	94	96	104	104	109	111	111
TSS	mg/L		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	4	< 2	< 2	< 2	2	2	2		0	3	< 2	3	< 2	< 2	2	2	2		2
Zinc Dissolved	µg/L		2	2	< 2	< 2	< 2	< 2	2	2	2		2	2	< 2	< 2	< 2	< 2	2	3	2		2	2	< 2	< 2	7	< 2	2	2	2		2
Zinc Total	µg/L		2	2	< 2	< 2	< 2	3	2	2	4		2	2	< 2	< 2	< 2	< 2	2	4	2		2	4	< 2	< 2	7	< 2	3	2	3		2

Analyte	Units		190.3	190.4	190.7
Water Quality Record Month-Year		06-Mar-25	24-Sep-24	24-Sep-24	24-Sep-24
Field Water Quality Parameters					
Field DO	%		-	-	-
Field EC	µS/cm		-	-	-
Field pH			-	-	-
Field Temp	°C		-	-	-
Field Turbidity	NTU		-	-	-
Laboratory Water Quality Results					
Alkalinity Bicarbonate	mg $CaCO_3$/L	55	< 2	5	5
Alkalinity Carbonate	mg $CaCO_3$/L	2	< 2	< 2	< 2
Alkalinity Hydroxide	mg $CaCO_3$/L	2	-	-	-
Alkalinity Total	mg $CaCO_3$/L	55	4	5	5
Aluminium Dissolved	µg/L	8	67	58	59
Aluminium Total	µg/L	26	157	154	168
Ammonia	mg-N/L	0.188	0.012	< 0.005	0.006
Arsenic Dissolved	µg/L	1	< 1	< 1	< 1
Arsenic Total	µg/L	1	< 1	< 1	< 1
Cadmium Dissolved	µg/L	0.1	< 0.1	< 0.1	< 0.1
Cadmium Total	µg/L	0.1	< 0.1	< 0.1	< 0.1
Calcium Dissolved	mg/L	11	1.15	1.33	1.34
Calcium Total	mg/L	11.3	1.17	1.39	1.46
Chloride	mg/L	8.46	5.36	4.56	4.73
Chromium Dissolved	µg/L	2	< 1	< 1	< 1
Chromium Total	µg/L	3	< 1	< 1	< 1
Conductivity	µS/cm	150	-	-	-
Copper Dissolved	µg/L	1	< 1	< 1	< 1
Copper Total	µg/L	1	< 1	< 1	< 1
Fluoride	mg/L	0.05	< 0.05	< 0.05	< 0.05
Iron Dissolved	µg/L	60	46	32	37
Iron Total	µg/L	133	151	103	113
Lead Dissolved	µg/L	0.5	< 0.5	< 0.5	< 0.5
Lead Total	µg/L	0.5	< 0.5	< 0.5	< 0.5
Magnesium Dissolved	mg/L	6.19	0.81	0.79	0.81
Magnesium Total	mg/L	6.33	0.84	0.81	0.87
Manganese Dissolved	µg/L	89	3	2	3
Manganese Total	µg/L	93	12	4	5
Nickel Dissolved	µg/L	0.5	< 0.5	< 0.5	< 0.5
Nickel Total	µg/L	0.7	< 0.5	< 0.5	< 0.5
Nitrate	mg N/L	1.05	0.036	0.01	0.009
Nitrite	mg N/L	0.022	< 0.002	< 0.002	< 0.002
pH		7.3	-	-	-
Phosphorus Total	mg P/L	0.03	< 0.01	< 0.01	< 0.01
Potassium Dissolved	mg/L	1.29	0.2	0.16	0.17
Potassium Total	mg/L	1.36	0.2	0.19	0.19
Selenium Dissolved	µg/L	2	< 2	< 2	< 2
Selenium Total	µg/L	2	< 2	< 2	< 2
Silica, Molybdate Reactive	mg/L	30.4	4.7	5.5	5.7
Sodium Dissolved	mg/L		-	-	-
Sodium Total	mg/L		-	-	-
Sulphate	mg/L	1.8	0.8	0.6	0.6
TDS	mg/L	124	35	30	32
TSS	mg/L	2	3	< 2	< 2
Zinc Dissolved	µg/L	10	< 2	< 2	< 2
Zinc Total	µg/L	19	< 2	< 2	< 2

Appendix D
Hydrogeological Tests

- D1 – Test Sheets
- D2 – Packer Test Plots
- D3 – Slug Tests

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

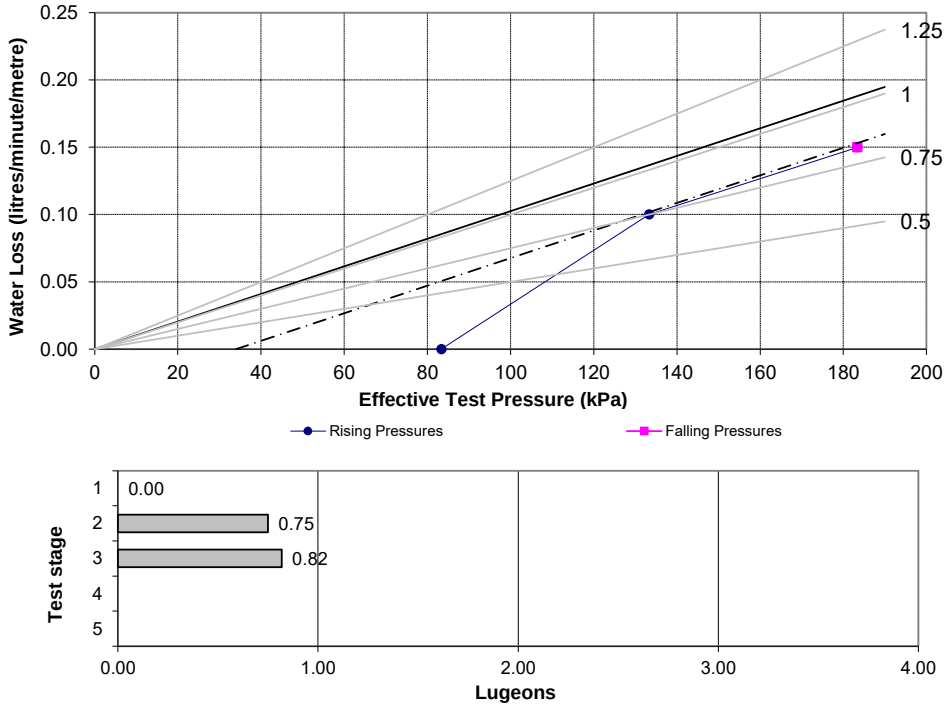
TA06DC001 : 21.8m to 26.8m

hole no:	TA06DC001	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Intake	by:	BS

section tested: from 21.8 m to 26.8 m length 5.0 m

relative level at surface:	723.5 m RL	centre of test section (downhole):	24.30 m
gauge height:	0.8 m	test depth converted to vertical:	23.93 m
inclination of borehole:	80 °	relative level at centre of test section:	699.6 m RL
inferred groundwater level:	720.9 m RL	correction to gauge pressure:	33.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
2	50	83.32	0.00	0.00	13.4%	0.00
2	100	133.32	1.00	0.10	21.4%	0.75
2	150	183.32	1.50	0.15	29.5%	0.82
			CANCELLED			



Interpreted flow mechanism: NO PATTERN

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 1.03

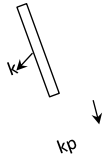
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

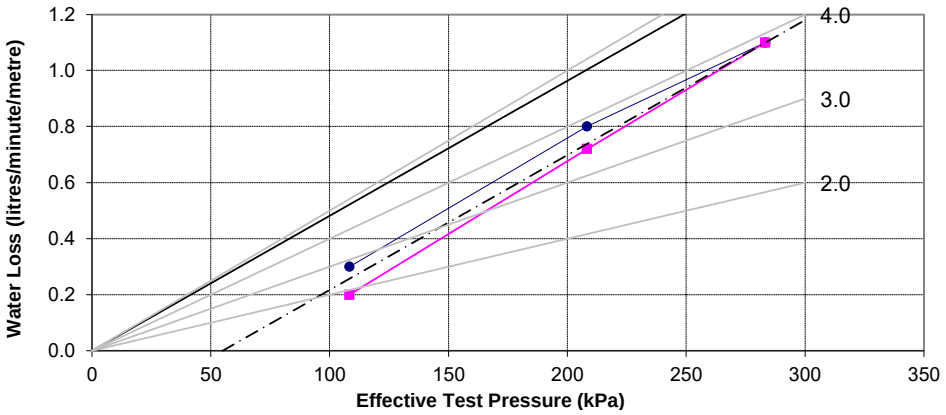
TA06DC001 : 27.8m to 32.8m

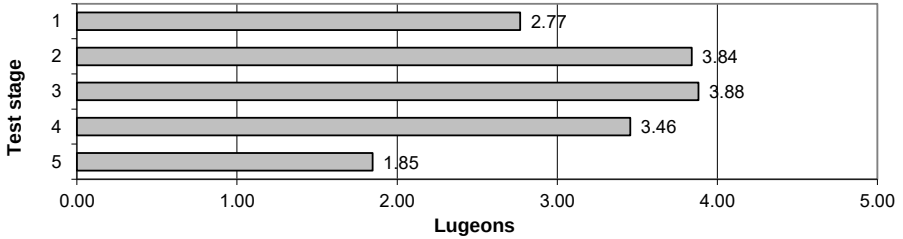
hole no:	TA06DC001	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Intake	by:	BS

section tested: from 27.8 m to 32.8 m length 5.0 m

relative level at surface:	723.5 m RL	centre of test section (downhole):	30.30 m
gauge height:	0.8 m	test depth converted to vertical:	29.84 m
inclination of borehole:	80 °	relative level at centre of test section:	693.7 m RL
inferred groundwater level:	720.9 m RL	correction to gauge pressure:	33.3 kPa

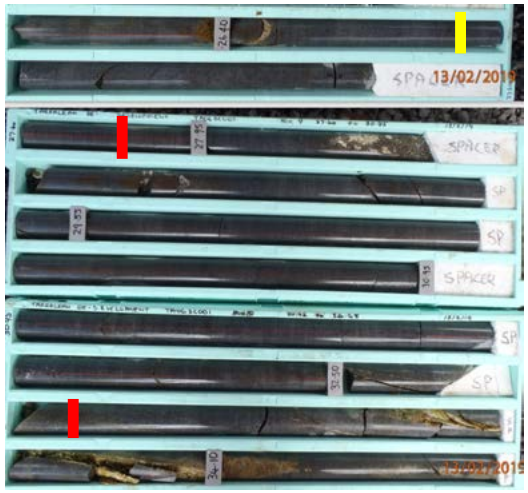
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	75	108.32	15.00	0.30	14.0%	2.77
10	175	208.32	40.00	0.80	26.9%	3.84
10	250	283.32	55.00	1.10	36.5%	3.88
10	175	208.32	36.00	0.72	26.9%	3.46
10	75	108.32	10.00	0.20	14.0%	1.85





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

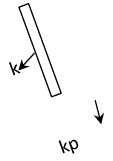
uL (Fell et al., 2005) - upper chart	4.82
uL (Houlsby, 1976) - lower chart	1.85

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.9E-07	m/sec
ke/kp = 100	5.9E-07	m/sec
ke/kp = 10	4.9E-07	m/sec
ke/kp = 1	3.9E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

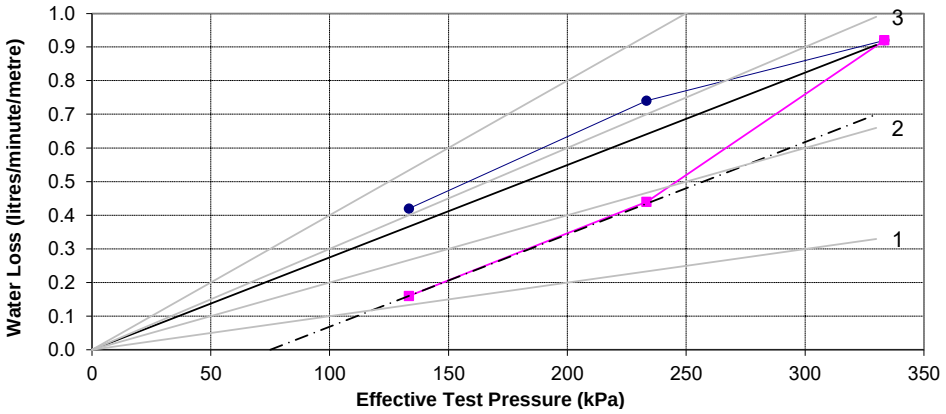
TA06DC001 : 33.3m to 38.3m

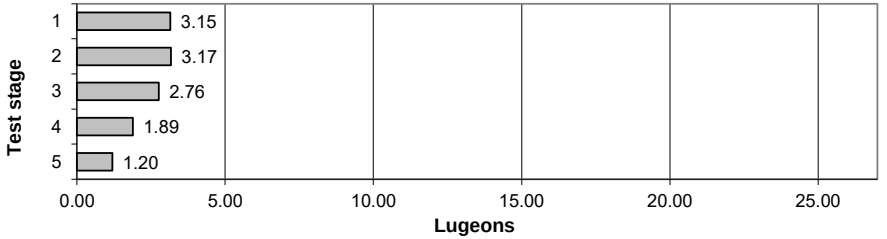
hole no:	TA06DC001	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Intake	by:	BS

section tested: from 33.3 m to 38.3 m length 5.0 m

relative level at surface:	723.5 m RL	centre of test section (downhole):	35.80 m
gauge height:	0.8 m	test depth converted to vertical:	35.26 m
inclination of borehole:	80 °	relative level at centre of test section:	688.2 m RL
inferred groundwater level:	720.9 m RL	correction to gauge pressure:	33.3 kPa

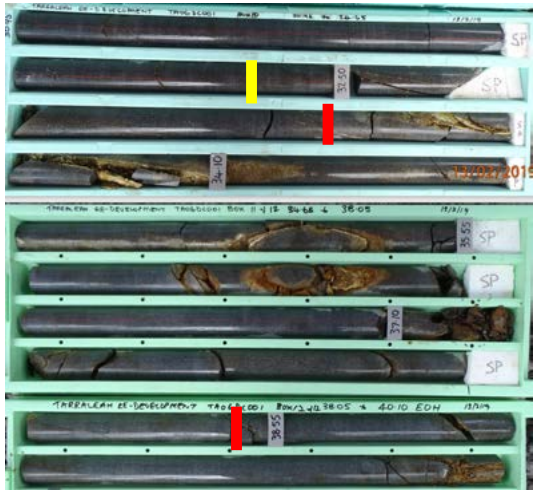
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	100	133.32	21.00	0.42	14.5%	3.15
10	200	233.32	37.00	0.74	25.5%	3.17
10	300	333.32	46.00	0.92	36.4%	2.76
10	200	233.32	22.00	0.44	25.5%	1.89
10	100	133.32	8.00	0.16	14.5%	1.20





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

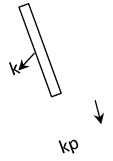
uL (Fell et al., 2005) - upper chart	2.75
uL (Houlsby, 1976) - lower chart	1.20

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.7E-07	m/sec
ke/kp = 100	4.1E-07	m/sec
ke/kp = 10	3.4E-07	m/sec
ke/kp = 1	2.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.9E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

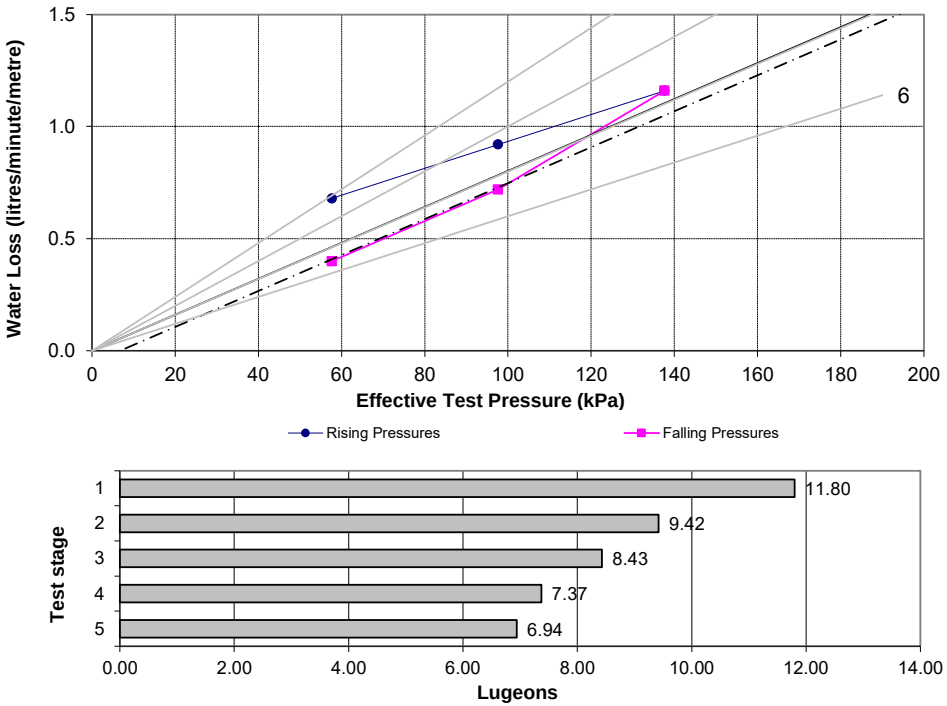
TA06DC002 : 15m to 20m

hole no:	TA06DC002	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Outlet	by:	CD

section tested: from 15.0 m to 20.0 m length 5.0 m

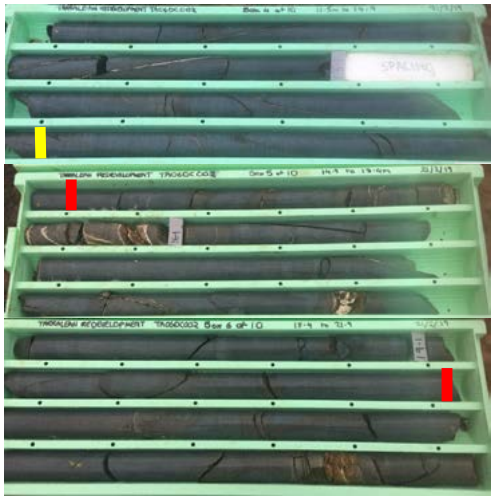
relative level at surface:	685.3 m RL	centre of test section (downhole):	17.50 m
gauge height:	0.8 m	test depth converted to vertical:	17.23 m
inclination of borehole:	80 °	relative level at centre of test section:	668.1 m RL
inferred groundwater level:	684.3 m RL	correction to gauge pressure:	17.6 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	40	57.64	17.00	0.68	12.9%	11.80
5	80	97.64	23.00	0.92	21.8%	9.42
5	120	137.64	29.00	1.16	30.7%	8.43
5	80	97.64	18.00	0.72	21.8%	7.37
5	40	57.64	10.00	0.40	12.9%	6.94



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

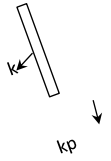
uL (Fell et al., 2005) - upper chart	8.02
uL (Houlsby, 1976) - lower chart	6.94

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.7E-06	m/sec
ke/kp = 100	1.5E-06	m/sec
ke/kp = 10	1.2E-06	m/sec
ke/kp = 1	9.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.0E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

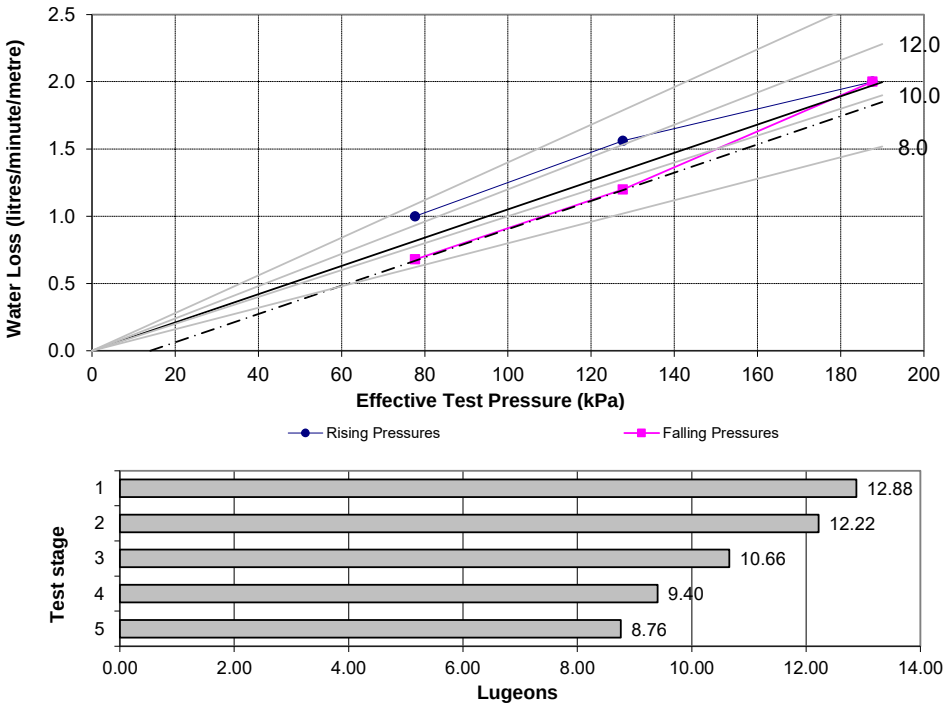
TA06DC002 : 18.5m to 23.5m

hole no:	TA06DC002	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Outlet	by:	CD

section tested: from 18.5 m to 23.5 m length 5.0 m

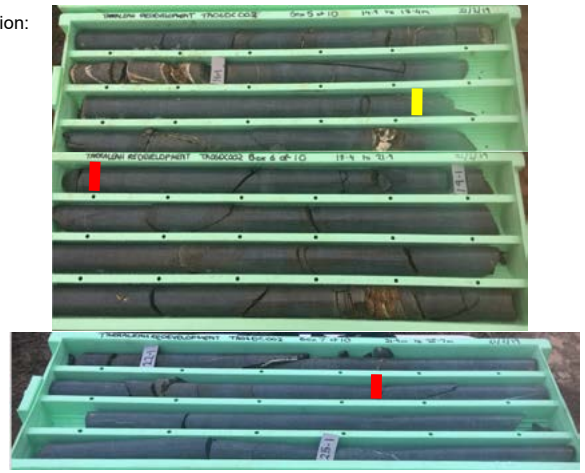
relative level at surface:	685.3 m RL	centre of test section (downhole):	21.00 m
gauge height:	0.8 m	test depth converted to vertical:	20.68 m
inclination of borehole:	80 °	relative level at centre of test section:	664.6 m RL
inferred groundwater level:	684.3 m RL	correction to gauge pressure:	17.6 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	60	77.64	25.00	1.00	14.4%	12.88
5	110	127.64	39.00	1.56	23.7%	12.22
5	170	187.64	50.00	2.00	34.9%	10.66
5	110	127.64	30.00	1.20	23.7%	9.40
5	60	77.64	17.00	0.68	14.4%	8.76



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

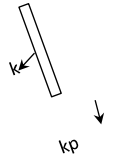
uL (Fell et al., 2005) - upper chart	10.51
uL (Houlsby, 1976) - lower chart	8.76

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.2E-06	m/sec
ke/kp = 100	1.9E-06	m/sec
ke/kp = 10	1.5E-06	m/sec
ke/kp = 1	1.2E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.3E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

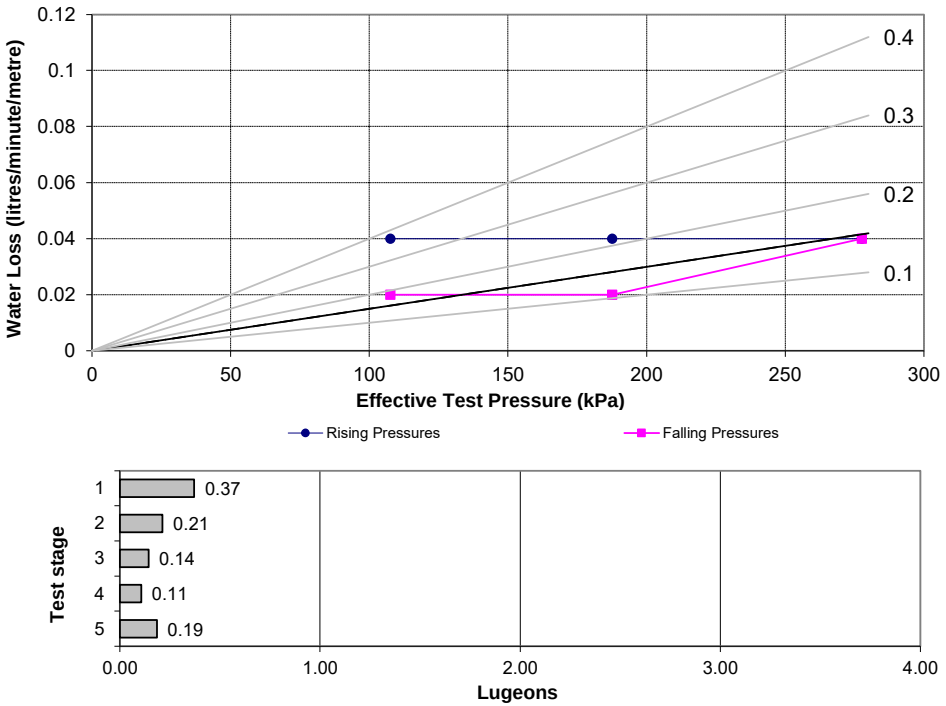
TA06DC002 : 27m to 32m

hole no:	TA06DC002	date:	14-Feb-19
project:	BOTN		
location:	Lake King William Outlet	by:	CD

section tested: from 27.0 m to 32.0 m length 5.0 m

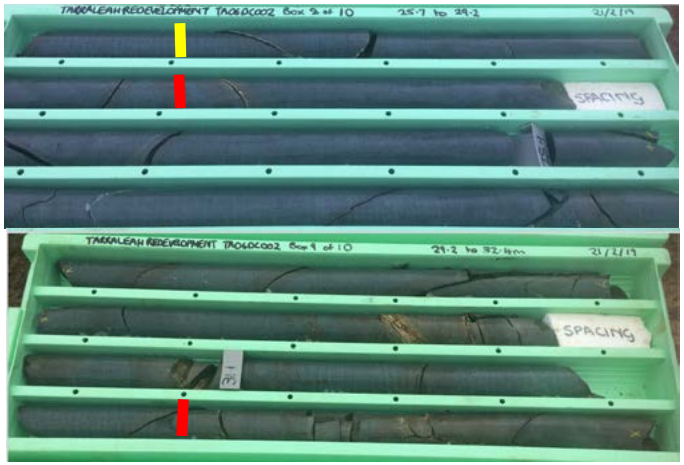
relative level at surface:	685.3 m RL	centre of test section (downhole):	29.50 m
gauge height:	0.8 m	test depth converted to vertical:	29.05 m
inclination of borehole:	80 °	relative level at centre of test section:	656.2 m RL
inferred groundwater level:	684.3 m RL	correction to gauge pressure:	17.6 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	90	107.64	1.00	0.04	14.3%	0.37
5	170	187.64	1.00	0.04	24.8%	0.21
5	260	277.64	1.00	0.04	36.8%	0.14
5	170	187.64	0.50	0.02	24.8%	0.11
5	90	107.64	0.50	0.02	14.3%	0.19



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

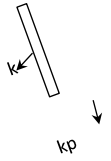
uL (Fell et al., 2005) - upper chart	0.15
uL (Houlsby, 1976) - lower chart	0.11

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.4E-08	m/sec
ke/kp = 100	2.9E-08	m/sec
ke/kp = 10	2.4E-08	m/sec
ke/kp = 1	2.0E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.1E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC003 : 5m to 10m

hole no: TA06DC003 date: 1-Mar-19

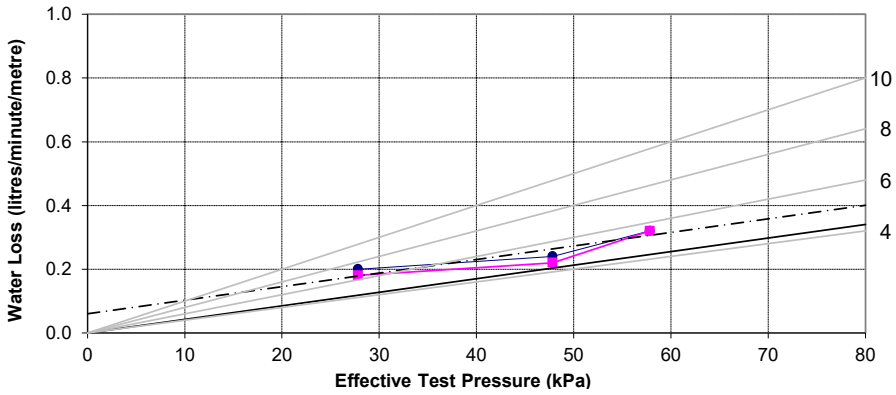
project: Tarraleah Redevelopment Feasibility Study

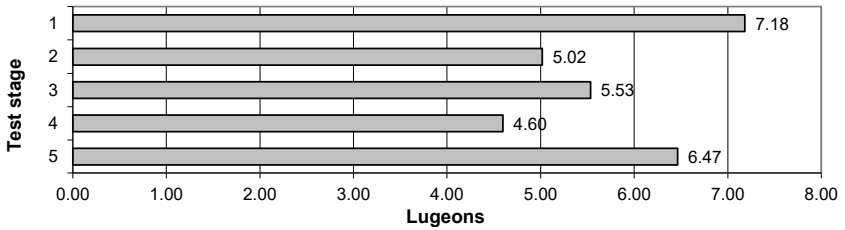
location: Mossy Marsh by: CD

section tested: from 5.0 m to 10.0 m length 5.0 m

relative level at surface:	686.8 m RL	centre of test section (downhole):	7.50 m
gauge height:	0.8 m	test depth converted to vertical:	7.39 m
inclination of borehole:	80 °	relative level at centre of test section:	679.4 m RL
inferred groundwater level:	686.8 m RL	correction to gauge pressure:	7.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	20	27.84	5.00	0.20	14.5%	7.18
5	40	47.84	6.00	0.24	24.9%	5.02
5	50	57.84	8.00	0.32	30.1%	5.53
5	40	47.84	5.50	0.22	24.9%	4.60
5	20	27.84	4.50	0.18	14.5%	6.47





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

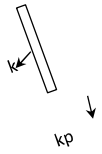
uL (Fell et al., 2005) - upper chart	4.25
uL (Houlsby, 1976) - lower chart	5.76

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.1E-06	m/sec
ke/kp = 100	9.8E-07	m/sec
ke/kp = 10	8.1E-07	m/sec
ke/kp = 1	6.5E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC003 : 7m to 30m

hole no: TA06DC003 date: 1-Mar-19

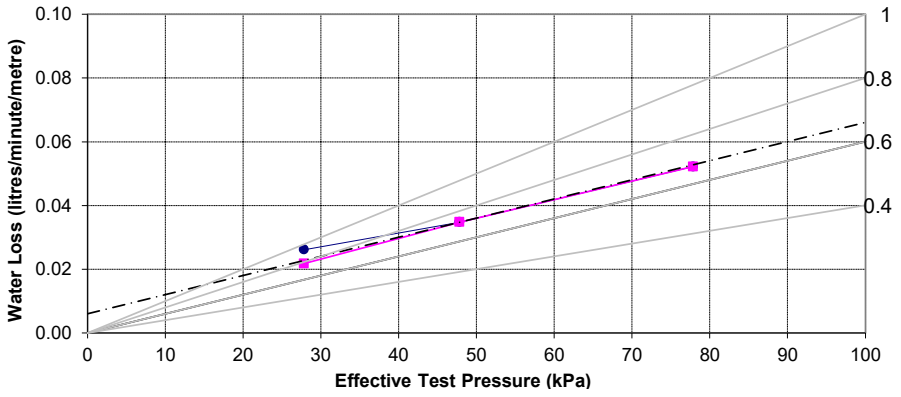
project: Tarraleah Redevelopment Feasibility Study

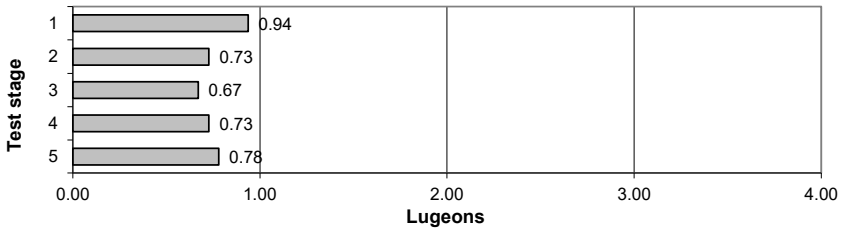
location: Mossy Marsh by: CD

section tested: from 7.0 m to 30.0 m length 23.0 m

relative level at surface:	686.8 m RL	centre of test section (downhole):	18.50 m
gauge height:	0.8 m	test depth converted to vertical:	18.22 m
inclination of borehole:	80 °	relative level at centre of test section:	668.6 m RL
inferred groundwater level:	686.8 m RL	correction to gauge pressure:	7.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	20	27.84	3.00	0.03	5.9%	0.94
5	40	47.84	4.00	0.03	10.1%	0.73
5	70	77.84	6.00	0.05	16.4%	0.67
5	40	47.84	4.00	0.03	10.1%	0.73
5	20	27.84	2.50	0.02	5.9%	0.78





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

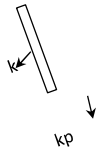
uL (Fell et al., 2005) - upper chart	0.60
uL (Houlsby, 1976) - lower chart	0.73

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-07	m/sec
ke/kp = 100	1.6E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC003 : 13m to 30m

hole no: TA06DC003 date: 1-Mar-19

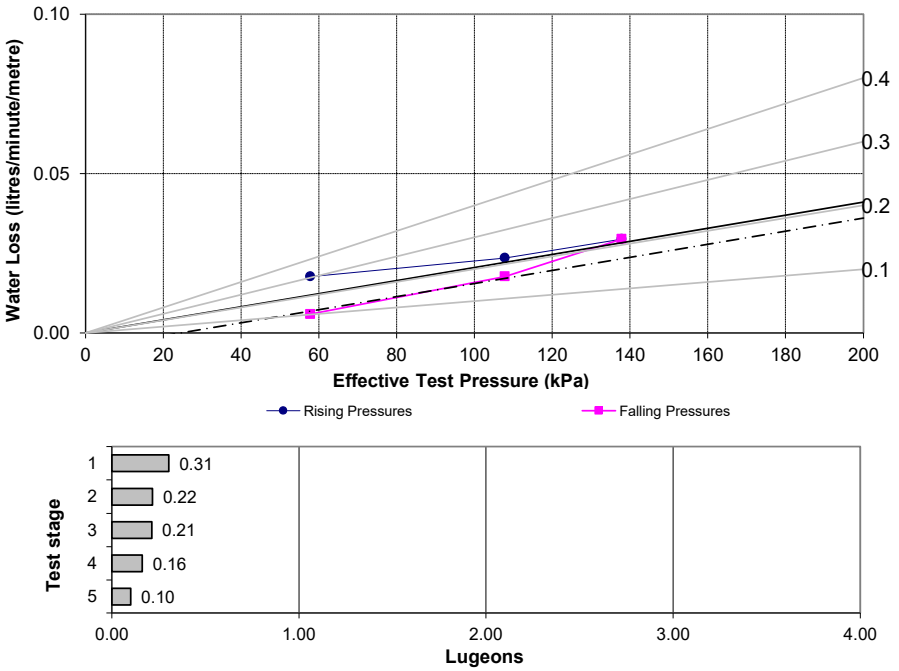
project: Tarraleah Redevelopment Feasibility Study

location: Mossy Marsh by: CD

section tested: from 13.0 m to 30.0 m length 17.0 m

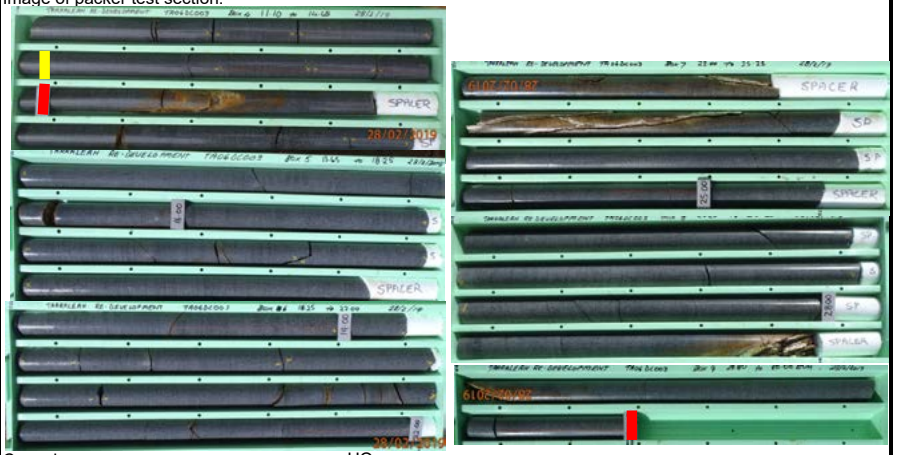
relative level at surface:	686.8 m RL	centre of test section (downhole):	21.50 m
gauge height:	0.8 m	test depth converted to vertical:	21.17 m
inclination of borehole:	80 °	relative level at centre of test section:	665.6 m RL
inferred groundwater level:	686.8 m RL	correction to gauge pressure:	7.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	50	57.84	1.50	0.02	10.5%	0.31
5	100	107.84	2.00	0.02	19.6%	0.22
5	130	137.84	2.50	0.03	25.0%	0.21
5	100	107.84	1.50	0.02	19.6%	0.16
5	50	57.84	0.50	0.01	10.5%	0.10



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

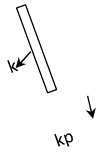
uL (Fell et al., 2005) - upper chart	0.21
uL (Houlsby, 1976) - lower chart	0.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.2E-08	m/sec
ke/kp = 100	3.7E-08	m/sec
ke/kp = 10	3.2E-08	m/sec
ke/kp = 1	2.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.8E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC003 : 19m to 30m

hole no: TA06DC003 date: 1-Mar-19

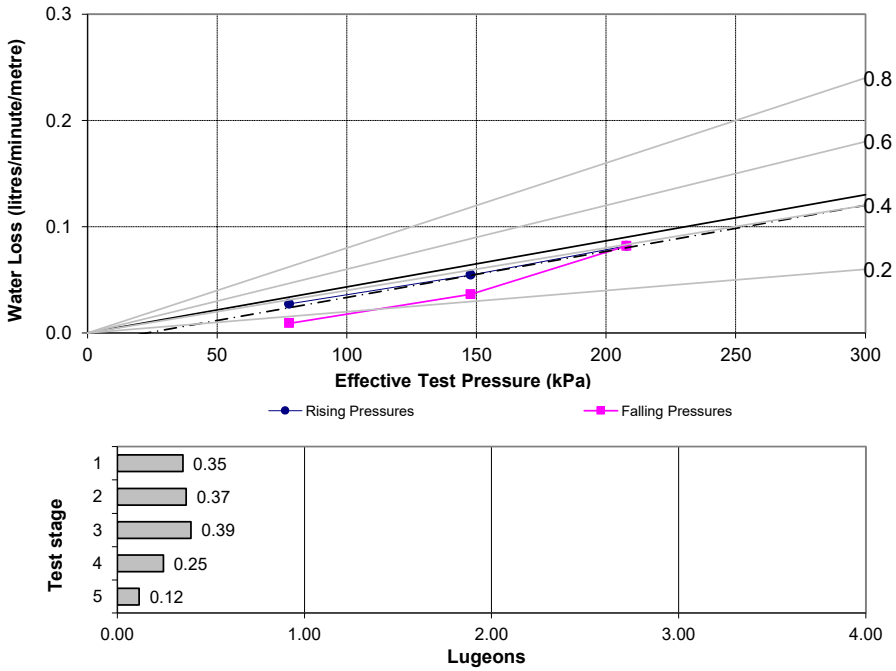
project: Tarraleah Redevelopment Feasibility Study

location: Mossy Marsh by: CD

section tested: from 19.0 m to 30.0 m length 11.0 m

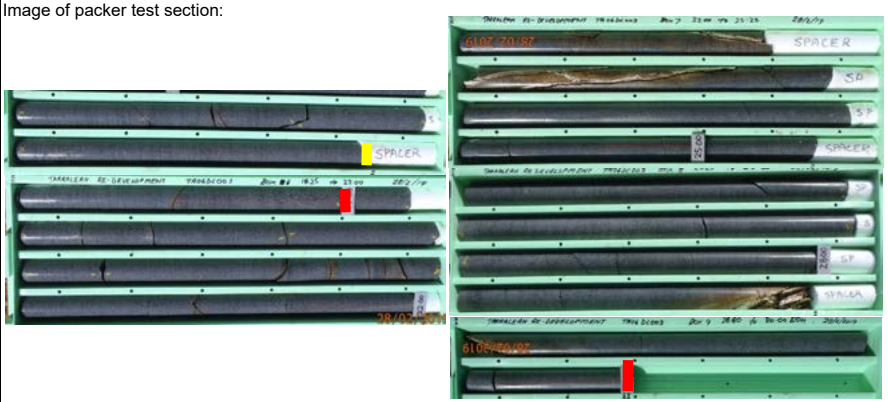
relative level at surface:	686.8 m RL	centre of test section (downhole):	24.50 m
gauge height:	0.8 m	test depth converted to vertical:	24.13 m
inclination of borehole:	80 °	relative level at centre of test section:	662.7 m RL
inferred groundwater level:	686.8 m RL	correction to gauge pressure:	7.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	70	77.84	1.50	0.03	12.4%	0.35
5	140	147.84	3.00	0.05	23.6%	0.37
5	200	207.84	4.50	0.08	33.1%	0.39
5	140	147.84	2.00	0.04	23.6%	0.25
5	70	77.84	0.50	0.01	12.4%	0.12



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

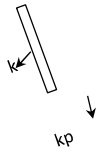
uL (Fell et al., 2005) - upper chart	0.43
uL (Houlsby, 1976) - lower chart	0.30

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.5E-08	m/sec
ke/kp = 100	5.7E-08	m/sec
ke/kp = 10	4.8E-08	m/sec
ke/kp = 1	4.0E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC003 : 25m to 30m

hole no: TA06DC003 date: 1-Mar-19

project: Tarraleah Redevelopment Feasibility Study

location: Mossy Marsh by: CD

section tested: from 25.0 m to 30.0 m length 5.0 m

relative level at surface: 686.8 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 686.8 m RL

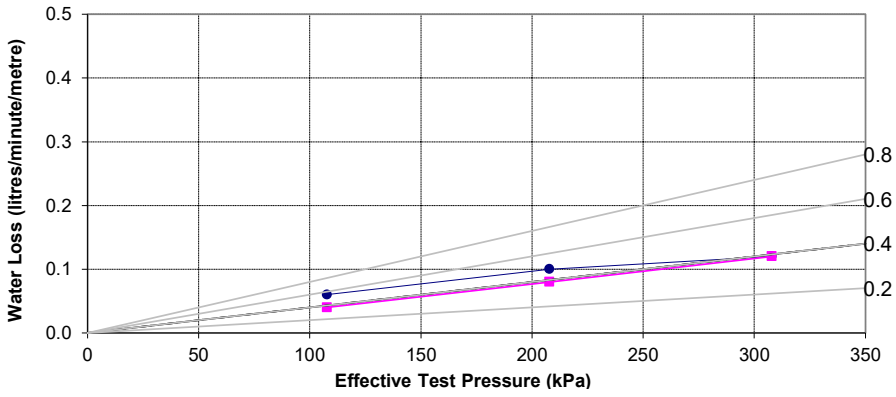
centre of test section (downhole): 27.50 m

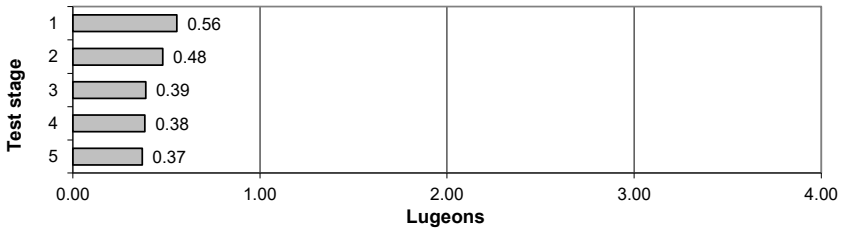
test depth converted to vertical: 27.08 m

relative level at centre of test section: 659.7 m RL

correction to gauge pressure: 7.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	100	107.84	3.00	0.06	15.3%	0.56
10	200	207.84	5.00	0.10	29.5%	0.48
10	300	307.84	6.00	0.12	43.7%	0.39
10	200	207.84	4.00	0.08	29.5%	0.38
10	100	107.84	2.00	0.04	15.3%	0.37





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

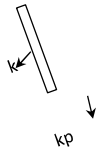
uL (Fell et al., 2005) - upper chart	0.40
uL (Houlsby, 1976) - lower chart	0.37

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	8.6E-08	m/sec
ke/kp = 100	7.3E-08	m/sec
ke/kp = 10	6.1E-08	m/sec
ke/kp = 1	4.9E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC006 : 8m to 13m

hole no: TA06DC006 date: 1-Mar-19

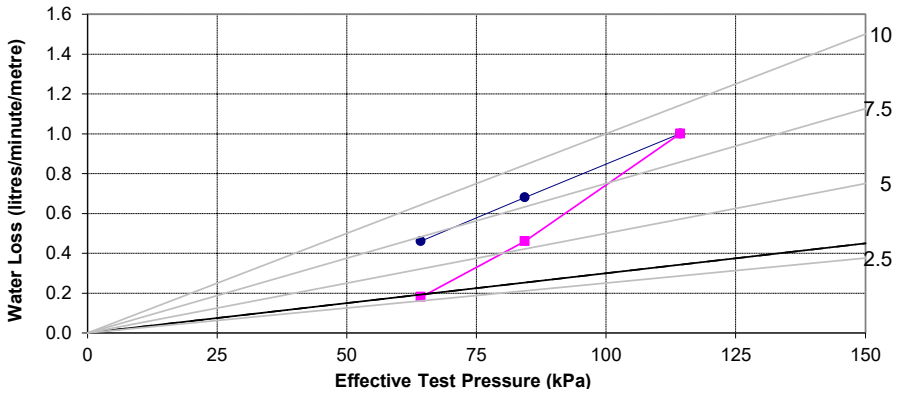
project: Tarraleah Redevelopment Feasibility Study

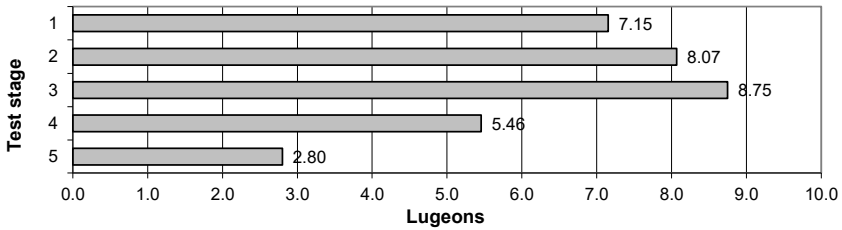
location: Mossy Marsh by: CD

section tested: from 8.0 m to 13.0 m length 5.0 m

relative level at surface:	680.3 m RL	centre of test section (downhole):	10.50 m
gauge height:	0.8 m	test depth converted to vertical:	10.34 m
inclination of borehole:	80 °	relative level at centre of test section:	670.0 m RL
inferred groundwater level:	677.6 m RL	correction to gauge pressure:	34.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	30	64.30	23.00	0.46	23.9%	7.15
10	50	84.30	34.00	0.68	31.4%	8.07
10	80	114.30	50.00	1.00	42.5%	8.75
10	50	84.30	23.00	0.46	31.4%	5.46
10	30	64.30	9.00	0.18	23.9%	2.80





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

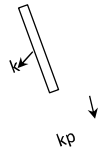
uL (Fell et al., 2005) - upper chart	3.00
uL (Houlsby, 1976) - lower chart	2.14

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.3E-06	m/sec
ke/kp = 100	1.1E-06	m/sec
ke/kp = 10	9.4E-07	m/sec
ke/kp = 1	7.6E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC006 : 16m to 21m

hole no: TA06DC006 date: 1-Mar-19

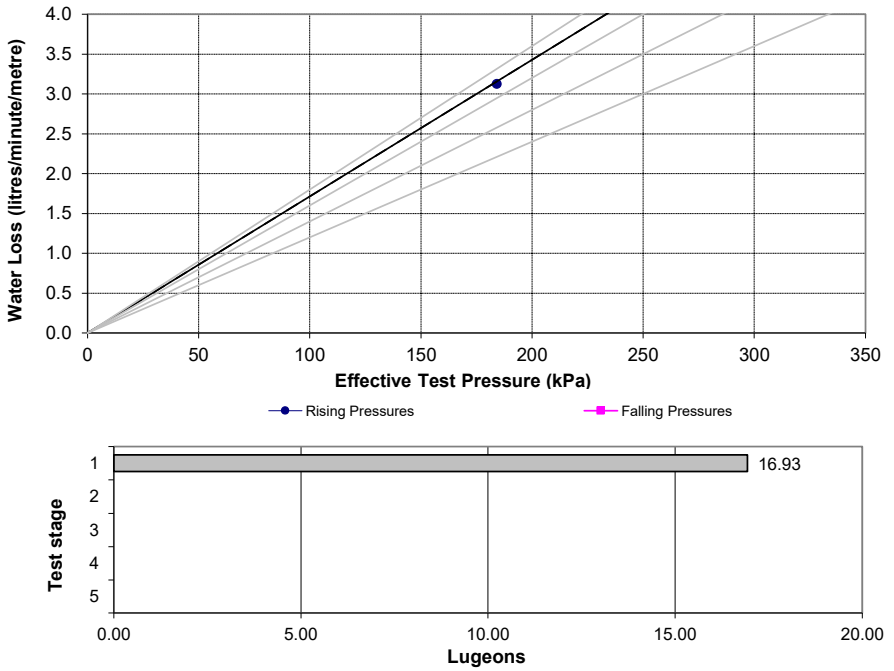
project: Tarraleah Redevelopment Feasibility Study

location: Mossy Marsh by: CD

section tested: from 16.0 m to 21.0 m length 5.0 m

relative level at surface:	680.3 m RL	centre of test section (downhole):	18.50 m
gauge height:	0.8 m	test depth converted to vertical:	18.22 m
inclination of borehole:	80 °	relative level at centre of test section:	662.1 m RL
inferred groundwater level:	677.6 m RL	correction to gauge pressure:	34.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	150	184.30	156.00	3.12	38.9%	16.93
10						
10	failed test					
10						
10						



Interpreted flow mechanism:

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart

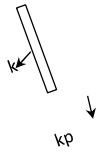
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC008 : 11m to 15m

hole no: TA06DC008 date: 21-Mar-19

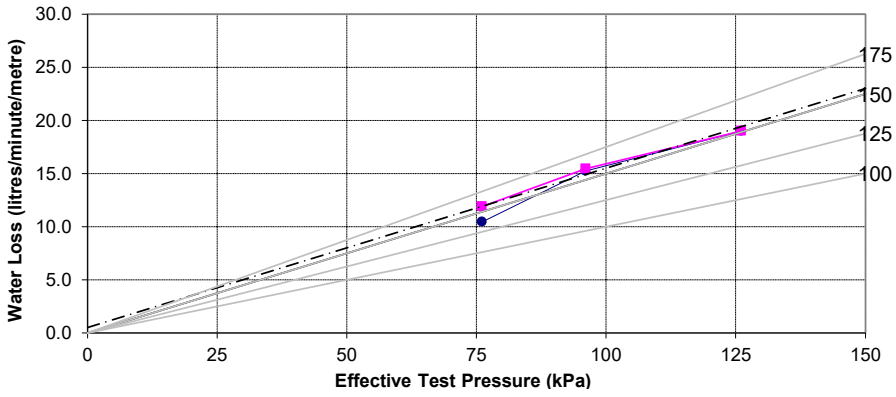
project: Tarraleah Redevelopment Feasibility Study

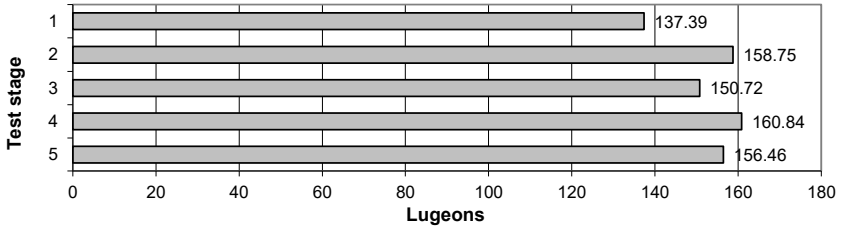
location: No 2 pond downstream foundation north by: MF

section tested: from 11.0 m to 15.0 m length 4.0 m

relative level at surface:	644.6 m RL	centre of test section (downhole):	13.00 m
gauge height:	0.8 m	test depth converted to vertical:	12.56 m
inclination of borehole:	75 °	relative level at centre of test section:	632.0 m RL
inferred groundwater level:	640.7 m RL	correction to gauge pressure:	46.1 kPa

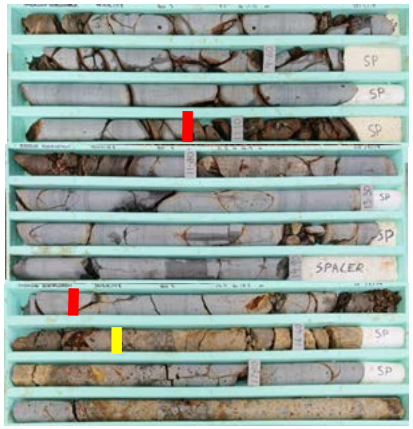
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	30	76.06	209.00	10.45	23.3%	137.39
5	50	96.06	305.00	15.25	29.4%	158.75
5	80	126.06	380.00	19.00	38.6%	150.72
5	50	96.06	309.00	15.45	29.4%	160.84
5	30	76.06	238.00	11.90	23.3%	156.46





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

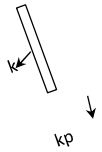
uL (Fell et al., 2005) - upper chart	150
uL (Houlsby, 1976) - lower chart	153

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.2E-05	m/sec
ke/kp = 100	2.7E-05	m/sec
ke/kp = 10	2.3E-05	m/sec
ke/kp = 1	1.8E-05	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.9E-05 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC008 : 15.1m to 20.1m

hole no: TA06DC008 date: 21-Mar-19

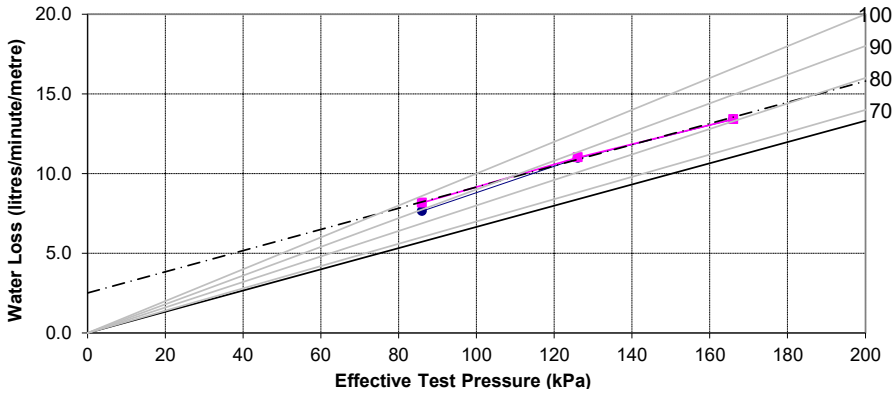
project: Tarraleah Redevelopment Feasibility Study

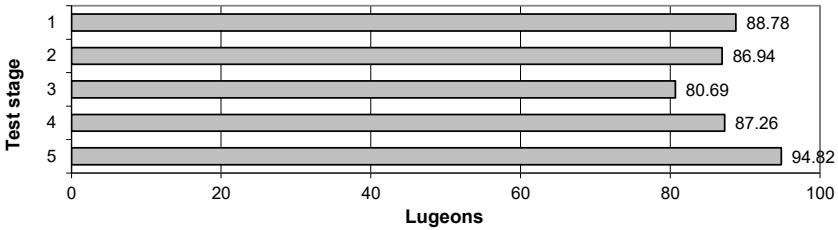
location: No 2 pond downstream foundation north by: MF

section tested: from 15.1 m to 20.1 m length 5.0 m

relative level at surface:	644.6 m RL	centre of test section (downhole):	17.60 m
gauge height:	0.8 m	test depth converted to vertical:	17.00 m
inclination of borehole:	75 °	relative level at centre of test section:	627.6 m RL
inferred groundwater level:	640.7 m RL	correction to gauge pressure:	46.1 kPa

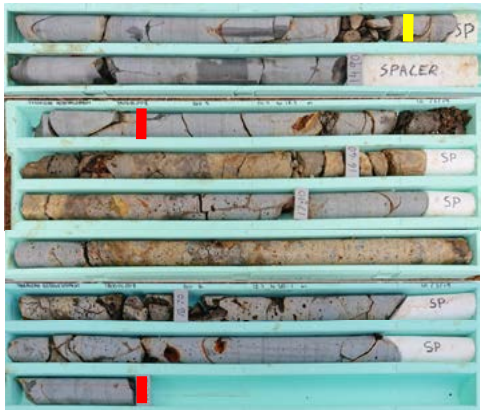
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	40	86.06	191.00	7.64	19.5%	88.78
5	80	126.06	274.00	10.96	28.5%	86.94
5	120	166.06	335.00	13.40	37.6%	80.69
5	80	126.06	275.00	11.00	28.5%	87.26
5	40	86.06	204.00	8.16	19.5%	94.82





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

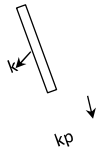
uL (Fell et al., 2005) - upper chart	66.50
uL (Houlsby, 1976) - lower chart	80.69

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-05	m/sec
ke/kp = 100	1.6E-05	m/sec
ke/kp = 10	1.3E-05	m/sec
ke/kp = 1	1.1E-05	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-05 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC010 : 8.3m to 13.3m

hole no: TA06DC010 date: 6-Mar-19

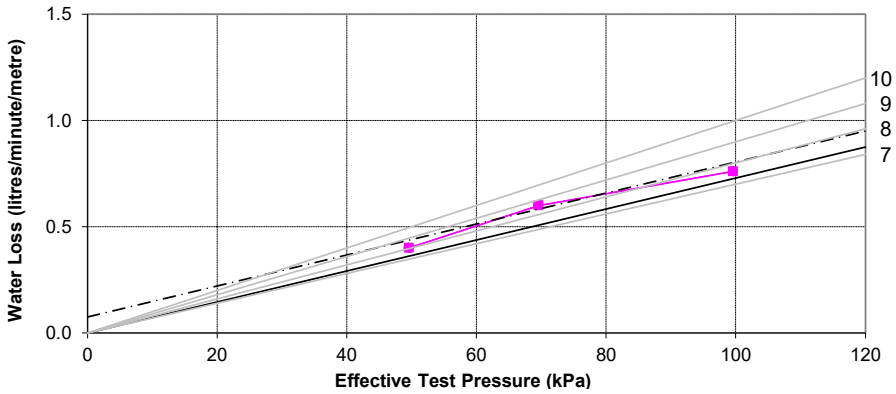
project: Tarraleah Redevelopment Feasibility Study

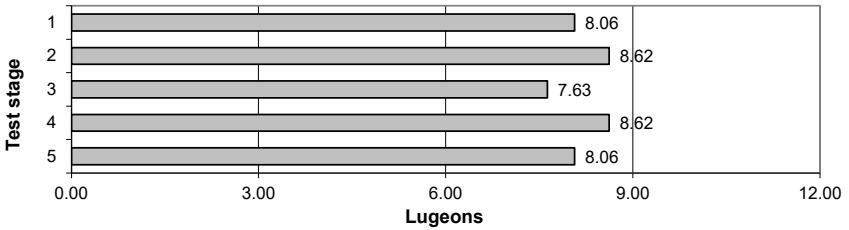
location: No 2 pond downstream foundation north by: BS

section tested: from 8.3 m to 13.3 m length 5.0 m

relative level at surface:	644.7 m RL	centre of test section (downhole):	10.80 m
gauge height:	0.8 m	test depth converted to vertical:	10.43 m
inclination of borehole:	75 °	relative level at centre of test section:	634.3 m RL
inferred groundwater level:	643.5 m RL	correction to gauge pressure:	19.6 kPa

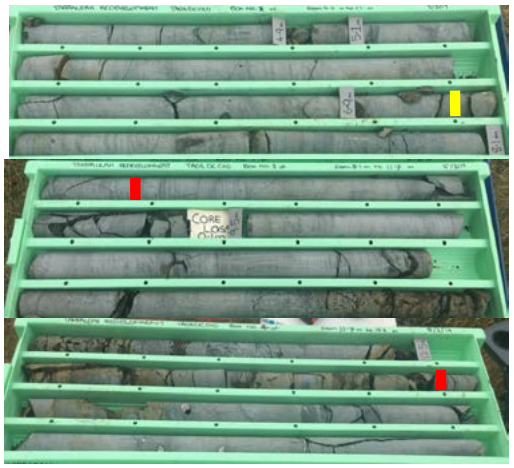
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	30	49.60	10.00	0.40	18.3%	8.06
5	50	69.60	15.00	0.60	25.7%	8.62
5	80	99.60	19.00	0.76	36.7%	7.63
5	50	69.60	15.00	0.60	25.7%	8.62
5	30	49.60	10.00	0.40	18.3%	8.06





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

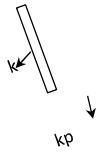
uL (Fell et al., 2005) - upper chart	7.29
uL (Houlsby, 1976) - lower chart	8.20

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.7E-06	m/sec
ke/kp = 100	1.5E-06	m/sec
ke/kp = 10	1.2E-06	m/sec
ke/kp = 1	9.9E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC010 : 15.3m to 21.7m

hole no: TA06DC010 date: 6-Mar-19

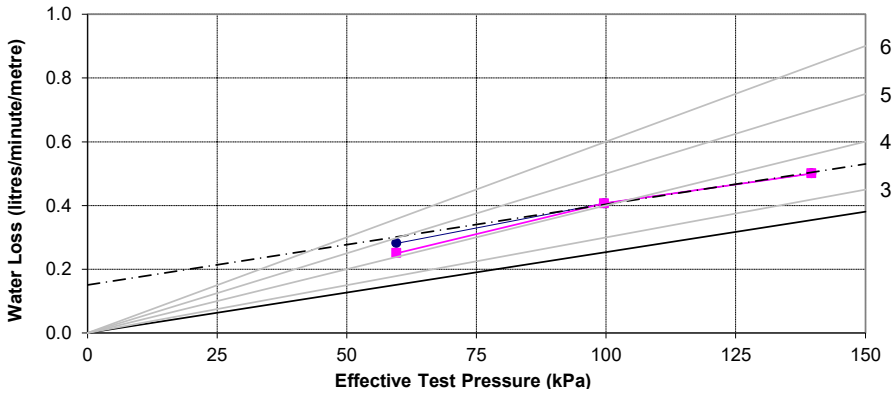
project: Tarraleah Redevelopment Feasibility Study

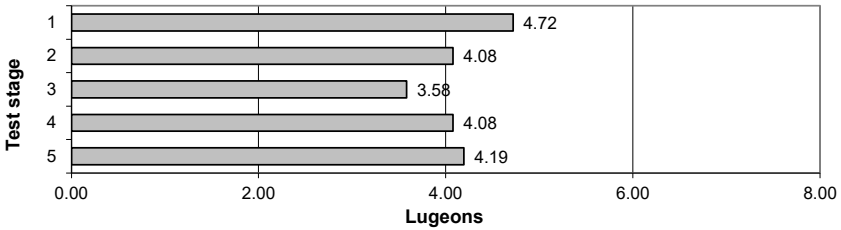
location: No 2 pond downstream foundation north by: BS

section tested: from 15.3 m to 21.7 m length 6.4 m

relative level at surface:	644.7 m RL	centre of test section (downhole):	18.50 m
gauge height:	0.8 m	test depth converted to vertical:	17.87 m
inclination of borehole:	75 °	relative level at centre of test section:	626.8 m RL
inferred groundwater level:	643.5 m RL	correction to gauge pressure:	19.6 kPa

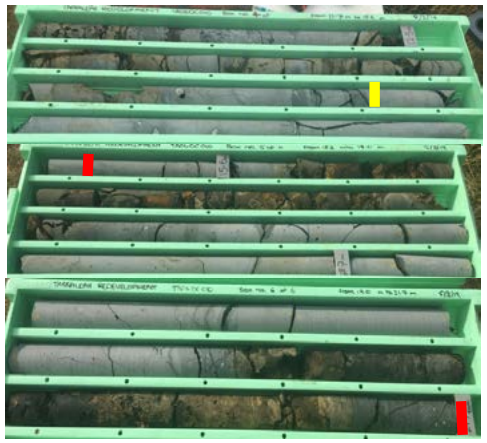
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	40	59.60	9.00	0.28	12.8%	4.72
5	80	99.60	13.00	0.41	21.4%	4.08
5	120	139.60	16.00	0.50	30.0%	3.58
5	80	99.60	13.00	0.41	21.4%	4.08
5	40	59.60	8.00	0.25	12.8%	4.19





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE Packer boundary Packer Seal

Lugeon (uL) Assessment

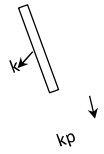
uL (Fell et al., 2005) - upper chart	2.53
uL (Houlsby, 1976) - lower chart	3.58

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	8.6E-07	m/sec
ke/kp = 100	7.4E-07	m/sec
ke/kp = 10	6.3E-07	m/sec
ke/kp = 1	5.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC010 : 20.3m to 21.7m

hole no: TA06DC010 date: 6-Mar-19

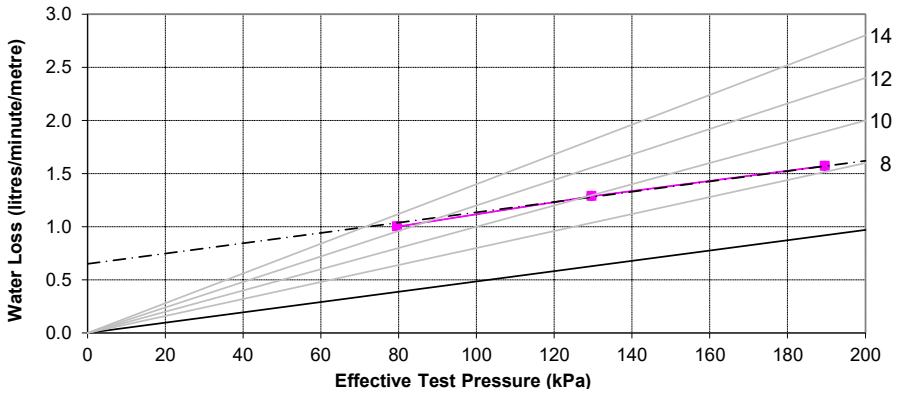
project: Tarraleah Redevelopment Feasibility Study

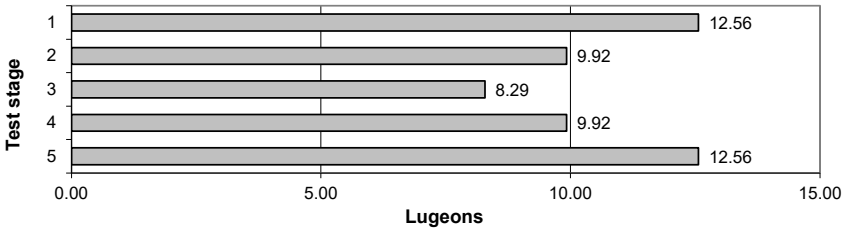
location: No 2 pond downstream foundation north by: BS

section tested: from 20.3 m to 21.7 m length 1.4 m

relative level at surface:	644.7 m RL	centre of test section (downhole):	21.00 m
gauge height:	0.8 m	test depth converted to vertical:	20.28 m
inclination of borehole:	75 °	relative level at centre of test section:	624.4 m RL
inferred groundwater level:	643.5 m RL	correction to gauge pressure:	19.6 kPa

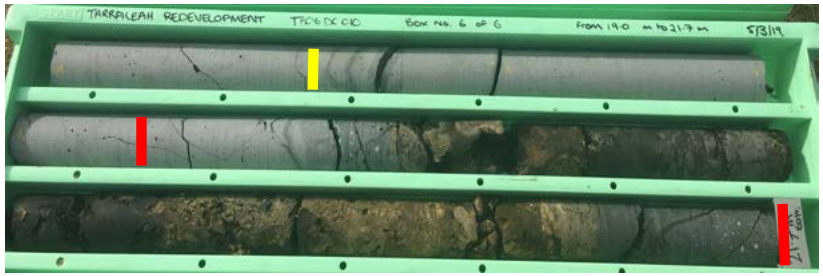
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	60	79.60	7.00	1.00	15.1%	12.56
5	110	129.60	9.00	1.29	24.6%	9.92
5	170	189.60	11.00	1.57	36.0%	8.29
5	110	129.60	9.00	1.29	24.6%	9.92
5	60	79.60	7.00	1.00	15.1%	12.56





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

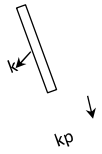
uL (Fell et al., 2005) - upper chart	4.85
uL (Houlsby, 1976) - lower chart	8.29

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-06	m/sec
ke/kp = 100	1.5E-06	m/sec
ke/kp = 10	1.2E-06	m/sec
ke/kp = 1	8.9E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 9.7E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC012 : 27.3m to 32.3m

hole no: TA06DC012 date: 26-Mar-19

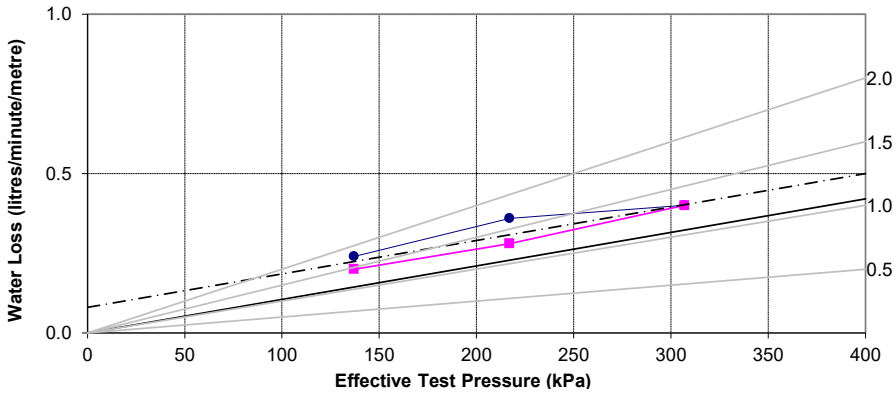
project: Tarraleah Redevelopment Feasibility Study

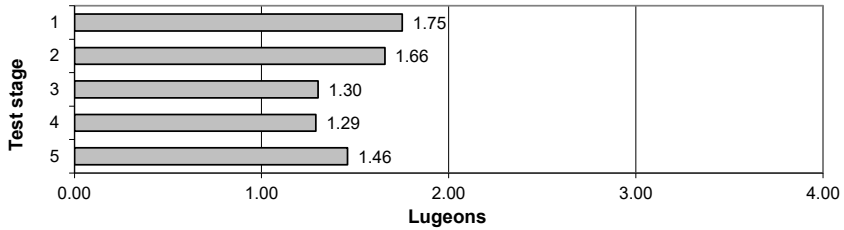
location: Hillside above TAPS2 by: BT

section tested: from 27.3 m to 32.3 m length 5.0 m

relative level at surface:	462.3 m RL	centre of test section (downhole):	29.80 m
gauge height:	0.8 m	test depth converted to vertical:	29.35 m
inclination of borehole:	80 °	relative level at centre of test section:	433.0 m RL
inferred groundwater level:	458.3 m RL	correction to gauge pressure:	47.0 kPa

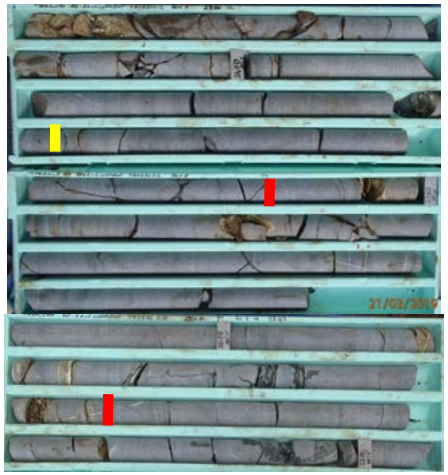
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	90	137.04	6.00	0.24	18.0%	1.75
5	170	217.04	9.00	0.36	28.4%	1.66
5	260	307.04	10.00	0.40	40.2%	1.30
5	170	217.04	7.00	0.28	28.4%	1.29
5	90	137.04	5.00	0.20	18.0%	1.46





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

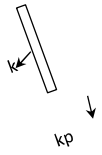
uL (Fell et al., 2005) - upper chart	1.05
uL (Houlsby, 1976) - lower chart	1.46

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.0E-07	m/sec
ke/kp = 100	2.6E-07	m/sec
ke/kp = 10	2.2E-07	m/sec
ke/kp = 1	1.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.8E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC012 : 36.3m to 41.3m

hole no: TA06DC012 date: 26-Mar-19

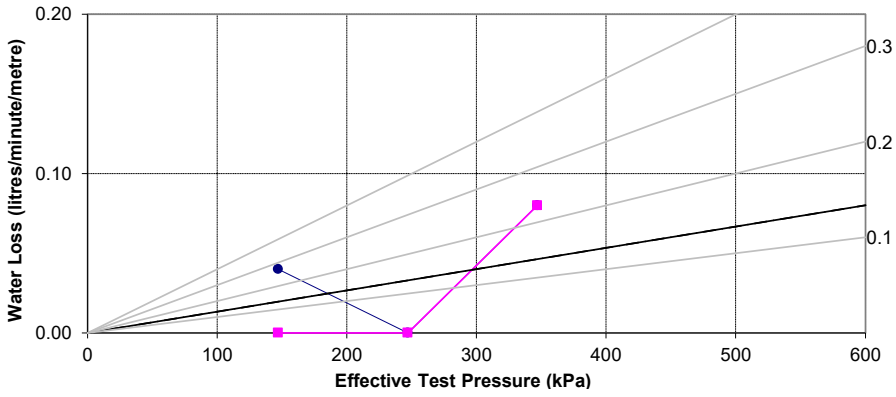
project: Tarraleah Redevelopment Feasibility Study

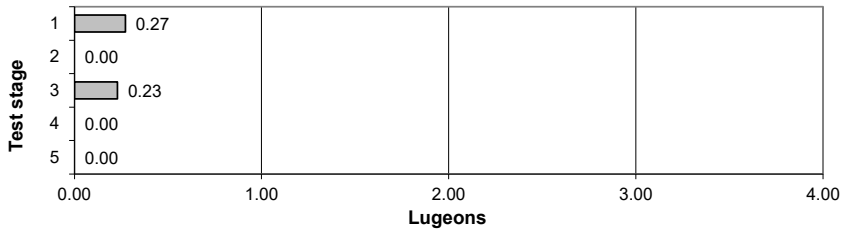
location: Hillside above TAPS2 by: BT

section tested: from 36.3 m to 41.3 m length 5.0 m

relative level at surface:	462.3 m RL	centre of test section (downhole):	38.80 m
gauge height:	0.8 m	test depth converted to vertical:	38.21 m
inclination of borehole:	80 °	relative level at centre of test section:	424.1 m RL
inferred groundwater level:	458.3 m RL	correction to gauge pressure:	47.0 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	100	147.04	1.00	0.04	14.8%	0.27
5	200	247.04	0.00	0.00	24.9%	0.00
5	300	347.04	2.00	0.08	34.9%	0.23
5	200	247.04	0.00	0.00	24.9%	0.00
5	100	147.04	0.00	0.00	14.8%	0.00





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

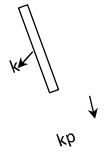
uL (Fell et al., 2005) - upper chart	0.13
uL (Houlsby, 1976) - lower chart	0.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-08	m/sec
ke/kp = 100	1.0E-08	m/sec
ke/kp = 10	8.7E-09	m/sec
ke/kp = 1	7.0E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.4E-09 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC012 : 52.3m to 57.3m

hole no: TA06DC012 date: 26-Mar-19

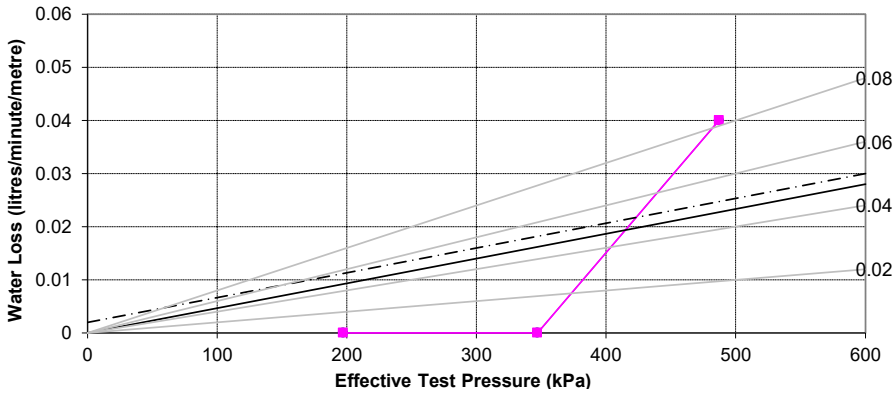
project: Tarraleah Redevelopment Feasibility Study

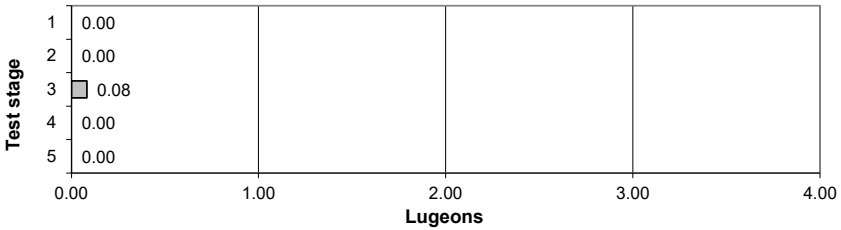
location: Hillside above TAPS2 by: BT

section tested: from 52.3 m to 57.3 m length 5.0 m

relative level at surface:	462.3 m RL	centre of test section (downhole):	54.80 m
gauge height:	0.8 m	test depth converted to vertical:	53.97 m
inclination of borehole:	80 °	relative level at centre of test section:	408.3 m RL
inferred groundwater level:	458.3 m RL	correction to gauge pressure:	47.0 kPa

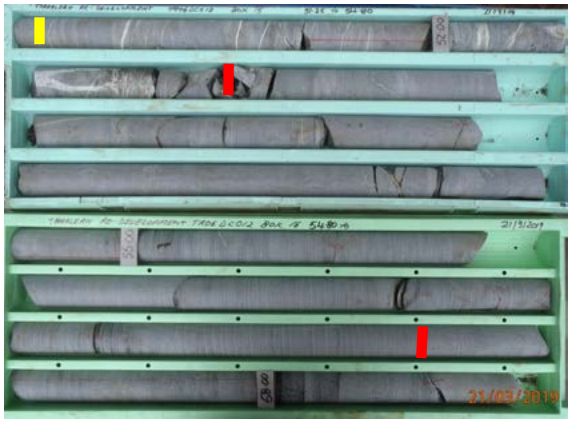
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	150	197.04	0.00	0.00	14.0%	0.00
5	300	347.04	0.00	0.00	24.7%	0.00
5	440	487.04	1.00	0.04	34.7%	0.08
5	300	347.04	0.00	0.00	24.7%	0.00
5	150	197.04	0.00	0.00	14.0%	0.00





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

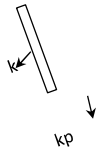
uL (Fell et al., 2005) - upper chart	0.05
uL (Houlsby, 1976) - lower chart	0.02

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.3E-09	m/sec
ke/kp = 100	3.7E-09	m/sec
ke/kp = 10	3.1E-09	m/sec
ke/kp = 1	2.5E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.6E-09 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC012 : 71.3m to 76.3m

hole no: TA06DC012 date: 26-Mar-19

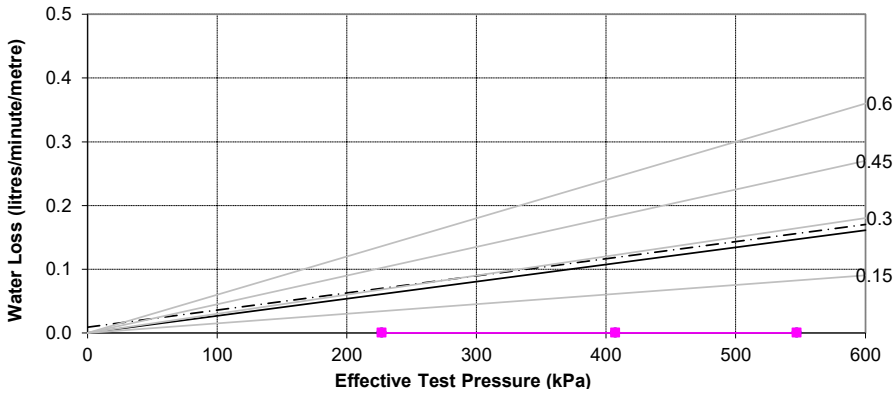
project: Tarraleah Redevelopment Feasibility Study

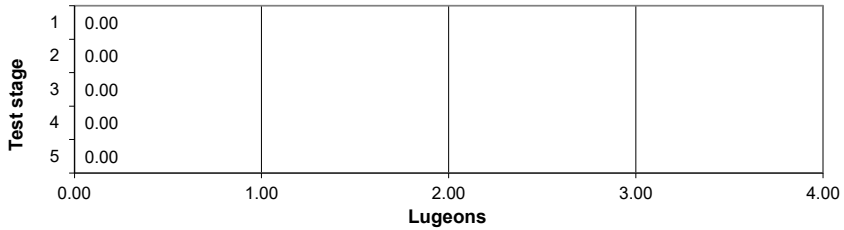
location: Hillside above TAPS2 by: BT

section tested: from 71.3 m to 76.3 m length 5.0 m

relative level at surface:	462.3 m RL	centre of test section (downhole):	73.80 m
gauge height:	0.8 m	test depth converted to vertical:	72.68 m
inclination of borehole:	80 °	relative level at centre of test section:	389.6 m RL
inferred groundwater level:	458.3 m RL	correction to gauge pressure:	47.0 kPa

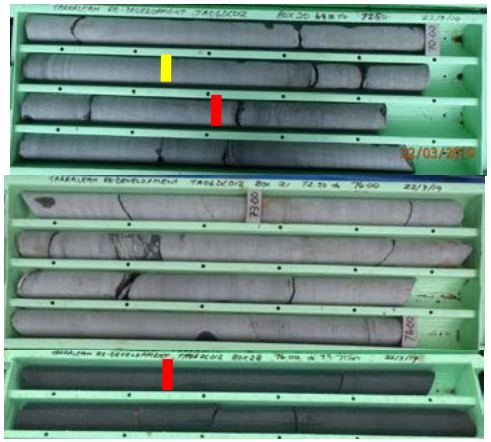
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	180	227.04		0.00	12.0%	0.00
5	360	407.04		0.00	21.5%	0.00
5	500	547.04	NO RESULTS	#VALUE!	28.9%	#VALUE!
5	360	407.04		0.00	21.5%	0.00
5	180	227.04		0.00	12.0%	0.00





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart

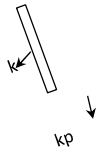
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#VALUE!	m/sec
ke/kp = 100	#VALUE!	m/sec
ke/kp = 10	#VALUE!	m/sec
ke/kp = 1	#VALUE!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #VALUE! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC012 : 83.3m to 88.3m

hole no: TA06DC012 date: 26-Mar-19

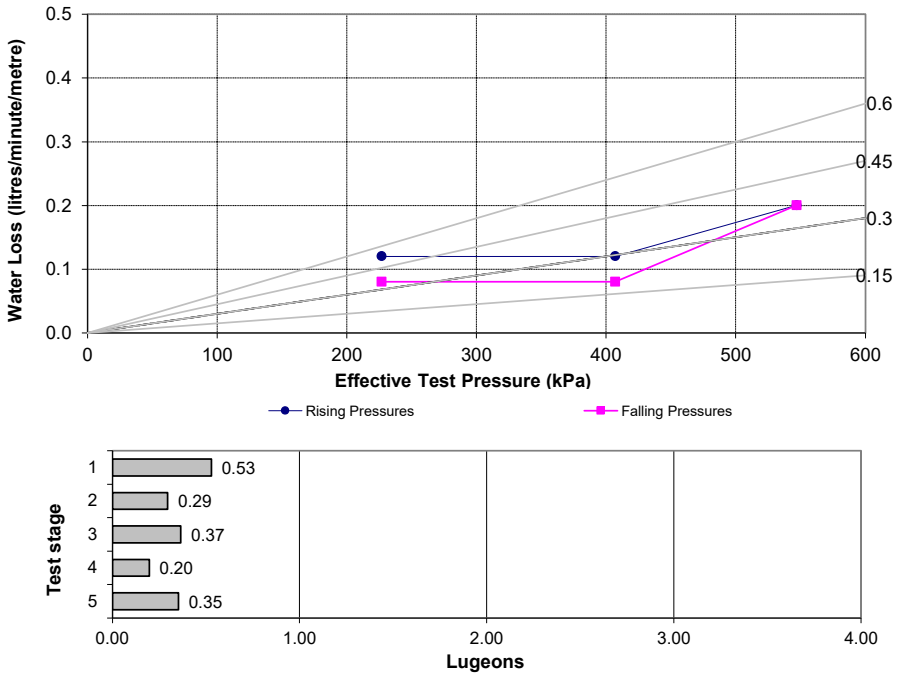
project: Tarraleah Redevelopment Feasibility Study

location: Hillside above TAPS2 by: BT

section tested: from 83.3 m to 88.3 m length 5.0 m

relative level at surface:	462.3 m RL	centre of test section (downhole):	85.80 m
gauge height:	0.8 m	test depth converted to vertical:	84.50 m
inclination of borehole:	80 °	relative level at centre of test section:	377.8 m RL
inferred groundwater level:	458.3 m RL	correction to gauge pressure:	47.0 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	180	227.04	3.00	0.12	10.3%	0.53
5	360	407.04	3.00	0.12	18.5%	0.29
5	500	547.04	5.00	0.20	24.9%	0.37
5	360	407.04	2.00	0.08	18.5%	0.20
5	180	227.04	2.00	0.08	10.3%	0.35



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

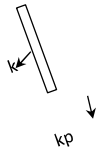
uL (Fell et al., 2005) - upper chart	0.30
uL (Houlsby, 1976) - lower chart	0.35

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.4E-08	m/sec
ke/kp = 100	5.5E-08	m/sec
ke/kp = 10	4.6E-08	m/sec
ke/kp = 1	3.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.9E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC013 : 125.3m to 130.3m

hole no: TA06DC013 date: 6-Mar-19

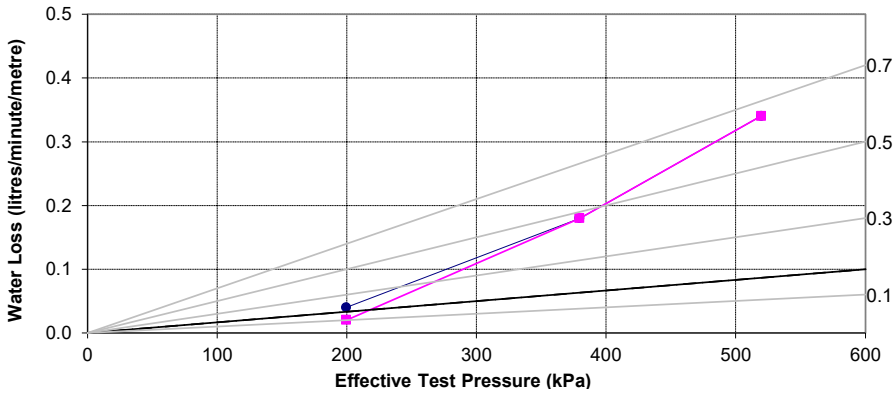
project: Tarraleah Redevelopment Feasibility Study

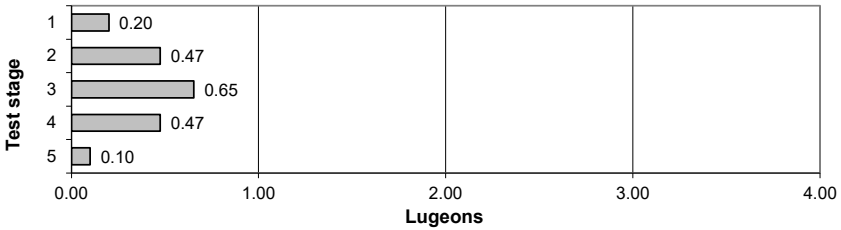
location: TAPS2 power shaft by: BS

section tested: from 125.3 m to 130.3 m length 5.0 m

relative level at surface:	608.7 m RL	centre of test section (downhole):	127.80 m
gauge height:	0.8 m	test depth converted to vertical:	125.86 m
inclination of borehole:	80 °	relative level at centre of test section:	482.8 m RL
inferred groundwater level:	607.5 m RL	correction to gauge pressure:	19.6 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	180	199.60	2.00	0.04	6.1%	0.20
10	360	379.60	9.00	0.18	11.6%	0.47
10	500	519.60	17.00	0.34	15.9%	0.65
10	360	379.60	9.00	0.18	11.6%	0.47
10	180	199.60	1.00	0.02	6.1%	0.10





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

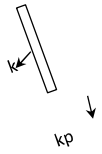
uL (Fell et al., 2005) - upper chart	0.17
uL (Houlsby, 1976) - lower chart	0.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	9.0E-08	m/sec
ke/kp = 100	7.7E-08	m/sec
ke/kp = 10	6.4E-08	m/sec
ke/kp = 1	5.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.5E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC013 : 110.3m to 115.3m

hole no: TA06DC013 date: 6-Mar-19

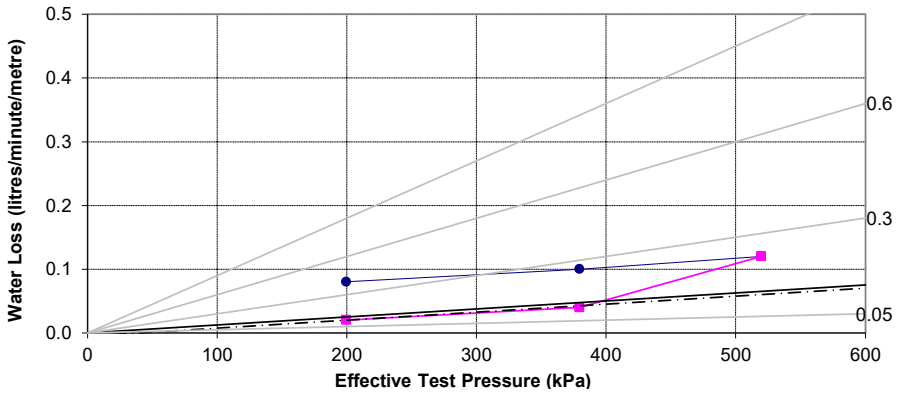
project: Tarraleah Redevelopment Feasibility Study

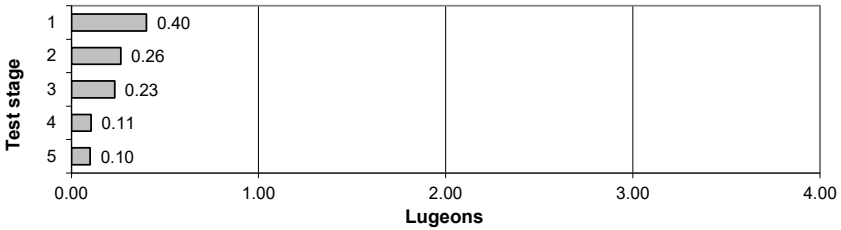
location: TAPS2 power shaft by: BS

section tested: from 110.3 m to 115.3 m length 5.0 m

relative level at surface: 608.7 m RL
centre of test section (downhole): 112.80 m
gauge height: 0.8 m
test depth converted to vertical: 111.09 m
inclination of borehole: 80 °
relative level at centre of test section: 497.6 m RL
inferred groundwater level: 607.5 m RL
correction to gauge pressure: 19.6 kPa

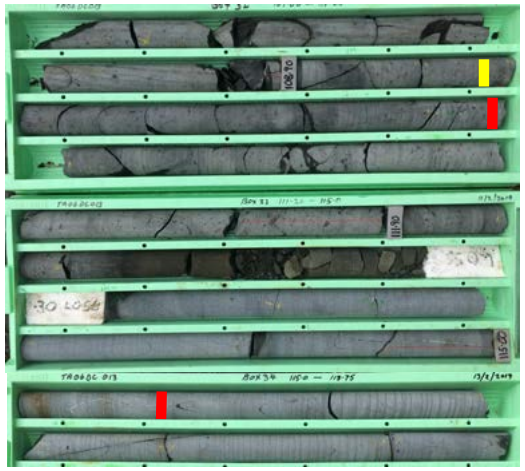
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	180	199.60	4.00	0.08	6.9%	0.40
10	360	379.60	5.00	0.10	13.1%	0.26
10	500	519.60	6.00	0.12	18.0%	0.23
10	360	379.60	2.00	0.04	13.1%	0.11
10	180	199.60	1.00	0.02	6.9%	0.10





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

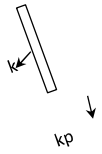
uL (Fell et al., 2005) - upper chart	0.13
uL (Houlsby, 1976) - lower chart	0.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.7E-08	m/sec
ke/kp = 100	3.2E-08	m/sec
ke/kp = 10	2.6E-08	m/sec
ke/kp = 1	2.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.3E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC013 : 98.3m to 103.3m

hole no: TA06DC013 date: 6-Mar-19

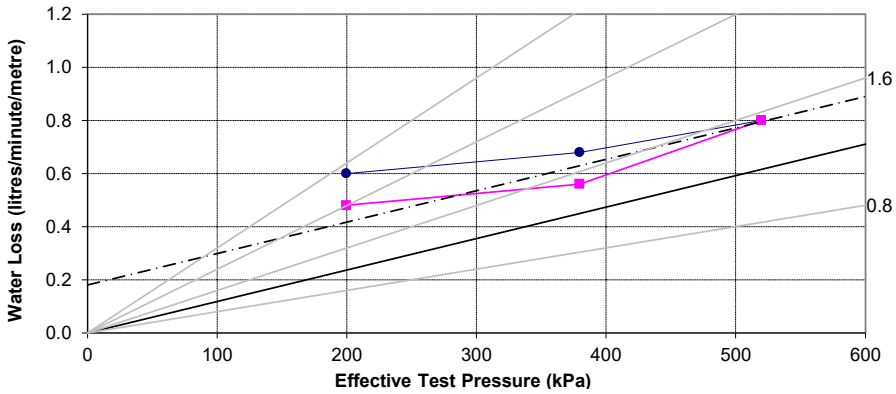
project: Tarraleah Redevelopment Feasibility Study

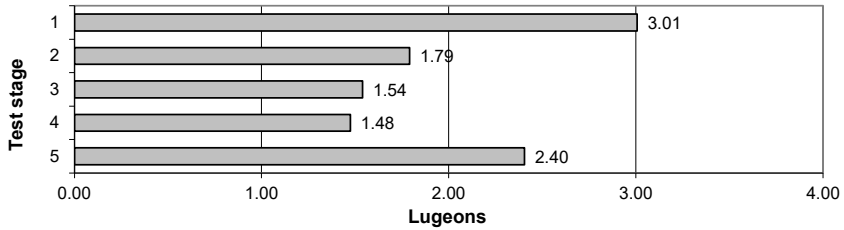
location: TAPS2 power shaft by: BS

section tested: from 98.3 m to 103.3 m length 5.0 m

relative level at surface:	608.7 m RL	centre of test section (downhole):	100.80 m
gauge height:	0.8 m	test depth converted to vertical:	99.27 m
inclination of borehole:	80 °	relative level at centre of test section:	509.4 m RL
inferred groundwater level:	607.5 m RL	correction to gauge pressure:	19.6 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	180	199.60	15.00	0.60	7.7%	3.01
5	360	379.60	17.00	0.68	14.7%	1.79
5	500	519.60	20.00	0.80	20.1%	1.54
5	360	379.60	14.00	0.56	14.7%	1.48
5	180	199.60	12.00	0.48	7.7%	2.40





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

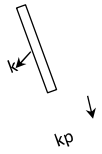
uL (Fell et al., 2005) - upper chart	1.18
uL (Houlsby, 1976) - lower chart	1.48

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.8E-07	m/sec
ke/kp = 100	3.3E-07	m/sec
ke/kp = 10	2.7E-07	m/sec
ke/kp = 1	2.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.3E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC013 : 67.3m to 72.3m

hole no: TA06DC013 date: 6-Mar-19

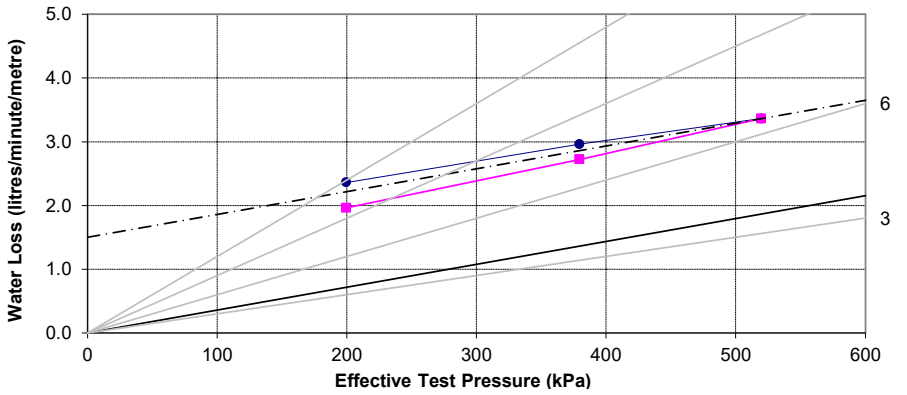
project: Tarraleah Redevelopment Feasibility Study

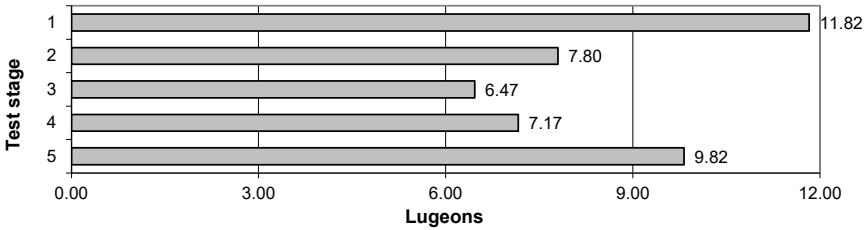
location: TAPS2 power shaft by: BS

section tested: from 67.3 m to 72.3 m length 5.0 m

relative level at surface:	608.7 m RL	centre of test section (downhole):	69.80 m
gauge height:	0.8 m	test depth converted to vertical:	68.74 m
inclination of borehole:	80 °	relative level at centre of test section:	540.0 m RL
inferred groundwater level:	607.5 m RL	correction to gauge pressure:	19.6 kPa

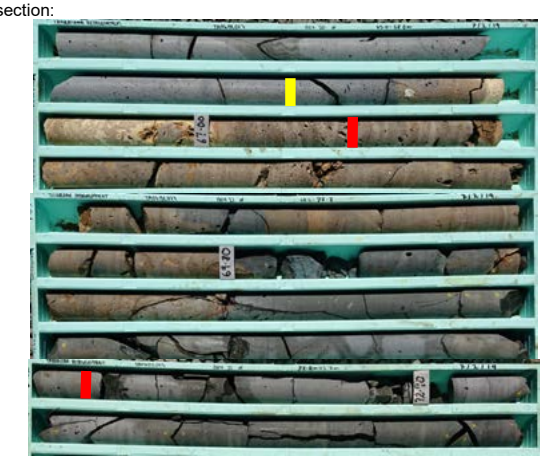
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	180	199.60	59.00	2.36	11.2%	11.82
5	360	379.60	74.00	2.96	21.2%	7.80
5	500	519.60	84.00	3.36	29.1%	6.47
5	360	379.60	68.00	2.72	21.2%	7.17
5	180	199.60	49.00	1.96	11.2%	9.82





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

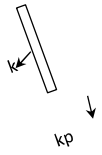
uL (Fell et al., 2005) - upper chart	3.58
uL (Houlsby, 1976) - lower chart	6.47

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.6E-06	m/sec
ke/kp = 100	1.4E-06	m/sec
ke/kp = 10	1.2E-06	m/sec
ke/kp = 1	9.4E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.0E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC013 : 35.3m to 40.3m

hole no: TA06DC013 date: 6-Mar-19

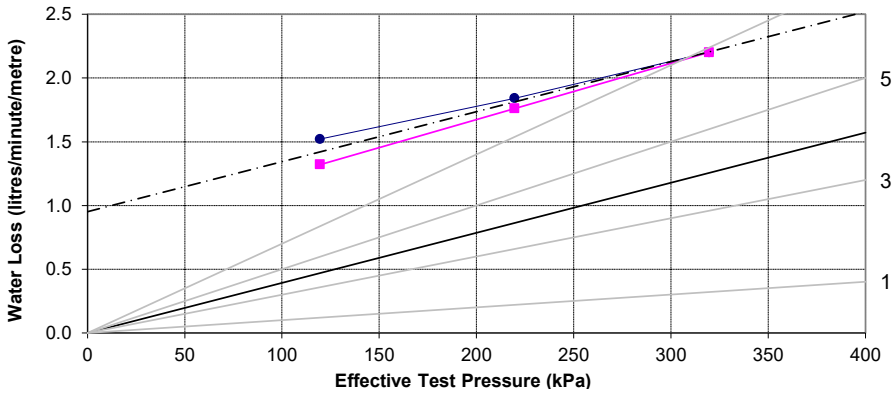
project: Tarraleah Redevelopment Feasibility Study

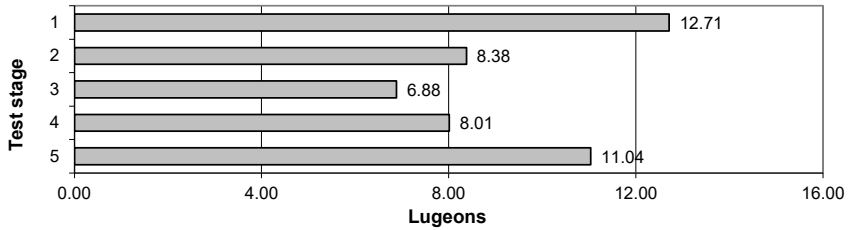
location: TAPS2 power shaft by: BS

section tested: from 35.3 m to 40.3 m length 5.0 m

relative level at surface:	608.7 m RL	centre of test section (downhole):	37.80 m
gauge height:	0.8 m	test depth converted to vertical:	37.23 m
inclination of borehole:	80 °	relative level at centre of test section:	571.5 m RL
inferred groundwater level:	607.5 m RL	correction to gauge pressure:	19.6 kPa

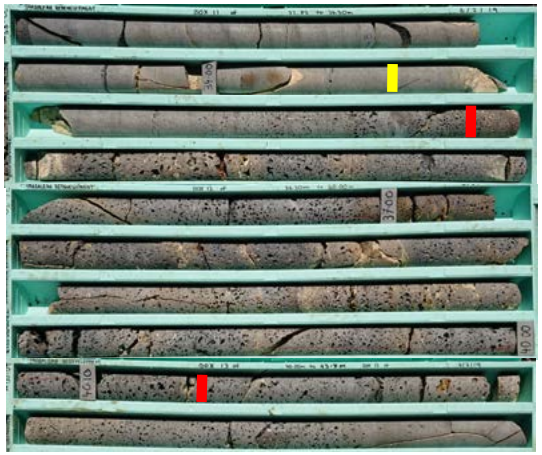
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	100	119.60	38.00	1.52	12.4%	12.71
5	200	219.60	46.00	1.84	22.7%	8.38
5	300	319.60	55.00	2.20	33.0%	6.88
5	200	219.60	44.00	1.76	22.7%	8.01
5	100	119.60	33.00	1.32	12.4%	11.04





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

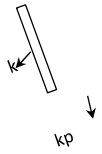
uL (Fell et al., 2005) - upper chart	3.93
uL (Houlsby, 1976) - lower chart	6.88

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-06	m/sec
ke/kp = 100	1.5E-06	m/sec
ke/kp = 10	1.3E-06	m/sec
ke/kp = 1	1.0E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

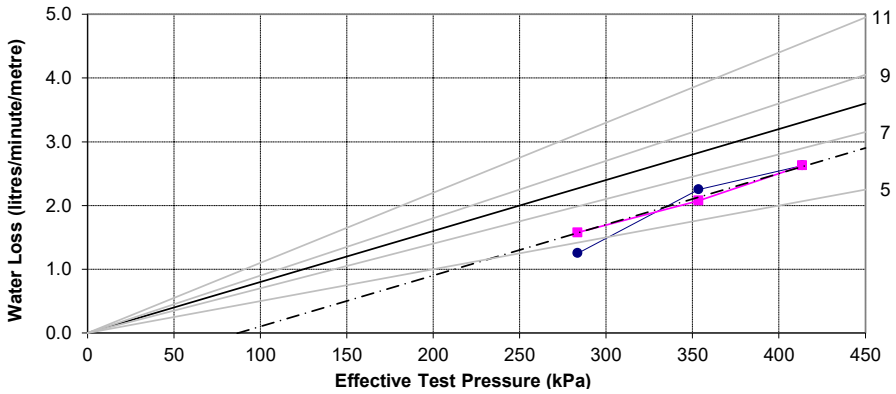
TA06DC015 : 23.5m to 31.5m

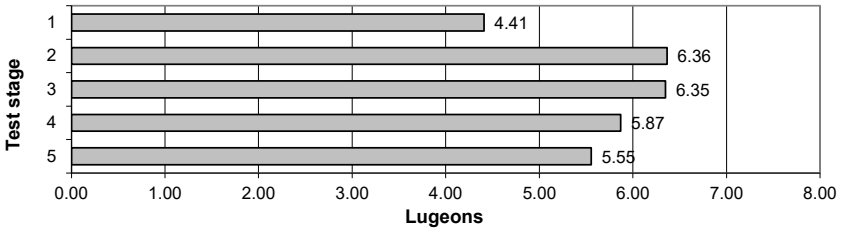
hole no:	TA06DC015	date:	13-Mar-19
project:	BoTN		
location:	TAPS2 Footprint	by:	CD

section tested: from 23.5 m to 31.5 m length 8.0 m

relative level at surface:	367.1 m RL	centre of test section (downhole):	27.50 m
gauge height:	0.8 m	test depth converted to vertical:	27.08 m
inclination of borehole:	80 °	relative level at centre of test section:	340.0 m RL
inferred groundwater level:	346.1 m RL	correction to gauge pressure:	213.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	70	283.53	50.00	1.25	40.3%	4.41
5	140	353.53	90.00	2.25	50.2%	6.36
5	200	413.53	105.00	2.63	58.7%	6.35
5	140	353.53	83.00	2.08	50.2%	5.87
5	70	283.53	63.00	1.58	40.3%	5.55





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

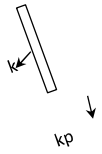
uL (Fell et al., 2005) - upper chart	8.00
uL (Houlsby, 1976) - lower chart	4.41

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.3E-06	m/sec
ke/kp = 100	1.2E-06	m/sec
ke/kp = 10	9.8E-07	m/sec
ke/kp = 1	8.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC016 : 36.7m to 41.8m

hole no: TA06DC016 date: 4-Mar-19

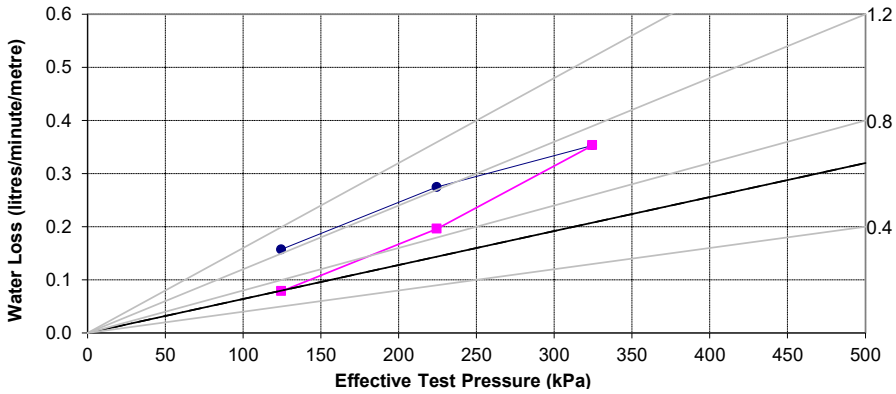
project: Tarraleah Redevelopment Feasibility Study

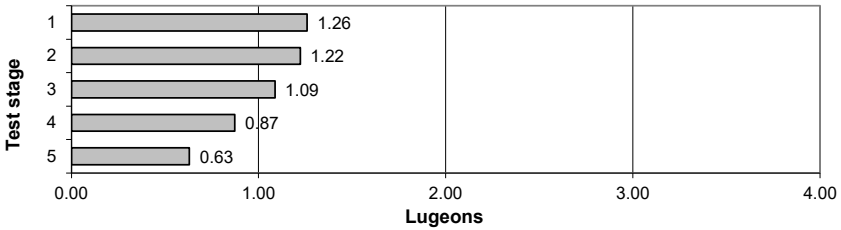
location: No3T-MM eastern fault zone by: BT

section tested: from 36.7 m to 41.8 m length 5.1 m

relative level at surface:	709.5 m RL	centre of test section (downhole):	39.25 m
gauge height:	0.8 m	test depth converted to vertical:	36.88 m
inclination of borehole:	70 °	relative level at centre of test section:	672.6 m RL
inferred groundwater level:	707.8 m RL	correction to gauge pressure:	24.5 kPa

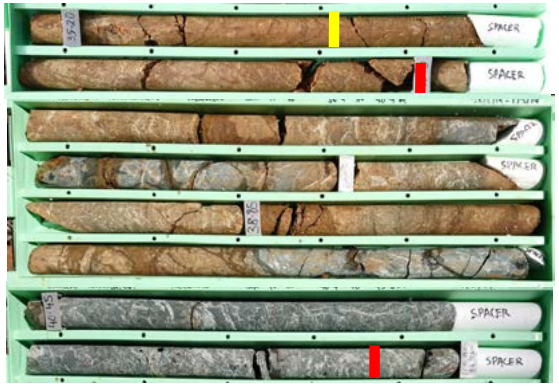
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	100	124.50	4.00	0.16	13.0%	1.26
5	200	224.50	7.00	0.27	23.4%	1.22
5	300	324.50	9.00	0.35	33.8%	1.09
5	200	224.50	5.00	0.20	23.4%	0.87
5	100	124.50	2.00	0.08	13.0%	0.63





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

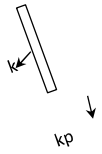
uL (Fell et al., 2005) - upper chart	0.64
uL (Houlsby, 1976) - lower chart	0.63

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.0E-07	m/sec
ke/kp = 100	1.7E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

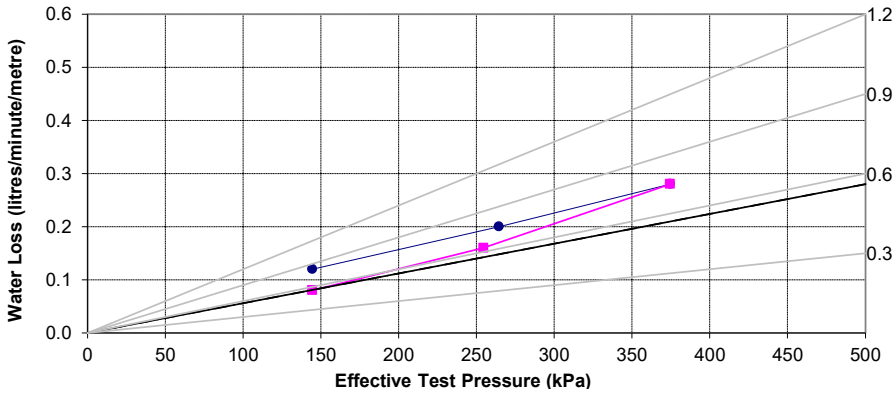
TA06DC016 : 42.8m to 47.8m

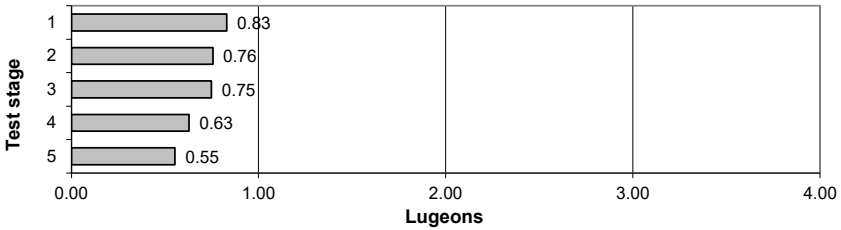
hole no:	TA06DC016	date:	4-Mar-19
project:	Tarraleah Redevelopment Feasibility Study		
location:	No3T-MM eastern fault zone	by:	BT

section tested: from 42.8 m to 47.8 m length 5.0 m

relative level at surface:	709.5 m RL	centre of test section (downhole):	45.30 m
gauge height:	0.8 m	test depth converted to vertical:	42.57 m
inclination of borehole:	70 °	relative level at centre of test section:	666.9 m RL
inferred groundwater level:	707.8 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	120	144.50	3.00	0.12	13.1%	0.83
5	240	264.50	5.00	0.20	23.9%	0.76
5	350	374.50	7.00	0.28	33.8%	0.75
5	230	254.50	4.00	0.16	23.0%	0.63
5	120	144.50	2.00	0.08	13.1%	0.55





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

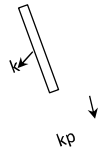
uL (Fell et al., 2005) - upper chart	0.56
uL (Houlsby, 1976) - lower chart	0.55

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.4E-07	m/sec
ke/kp = 100	1.2E-07	m/sec
ke/kp = 10	1.0E-07	m/sec
ke/kp = 1	8.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.6E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA06DC016 : 51.3m to 56m

hole no: TA06DC016 date: 4-Mar-19

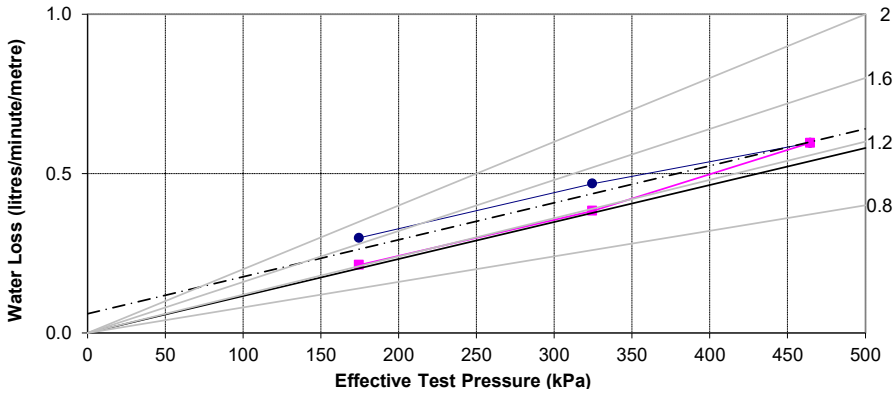
project: Tarraleah Redevelopment Feasibility Study

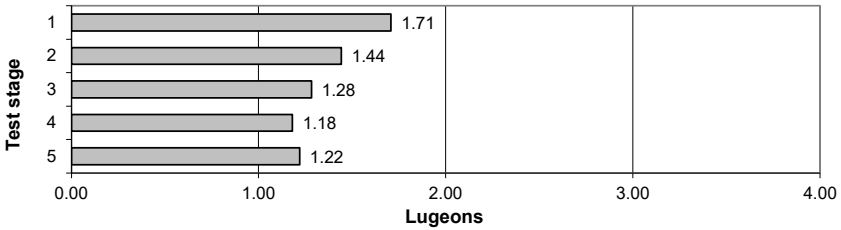
location: No3T-MM eastern fault zone by: BT

section tested: from 51.3 m to 56.0 m length 4.7 m

relative level at surface:	709.5 m RL	centre of test section (downhole):	53.65 m
gauge height:	0.8 m	test depth converted to vertical:	50.41 m
inclination of borehole:	70 °	relative level at centre of test section:	659.1 m RL
inferred groundwater level:	707.8 m RL	correction to gauge pressure:	24.5 kPa

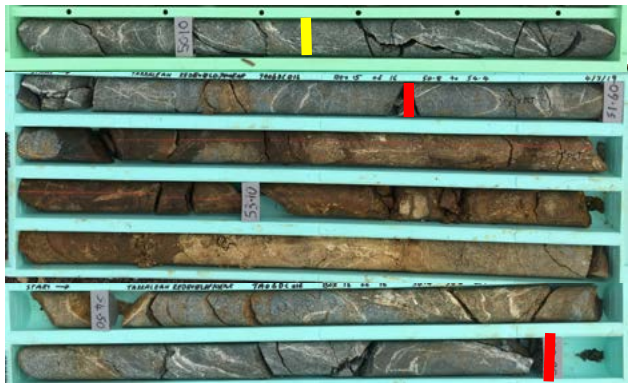
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	150	174.50	7.00	0.30	13.3%	1.71
5	300	324.50	11.00	0.47	24.8%	1.44
5	440	464.50	14.00	0.60	35.4%	1.28
5	300	324.50	9.00	0.38	24.8%	1.18
5	150	174.50	5.00	0.21	13.3%	1.22





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

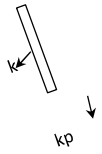
uL (Fell et al., 2005) - upper chart	1.16
uL (Houlsby, 1976) - lower chart	1.28

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.7E-07	m/sec
ke/kp = 100	2.3E-07	m/sec
ke/kp = 10	1.9E-07	m/sec
ke/kp = 1	1.5E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.6E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC201 : 6.9m to 9.9m

hole no: TA-DC201 date: 6-Apr-22

project: BOTN

location: Lake King William Intake by: AD

section tested: from 6.9 m to 9.9 m length 3.0 m

relative level at surface: 711.6 m RL

gauge height: 0.8 m

inclination of borehole: 85 °

inferred groundwater level: 712.9 m RL

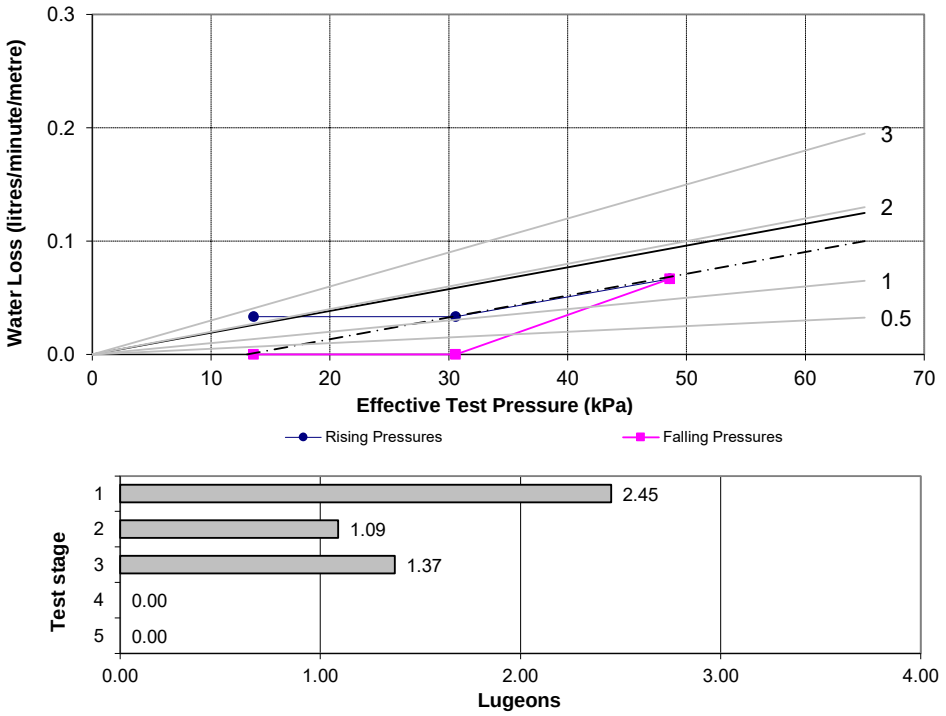
centre of test section (downhole): 8.40 m

test depth converted to vertical: 8.37 m

relative level at centre of test section: 703.2 m RL

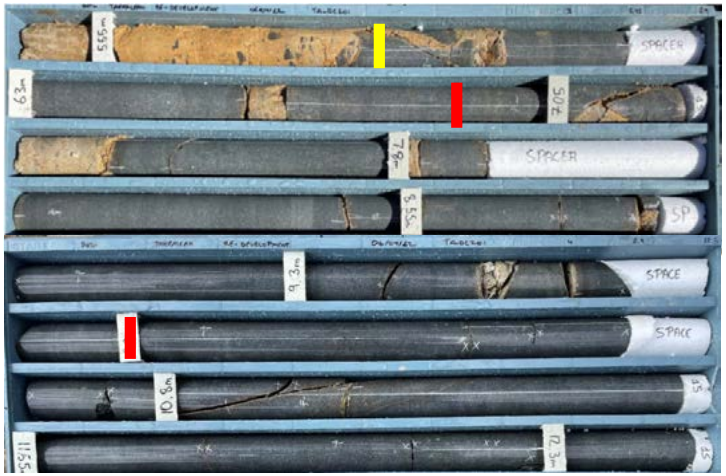
correction to gauge pressure: -4.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	18	13.59	1.00	0.03	6.2%	2.45
10	35	30.59	1.00	0.03	14.1%	1.09
10	53	48.59	2.00	0.07	22.3%	1.37
10	35	30.59	0.00	0.00	14.1%	0.00
10	18	13.59	0.00	0.00	6.2%	0.00



Interpreted flow mechanism: NO PATTERN

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

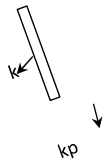
uL (Fell et al., 2005) - upper chart	1.92
uL (Houlsby, 1976) - lower chart	1.50

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-07	m/sec
ke/kp = 100	1.0E-07	m/sec
ke/kp = 10	8.5E-08	m/sec
ke/kp = 1	6.6E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.1E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

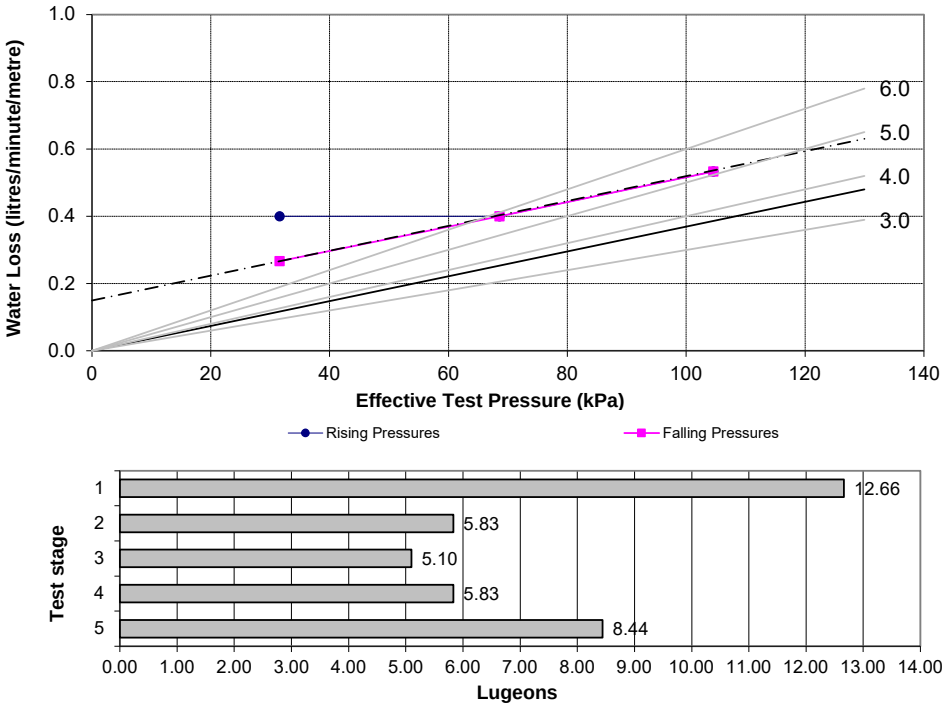
TA-DC201 : 10m to 13m

hole no:	TA-DC201	date:	6-Apr-22
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 10.0 m to 13.0 m length 3.0 m

relative level at surface:	711.6 m RL	centre of test section (downhole):	11.50 m
gauge height:	0.8 m	test depth converted to vertical:	11.46 m
inclination of borehole:	85 °	relative level at centre of test section:	700.1 m RL
inferred groundwater level:	712.9 m RL	correction to gauge pressure:	-4.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	36	31.59	6.00	0.40	10.6%	12.66
5	73	68.59	6.00	0.40	23.0%	5.83
5	109	104.59	8.00	0.53	35.1%	5.10
5	73	68.59	6.00	0.40	23.0%	5.83
5	36	31.59	4.00	0.27	10.6%	8.44



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

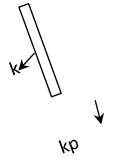
uL (Fell et al., 2005) - upper chart	3.69
uL (Houlsby, 1976) - lower chart	5.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-06	m/sec
ke/kp = 100	1.1E-06	m/sec
ke/kp = 10	8.7E-07	m/sec
ke/kp = 1	6.8E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.3E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

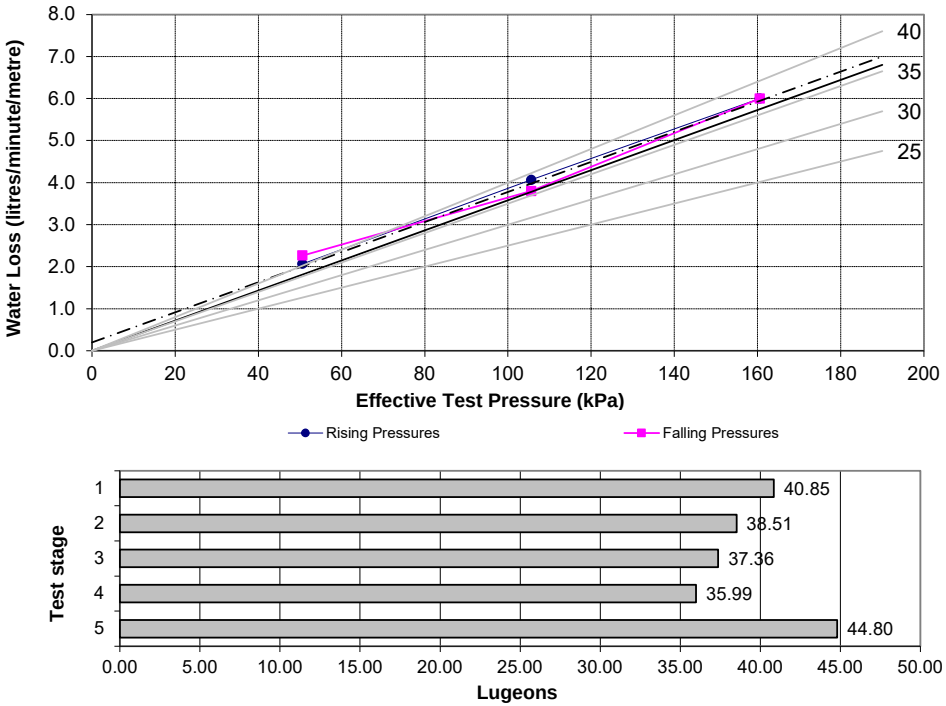
TA-DC201 : 13m to 16m

hole no:	TA-DC201	date:	6-Apr-22
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 13.0 m to 16.0 m length 3.0 m

relative level at surface:	711.6 m RL	centre of test section (downhole):	14.50 m
gauge height:	0.8 m	test depth converted to vertical:	14.44 m
inclination of borehole:	85 °	relative level at centre of test section:	697.2 m RL
inferred groundwater level:	712.9 m RL	correction to gauge pressure:	-4.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	50.59	31.00	2.07	13.5%	40.85
5	110	105.59	61.00	4.07	28.1%	38.51
5	165	160.59	90.00	6.00	42.8%	37.36
5	110	105.59	57.00	3.80	28.1%	35.99
5	55	50.59	34.00	2.27	13.5%	44.80



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

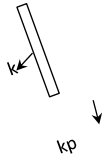
uL (Fell et al., 2005) - upper chart	35.79
uL (Houlsby, 1976) - lower chart	37.29

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.7E-06	m/sec
ke/kp = 100	6.6E-06	m/sec
ke/kp = 10	5.4E-06	m/sec
ke/kp = 1	4.2E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.5E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

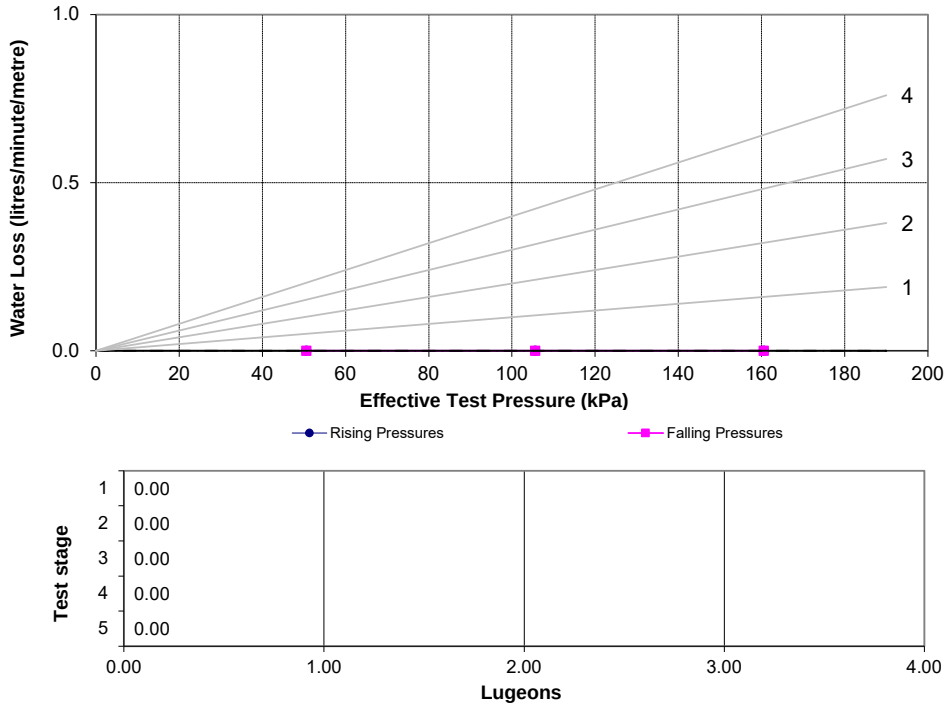
TA-DC201 : 17m to 19.5m

hole no:	TA-DC201	date:	6-Apr-22
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 17.0 m to 19.5 m length 2.5 m

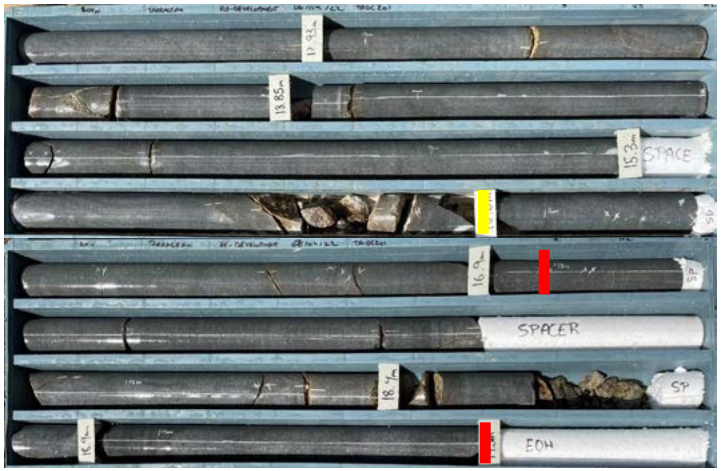
relative level at surface:	711.6 m RL	centre of test section (downhole):	18.25 m
gauge height:	0.8 m	test depth converted to vertical:	18.18 m
inclination of borehole:	85 °	relative level at centre of test section:	693.4 m RL
inferred groundwater level:	712.9 m RL	correction to gauge pressure:	-4.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	50.59	0.00	0.00	10.7%	0.00
5	110	105.59	0.00	0.00	22.3%	0.00
5	165	160.59	0.00	0.00	34.0%	0.00
5	110	105.59	0.00	0.00	22.3%	0.00
5	55	50.59	0.00	0.00	10.7%	0.00



Interpreted flow mechanism: No Flow

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

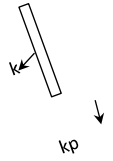
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke): <1.2E-8 m/sec

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

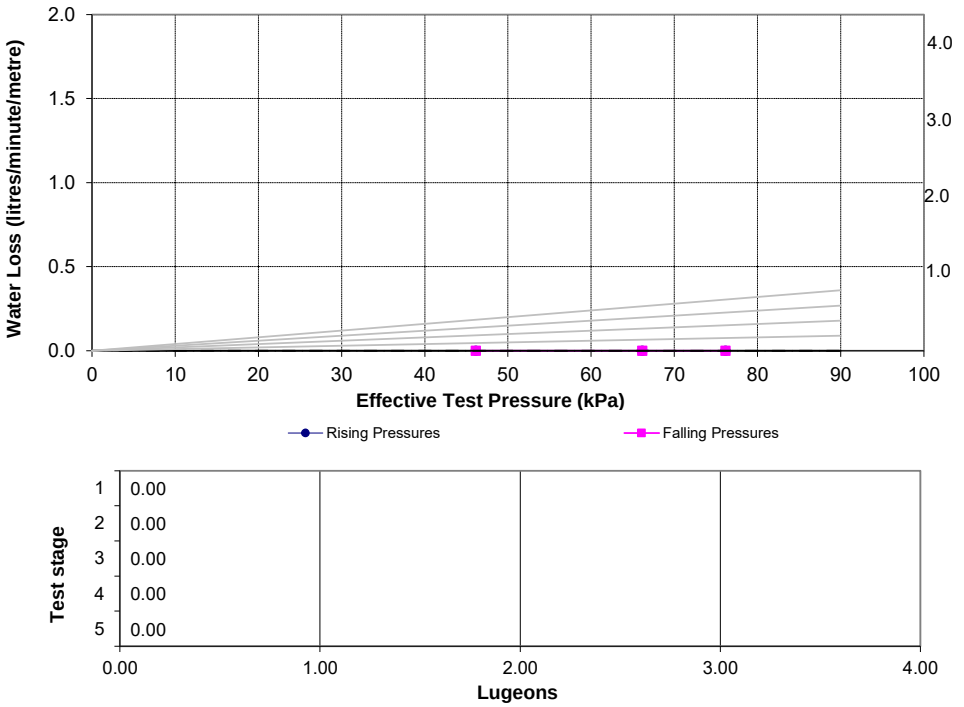
TA-DC202 : 7.5m to 10.5m

hole no:	TA-DC202	date:	8-Feb-22
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 7.5 m to 10.5 m length 3.0 m

relative level at surface:	716.2 m RL	centre of test section (downhole):	9.00 m
gauge height:	0.8 m	test depth converted to vertical:	8.46 m
inclination of borehole:	70 °	relative level at centre of test section:	707.7 m RL
inferred groundwater level:	714.3 m RL	correction to gauge pressure:	26.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	20	46.17	0.00	0.00	21.0%	0.00
10	40	66.17	0.00	0.00	30.1%	0.00
10	50	76.17	0.00	0.00	34.6%	0.00
10	40	66.17	0.00	0.00	30.1%	0.00
10	20	46.17	0.00	0.00	21.0%	0.00



Interpreted flow mechanism: No Flow

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

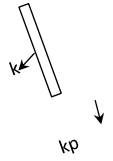
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke): <1.1E-08 m/sec

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

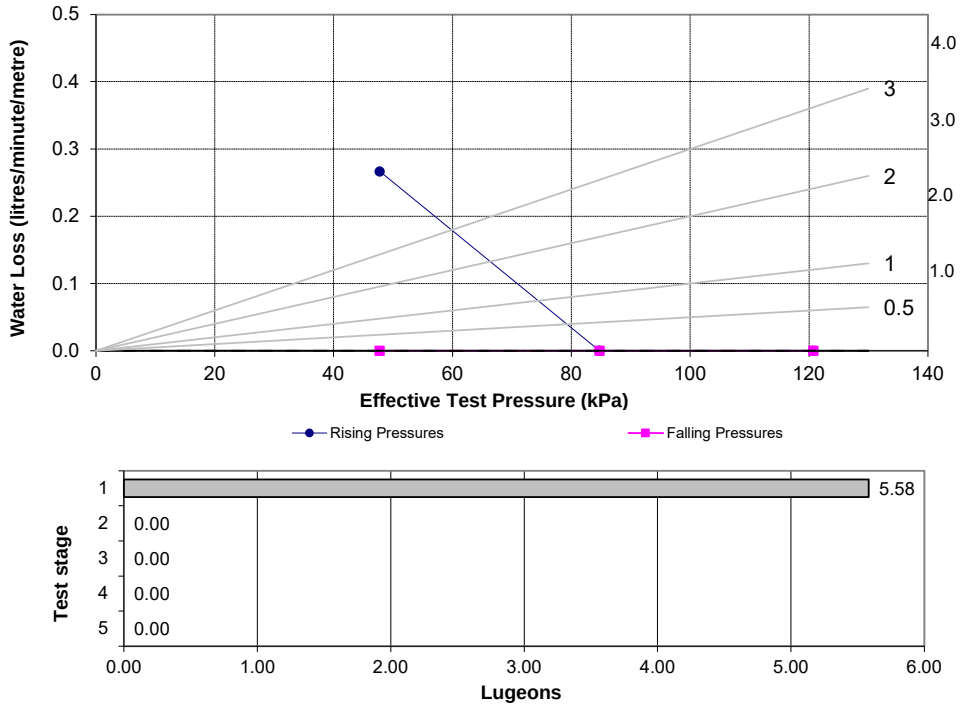
TA-DC205 : 12m to 15m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 12.0 m to 15.0 m length 3.0 m

relative level at surface:	725.7 m RL	centre of test section (downhole):	13.50 m
gauge height:	0.8 m	test depth converted to vertical:	13.29 m
inclination of borehole:	80 °	relative level at centre of test section:	712.4 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	36	47.76	4.00	0.27	13.8%	5.58
5	73	84.76	0.00	0.00	24.5%	0.00
5	109	120.76	0.00	0.00	34.9%	0.00
5	73	84.76	0.00	0.00	24.5%	0.00
5	36	47.76	0.00	0.00	13.8%	0.00



Interpreted flow mechanism: NO PATTERN

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

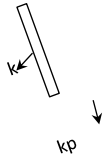
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

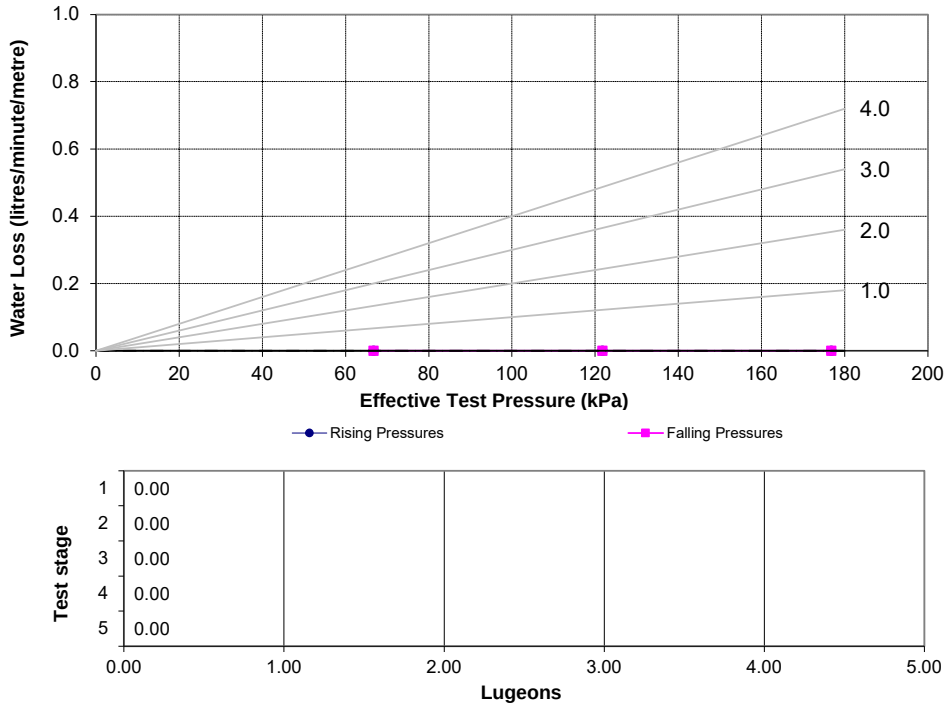
TA-DC205 : 15m to 18m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 15.0 m to 18.0 m length 3.0 m

relative level at surface:	725.7 m RL	centre of test section (downhole):	16.50 m
gauge height:	0.8 m	test depth converted to vertical:	16.25 m
inclination of borehole:	80 °	relative level at centre of test section:	709.5 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	66.76	0.00	0.00	15.8%	0.00
5	110	121.76	0.00	0.00	28.8%	0.00
5	165	176.76	0.00	0.00	41.8%	0.00
5	110	121.76	0.00	0.00	28.8%	0.00
5	55	66.76	0.00	0.00	15.8%	0.00



Interpreted flow mechanism: No Flow

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

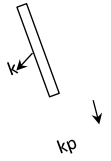
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

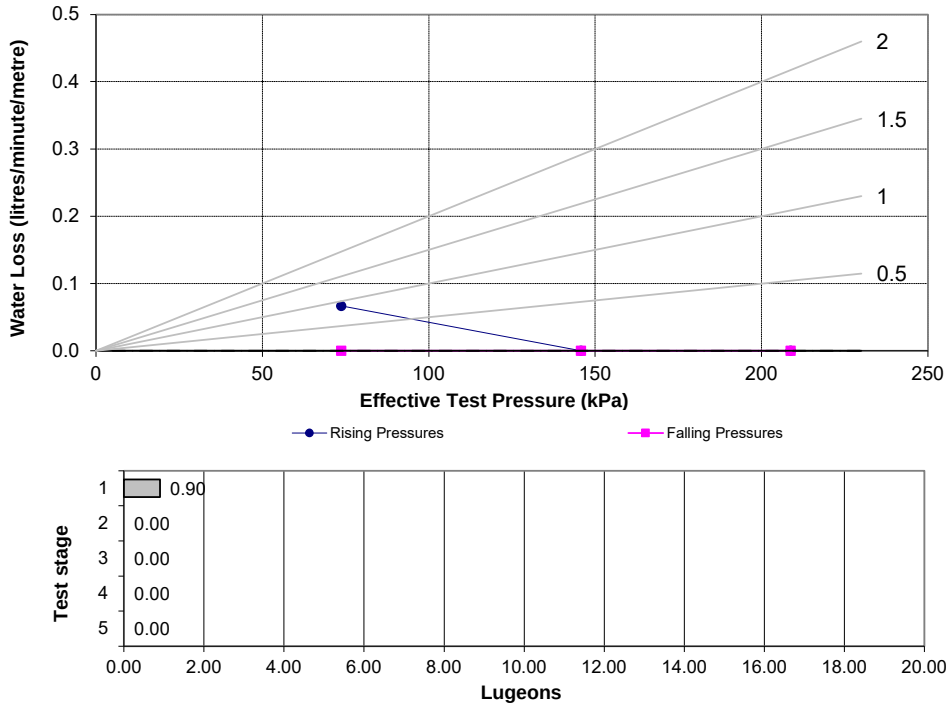
TA-DC205 : 18m to 21m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 18.0 m to 21.0 m length 3.0 m

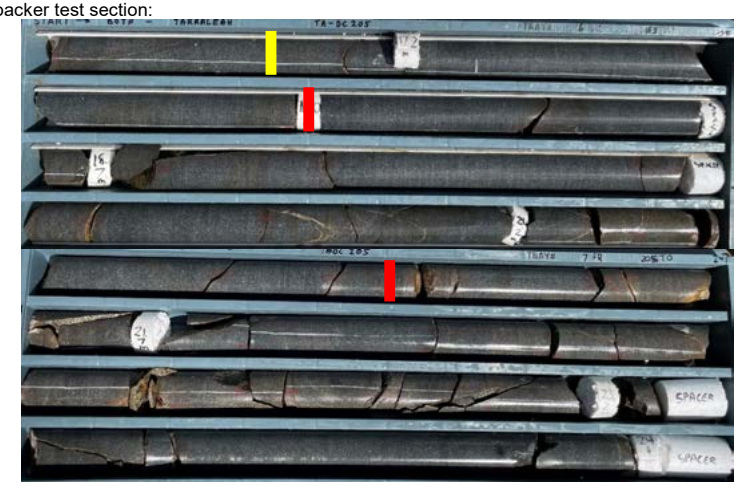
relative level at surface:	725.7 m RL	centre of test section (downhole):	19.50 m
gauge height:	0.8 m	test depth converted to vertical:	19.20 m
inclination of borehole:	80 °	relative level at centre of test section:	706.5 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	62	73.76	1.00	0.07	14.8%	0.90
5	134	145.76	0.00	0.00	29.2%	0.00
5	197	208.76	0.00	0.00	41.8%	0.00
5	134	145.76	0.00	0.00	29.2%	0.00
5	62	73.76	0.00	0.00	14.8%	0.00



Interpreted flow mechanism: No Flow

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

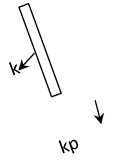
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke): < 8E-09 m/sec

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

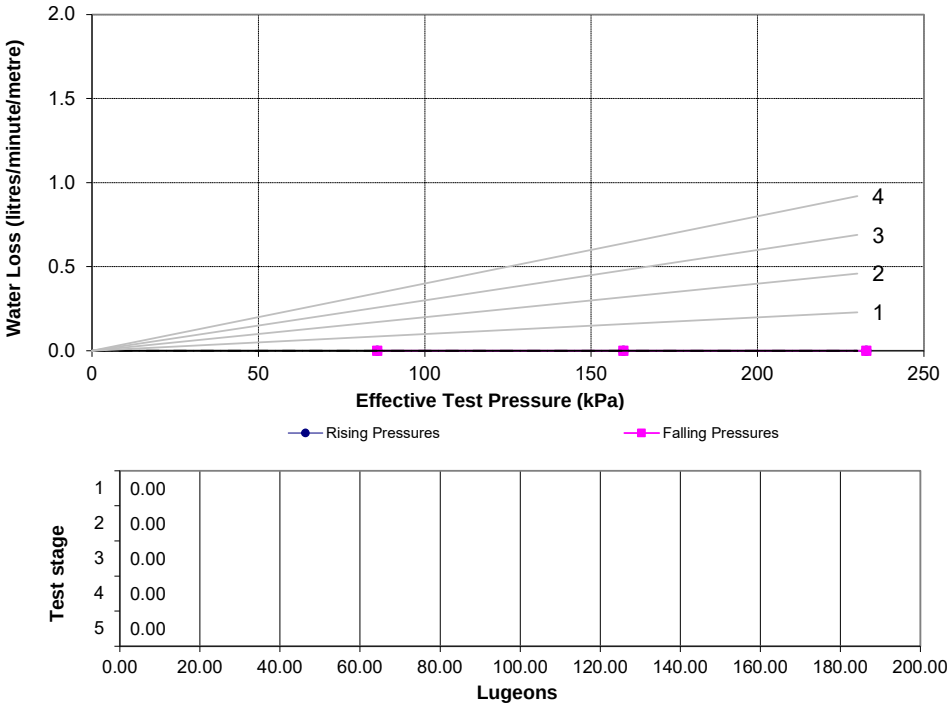
TA-DC205 : 21m to 24m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 21.0 m to 24.0 m length 3.0 m

relative level at surface:	725.7 m RL	centre of test section (downhole):	22.50 m
gauge height:	0.8 m	test depth converted to vertical:	22.16 m
inclination of borehole:	80 °	relative level at centre of test section:	703.5 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	74	85.76	0.00	0.00	14.9%	0.00
5	148	159.76	0.00	0.00	27.7%	0.00
5	221	232.76	0.00	0.00	40.4%	0.00
5	148	159.76	0.00	0.00	27.7%	0.00
5	74	85.76	0.00	0.00	14.9%	0.00



Interpreted flow mechanism: No Flow

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

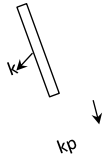
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke): < 4E-09 m/sec

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

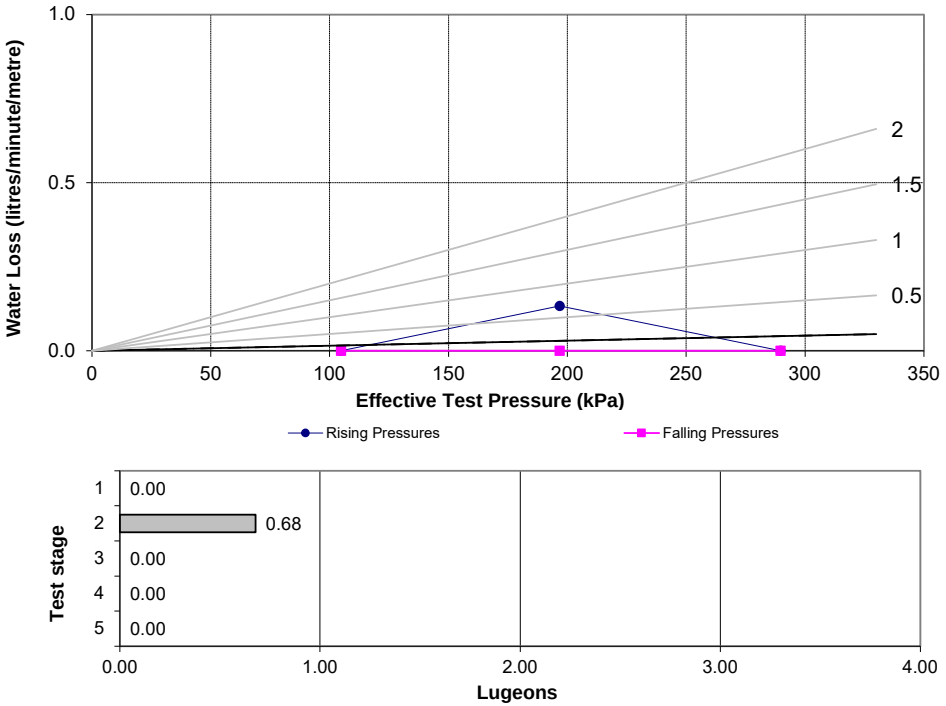
TA-DC205 : 24m to 27m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 24.0 m to 27.0 m length 3.0 m

relative level at surface:	725.7 m RL	centre of test section (downhole):	25.50 m
gauge height:	0.8 m	test depth converted to vertical:	25.11 m
inclination of borehole:	80 °	relative level at centre of test section:	700.6 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	93	104.76	0.00	0.00	16.0%	0.00
5	185	196.76	2.00	0.13	30.1%	0.68
5	278	289.76	0.00	0.00	44.4%	0.00
5	185	196.76	0.00	0.00	30.1%	0.00
5	93	104.76	0.00	0.00	16.0%	0.00



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

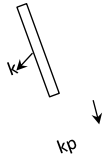
uL (Fell et al., 2005) - upper chart	0.15
uL (Houlsby, 1976) - lower chart	0.14

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.3E-08	m/sec
ke/kp = 100	2.8E-08	m/sec
ke/kp = 10	2.3E-08	m/sec
ke/kp = 1	1.8E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.0E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

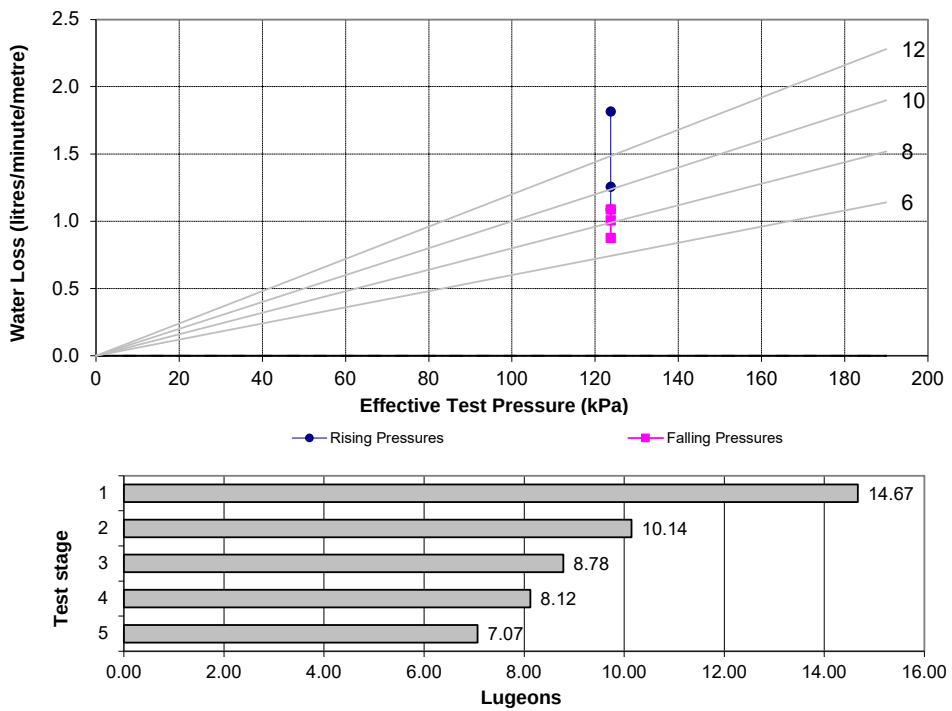
TA-DC205 : 27m to 45.4m

hole no:	TA-DC205	date:	01-03/02/2022
project:	BOTN		
location:	Lake King William Intake	by:	AD

section tested: from 27.0 m to 45.4 m length 18.4 m

relative level at surface:	725.7 m RL	centre of test section (downhole):	36.20 m
gauge height:	0.8 m	test depth converted to vertical:	35.65 m
inclination of borehole:	80 °	relative level at centre of test section:	690.0 m RL
inferred groundwater level:	725.3 m RL	correction to gauge pressure:	11.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	112	123.76	334.00	1.82	13.4%	14.67
10	112	123.76	231.00	1.26	13.4%	10.14
10	112	123.76	200.00	1.09	13.4%	8.78
10	112	123.76	185.00	1.01	13.4%	8.12
10	112	123.76	161.00	0.88	13.4%	7.07
PRESSURE COULD NOT BE INCREASED						

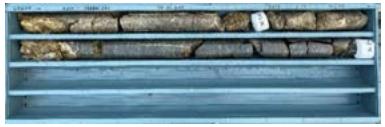


Interpreted flow mechanism: NO PATTERN

Image of packer test section:













Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

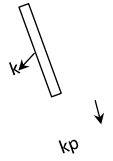
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.1E-06	m/sec
ke/kp = 100	1.8E-06	m/sec
ke/kp = 10	1.6E-06	m/sec
ke/kp = 1	1.3E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

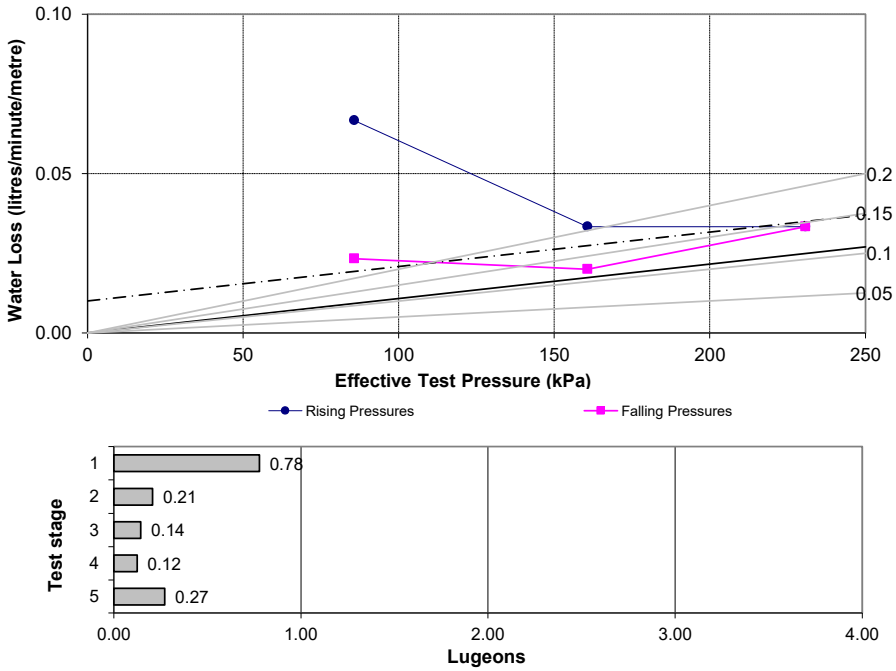
TA-DC207 : 20.1m to 23.1m

hole no:	TA-DC207	date:	4-May-22
project:	BOTN		
location:	Mossy Marsh	by:	JsR

section tested: from 20.1 m to 23.1 m length 3.0 m

relative level at surface:	659.9 m RL	centre of test section (downhole):	21.60 m
gauge height:	0.8 m	test depth converted to vertical:	21.57 m
inclination of borehole:	87 °	relative level at centre of test section:	638.3 m RL
inferred groundwater level:	659.6 m RL	correction to gauge pressure:	10.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	75	85.68	2.00	0.07	15.3%	0.78
10	150	160.68	1.00	0.03	28.7%	0.21
10	220	230.68	1.00	0.03	41.1%	0.14
10	150	160.68	0.60	0.02	28.7%	0.12
10	75	85.68	0.70	0.02	15.3%	0.27



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

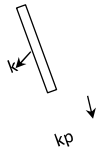
uL (Fell et al., 2005) - upper chart	0.11
uL (Houlsby, 1976) - lower chart	0.14

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.7E-08	m/sec
ke/kp = 100	3.1E-08	m/sec
ke/kp = 10	2.6E-08	m/sec
ke/kp = 1	2.0E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC207 : 32.6m to 35.6m

hole no: TA-DC207 date: 4-May-22

project: BOTN

location: Mossy Marsh by: JsR

section tested: from 32.6 m to 35.6 m length 3.0 m

relative level at surface: 659.9 m RL

gauge height: 0.8 m

inclination of borehole: 87 °

inferred groundwater level: 659.6 m RL

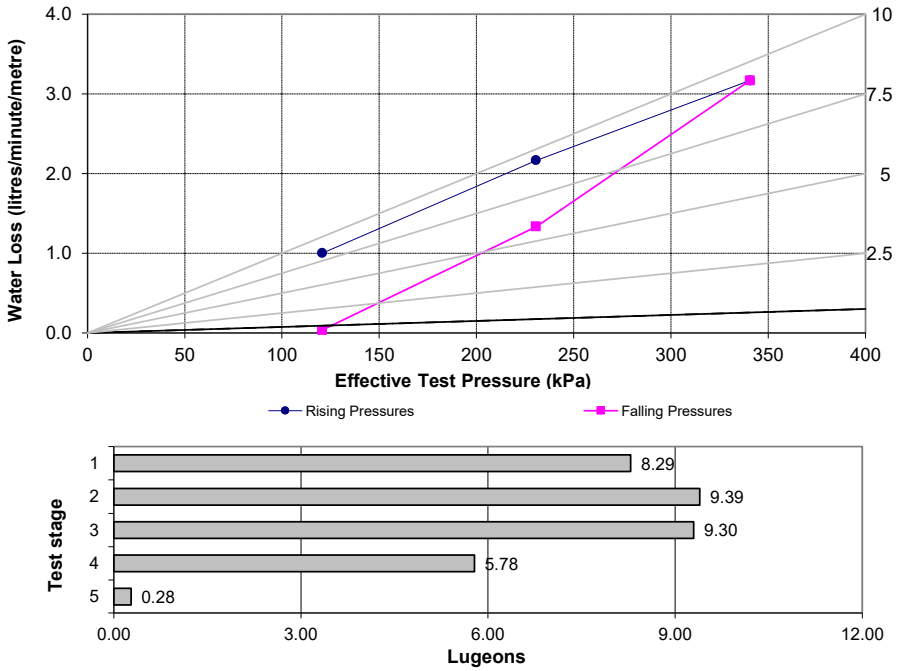
centre of test section (downhole): 34.10 m

test depth converted to vertical: 34.05 m

relative level at centre of test section: 625.8 m RL

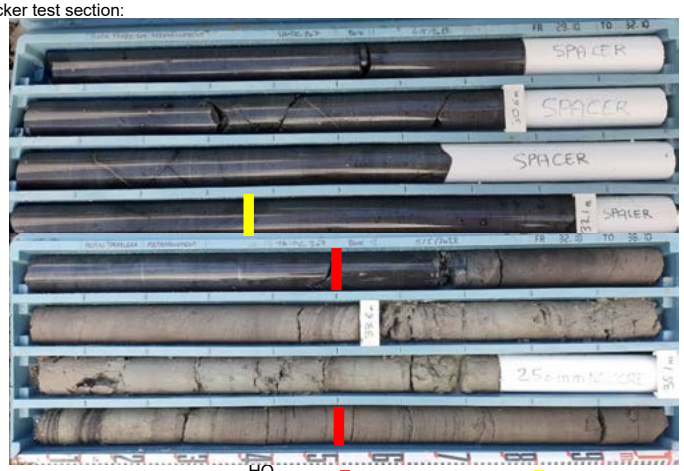
correction to gauge pressure: 10.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	110	120.68	30.00	1.00	13.6%	8.29
10	220	230.68	65.00	2.17	26.1%	9.39
10	330	340.68	95.00	3.17	38.5%	9.30
10	220	230.68	40.00	1.33	26.1%	5.78
10	110	120.68	1.00	0.03	13.6%	0.28



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

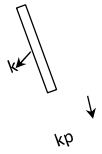
uL (Fell et al., 2005) - upper chart	0.75
uL (Houlsby, 1976) - lower chart	0.28

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-06	m/sec
ke/kp = 100	1.0E-06	m/sec
ke/kp = 10	8.5E-07	m/sec
ke/kp = 1	6.6E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC207 : 36.6m to 39.6m

hole no: TA-DC207 date: 4-May-22

project: BOTN

location: Mossy Marsh by: JsR

section tested: from 36.6 m to 39.6 m length 3.0 m

relative level at surface: 659.9 m RL

gauge height: 0.8 m

inclination of borehole: 87 °

inferred groundwater level: 659.6 m RL

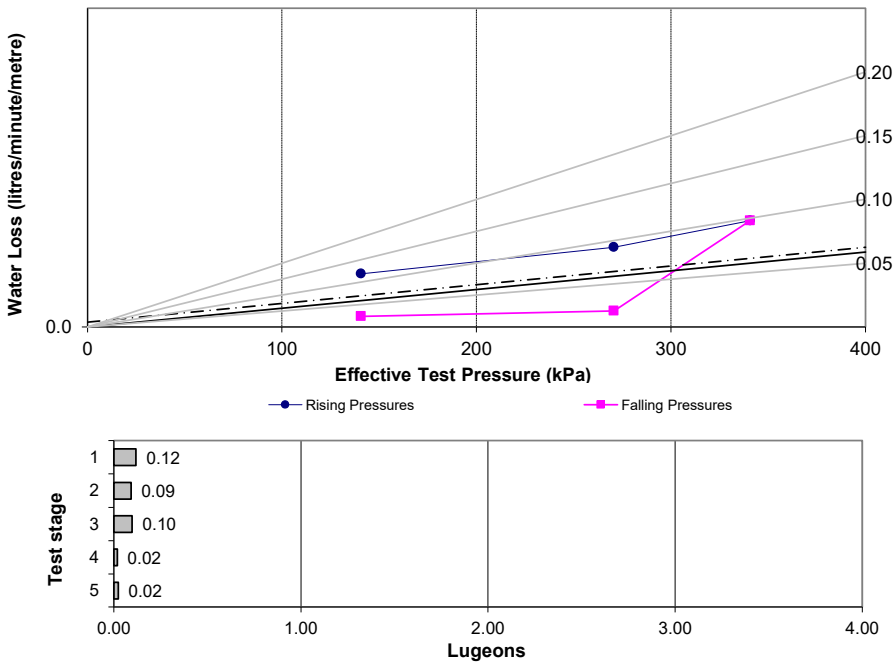
centre of test section (downhole): 38.10 m

test depth converted to vertical: 38.05 m

relative level at centre of test section: 621.8 m RL

correction to gauge pressure: 10.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	130	140.68	0.50	0.02	14.2%	0.12
10	260	270.68	0.75	0.03	27.4%	0.09
10	330	340.68	1.00	0.03	34.4%	0.10
10	260	270.68	0.15	0.01	27.4%	0.02
10	130	140.68	0.10	0.00	14.2%	0.02



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

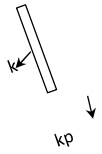
uL (Fell et al., 2005) - upper chart	0.06
uL (Houlsby, 1976) - lower chart	0.07

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.1E-08	m/sec
ke/kp = 100	9.7E-09	m/sec
ke/kp = 10	8.0E-09	m/sec
ke/kp = 1	6.2E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.7E-09 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC207 : 48.6m to 51.6m

hole no: TA-DC207 date: 4-May-22

project: BOTN

location: Mossy Marsh by: JsR

section tested: from 48.6 m to 51.6 m length 3.0 m

relative level at surface: 659.9 m RL

gauge height: 0.8 m

inclination of borehole: 87 °

inferred groundwater level: 659.6 m RL

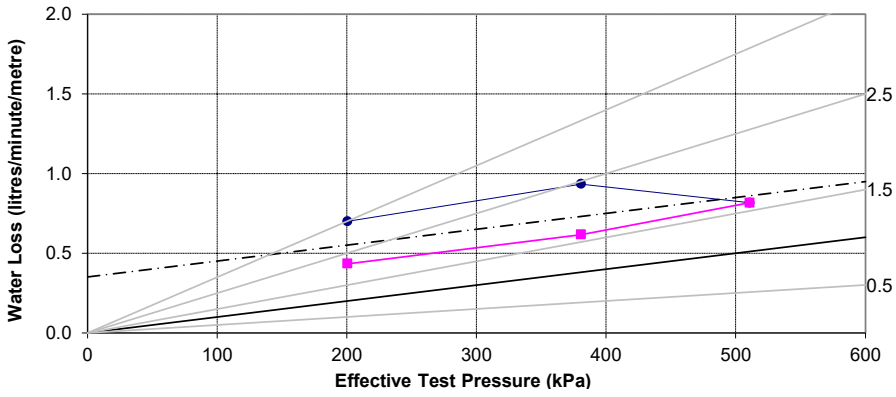
centre of test section (downhole): 50.10 m

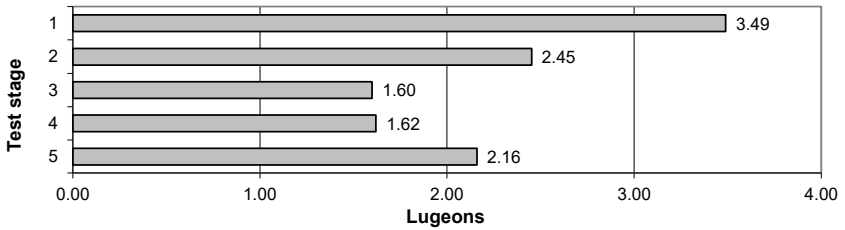
test depth converted to vertical: 50.03 m

relative level at centre of test section: 609.9 m RL

correction to gauge pressure: 10.7 kPa

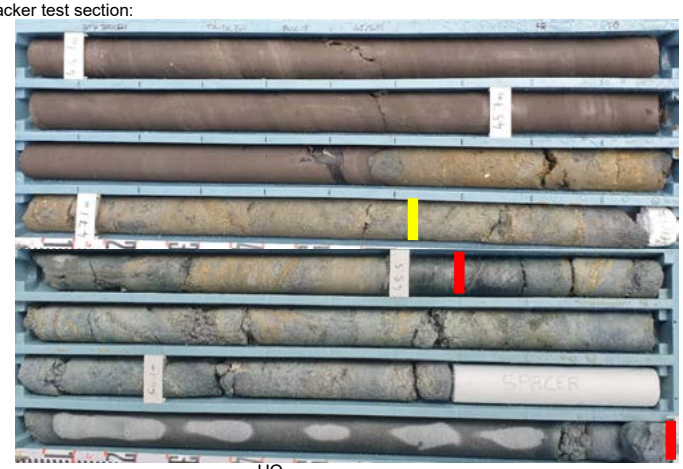
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	190	200.68	21.00	0.70	15.4%	3.49
10	370	380.68	28.00	0.93	29.3%	2.45
10	500	510.68	24.50	0.82	39.3%	1.60
10	370	380.68	18.50	0.62	29.3%	1.62
10	190	200.68	13.00	0.43	15.4%	2.16





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

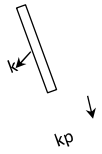
uL (Fell et al., 2005) - upper chart	1.00
uL (Houlsby, 1976) - lower chart	1.60

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.9E-07	m/sec
ke/kp = 100	3.3E-07	m/sec
ke/kp = 10	2.7E-07	m/sec
ke/kp = 1	2.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.3E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

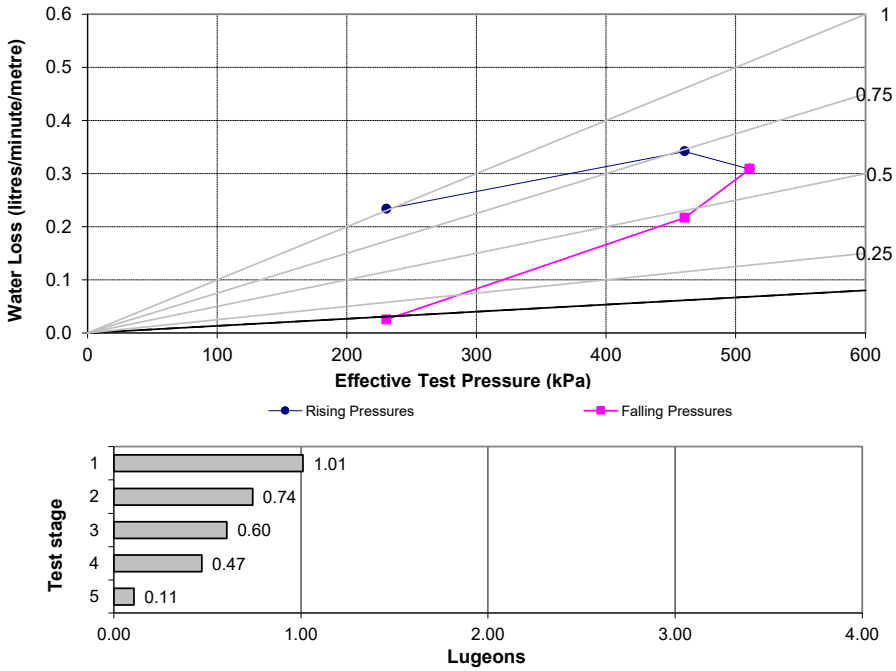
TA-DC207 : 74.1m to 77.1m

hole no:	TA-DC207	date:	4-May-22
project:	BOTN		
location:	Mossy Marsh	by:	JsR

section tested: from 74.1 m to 77.1 m length 3.0 m

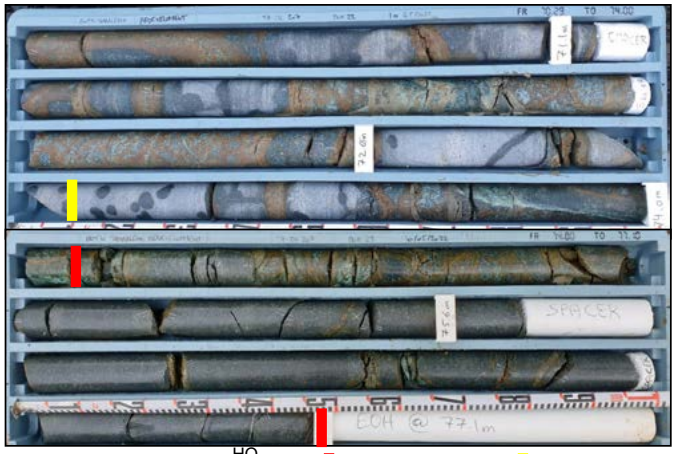
relative level at surface:	659.9 m RL	centre of test section (downhole):	75.60 m
gauge height:	0.8 m	test depth converted to vertical:	75.50 m
inclination of borehole:	87 °	relative level at centre of test section:	584.4 m RL
inferred groundwater level:	659.6 m RL	correction to gauge pressure:	10.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	220	230.68	7.00	0.23	11.8%	1.01
10	450	460.68	10.25	0.34	23.5%	0.74
10	500	510.68	9.25	0.31	26.0%	0.60
10	450	460.68	6.50	0.22	23.5%	0.47
10	220	230.68	0.75	0.03	11.8%	0.11



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

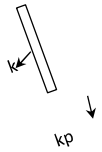
uL (Fell et al., 2005) - upper chart	0.13
uL (Houlsby, 1976) - lower chart	0.11

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	9.5E-08	m/sec
ke/kp = 100	8.0E-08	m/sec
ke/kp = 10	6.6E-08	m/sec
ke/kp = 1	5.2E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.6E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC208 : 32.8m to 35.8m

hole no: TA-DC208 date: 1-Jun-22

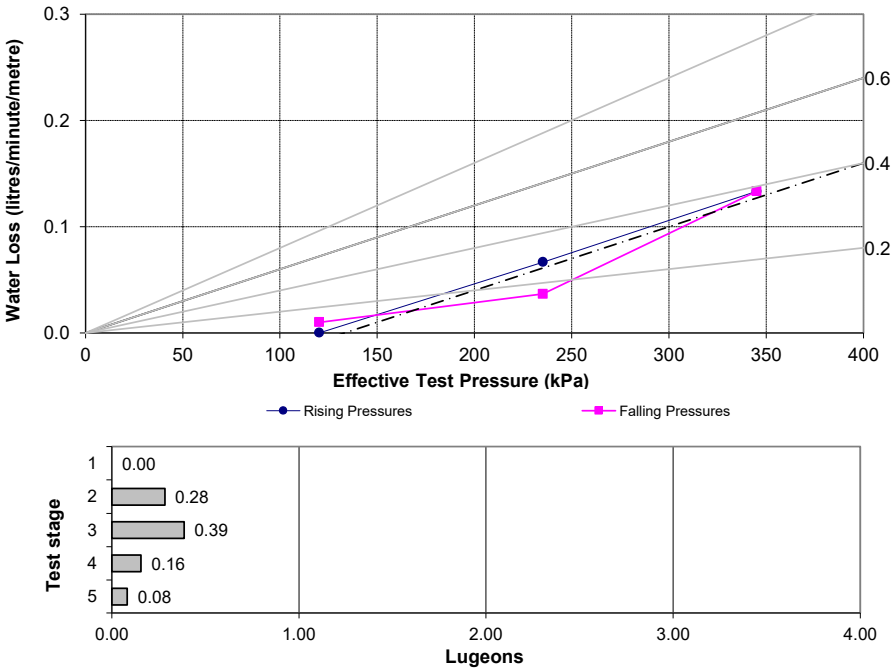
project: BOTN

location: Lake King William by: AD

section tested: from 32.8 m to 35.8 m length 3.0 m

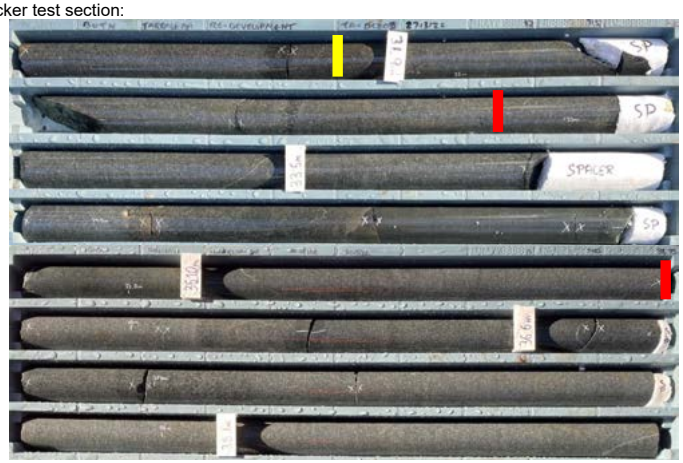
relative level at surface:	658.8 m RL	centre of test section (downhole):	34.30 m
gauge height:	0.8 m	test depth converted to vertical:	31.80 m
inclination of borehole:	68 °	relative level at centre of test section:	627.0 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	110	120.19	0.00	0.00	14.5%	0.00
10	225	235.19	2.00	0.07	28.4%	0.28
10	335	345.19	4.00	0.13	41.7%	0.39
10	225	235.19	1.10	0.04	28.4%	0.16
10	110	120.19	0.30	0.01	14.5%	0.08
			This small division not visibles on watermeter			



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

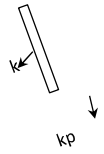
uL (Fell et al., 2005) - upper chart	0.60
uL (Houlsby, 1976) - lower chart	0.39

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.5E-08	m/sec
ke/kp = 100	3.8E-08	m/sec
ke/kp = 10	3.1E-08	m/sec
ke/kp = 1	2.4E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.6E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

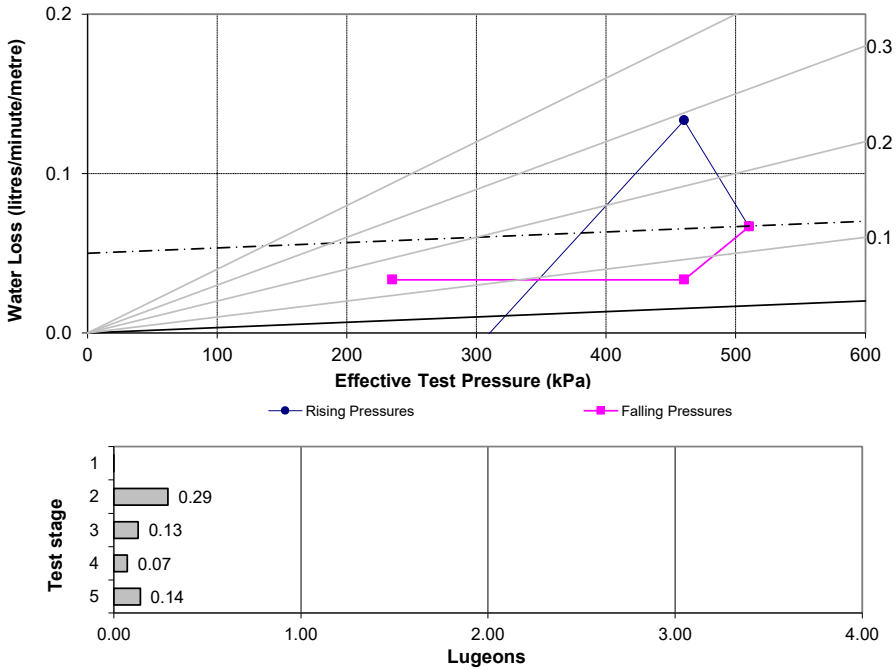
TA-DC208 : 69.6m to 72.6m

hole no:	TA-DC208	date:	1-Jun-22
project:	BOTN		
location:	Lake King William	by:	AD

section tested: from 69.6 m to 72.6 m length 3.0 m

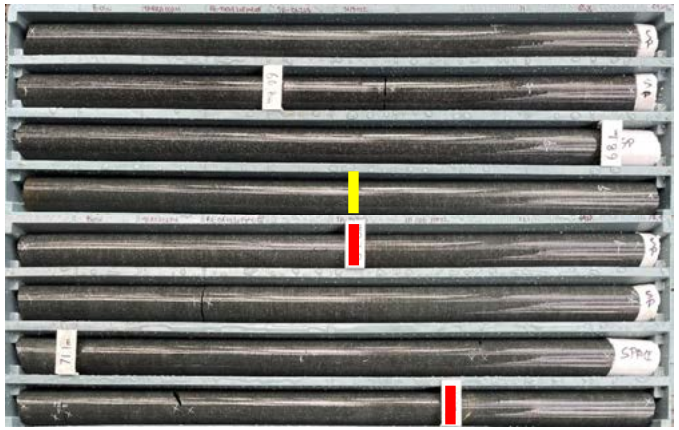
relative level at surface:	658.8 m RL	centre of test section (downhole):	71.10 m
gauge height:	0.8 m	test depth converted to vertical:	65.92 m
inclination of borehole:	68 °	relative level at centre of test section:	592.9 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	235.19	-2.00	-0.07	13.7%	-0.28
10	450	460.19	4.00	0.13	26.8%	0.29
10	500	510.19	2.00	0.07	29.8%	0.13
10	450	460.19	1.00	0.03	26.8%	0.07
10	225	235.19	1.00	0.03	13.7%	0.14



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

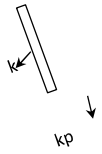
uL (Fell et al., 2005) - upper chart	0.03
uL (Houlsby, 1976) - lower chart	0.07

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.1E-08	m/sec
ke/kp = 100	2.7E-08	m/sec
ke/kp = 10	2.2E-08	m/sec
ke/kp = 1	1.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.8E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

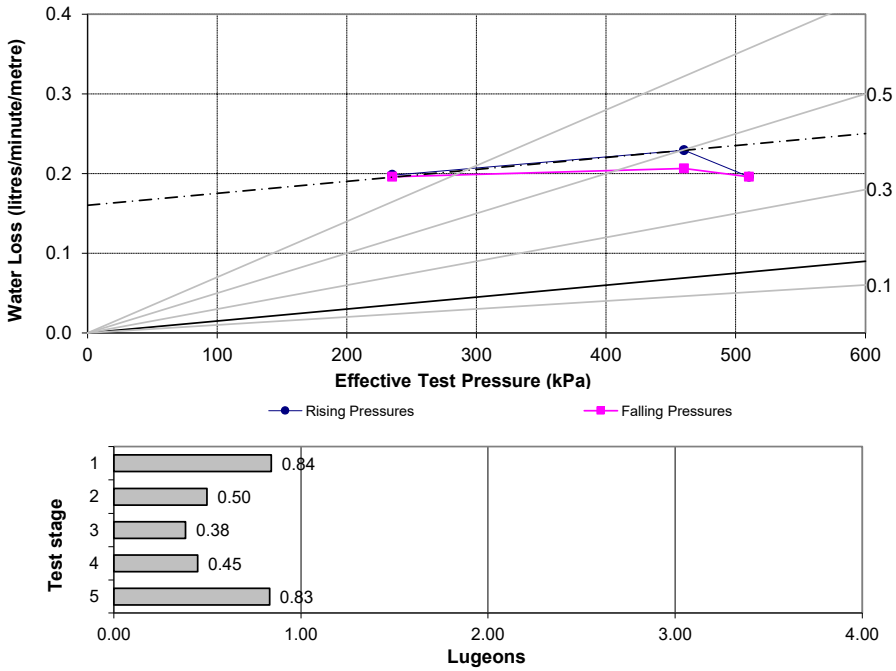
TA-DC208 : 86.1m to 98.1m

hole no:	TA-DC208	date:	1-Jun-22
project:	BOTN		
location:	Lake King William	by:	AD

section tested: from 86.1 m to 98.1 m length 12.0 m

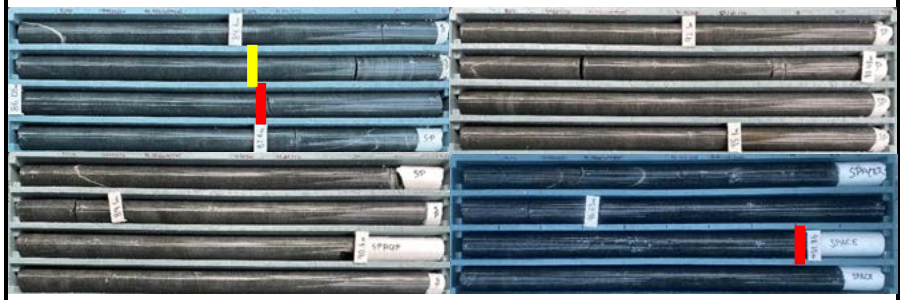
relative level at surface:	658.8 m RL	centre of test section (downhole):	92.10 m
gauge height:	0.8 m	test depth converted to vertical:	85.39 m
inclination of borehole:	68 °	relative level at centre of test section:	573.4 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	235.19	23.75	0.20	10.6%	0.84
10	450	460.19	27.50	0.23	20.7%	0.50
10	500	510.19	23.50	0.20	23.0%	0.38
10	450	460.19	24.75	0.21	20.7%	0.45
10	225	235.19	23.50	0.20	10.6%	0.83



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

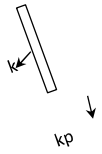
uL (Fell et al., 2005) - upper chart	0.15
uL (Houlsby, 1976) - lower chart	0.38

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.3E-07	m/sec
ke/kp = 100	1.1E-07	m/sec
ke/kp = 10	9.4E-08	m/sec
ke/kp = 1	7.8E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC208 : 103.3m to 105.3m

hole no: TA-DC208 date: 1-Jun-22

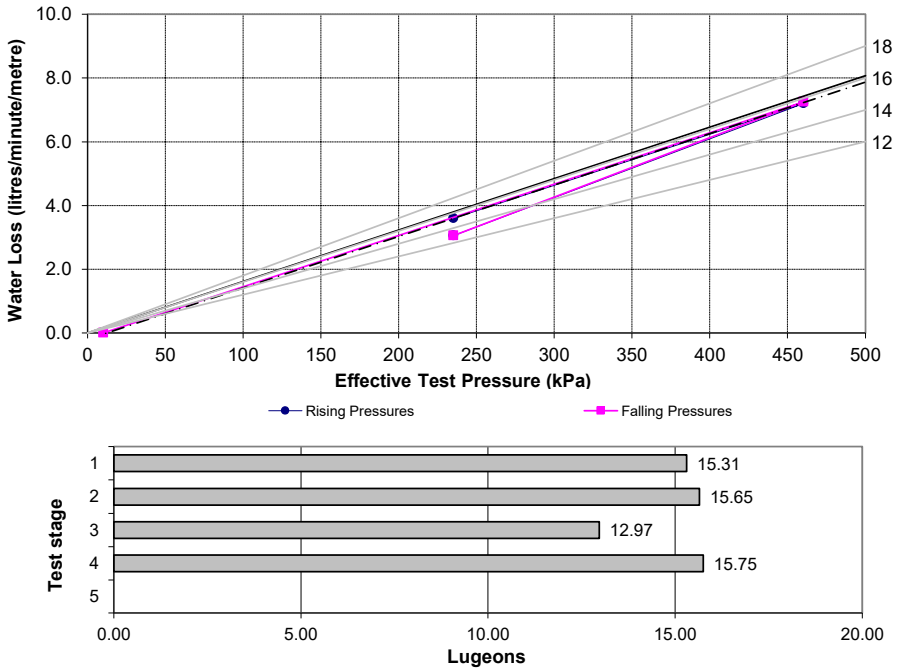
project: BOTN

location: Lake King William by: AD

section tested: from 103.3 m to 105.3 m length 2.0 m

relative level at surface:	658.8 m RL	centre of test section (downhole):	104.30 m
gauge height:	0.8 m	test depth converted to vertical:	96.71 m
inclination of borehole:	68 °	relative level at centre of test section:	562.1 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	235.19	36.00	3.60	9.4%	15.31
5	450	460.19	72.00	7.20	18.3%	15.65
5	225	235.19	30.50	3.05	9.4%	12.97
5	450	460.19	72.50	7.25	18.3%	15.75
5		10.19		0.00	0.4%	
			Discontinued - Issue water leakage/rod string			



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

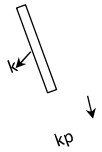
uL (Fell et al., 2005) - upper chart	16.14
uL (Houlsby, 1976) - lower chart	14.92

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.1E-06	m/sec
ke/kp = 100	1.7E-06	m/sec
ke/kp = 10	1.4E-06	m/sec
ke/kp = 1	1.1E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

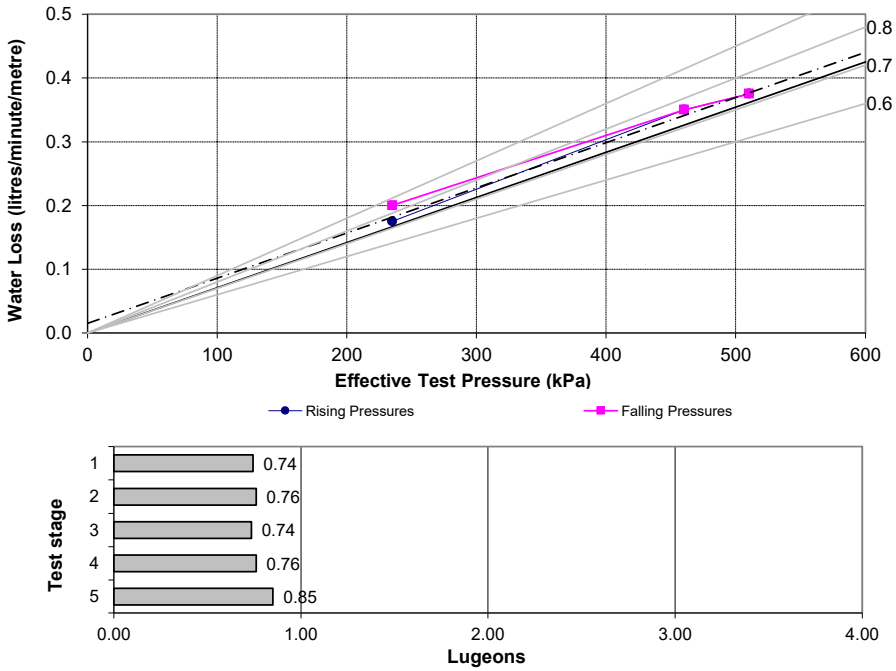
TA-DC208 : 113.8m to 115.8m

hole no:	TA-DC208	date:	1-Jun-22
project:	BOTN		
location:	Lake King William	by:	AD

section tested: from 113.8 m to 115.8 m length 2.0 m

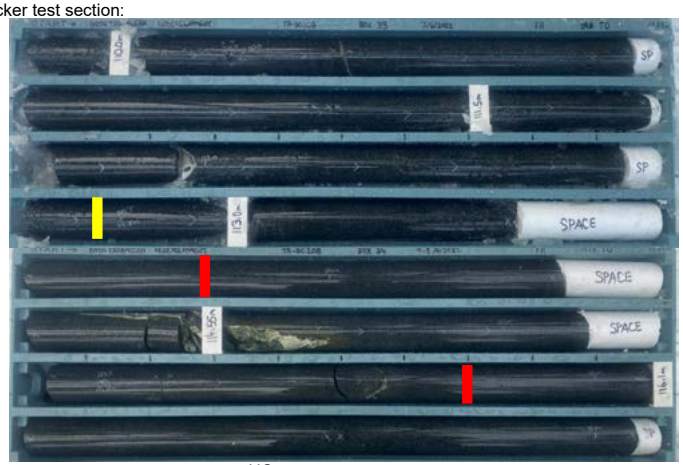
relative level at surface:	658.8 m RL	centre of test section (downhole):	114.8 m
gauge height:	0.8 m	test depth converted to vertical:	106.4 m
inclination of borehole:	68 °	relative level at centre of test section:	552.4 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	235.19	1.75	0.18	8.5%	0.74
5	450	460.19	3.50	0.35	16.6%	0.76
5	500	510.19	3.75	0.38	18.4%	0.74
5	450	460.19	3.50	0.35	16.6%	0.76
5	225	235.19	2.00	0.20	8.5%	0.85



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

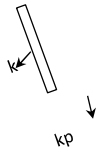
uL (Fell et al., 2005) - upper chart	0.71
uL (Houlsby, 1976) - lower chart	0.77

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.4E-07	m/sec
ke/kp = 100	1.2E-07	m/sec
ke/kp = 10	9.9E-08	m/sec
ke/kp = 1	7.5E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.1E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

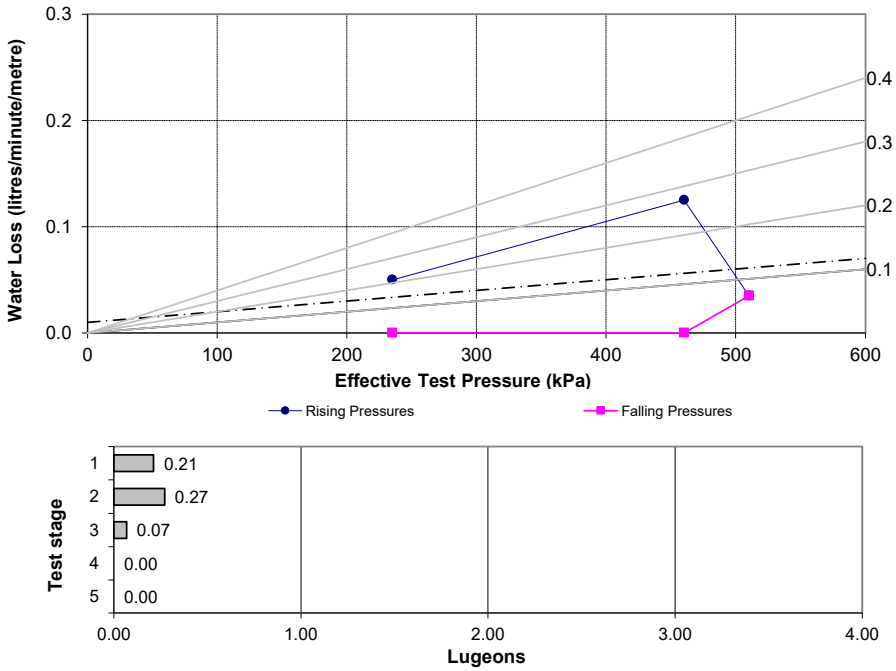
TA-DC208 : 122.8m to 124.8m

hole no:	TA-DC208	date:	1-Jun-22
project:	BOTN		
location:	Lake King William	by:	AD

section tested: from 122.8 m to 124.8 m length 2.0 m

relative level at surface:	658.8 m RL	centre of test section (downhole):	123.80 m
gauge height:	0.8 m	test depth converted to vertical:	114.79 m
inclination of borehole:	68 °	relative level at centre of test section:	544.1 m RL
inferred groundwater level:	658.6 m RL	correction to gauge pressure:	10.2 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	235.19	0.50	0.05	7.9%	0.21
5	450	460.19	1.25	0.13	15.4%	0.27
5	500	510.19	0.35	0.04	17.1%	0.07
5	450	460.19	0.00	0.00	15.4%	0.00
5	225	235.19	0.00	0.00	7.9%	0.00
			This small division not visibles on watermeter			



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

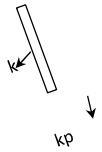
uL (Fell et al., 2005) - upper chart	0.10
uL (Houlsby, 1976) - lower chart	0.07

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.6E-08	m/sec
ke/kp = 100	1.3E-08	m/sec
ke/kp = 10	1.1E-08	m/sec
ke/kp = 1	8.2E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.9E-09 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

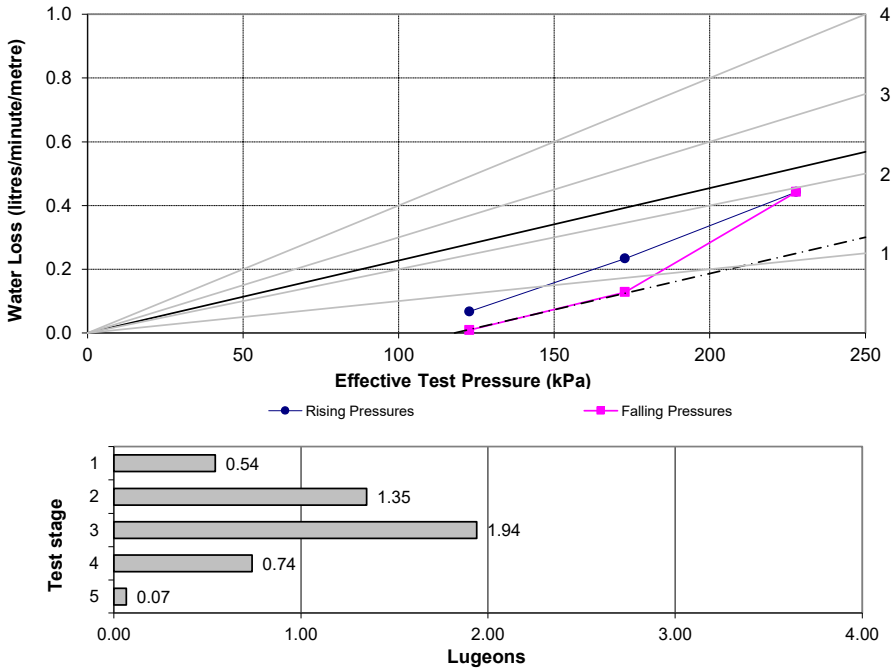
TA-DC212 : 17.1m to 20.1m

hole no:	TA-DC212	date:	6-Apr-22
project:	BOTN		
location:	TAPS2 Hillside	by:	JK

section tested: from 17.1 m to 20.1 m length 3.0 m

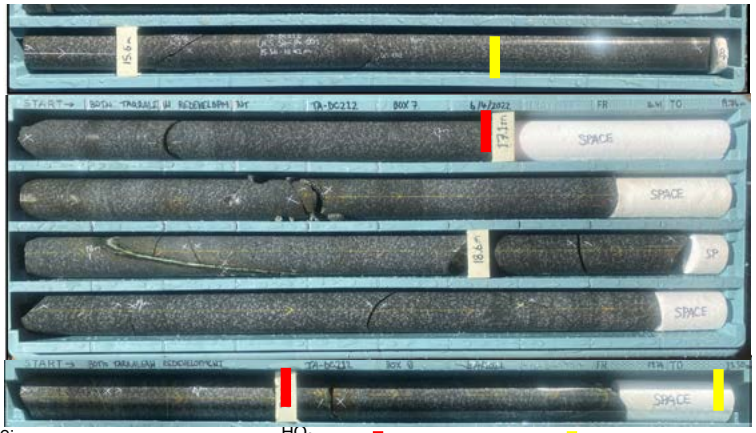
relative level at surface:	468.99 m RL	centre of test section (downhole):	18.60 m
gauge height:	0.8 m	test depth converted to vertical:	17.48 m
inclination of borehole:	70 °	relative level at centre of test section:	451.5 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
15	60	122.72	3.00	0.07	27.0%	0.54
10	110	172.72	7.00	0.23	38.0%	1.35
10	165	227.72	13.25	0.44	50.1%	1.94
15	110	172.72	5.75	0.13	38.0%	0.74
10	60	122.72	0.25	0.01	27.0%	0.07
		WATER METER STOPPED WORKING				



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

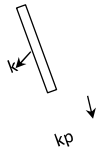
uL (Fell et al., 2005) - upper chart	2.27
uL (Houlsby, 1976) - lower chart	0.54

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.0E-07	m/sec
ke/kp = 100	1.7E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

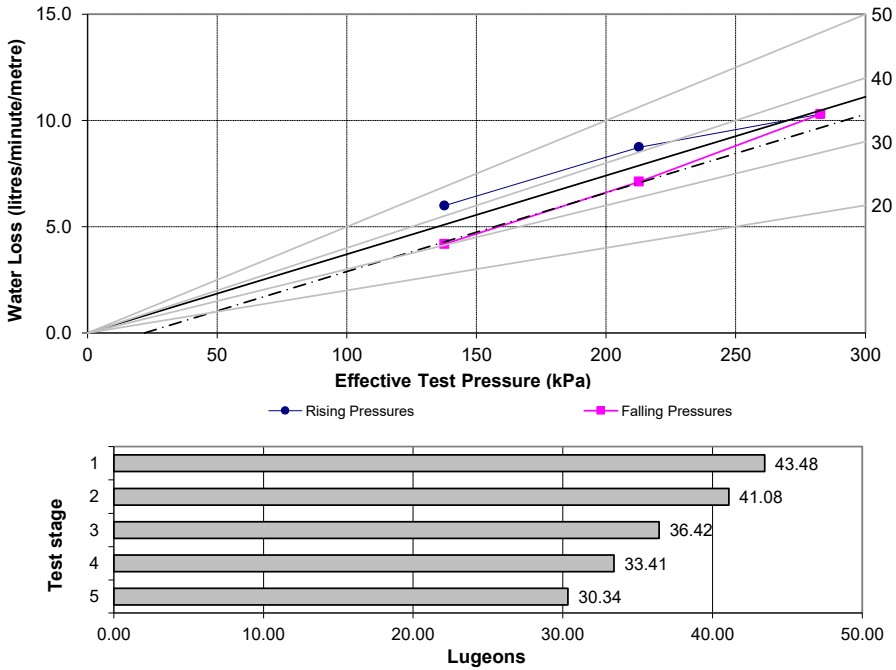
TA-DC212 : 21.9m to 26.1m

hole no:	TA-DC212	date:	6-Apr-22
project:	BOTN		
location:	TAPS2 Hillside	by:	JK

section tested: from 21.9 m to 26.1 m length 4.2 m

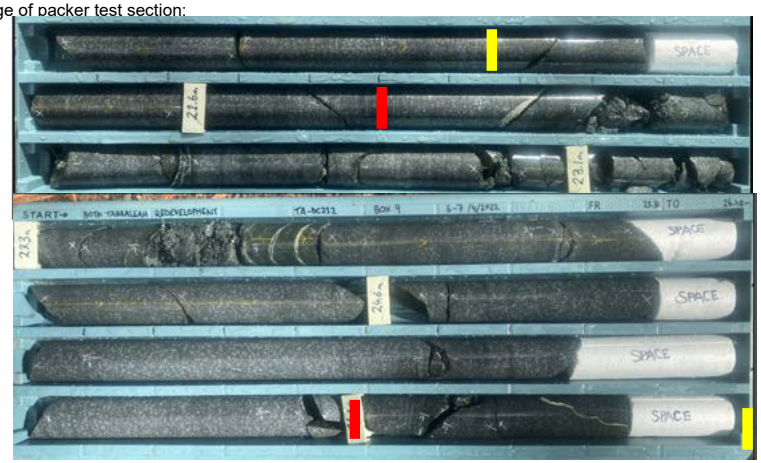
relative level at surface:	468.99 m RL	centre of test section (downhole):	24.00 m
gauge height:	0.8 m	test depth converted to vertical:	22.55 m
inclination of borehole:	70 °	relative level at centre of test section:	446.4 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	75	137.72	251.50	5.99	23.5%	43.48
10	150	212.72	367.00	8.74	36.3%	41.08
10	220	282.72	432.50	10.30	48.2%	36.42
10	150	212.72	298.50	7.11	36.3%	33.41
10	75	137.72	175.50	4.18	23.5%	30.34
		WATER LEAKING				



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

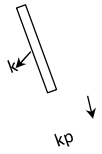
uL (Fell et al., 2005) - upper chart	37.05
uL (Houlsby, 1976) - lower chart	30.34

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.3E-06	m/sec
ke/kp = 100	6.2E-06	m/sec
ke/kp = 10	5.2E-06	m/sec
ke/kp = 1	4.1E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.4E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC212 : 71.5m to 74.5m

hole no: TA-DC212 date: 6-Apr-22

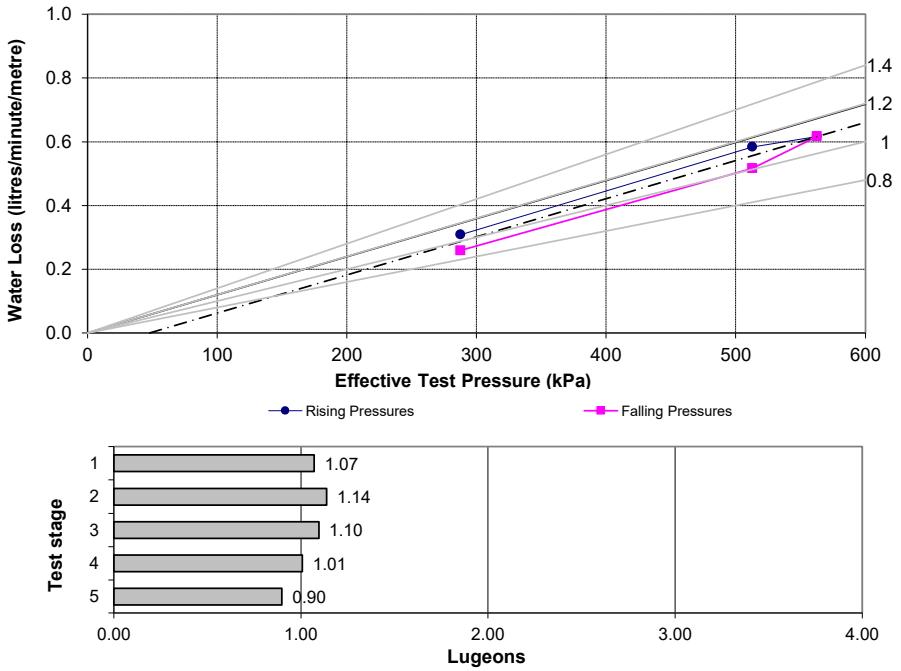
project: BOTN

location: TAPS2 Hillside by: JK

section tested: from 71.5 m to 74.5 m length 3.0 m

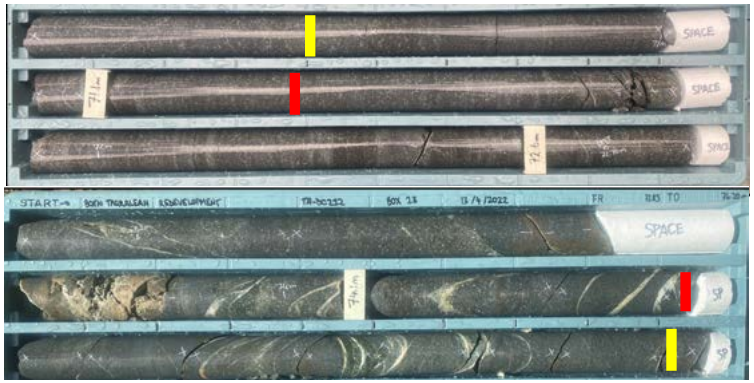
relative level at surface:	468.99 m RL	centre of test section (downhole):	73.00 m
gauge height:	0.8 m	test depth converted to vertical:	68.60 m
inclination of borehole:	70 °	relative level at centre of test section:	400.4 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	9.25	0.31	16.1%	1.07
10	450	512.72	17.50	0.58	28.7%	1.14
10	500	562.72	18.50	0.62	31.6%	1.10
10	450	512.72	15.50	0.52	28.7%	1.01
10	225	287.72	7.75	0.26	16.1%	0.90



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

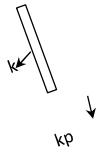
uL (Fell et al., 2005) - upper chart	1.20
uL (Houlsby, 1976) - lower chart	1.04

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.0E-07	m/sec
ke/kp = 100	1.7E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC212 : 114.4m to 119.4m

hole no: TA-DC212 date: 6-Apr-22

project: BOTN

location: TAPS2 Hillside by: JK

section tested: from 114.4 m to 119.4 m length 5.0 m

relative level at surface: 468.99 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 463.4 m RL

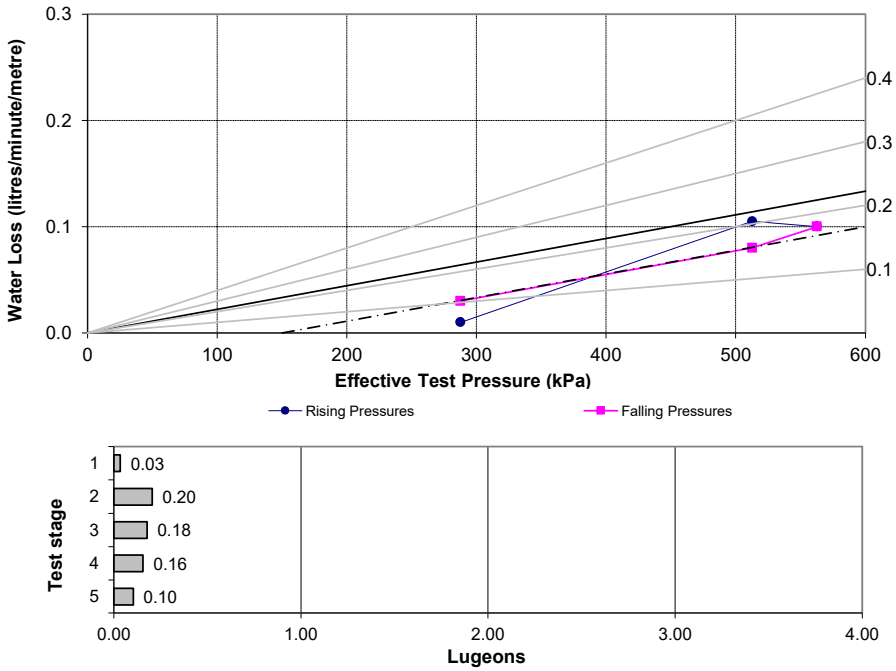
centre of test section (downhole): 116.90 m

test depth converted to vertical: 109.85 m

relative level at centre of test section: 359.1 m RL

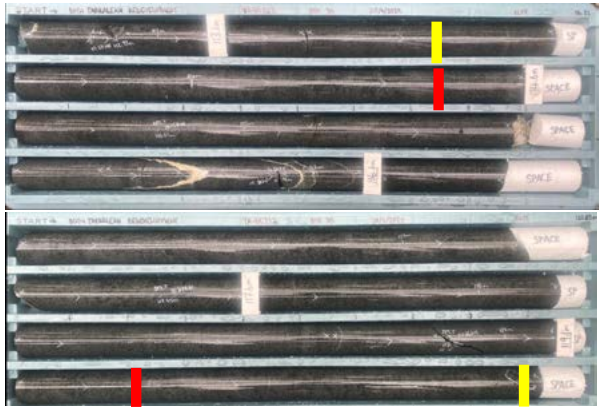
correction to gauge pressure: 62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	0.50	0.01	10.1%	0.03
10	450	512.72	5.25	0.11	18.0%	0.20
10	500	562.72	5.00	0.10	19.7%	0.18
10	450	512.72	4.00	0.08	18.0%	0.16
10	225	287.72	1.50	0.03	10.1%	0.10



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

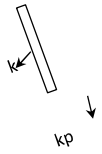
uL (Fell et al., 2005) - upper chart	0.22
uL (Houlsby, 1976) - lower chart	0.10

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.4E-08	m/sec
ke/kp = 100	2.9E-08	m/sec
ke/kp = 10	2.4E-08	m/sec
ke/kp = 1	1.9E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.1E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

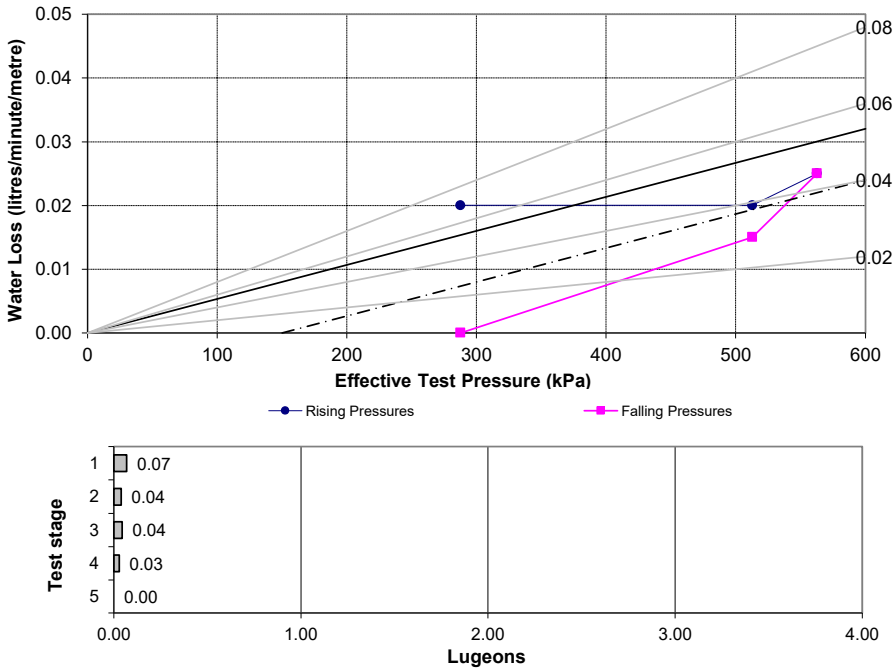
TA-DC212 : 119.4m to 124.4m

hole no:	TA-DC212	date:	6-Apr-22
project:	BOTN		
location:	TAPS2 Hillside	by:	JK

section tested: from 119.4 m to 124.4 m length 5.0 m

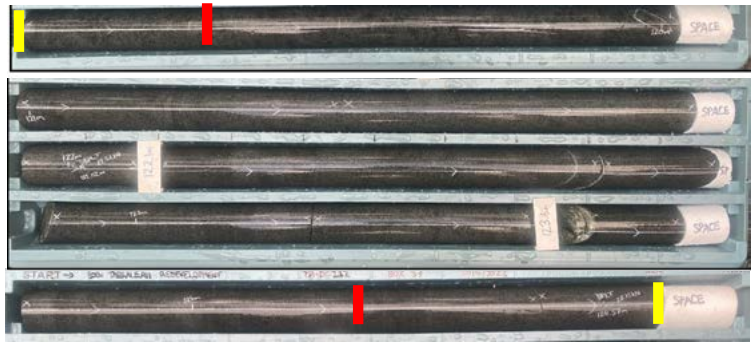
relative level at surface:	468.99 m RL	centre of test section (downhole):	121.90 m
gauge height:	0.8 m	test depth converted to vertical:	114.55 m
inclination of borehole:	70 °	relative level at centre of test section:	354.4 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	1.00	0.02	9.7%	0.07
10	450	512.72	1.00	0.02	17.2%	0.04
10	500	562.72	1.25	0.03	18.9%	0.04
10	450	512.72	0.75	0.02	17.2%	0.03
10	225	287.72	0.00	0.00	9.7%	0.00



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

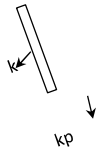
uL (Fell et al., 2005) - upper chart	0.05
uL (Houlsby, 1976) - lower chart	0.04

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.9E-09	m/sec
ke/kp = 100	5.1E-09	m/sec
ke/kp = 10	4.2E-09	m/sec
ke/kp = 1	3.4E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.6E-09 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

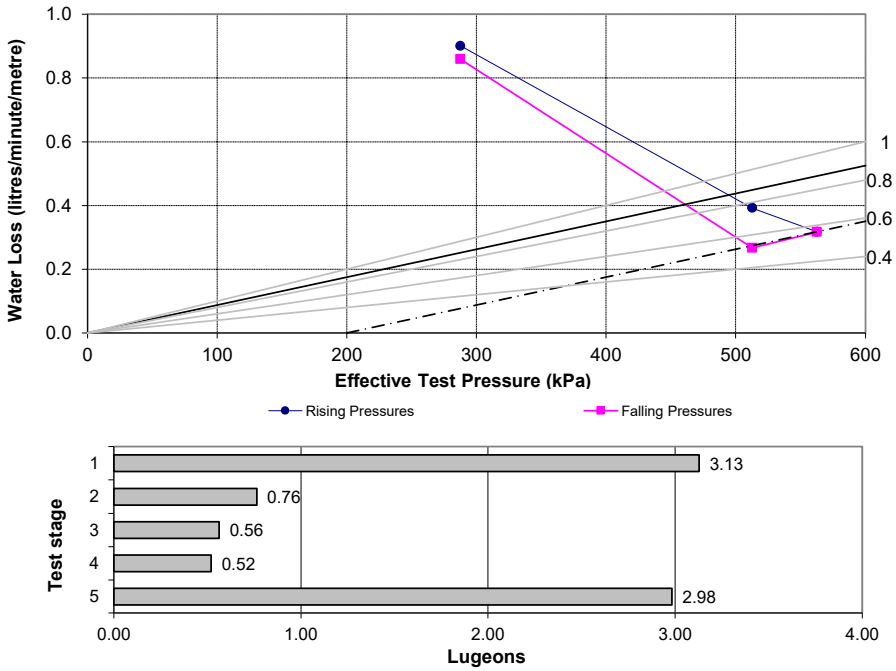
TA-DC212 : 131.4m to 134.4m

hole no:	TA-DC212	date:	6-Apr-22
project:	BOTN		
location:	TAPS2 Hillside	by:	JK

section tested: from 131.4 m to 134.4 m length 3.0 m

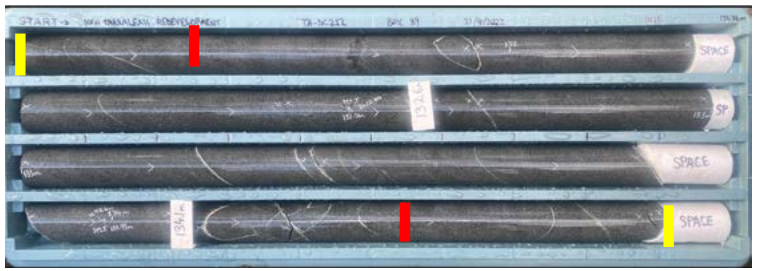
relative level at surface:	468.99 m RL	centre of test section (downhole):	132.90 m
gauge height:	0.8 m	test depth converted to vertical:	124.89 m
inclination of borehole:	70 °	relative level at centre of test section:	344.1 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	27.00	0.90	8.9%	3.13
10	450	512.72	11.75	0.39	15.8%	0.76
10	500	562.72	9.50	0.32	17.3%	0.56
10	450	512.72	8.00	0.27	15.8%	0.52
10	225	287.72	25.75	0.86	8.9%	2.98
		LOSS OF PRESSURE				



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

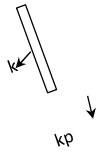
uL (Fell et al., 2005) - upper chart	0.88
uL (Houlsby, 1976) - lower chart	0.56

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.0E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC212 : 135m to 140.1m

hole no: TA-DC212 | date: 6-Apr-22

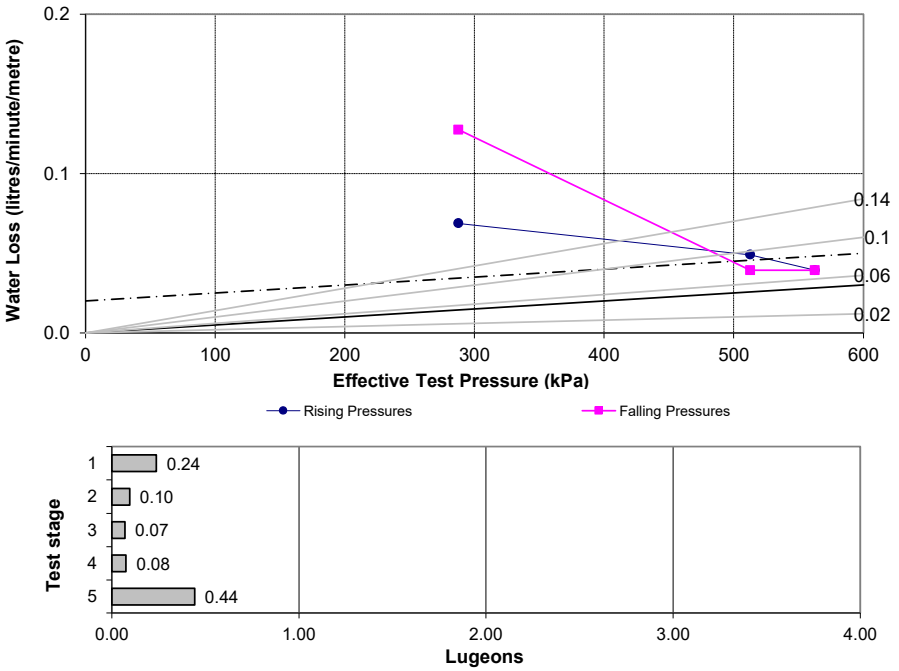
project: BOTN

location: TAPS2 Hillside | by: JK

section tested: from 135.0 m to 140.1 m length 5.1 m

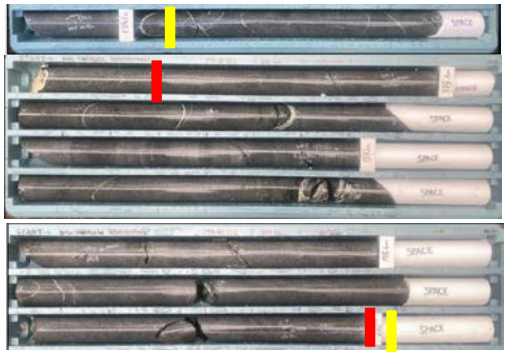
relative level at surface:	468.99 m RL	centre of test section (downhole):	137.55 m
gauge height:	0.8 m	test depth converted to vertical:	129.25 m
inclination of borehole:	70 °	relative level at centre of test section:	339.7 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	3.50	0.07	8.6%	0.24
10	450	512.72	2.50	0.05	15.3%	0.10
10	500	562.72	2.00	0.04	16.7%	0.07
10	450	512.72	2.00	0.04	15.3%	0.08
10	225	287.72	6.50	0.13	8.6%	0.44
		WATER METER DID NOT WORK				



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

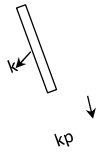
uL (Fell et al., 2005) - upper chart	0.05
uL (Houlsby, 1976) - lower chart	0.07

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.6E-08	m/sec
ke/kp = 100	3.1E-08	m/sec
ke/kp = 10	2.6E-08	m/sec
ke/kp = 1	2.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

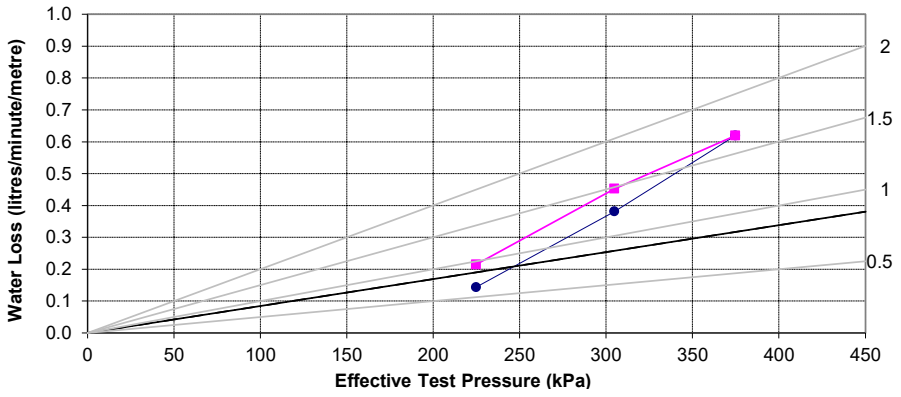
TA-DC214 : 21.5m to 25.7m

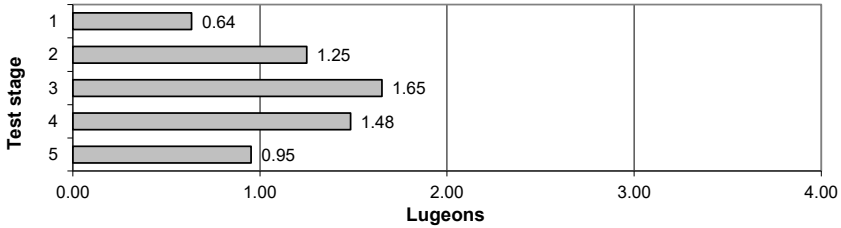
hole no:	TA-DC214	date:	13-Apr-22
project:	BoTN		
location:	TAPS2 Hillside	by:	AD

section tested: from 21.5 m to 25.7 m length 4.2 m

relative level at surface:	402.0 m RL	centre of test section (downhole):	23.60 m
gauge height:	0.8 m	test depth converted to vertical:	23.24 m
inclination of borehole:	80 °	relative level at centre of test section:	378.73 m RL
inferred groundwater level:	387.0 m RL	correction to gauge pressure:	154.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	70	224.84	6.00	0.14	37.2%	0.64
10	150	304.84	16.00	0.38	50.4%	1.25
10	220	374.84	26.00	0.62	62.0%	1.65
10	150	304.84	19.00	0.45	50.4%	1.48
10	70	224.84	9.00	0.21	37.2%	0.95





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Lugeon (uL) Assessment

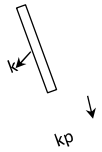
uL (Fell et al., 2005) - upper chart	0.84
uL (Houlsby, 1976) - lower chart	0.95

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.7E-07	m/sec
ke/kp = 100	2.3E-07	m/sec
ke/kp = 10	2.0E-07	m/sec
ke/kp = 1	1.6E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.7E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

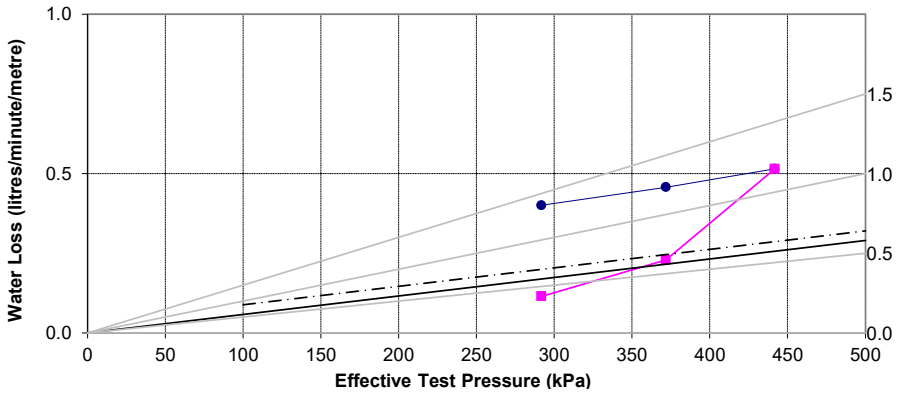
TA-DC215 : 21.1m to 24.6m

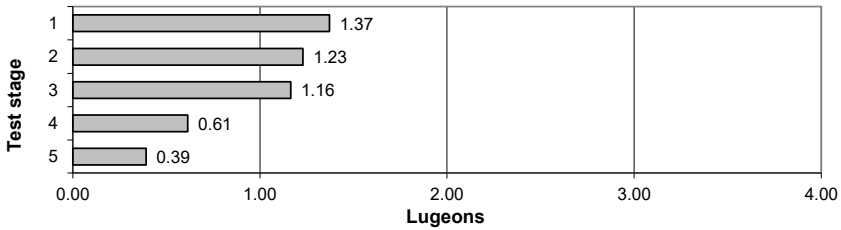
hole no:	TA-DC215	date:	22-Mar-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 21.1 m to 24.6 m length 3.5 m

relative level at surface:	370.7 m RL	centre of test section (downhole):	22.85 m
gauge height:	0.8 m	test depth converted to vertical:	22.17 m
inclination of borehole:	76 °	relative level at centre of test section:	348.5 m RL
inferred groundwater level:	348.9 m RL	correction to gauge pressure:	221.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	70	291.77	7.00	0.40	50.6%	1.37
5	150	371.77	8.00	0.46	64.5%	1.23
5	220	441.77	9.00	0.51	76.6%	1.16
5	150	371.77	4.00	0.23	64.5%	0.61
5	70	291.77	2.00	0.11	50.6%	0.39





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

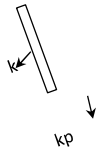
uL (Fell et al., 2005) - upper chart	0.58
uL (Houlsby, 1976) - lower chart	0.39

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.7E-07	m/sec
ke/kp = 100	1.5E-07	m/sec
ke/kp = 10	1.2E-07	m/sec
ke/kp = 1	9.5E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

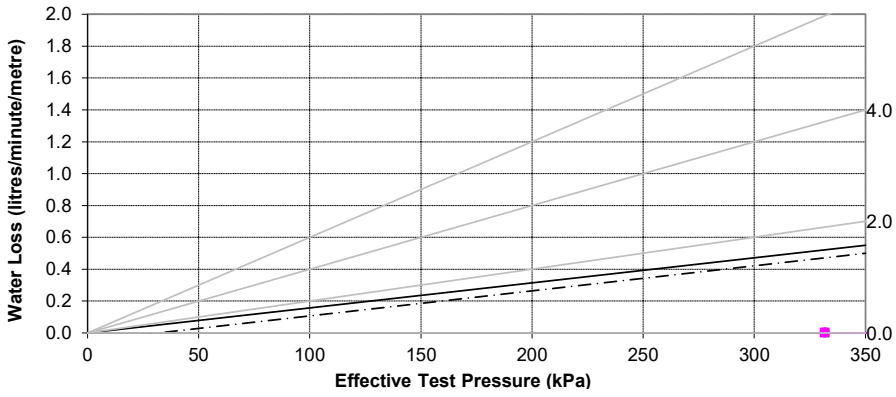
TA-DC215 : 28m to 32.1m

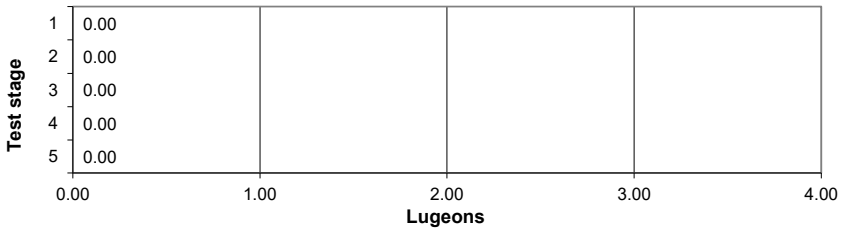
hole no:	TA-DC215	date:	22-Mar-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 28.0 m to 32.1 m length 4.1 m

relative level at surface:	370.7 m RL	centre of test section (downhole):	30.05 m
gauge height:	0.8 m	test depth converted to vertical:	29.16 m
inclination of borehole:	76 °	relative level at centre of test section:	341.5 m RL
inferred groundwater level:	348.9 m RL	correction to gauge pressure:	221.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	110	331.77	0.00	0.00	43.8%	0.00
10	220	441.77	0.00	0.00	58.3%	0.00
10	330	551.77	0.00	0.00	72.8%	0.00
10	220	441.77	0.00	0.00	58.3%	0.00
10	110	331.77	0.00	0.00	43.8%	0.00





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

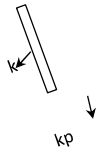
uL (Fell et al., 2005) - upper chart	1.57
uL (Houlsby, 1976) - lower chart	0.01

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC215 : 35m to 41m

hole no: TA-DC215 | date: 22-Mar-22

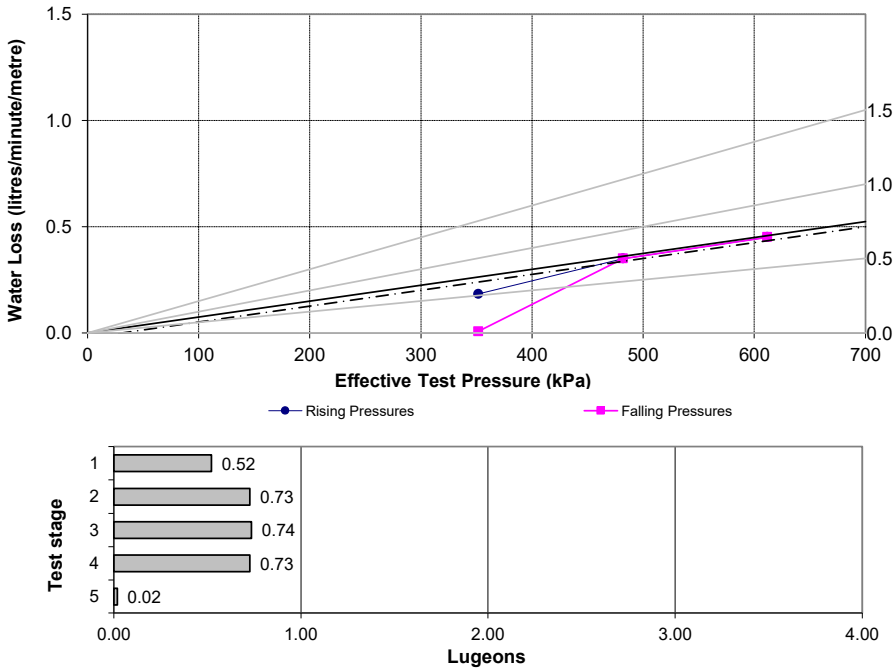
project: BoTN

location: TAPS2 Footprint | by: AD

section tested: from 35.0 m to 41.0 m length 6.0 m

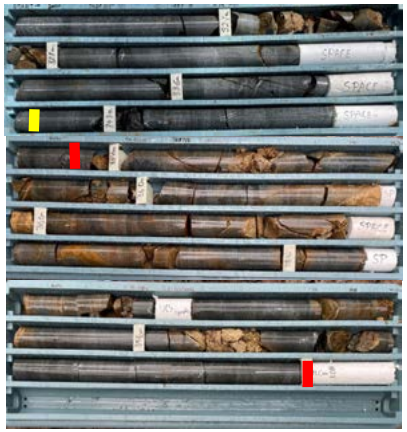
relative level at surface:	370.7 m RL	centre of test section (downhole):	38.00 m
gauge height:	0.8 m	test depth converted to vertical:	36.87 m
inclination of borehole:	76 °	relative level at centre of test section:	333.8 m RL
inferred groundwater level:	348.9 m RL	correction to gauge pressure:	221.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	130	351.77	11.00	0.18	36.7%	0.52
10	260	481.77	21.00	0.35	50.3%	0.73
10	390	611.77	27.00	0.45	63.8%	0.74
10	260	481.77	21.00	0.35	50.3%	0.73
10	130	351.77	0.40	0.01	36.7%	0.02



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

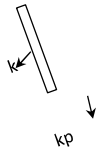
uL (Fell et al., 2005) - upper chart	0.75
uL (Houlsby, 1976) - lower chart	0.55

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-07	m/sec
ke/kp = 100	1.0E-07	m/sec
ke/kp = 10	8.6E-08	m/sec
ke/kp = 1	6.9E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.4E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC216 : 25.2m to 30.05m

hole no: TA-DC216 date: 11-Mar-22

project: BoTN

location: TAPS2 Footprint by: HG

section tested: from 25.2 m to 30.1 m length 4.9 m

relative level at surface: 359.0 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 348.8 m RL

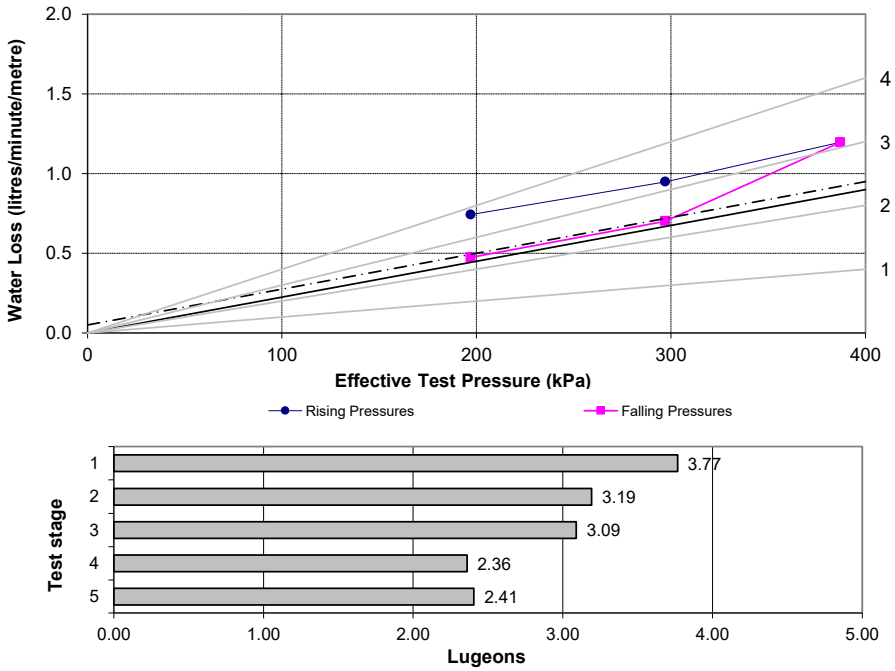
centre of test section (downhole): 27.63 m

test depth converted to vertical: 25.96 m

relative level at centre of test section: 333.0 m RL

correction to gauge pressure: 107.1 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	90	197.11	18.00	0.74	29.2%	3.77
5	190	297.11	23.00	0.95	44.0%	3.19
5	280	387.11	29.00	1.20	57.4%	3.09
10	190	297.11	34.00	0.70	44.0%	2.36
10	90	197.11	23.00	0.47	29.2%	2.41



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

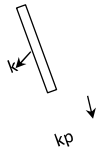
uL (Fell et al., 2005) - upper chart	2.25
uL (Houlsby, 1976) - lower chart	2.36

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.8E-07	m/sec
ke/kp = 100	5.0E-07	m/sec
ke/kp = 10	4.1E-07	m/sec
ke/kp = 1	3.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC217 : 10m to 14.3m

hole no: TA-DC217 date: 29-Mar-22

project: BoTN

location: TAPS2 Footprint by: JK

section tested: from 10.0 m to 14.3 m length 4.3 m

relative level at surface: 347.6 m RL

gauge height: 0.8 m

inclination of borehole: 81 °

inferred groundwater level: 346.7 m RL

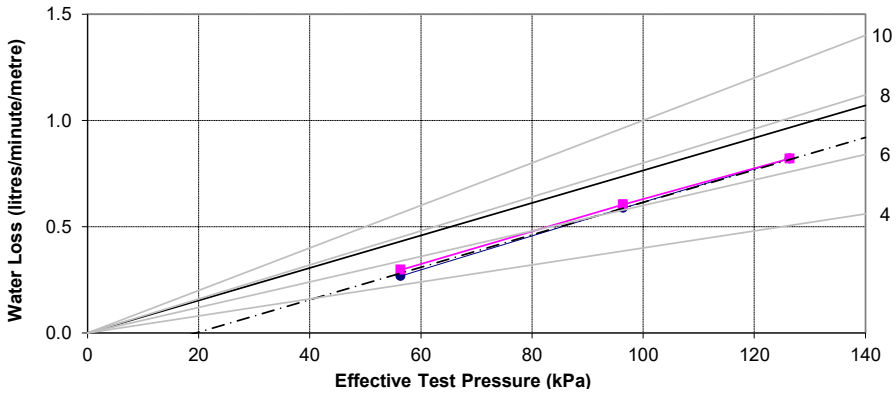
centre of test section (downhole): 12.15 m

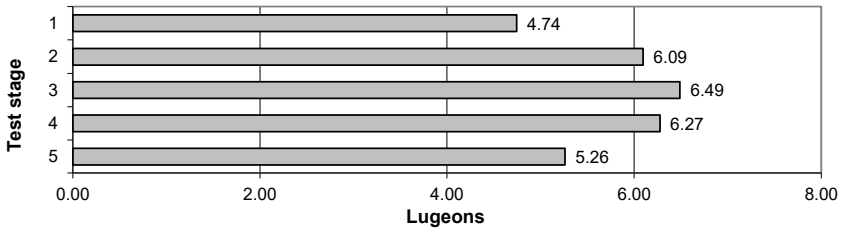
test depth converted to vertical: 12.00 m

relative level at centre of test section: 335.6 m RL

correction to gauge pressure: 16.4 kPa

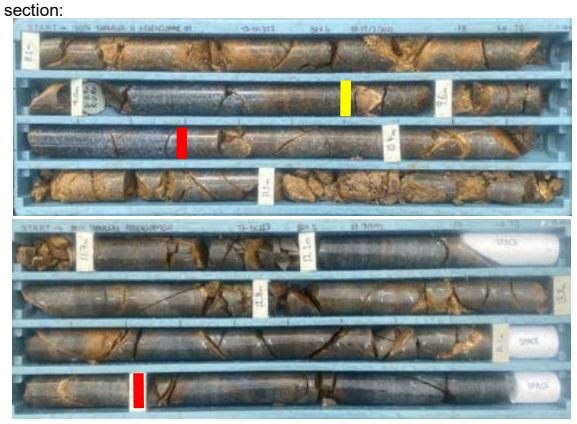
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	40	56.37	11.50	0.27	18.1%	4.74
10	80	96.37	25.25	0.59	30.9%	6.09
10	110	126.37	35.25	0.82	40.5%	6.49
10	80	96.37	26.00	0.60	30.9%	6.27
10	40	56.37	12.75	0.30	18.1%	5.26





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

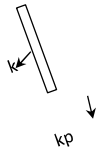
uL (Fell et al., 2005) - upper chart	7.64
uL (Houlsby, 1976) - lower chart	4.74

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-06	m/sec
ke/kp = 100	1.1E-06	m/sec
ke/kp = 10	8.8E-07	m/sec
ke/kp = 1	7.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

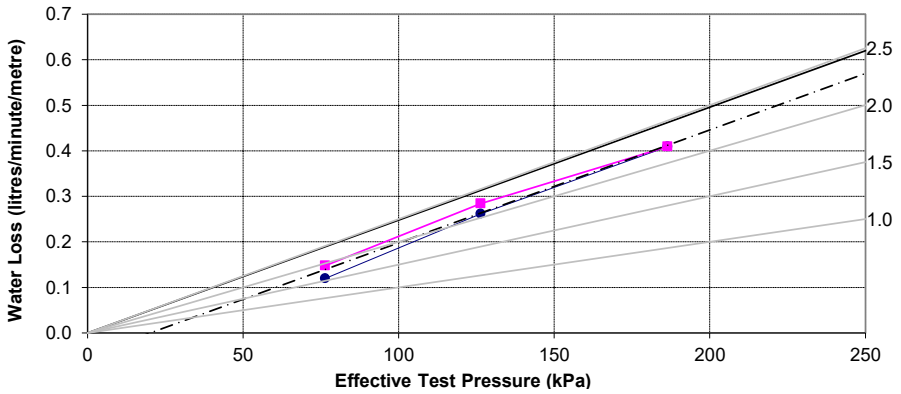
TA-DC217 : 15.3m to 19.7m

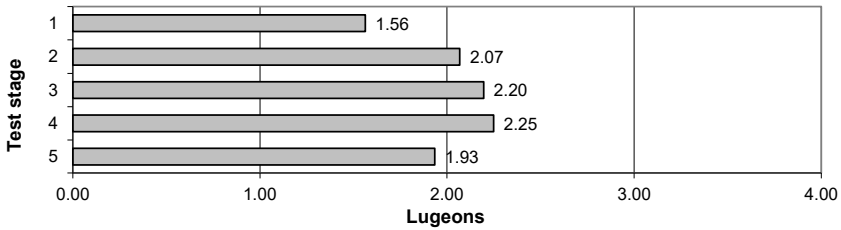
hole no:	TA-DC217	date:	29-Mar-22
project:	BoTN		
location:	TAPS2 Footprint	by:	JK

section tested: from 15.3 m to 19.7 m length 4.4 m

relative level at surface:	347.6 m RL	centre of test section (downhole):	17.50 m
gauge height:	0.8 m	test depth converted to vertical:	17.28 m
inclination of borehole:	81 °	relative level at centre of test section:	330.3 m RL
inferred groundwater level:	346.7 m RL	correction to gauge pressure:	16.4 kPa

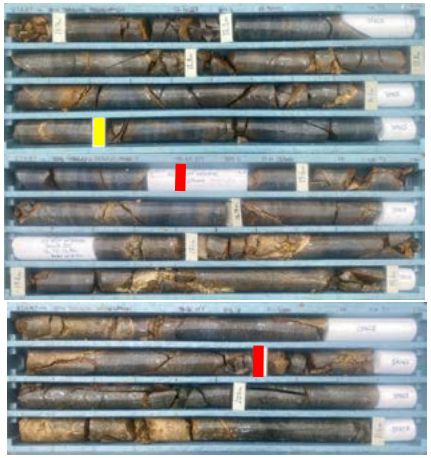
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	60	76.37	5.25	0.12	17.0%	1.56
10	110	126.37	11.50	0.26	28.1%	2.07
10	170	186.37	18.00	0.41	41.5%	2.20
10	110	126.37	12.50	0.28	28.1%	2.25
10	60	76.37	6.50	0.15	17.0%	1.93





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

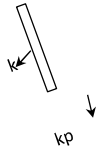
uL (Fell et al., 2005) - upper chart	2.48
uL (Houlsby, 1976) - lower chart	1.93

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.4E-07	m/sec
ke/kp = 100	3.7E-07	m/sec
ke/kp = 10	3.1E-07	m/sec
ke/kp = 1	2.5E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.6E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC217 : 20m to 24.6m

hole no: TA-DC217 date: 29-Mar-22

project: BoTN

location: TAPS2 Footprint by: JK

section tested: from 20.0 m to 24.6 m length 4.6 m

relative level at surface: 347.6 m RL

gauge height: 0.8 m

inclination of borehole: 81 °

inferred groundwater level: 346.7 m RL

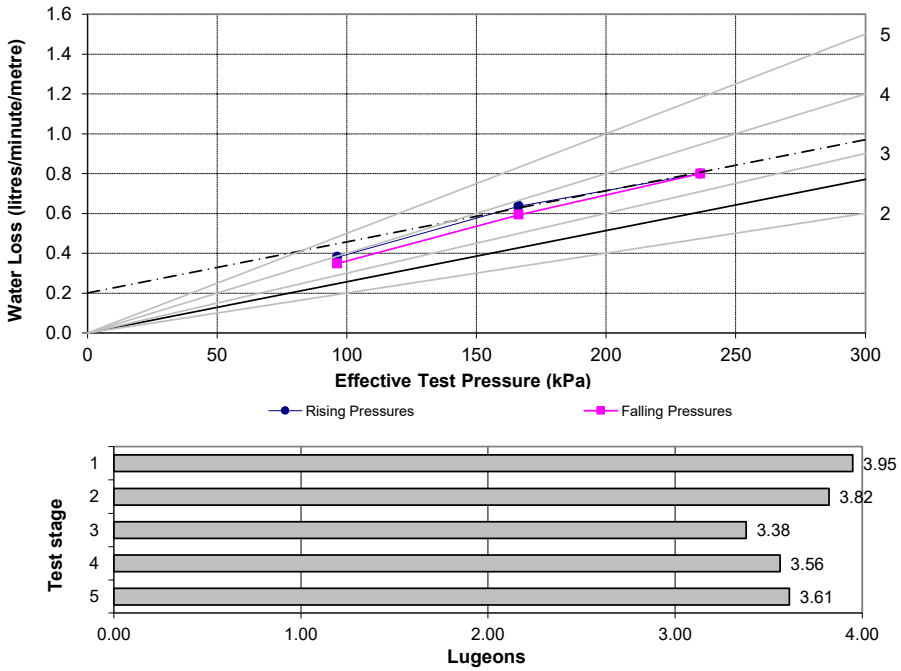
centre of test section (downhole): 22.30 m

test depth converted to vertical: 22.03 m

relative level at centre of test section: 325.5 m RL

correction to gauge pressure: 16.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	80	96.37	17.50	0.38	16.8%	3.95
10	150	166.37	29.25	0.64	29.1%	3.82
10	220	236.37	36.75	0.80	41.3%	3.38
10	150	166.37	27.25	0.59	29.1%	3.56
10	80	96.37	16.00	0.35	16.8%	3.61



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

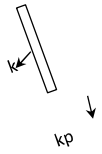
uL (Fell et al., 2005) - upper chart	2.57
uL (Houlsby, 1976) - lower chart	3.38

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.5E-07	m/sec
ke/kp = 100	6.4E-07	m/sec
ke/kp = 10	5.3E-07	m/sec
ke/kp = 1	4.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

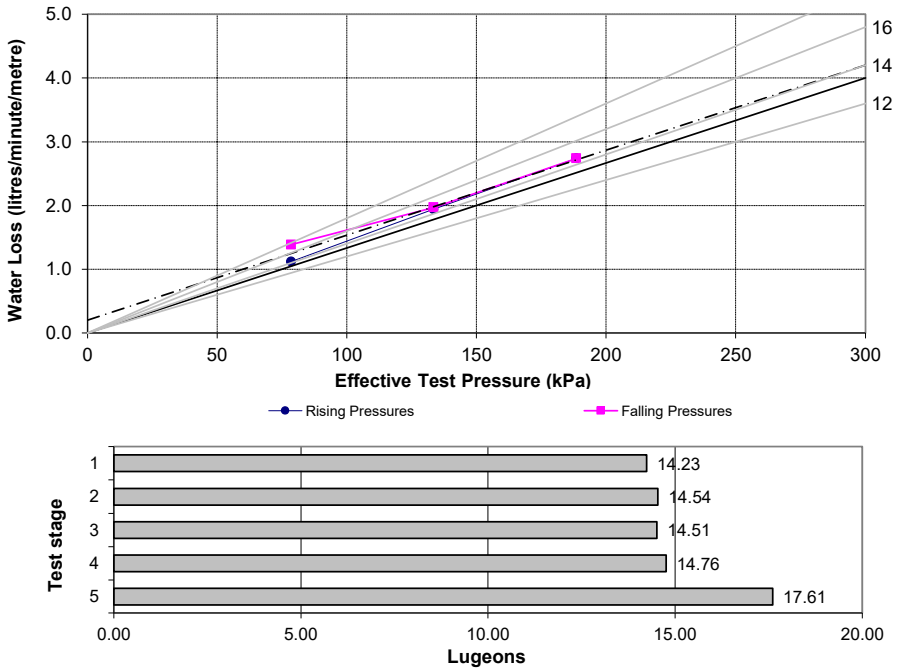
TA-DC218 : 13.5m to 16.9m

hole no:	TA-DC218	date:	23-Mar-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 13.5 m to 16.9 m length 3.4 m

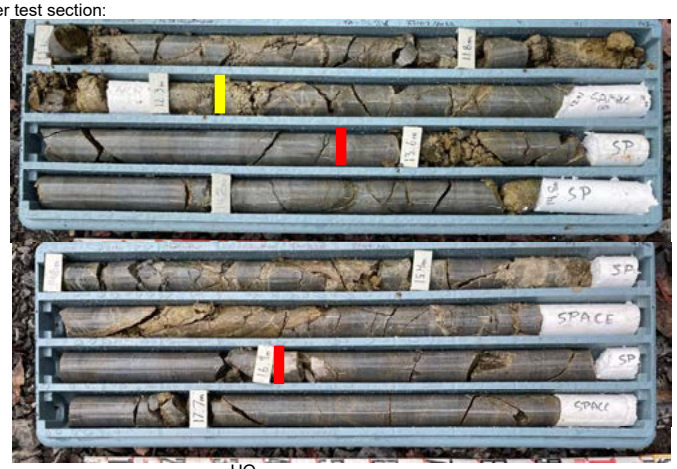
relative level at surface:	345.9 m RL	centre of test section (downhole):	15.20 m
gauge height:	0.8 m	test depth converted to vertical:	14.92 m
inclination of borehole:	79 °	relative level at centre of test section:	330.94 m RL
inferred groundwater level:	344.3 m RL	correction to gauge pressure:	23.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	78.52	38.00	1.12	20.2%	14.23
10	110	133.52	66.00	1.94	34.4%	14.54
10	165	188.52	93.00	2.74	48.6%	14.51
10	110	133.52	67.00	1.97	34.4%	14.76
10	55	78.52	47.00	1.38	20.2%	17.61



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

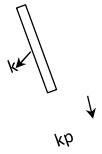
uL (Fell et al., 2005) - upper chart	13.33
uL (Houlsby, 1976) - lower chart	17.61

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.1E-06	m/sec
ke/kp = 100	2.6E-06	m/sec
ke/kp = 10	2.2E-06	m/sec
ke/kp = 1	1.7E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.8E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC218 : 18m to 21m

hole no: TA-DC218 date: 23-Mar-22

project: BoTN

location: TAPS2 Footprint by: AD

section tested: from 18.0 m to 21.0 m length 3.0 m

relative level at surface: 345.9 m RL

gauge height: 0.8 m

inclination of borehole: 79 °

inferred groundwater level: 344.3 m RL

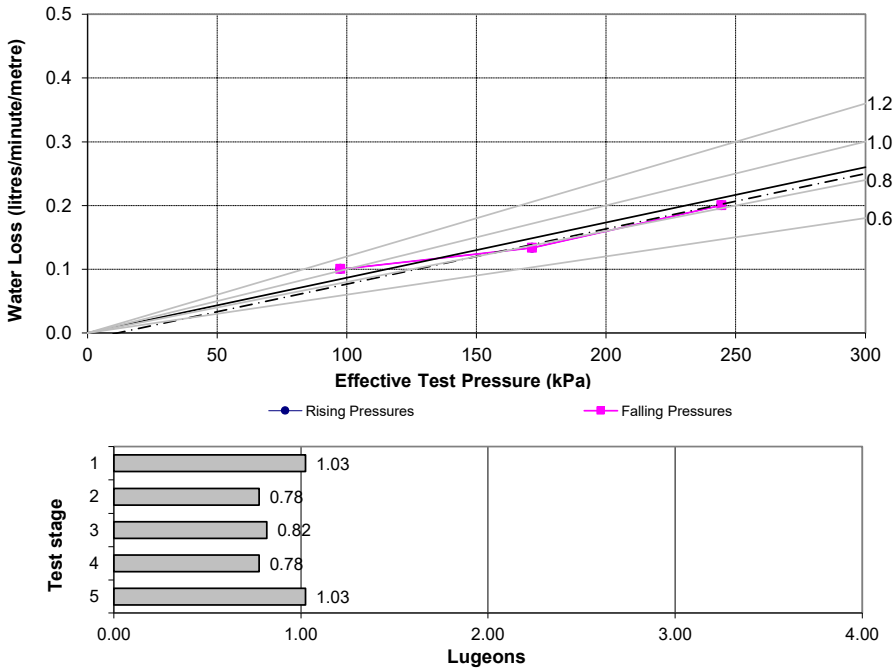
centre of test section (downhole): 19.50 m

test depth converted to vertical: 19.14 m

relative level at centre of test section: 326.72 m RL

correction to gauge pressure: 23.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	74	97.52	3.00	0.10	19.6%	1.03
10	148	171.52	4.00	0.13	34.5%	0.78
10	221	244.52	6.00	0.20	49.1%	0.82
10	148	171.52	4.00	0.13	34.5%	0.78
10	74	97.52	3.00	0.10	19.6%	1.03



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

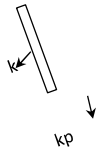
uL (Fell et al., 2005) - upper chart	0.87
uL (Houlsby, 1976) - lower chart	0.88

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.7E-07	m/sec
ke/kp = 100	1.4E-07	m/sec
ke/kp = 10	1.2E-07	m/sec
ke/kp = 1	9.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 9.8E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

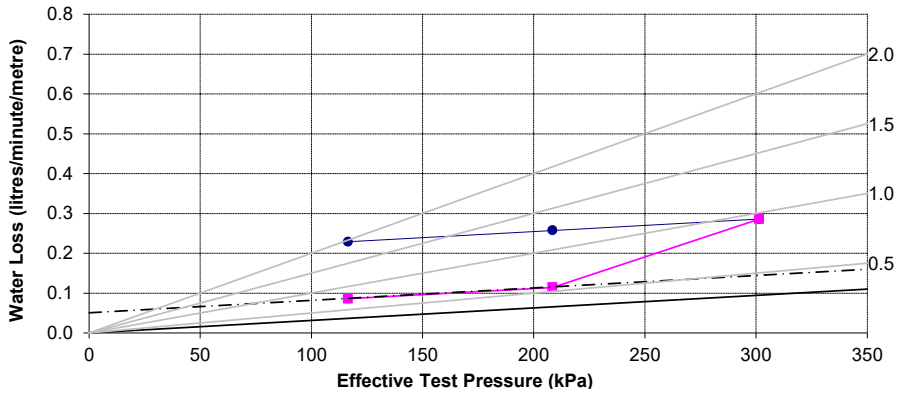
TA-DC218 : 22.6m to 26.1m

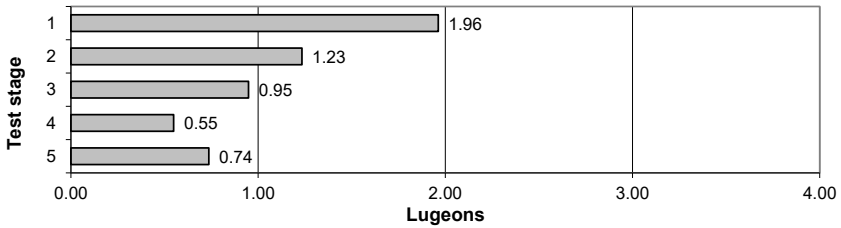
hole no:	TA-DC218	date:	23-Mar-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 22.6 m to 26.1 m length 3.5 m

relative level at surface:	345.9 m RL	centre of test section (downhole):	24.35 m
gauge height:	0.8 m	test depth converted to vertical:	23.90 m
inclination of borehole:	79 °	relative level at centre of test section:	321.96 m RL
inferred groundwater level:	344.3 m RL	correction to gauge pressure:	23.5 kPa

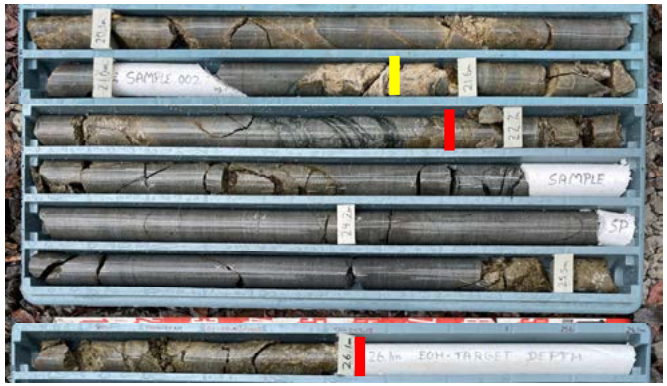
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	93	116.52	8.00	0.23	18.7%	1.96
10	185	208.52	9.00	0.26	33.6%	1.23
10	278	301.52	10.00	0.29	48.5%	0.95
10	185	208.52	4.00	0.11	33.6%	0.55
10	93	116.52	3.00	0.09	18.7%	0.74





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

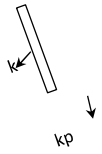
uL (Fell et al., 2005) - upper chart	0.31
uL (Houlsby, 1976) - lower chart	0.55

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.7E-07	m/sec
ke/kp = 100	1.5E-07	m/sec
ke/kp = 10	1.2E-07	m/sec
ke/kp = 1	9.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

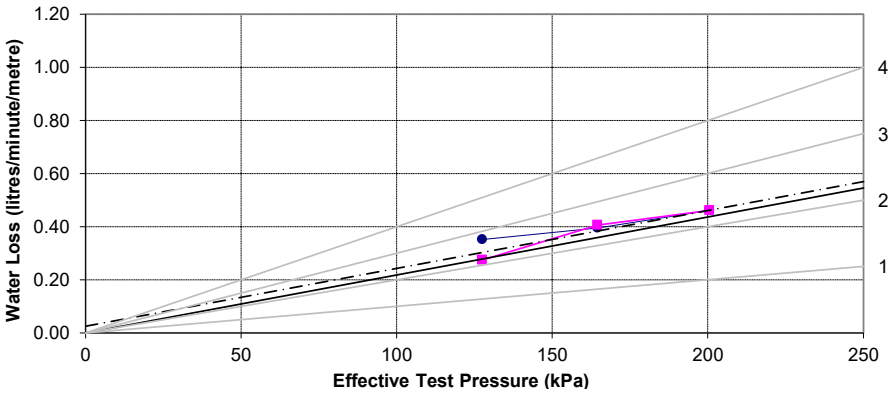
TA-DC219 : 11m to 20.1m

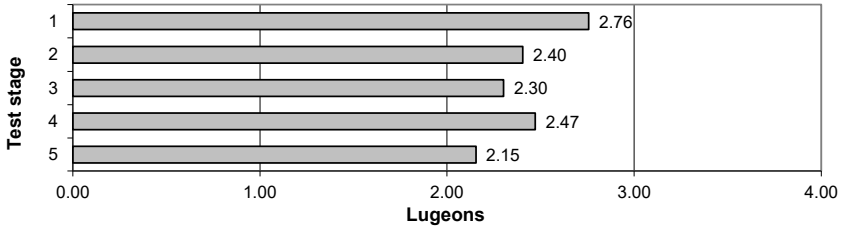
hole no:	TA-DC219	date:	28-Feb-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 11.0 m to 20.1 m length 9.1 m

relative level at surface:	357.9 m RL	centre of test section (downhole):	15.55 m
gauge height:	0.8 m	test depth converted to vertical:	15.31 m
inclination of borehole:	80 °	relative level at centre of test section:	342.55 m RL
inferred groundwater level:	349.3 m RL	correction to gauge pressure:	91.5 kPa

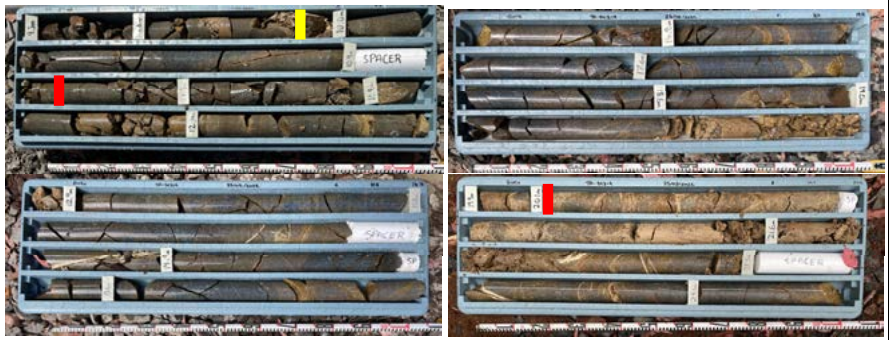
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	36	127.53	32.00	0.35	32.0%	2.76
10	73	164.53	36.00	0.40	41.3%	2.40
10	109	200.53	42.00	0.46	50.4%	2.30
10	73	164.53	37.00	0.41	41.3%	2.47
10	36	127.53	25.00	0.27	32.0%	2.15





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

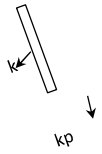
uL (Fell et al., 2005) - upper chart	2.18
uL (Houlsby, 1976) - lower chart	2.42

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.3E-07	m/sec
ke/kp = 100	4.6E-07	m/sec
ke/kp = 10	3.9E-07	m/sec
ke/kp = 1	3.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC219 : 14m to 20.1m

hole no: TA-DC219 date: 28-Feb-22

project: BoTN

location: TAPS2 Footprint by: AD

section tested: from 14.0 m to 20.1 m length 6.1 m

relative level at surface: 357.9 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 349.3 m RL

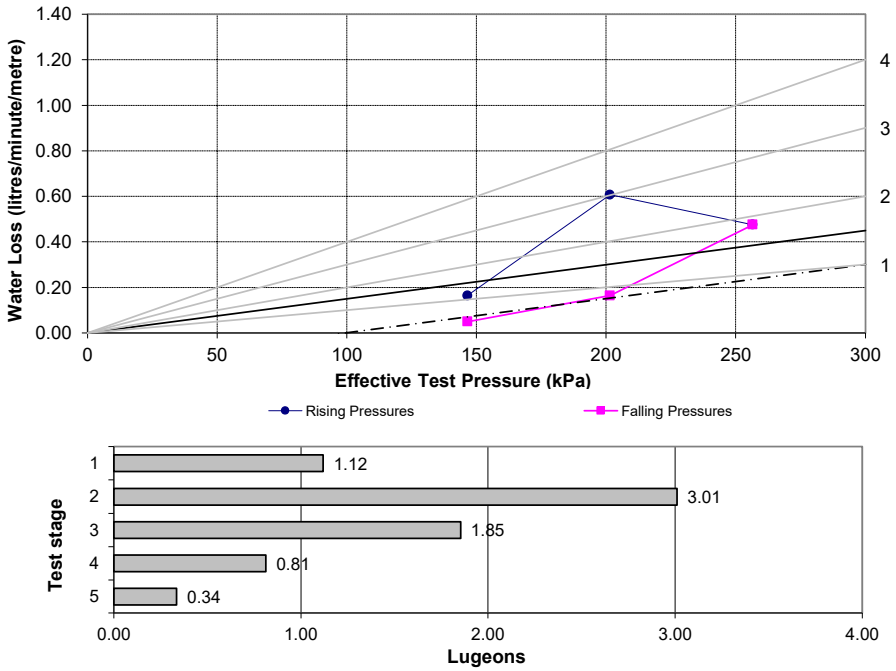
centre of test section (downhole): 17.05 m

test depth converted to vertical: 16.79 m

relative level at centre of test section: 341.07 m RL

correction to gauge pressure: 91.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	146.53	10.00	0.16	33.6%	1.12
10	110	201.53	37.00	0.61	46.2%	3.01
10	165	256.53	29.00	0.48	58.8%	1.85
10	110	201.53	10.00	0.16	46.2%	0.81
10	55	146.53	3.00	0.05	33.6%	0.34



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

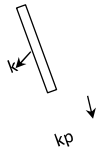
uL (Fell et al., 2005) - upper chart	1.50
uL (Houlsby, 1976) - lower chart	0.34

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.2E-07	m/sec
ke/kp = 100	2.8E-07	m/sec
ke/kp = 10	2.3E-07	m/sec
ke/kp = 1	1.9E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

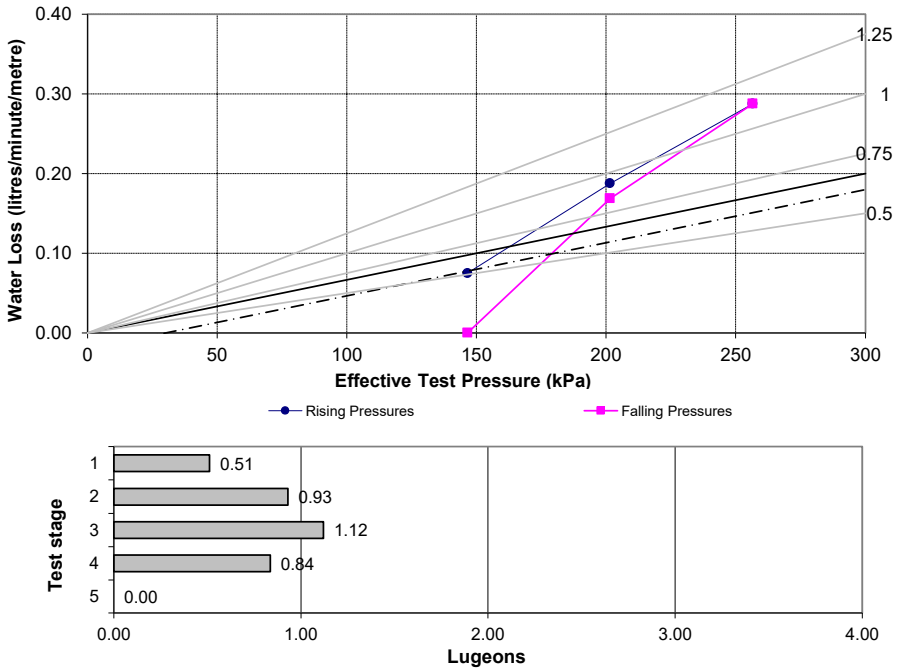
TA-DC219 : 19.2m to 23.2m

hole no:	TA-DC219	date:	28-Feb-22
project:	BoTN		
location:	TAPS2 Footprint	by:	AD

section tested: from 19.2 m to 23.2 m length 4.0 m

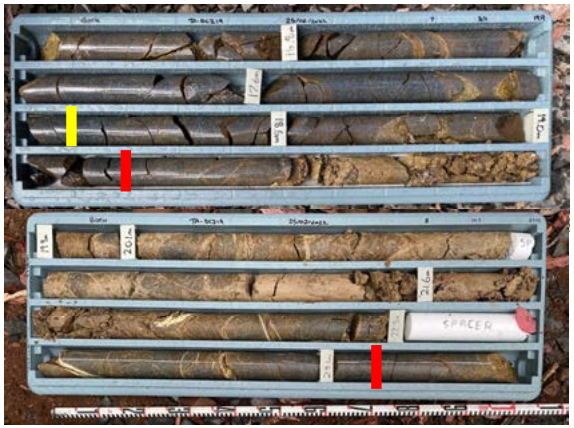
relative level at surface:	357.9 m RL	centre of test section (downhole):	21.20 m
gauge height:	0.8 m	test depth converted to vertical:	20.88 m
inclination of borehole:	80 °	relative level at centre of test section:	336.98 m RL
inferred groundwater level:	349.3 m RL	correction to gauge pressure:	91.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	146.53	3.00	0.08	27.0%	0.51
10	110	201.53	7.50	0.19	37.1%	0.93
10	165	256.53	11.50	0.29	47.3%	1.12
10	110	201.53	6.75	0.17	37.1%	0.84
5	55	146.53	0.00	0.00	27.0%	0.00



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

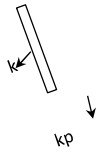
uL (Fell et al., 2005) - upper chart	0.67
uL (Houlsby, 1976) - lower chart	0.51

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.5E-07	m/sec
ke/kp = 100	1.3E-07	m/sec
ke/kp = 10	1.0E-07	m/sec
ke/kp = 1	8.3E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 8.9E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC219 : 23.7m to 27.7m

hole no: TA-DC219 date: 28-Feb-22

project: BoTN

location: TAPS2 Footprint by: AD

section tested: from 23.7 m to 27.7 m length 4.0 m

relative level at surface: 357.9 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 349.3 m RL

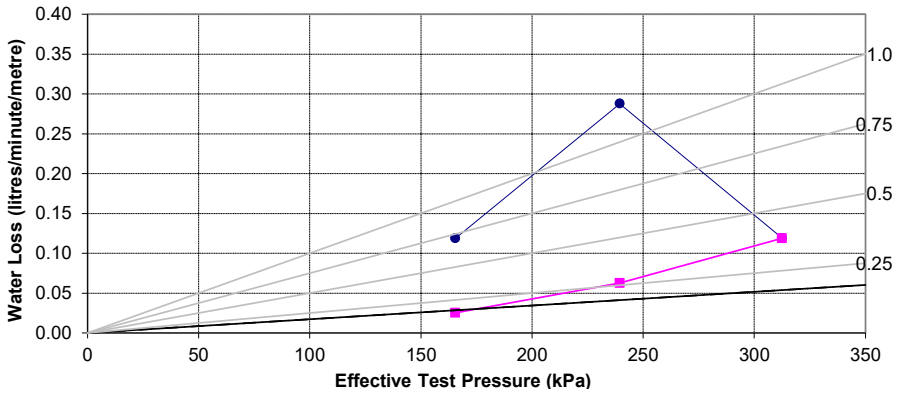
centre of test section (downhole): 25.70 m

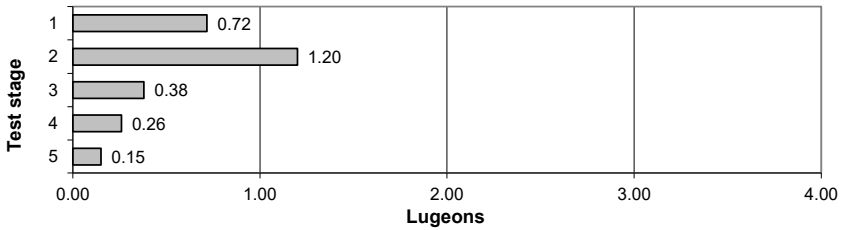
test depth converted to vertical: 25.31 m

relative level at centre of test section: 332.55 m RL

correction to gauge pressure: 91.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	74	165.53	4.75	0.12	25.2%	0.72
10	148	239.53	11.50	0.29	36.4%	1.20
10	221	312.53	4.75	0.12	47.5%	0.38
5	148	239.53	1.25	0.06	36.4%	0.26
5	74	165.53	0.50	0.03	25.2%	0.15





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

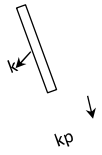
uL (Fell et al., 2005) - upper chart	0.17
uL (Houlsby, 1976) - lower chart	0.15

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.0E-07	m/sec
ke/kp = 100	8.7E-08	m/sec
ke/kp = 10	7.2E-08	m/sec
ke/kp = 1	5.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.1E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC219 : 27.7m to 32.5m

hole no: TA-DC219 date: 28-Feb-22

project: BoTN

location: TAPS2 Footprint by: AD

section tested: from 27.7 m to 32.5 m length 4.8 m

relative level at surface: 357.9 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 349.3 m RL

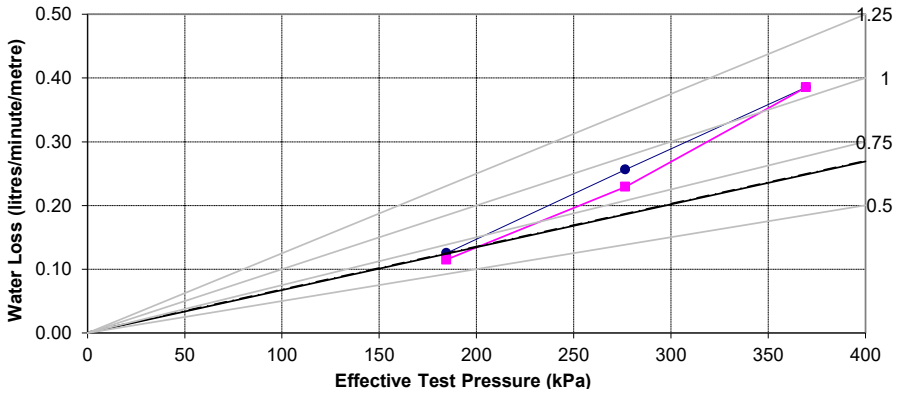
centre of test section (downhole): 30.10 m

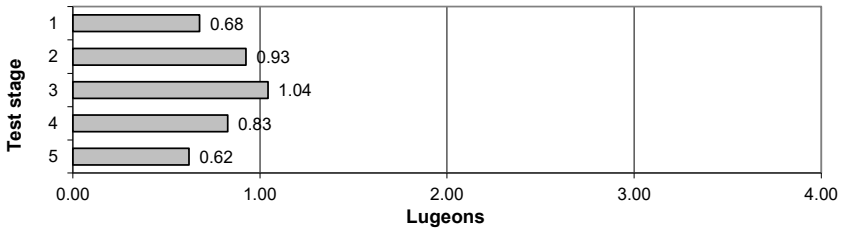
test depth converted to vertical: 29.64 m

relative level at centre of test section: 328.22 m RL

correction to gauge pressure: 91.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	93	184.53	6.00	0.13	23.9%	0.68
12	185	276.53	14.75	0.26	35.9%	0.93
10	278	369.53	18.50	0.39	47.9%	1.04
10	185	276.53	11.00	0.23	35.9%	0.83
10	93	184.53	5.50	0.11	23.9%	0.62





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

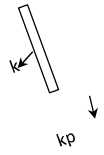
uL (Fell et al., 2005) - upper chart	0.67
uL (Houlsby, 1976) - lower chart	0.62

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-07	m/sec
ke/kp = 100	1.5E-07	m/sec
ke/kp = 10	1.3E-07	m/sec
ke/kp = 1	1.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

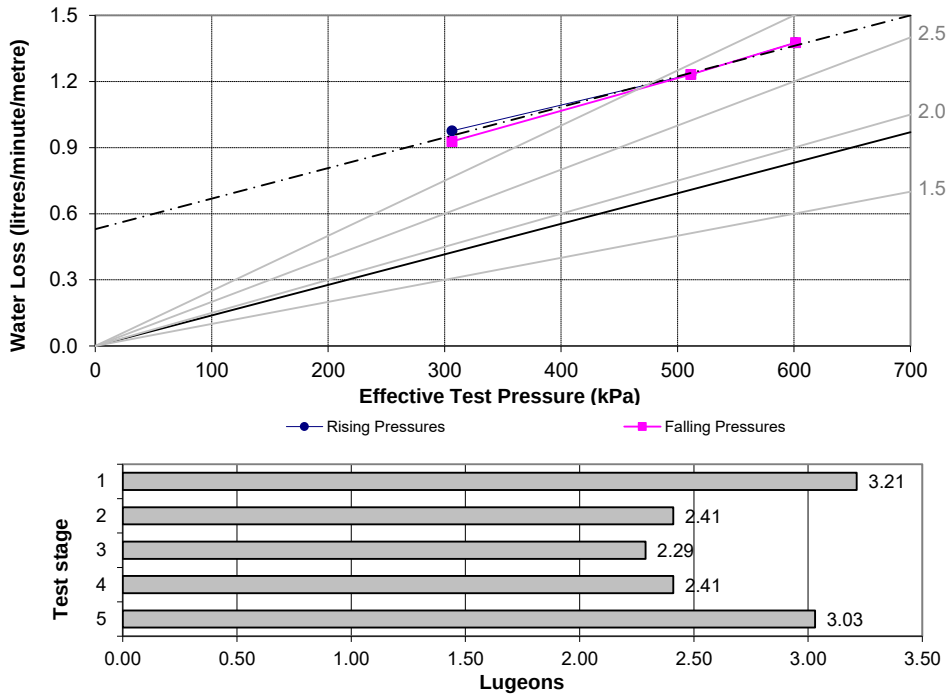
TA-DC225 : 59.4m to 61.9m

hole no:	TA-DC225	date:	1-Jun-23
project:	BOTN		
location:	Switchyard - Hillside	by:	AT

section tested: from 59.4 m to 61.9 m length 2.5 m

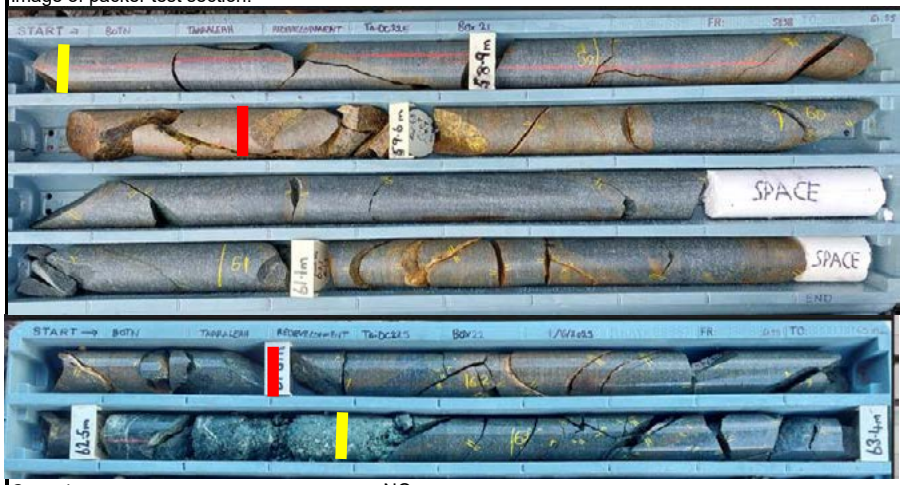
relative level at surface:	379.2 m RL	centre of test section (downhole):	60.65 m
gauge height:	0.8 m	test depth converted to vertical:	59.73 m
inclination of borehole:	80 °	relative level at centre of test section:	319.45 m RL
inferred groundwater level:	369.65 m RL	correction to gauge pressure:	101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	205	306.25	12.30	0.98	19.7%	3.21
5	205	306.25	12.20	0.98	19.7%	3.19
5	205	306.25	11.80	0.94	19.7%	3.08
5	410	511.25	15.40	1.23	32.9%	2.41
5	410	511.25	15.20	1.22	32.9%	2.38
5	500	601.25	17.20	1.38	38.7%	2.29
5	500	601.25	17.20	1.38	38.7%	2.29
5	410	511.25	15.40	1.23	32.9%	2.41
5	410	511.25	14.80	1.18	32.9%	2.32
5	205	306.25	11.60	0.93	19.7%	3.03
5	205	306.25	11.40	0.91	19.7%	2.98



Interpreted flow mechanism: Turbulent Flow

Image of packer test section:



Core size: NQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

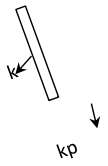
uL (Fell et al., 2005) - upper chart	1.39
uL (Houlsby, 1976) - lower chart	2.29

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.1E-07	m/sec
ke/kp = 100	4.3E-07	m/sec
ke/kp = 10	3.5E-07	m/sec
ke/kp = 1	2.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.9E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

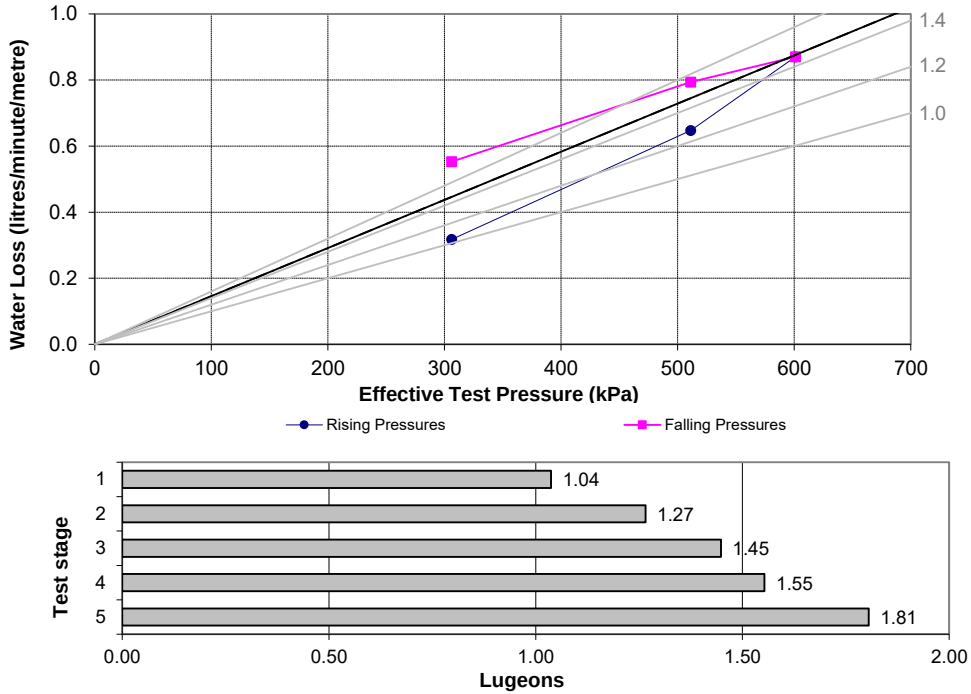
TA-DC225 : 61.1m to 64.5m

hole no:	TA-DC225	date:	1-Jun-23
project:	BOTN		
location:	Switchyard - Hillside	by:	AT

section tested: from 61.1 m to 64.5 m length 3.4 m

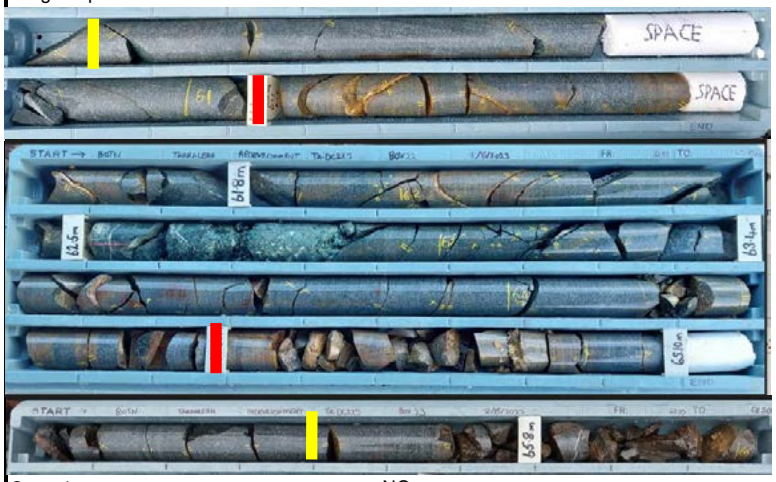
relative level at surface:	379.2 m RL	centre of test section (downhole):	62.80 m
gauge height:	0.8 m	test depth converted to vertical:	61.85 m
inclination of borehole:	80 °	relative level at centre of test section:	317.33 m RL
inferred groundwater level:	369.65 m RL	correction to gauge pressure:	101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	205	306.25	5.40	0.32	19.0%	1.04
5	205	306.25	5.00	0.29	19.0%	0.96
5	410	511.25	11.00	0.65	31.8%	1.27
5	410	511.25	11.00	0.65	31.8%	1.27
5	500	601.25	14.00	0.82	37.4%	1.37
5	500	601.25	14.80	0.87	37.4%	1.45
5	410	511.25	13.50	0.79	31.8%	1.55
5	410	511.25	12.80	0.75	31.8%	1.47
5	205	306.25	9.40	0.55	19.0%	1.81
5	205	306.25	9.00	0.53	19.0%	1.73



Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: NQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

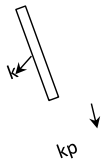
uL (Fell et al., 2005) - upper chart	1.46
uL (Houlsby, 1976) - lower chart	1.81

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.0E-07	m/sec
ke/kp = 10	1.6E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

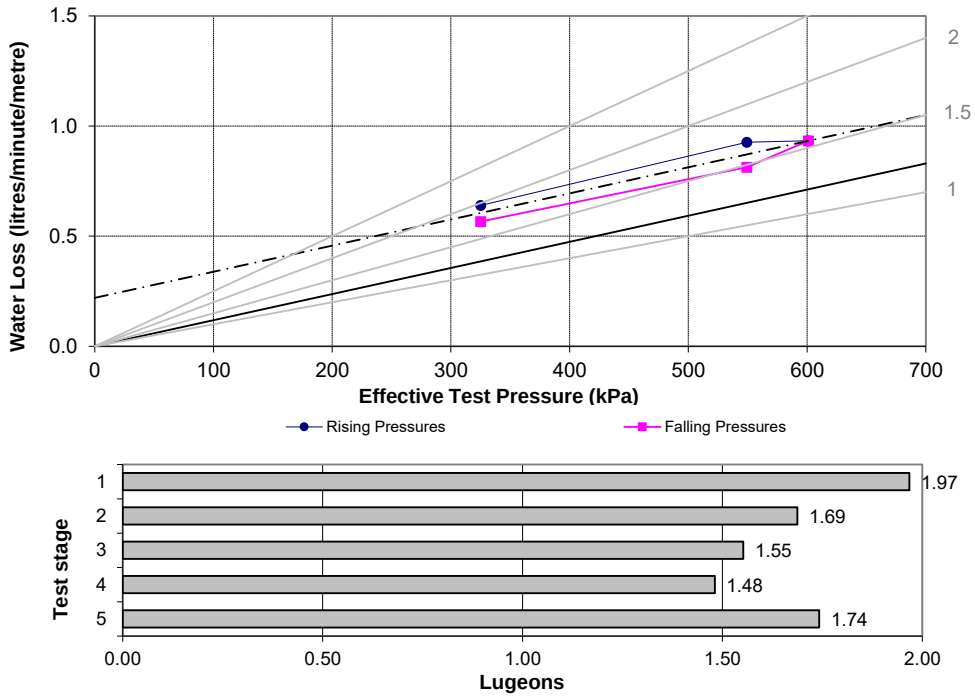
TA-DC225 : 75.6m to 78.6m

hole no:	TA-DC225	date:	1-Jun-23
project:	BOTN		
location:	Switchyard - Hillside	by:	AT

section tested: from 75.6 m to 78.6 m length 3.0 m

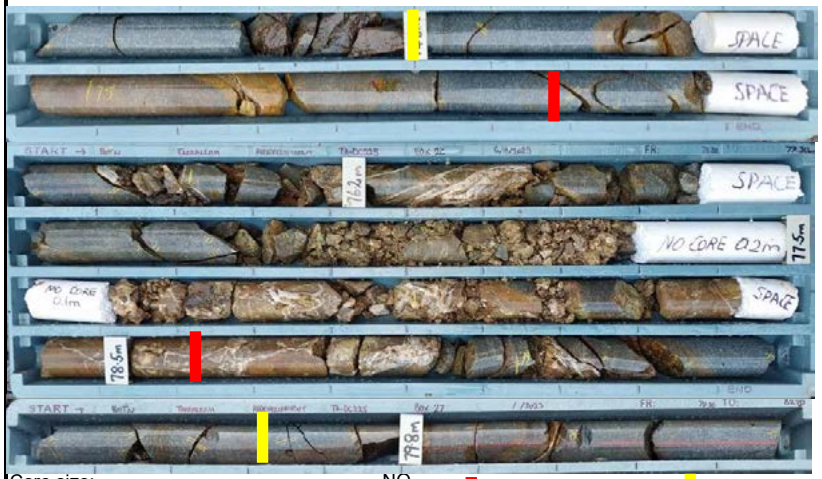
relative level at surface:	379.2 m RL	centre of test section (downhole):	77.10 m
gauge height:	0.8 m	test depth converted to vertical:	75.93 m
inclination of borehole:	80 °	relative level at centre of test section:	303.25 m RL
inferred groundwater level:	369.65 m RL	correction to gauge pressure:	101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	224	325.25	9.60	0.64	16.5%	1.97
5	224	325.25	8.70	0.58	16.5%	1.78
5	448	549.25	13.70	0.91	27.8%	1.66
5	448	549.25	13.90	0.93	27.8%	1.69
5	500	601.25	14.00	0.93	30.5%	1.55
5	500	601.25	13.80	0.92	30.5%	1.53
5	448	549.25	12.20	0.81	27.8%	1.48
5	448	549.25	11.80	0.79	27.8%	1.43
5	224	325.25	8.50	0.57	16.5%	1.74
5	224	325.25	8.20	0.55	16.5%	1.68



Interpreted flow mechanism: Turbulent Flow

Image of packer test section:



Core size: NQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

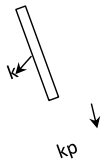
uL (Fell et al., 2005) - upper chart	1.19
uL (Houlsby, 1976) - lower chart	1.55

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.2E-07	m/sec
ke/kp = 100	2.7E-07	m/sec
ke/kp = 10	2.2E-07	m/sec
ke/kp = 1	1.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.8E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

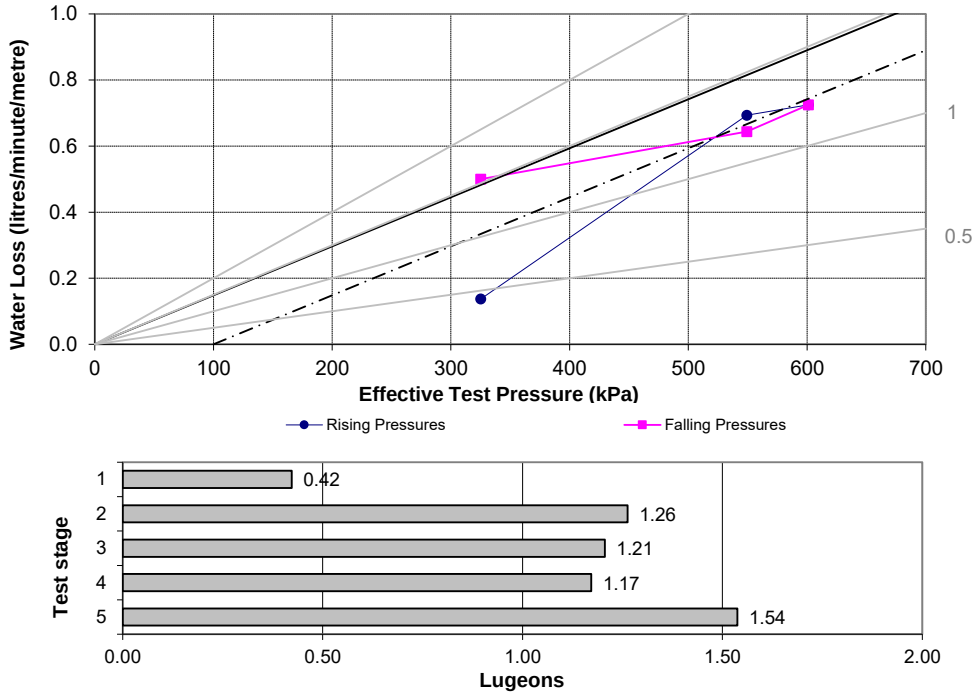
TA-DC225 : 86.7m to 89.9m

hole no:	TA-DC225	date:	1-Jun-23
project:	BOTN		
location:	Switchyard - Hillside	by:	AT

section tested: from 86.7 m to 89.9 m length 3.2 m

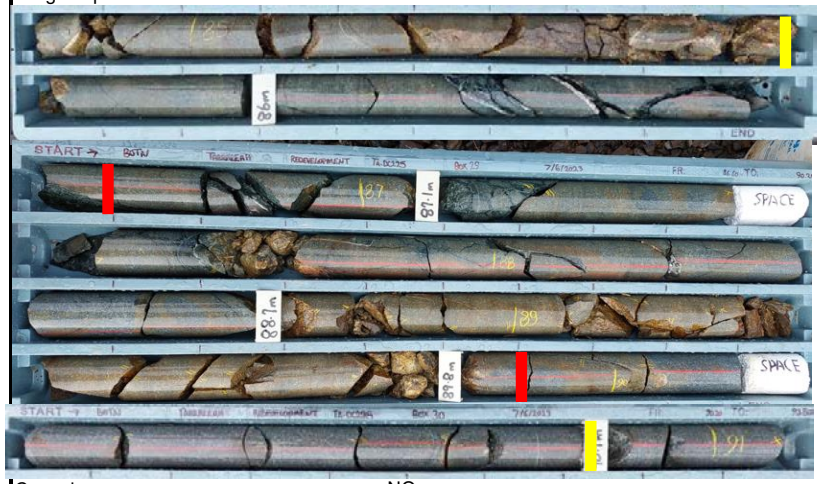
relative level at surface:	379.2 m RL	centre of test section (downhole):	88.30 m
gauge height:	0.8 m	test depth converted to vertical:	86.96 m
inclination of borehole:	80 °	relative level at centre of test section:	292.22 m RL
inferred groundwater level:	369.65 m RL	correction to gauge pressure:	101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	224	325.25	2.20	0.14	14.4%	0.42
5	224	325.25	1.50	0.09	14.4%	0.29
5	224	325.25	1.40	0.09	14.4%	0.27
5	224	325.25	1.40	0.09	14.4%	0.27
5	448	549.25	10.20	0.64	24.3%	1.16
5	448	549.25	11.10	0.69	24.3%	1.26
5	500	601.25	11.60	0.72	26.6%	1.21
5	500	601.25	11.30	0.71	26.6%	1.17
5	448	549.25	10.30	0.64	24.3%	1.17
5	448	549.25	10.10	0.63	24.3%	1.15
5	224	325.25	8.00	0.50	14.4%	1.54
5	224	325.25	7.50	0.47	14.4%	1.44



Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: NQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

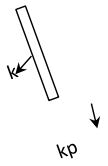
uL (Fell et al., 2005) - upper chart	1.48
uL (Houlsby, 1976) - lower chart	1.54

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	9.6E-08	m/sec
ke/kp = 100	8.1E-08	m/sec
ke/kp = 10	6.6E-08	m/sec
ke/kp = 1	5.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.5E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC225 : 91.9m to 95m

hole no: TA-DC225 date: 1-Jun-23

project: BOTN

location: Switchyard - Hillside by: AT

section tested: from 91.9 m to 95.0 m length 3.1 m

relative level at surface: 379.2 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 369.65 m RL

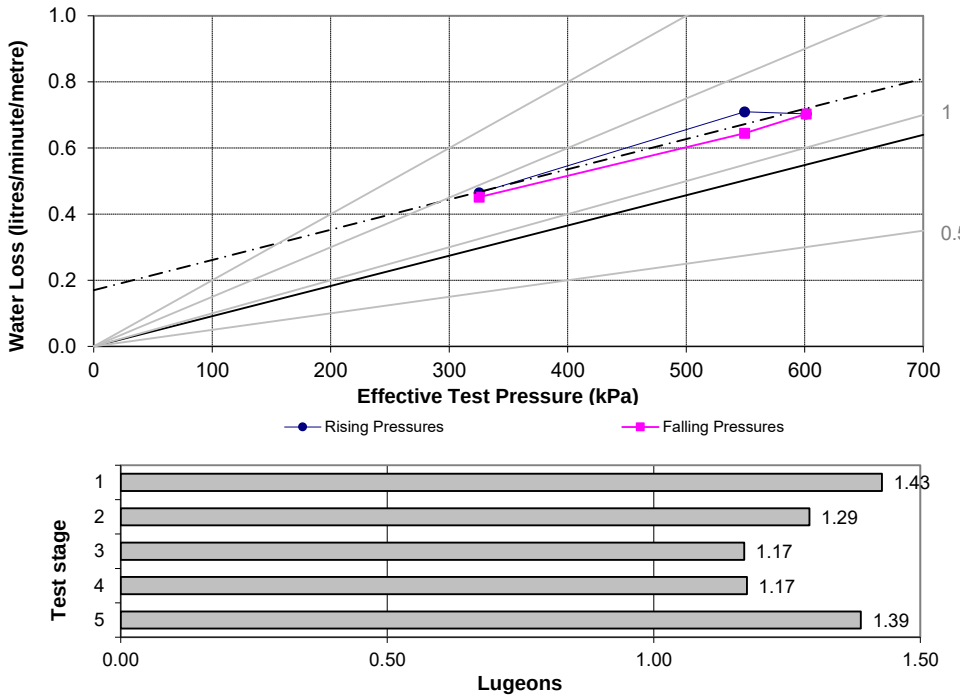
centre of test section (downhole): 93.45 m

test depth converted to vertical: 92.03 m

relative level at centre of test section: 287.15 m RL

correction to gauge pressure: 101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	224	325.25	7.20	0.46	13.6%	1.43
5	224	325.25	6.60	0.43	13.6%	1.31
5	448	549.25	11.00	0.71	23.0%	1.29
5	448	549.25	10.90	0.70	23.0%	1.28
5	500	601.25	10.80	0.70	25.1%	1.16
5	500	601.25	10.90	0.70	25.1%	1.17
5	448	549.25	10.00	0.65	23.0%	1.17
5	448	549.25	9.70	0.63	23.0%	1.14
5	224	325.25	7.00	0.45	13.6%	1.39
5	224	325.25	6.80	0.44	13.6%	1.35



Interpreted flow mechanism: Turbulent Flow

Image of packer test section:



Core size: NQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

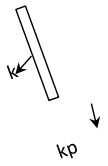
uL (Fell et al., 2005) - upper chart	0.91
uL (Houlsby, 1976) - lower chart	1.17

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.0E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

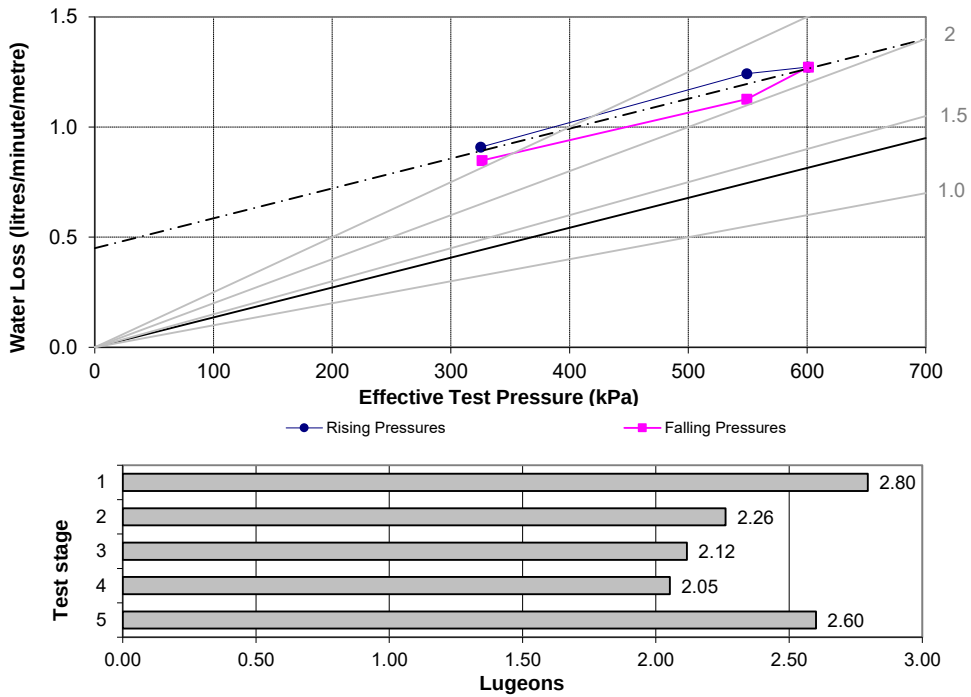
TA-DC225 : 105.9m to 109.2m

hole no:	TA-DC225	date:	1-Jun-23
project:	BOTN		
location:	Switchyard - Hillside	by:	AT

section tested: from 105.9 m to 109.2 m length 3.3 m

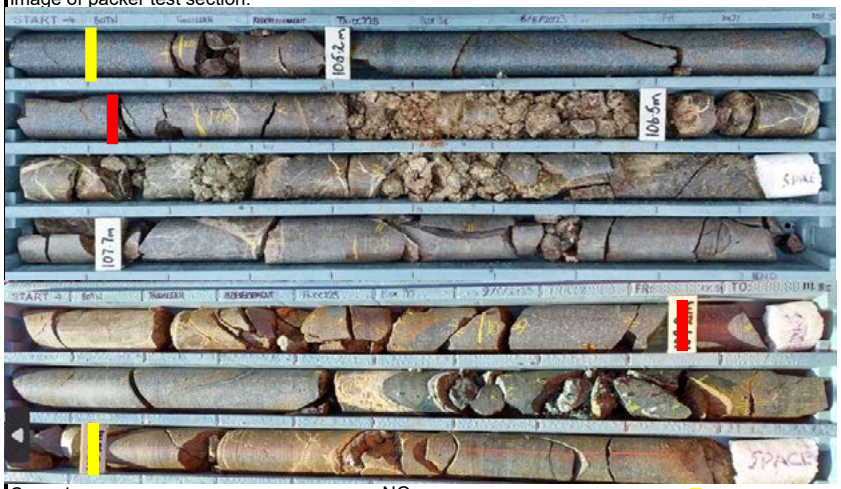
relative level at surface:	379.2 m RL	centre of test section (downhole):	107.55 m
gauge height:	0.8 m	test depth converted to vertical:	105.92 m
inclination of borehole:	80 °	relative level at centre of test section:	273.26 m RL
inferred groundwater level:	369.65 m RL	correction to gauge pressure:	101.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	224	325.25	15.00	0.91	11.8%	2.80
5	224	325.25	14.00	0.85	11.8%	2.61
5	448	549.25	20.50	1.24	19.9%	2.26
5	448	549.25	20.00	1.21	19.9%	2.21
5	500	601.25	21.00	1.27	21.8%	2.12
5	500	601.25	21.00	1.27	21.8%	2.12
5	448	549.25	18.60	1.13	19.9%	2.05
5	448	549.25	18.50	1.12	19.9%	2.04
5	225	326.25	14.00	0.85	11.8%	2.60
5	225	326.25	13.60	0.82	11.8%	2.53



Interpreted flow mechanism: Turbulent Flow

Image of packer test section:



Core size: NQ3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

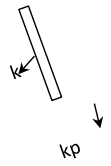
uL (Fell et al., 2005) - upper chart	1.36
uL (Houlsby, 1976) - lower chart	2.12

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.4E-07	m/sec
ke/kp = 100	3.8E-07	m/sec
ke/kp = 10	3.1E-07	m/sec
ke/kp = 1	2.4E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.6E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

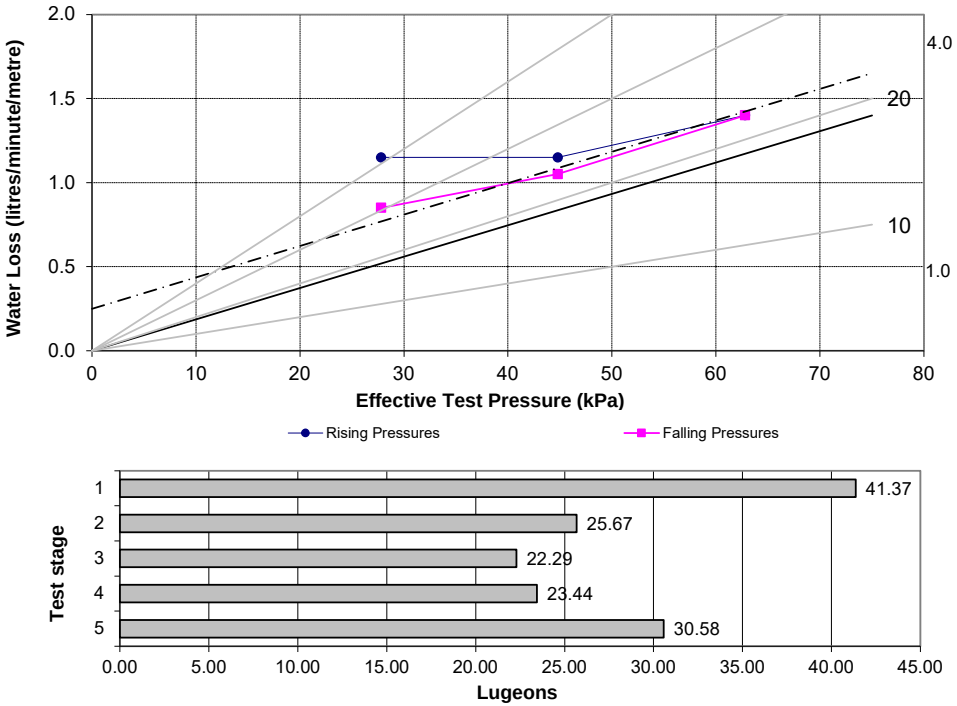
TA-DC226 : 9.3m to 12.3m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 9.3 m to 12.3 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	10.80 m
gauge height:	0.8 m	test depth converted to vertical:	9.94 m
inclination of borehole:	67 °	relative level at centre of test section:	715.66 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	18	27.80	34.50	1.15	10.8%	41.37
10	35	44.80	34.50	1.15	17.3%	25.67
10	53	62.80	42.00	1.40	24.3%	22.29
10	35	44.80	31.50	1.05	17.3%	23.44
10	18	27.80	25.50	0.85	10.8%	30.58



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

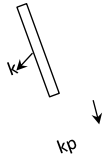
uL (Fell et al., 2005) - upper chart	18.67
uL (Houlsby, 1976) - lower chart	22.29

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.0E-06	m/sec
ke/kp = 100	4.3E-06	m/sec
ke/kp = 10	3.5E-06	m/sec
ke/kp = 1	2.7E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.9E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

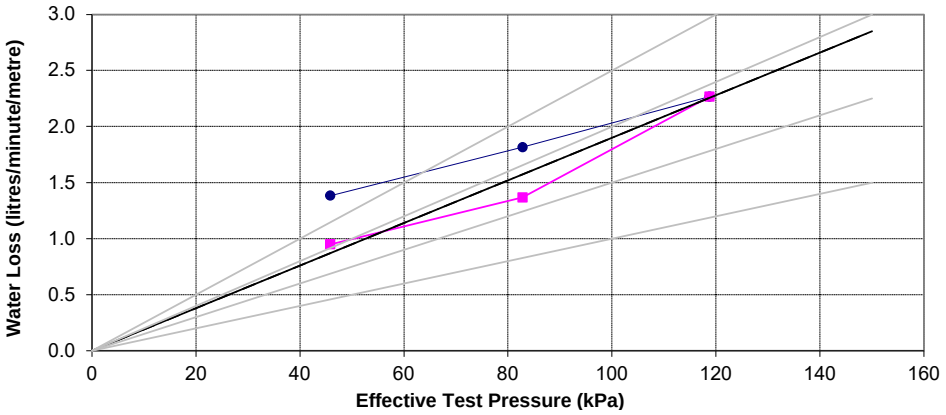
TA-DC226 : 12.3m to 15.3m

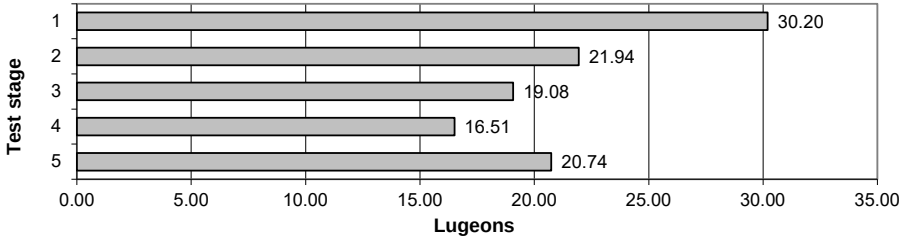
hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 12.3 m to 15.3 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	13.80 m
gauge height:	0.8 m	test depth converted to vertical:	12.70 m
inclination of borehole:	67 °	relative level at centre of test section:	712.90 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	36	45.80	41.50	1.38	13.9%	30.20
10	73	82.80	54.50	1.82	25.1%	21.94
10	109	118.80	68.00	2.27	36.0%	19.08
10	73	82.80	41.00	1.37	25.1%	16.51
10	36	45.80	28.50	0.95	13.9%	20.74





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

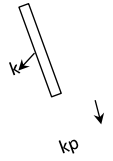
uL (Fell et al., 2005) - upper chart	19.00
uL (Houlsby, 1976) - lower chart	16.51

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.9E-06	m/sec
ke/kp = 100	3.3E-06	m/sec
ke/kp = 10	2.7E-06	m/sec
ke/kp = 1	2.1E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.3E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

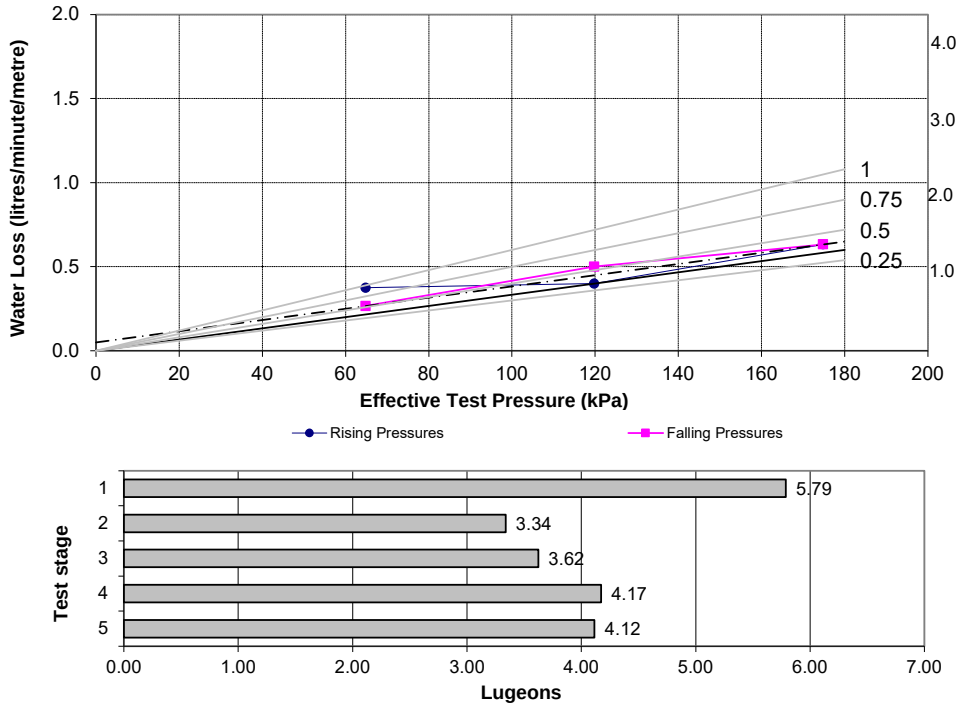
TA-DC226 : 15.4m to 18.4m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 15.4 m to 18.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	16.90 m
gauge height:	0.8 m	test depth converted to vertical:	15.56 m
inclination of borehole:	67 °	relative level at centre of test section:	710.04 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	64.80	11.25	0.38	16.0%	5.79
10	110	119.80	12.00	0.40	29.6%	3.34
10	165	174.80	19.00	0.63	43.2%	3.62
10	110	119.80	15.00	0.50	29.6%	4.17
10	55	64.80	8.00	0.27	16.0%	4.12



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

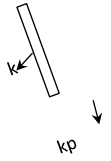
uL (Fell et al., 2005) - upper chart	3.33
uL (Houlsby, 1976) - lower chart	3.81

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.5E-07	m/sec
ke/kp = 100	6.4E-07	m/sec
ke/kp = 10	5.2E-07	m/sec
ke/kp = 1	4.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

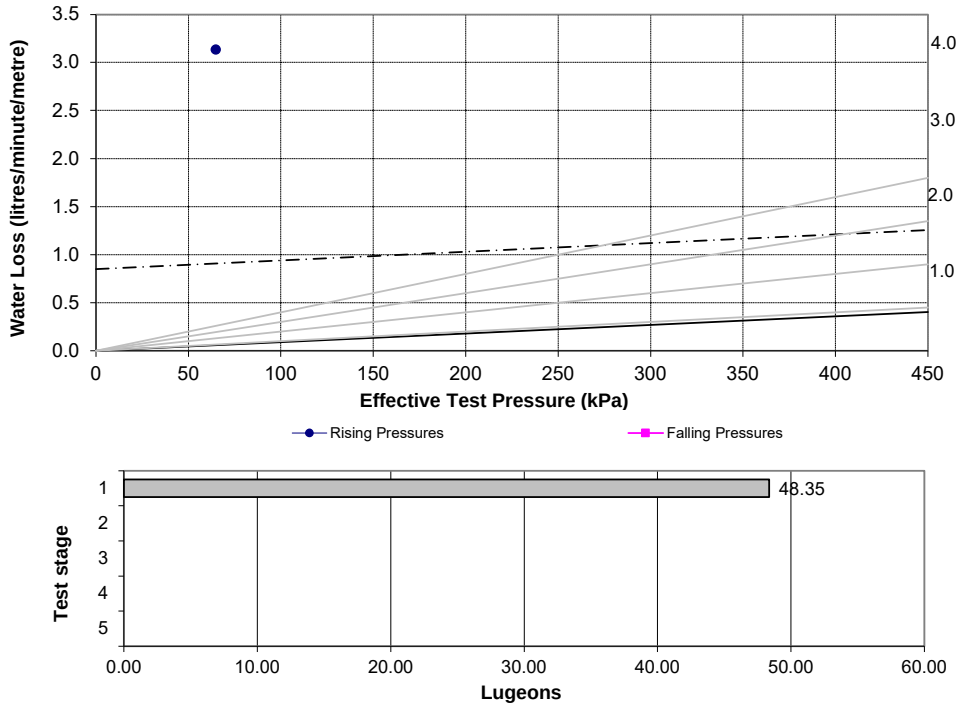
TA-DC226 : 18.4m to 21.4m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 18.4 m to 21.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	19.90 m
gauge height:	0.8 m	test depth converted to vertical:	18.32 m
inclination of borehole:	67 °	relative level at centre of test section:	707.28 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	64.80	94.00	3.13	13.6%	48.35
				#DIV/0!		
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.90

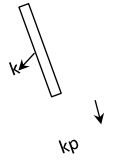
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

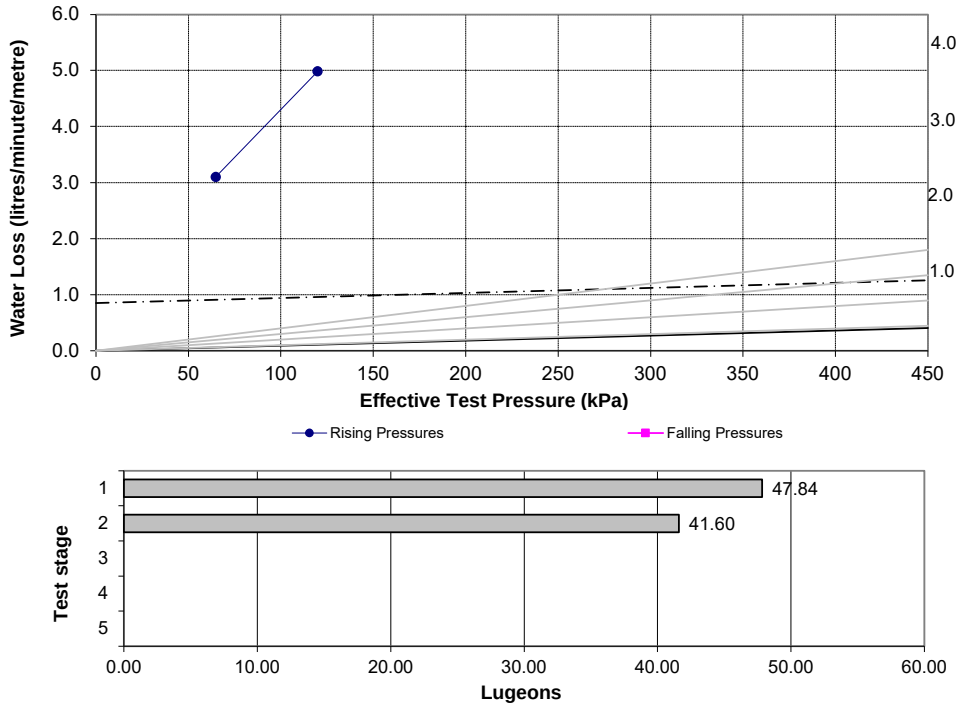
TA-DC226 : 18.4m to 21.4m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 18.4 m to 21.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	19.90 m
gauge height:	0.8 m	test depth converted to vertical:	18.32 m
inclination of borehole:	67 °	relative level at centre of test section:	707.28 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	64.80	93.00	3.10	13.6%	47.84
10	110	119.80	149.50	4.98	25.2%	41.60
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

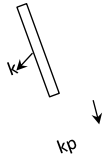
uL (Fell et al., 2005) - upper chart	0.90
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

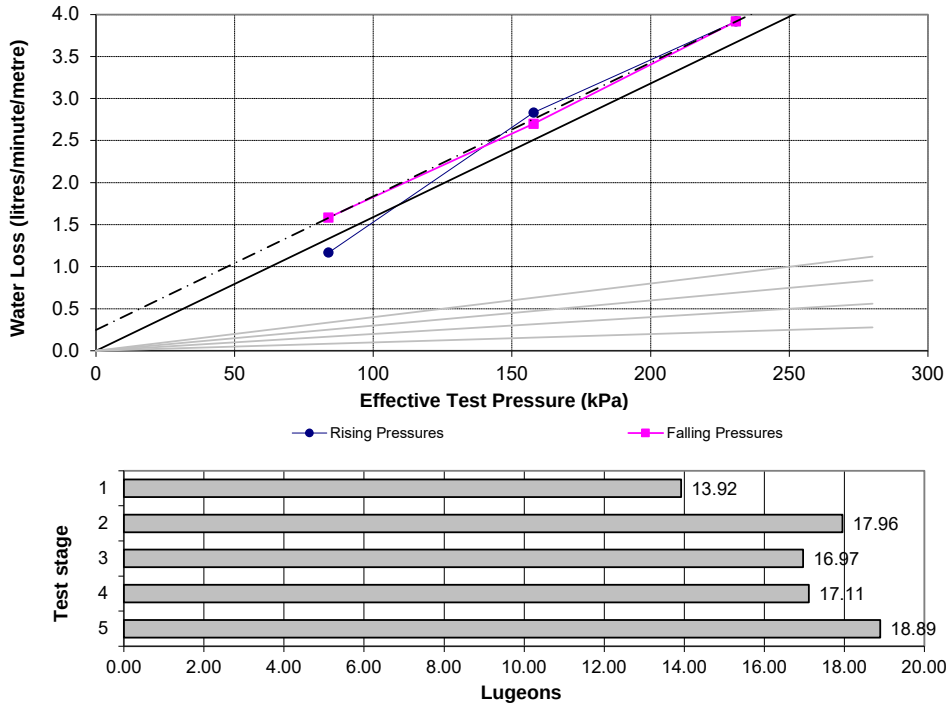
TA-DC226 : 21.4m to 24.4m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 21.4 m to 24.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	22.90 m
gauge height:	0.8 m	test depth converted to vertical:	21.08 m
inclination of borehole:	67 °	relative level at centre of test section:	704.52 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	74	83.80	35.00	1.17	15.3%	13.92
10	148	157.80	85.00	2.83	28.8%	17.96
10	221	230.80	117.50	3.92	42.1%	16.97
10	148	157.80	81.00	2.70	28.8%	17.11
10	74	83.80	47.50	1.58	15.3%	18.89



Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

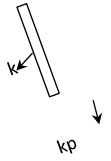
uL (Fell et al., 2005) - upper chart	15.89
uL (Houlsby, 1976) - lower chart	18.89

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.5E-06	m/sec
ke/kp = 100	3.0E-06	m/sec
ke/kp = 10	2.4E-06	m/sec
ke/kp = 1	1.9E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.0E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

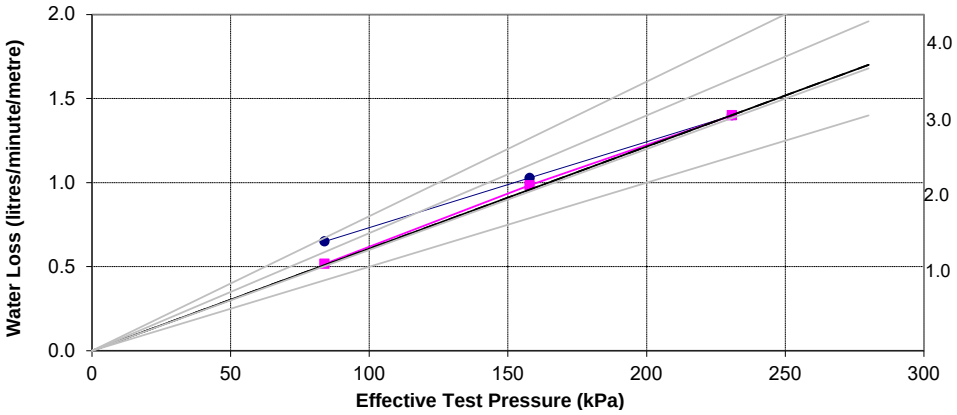
TA-DC226 : 24.4m to 27.4m

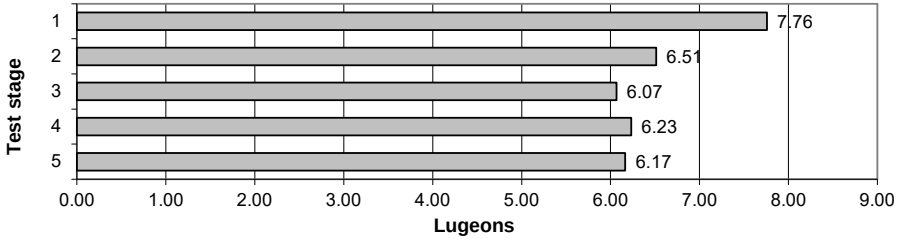
hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 24.4 m to 27.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	25.90 m
gauge height:	0.8 m	test depth converted to vertical:	23.84 m
inclination of borehole:	67 °	relative level at centre of test section:	701.76 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	74	83.80	19.50	0.65	13.5%	7.76
12	148	157.80	37.00	1.03	25.5%	6.51
10	221	230.80	42.00	1.40	37.2%	6.07
10	148	157.80	29.50	0.98	25.5%	6.23
10	74	83.80	15.50	0.52	13.5%	6.17





Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

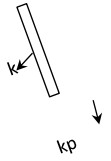
uL (Fell et al., 2005) - upper chart	6.07
uL (Houlsby, 1976) - lower chart	6.24

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-06	m/sec
ke/kp = 100	1.0E-06	m/sec
ke/kp = 10	8.6E-07	m/sec
ke/kp = 1	6.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

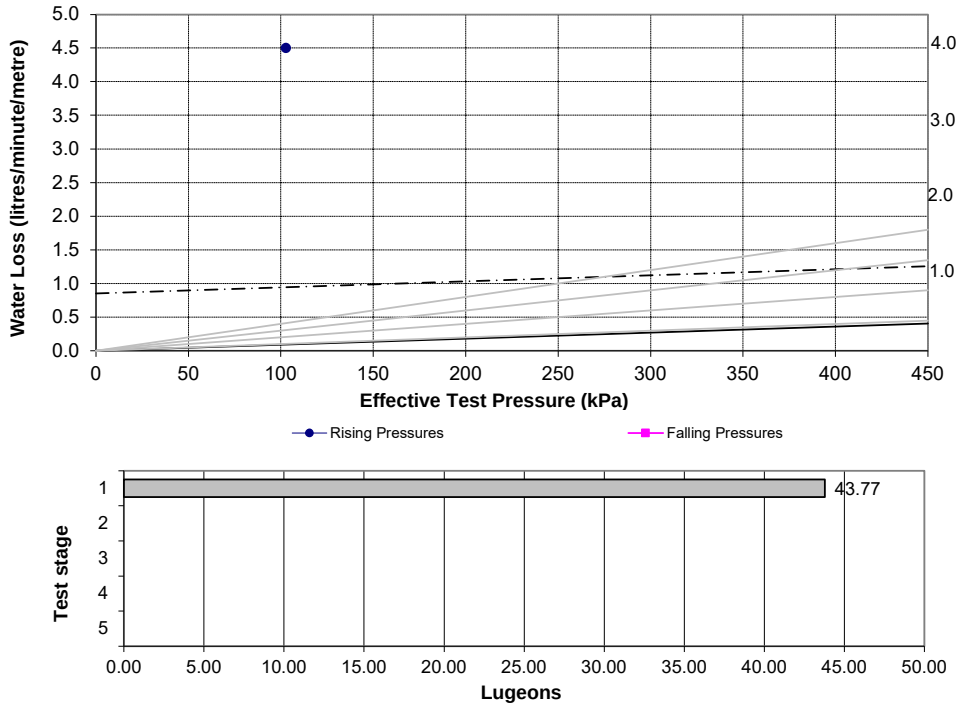
TA-DC226 : 27.4m to 30.4m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 27.4 m to 30.4 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	28.90 m
gauge height:	0.8 m	test depth converted to vertical:	26.60 m
inclination of borehole:	67 °	relative level at centre of test section:	699.00 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	93	102.80	135.00	4.50	14.9%	43.77
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.90

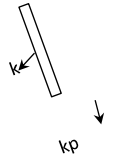
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

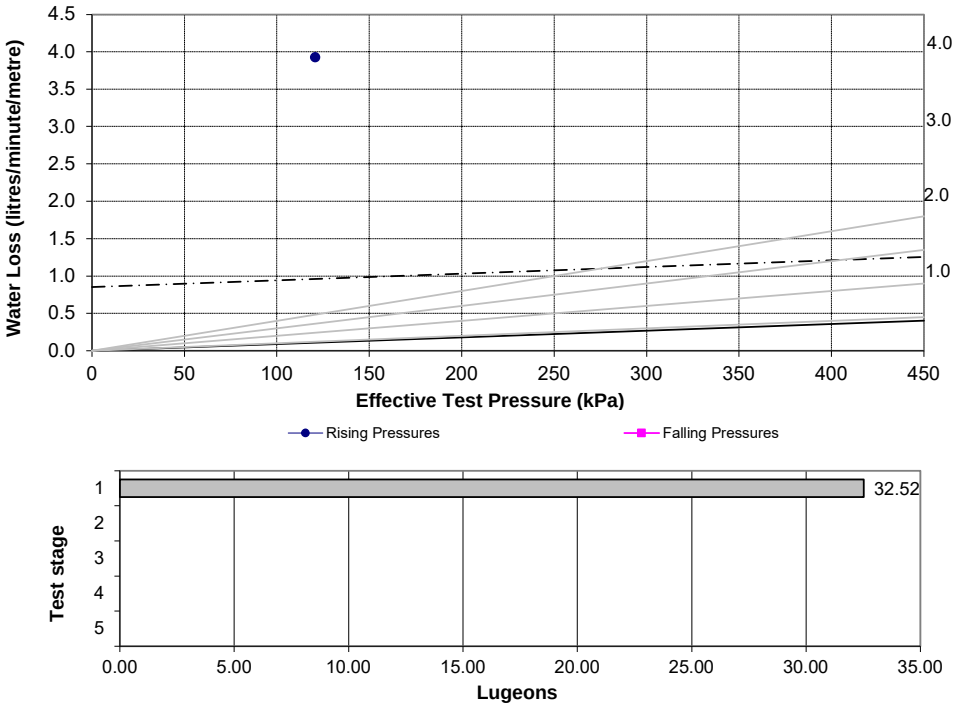
TA-DC226 : 30.4m to 33.2m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 30.4 m to 33.2 m length 2.8 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	31.80 m
gauge height:	0.8 m	test depth converted to vertical:	29.27 m
inclination of borehole:	67 °	relative level at centre of test section:	696.33 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
4	111	120.80	44.00	3.93	15.9%	32.52
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.90

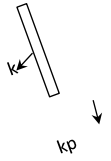
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

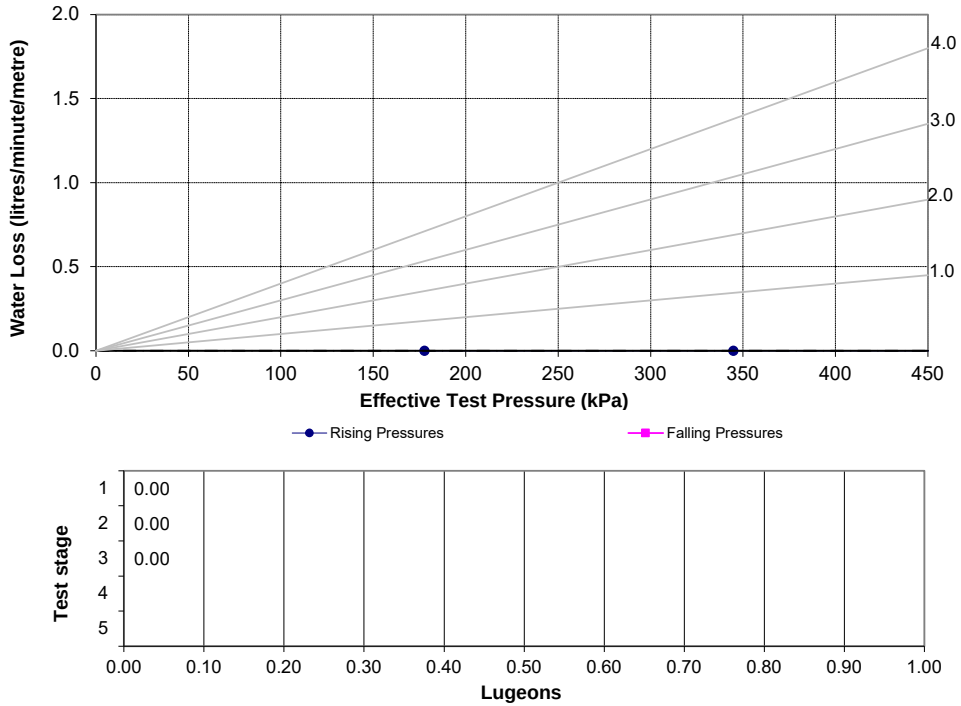
TA-DC226 : 30.4m to 33.2m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 30.4 m to 33.2 m length 2.8 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	31.80 m
gauge height:	0.8 m	test depth converted to vertical:	29.27 m
inclination of borehole:	67 °	relative level at centre of test section:	696.33 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	168	177.80	0.00	0.00	23.4%	0.00
10	335	344.80	0.00	0.00	45.3%	0.00
10	500	509.80	0.00	0.00	67.0%	0.00
			Water metre did not work			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: ARGILLITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.00

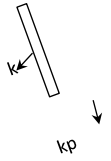
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000 #DIV/0! m/sec

ke/kp = 100 #DIV/0! m/sec

ke/kp = 10 #DIV/0! m/sec

ke/kp = 1 #DIV/0! m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

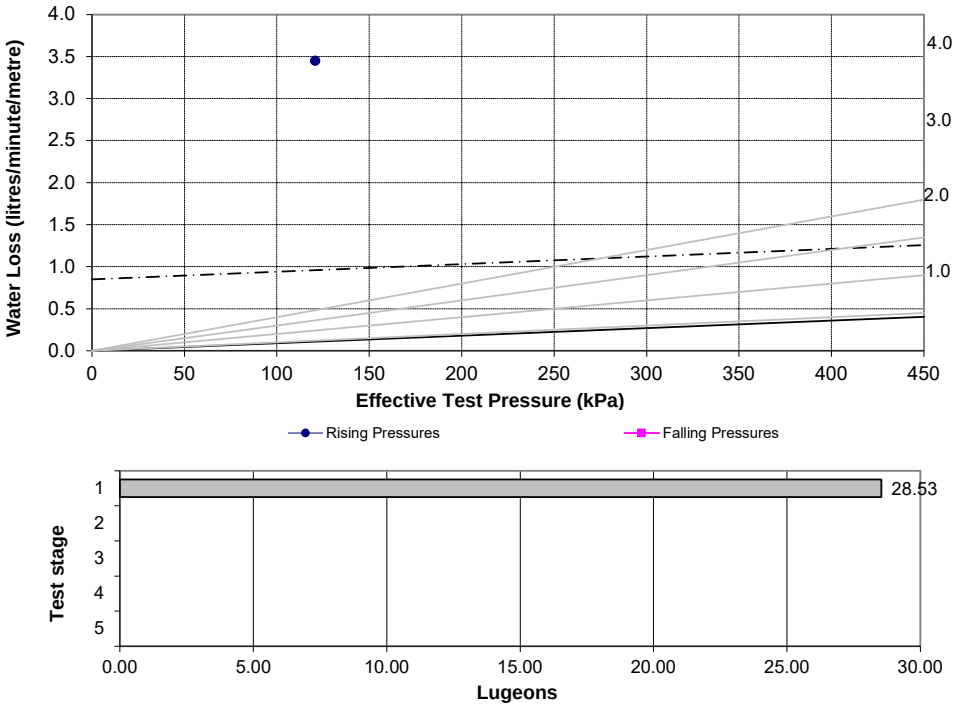
TA-DC226 : 33.2m to 36.5m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 33.2 m to 36.5 m length 3.3 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	34.85 m
gauge height:	0.8 m	test depth converted to vertical:	32.08 m
inclination of borehole:	67 °	relative level at centre of test section:	693.52 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
8	111	120.80	91.00	3.45	14.5%	28.53
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

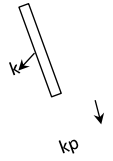
uL (Fell et al., 2005) - upper chart	0.90
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

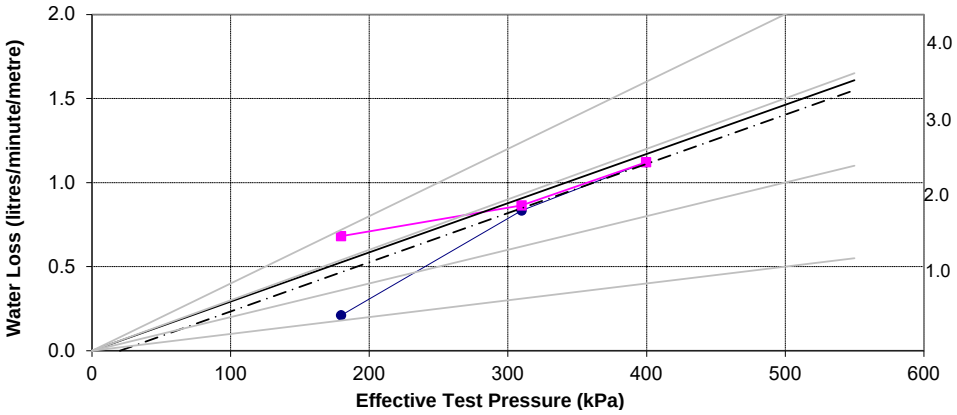
TA-DC226 : 33.2m to 36.5m

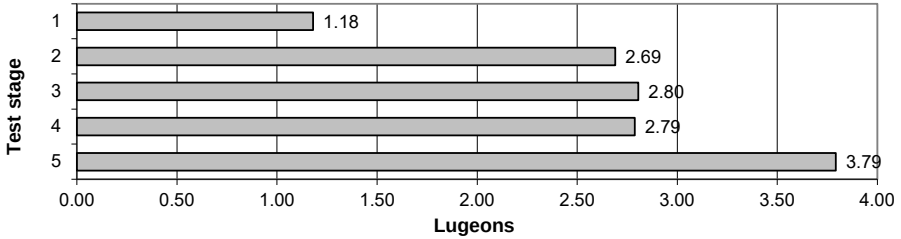
hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 33.2 m to 36.5 m length 3.3 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	34.85 m
gauge height:	0.8 m	test depth converted to vertical:	32.08 m
inclination of borehole:	67 °	relative level at centre of test section:	693.52 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	170	179.80	7.00	0.21	21.6%	1.18
10	300	309.80	27.50	0.83	37.1%	2.69
10	390	399.80	37.00	1.12	47.9%	2.80
10	300	309.80	28.50	0.86	37.1%	2.79
10	170	179.80	22.50	0.68	21.6%	3.79





Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

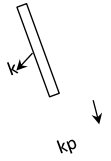
uL (Fell et al., 2005) - upper chart	2.92
uL (Houlsby, 1976) - lower chart	3.79

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.0E-07	m/sec
ke/kp = 100	5.1E-07	m/sec
ke/kp = 10	4.2E-07	m/sec
ke/kp = 1	3.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.6E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

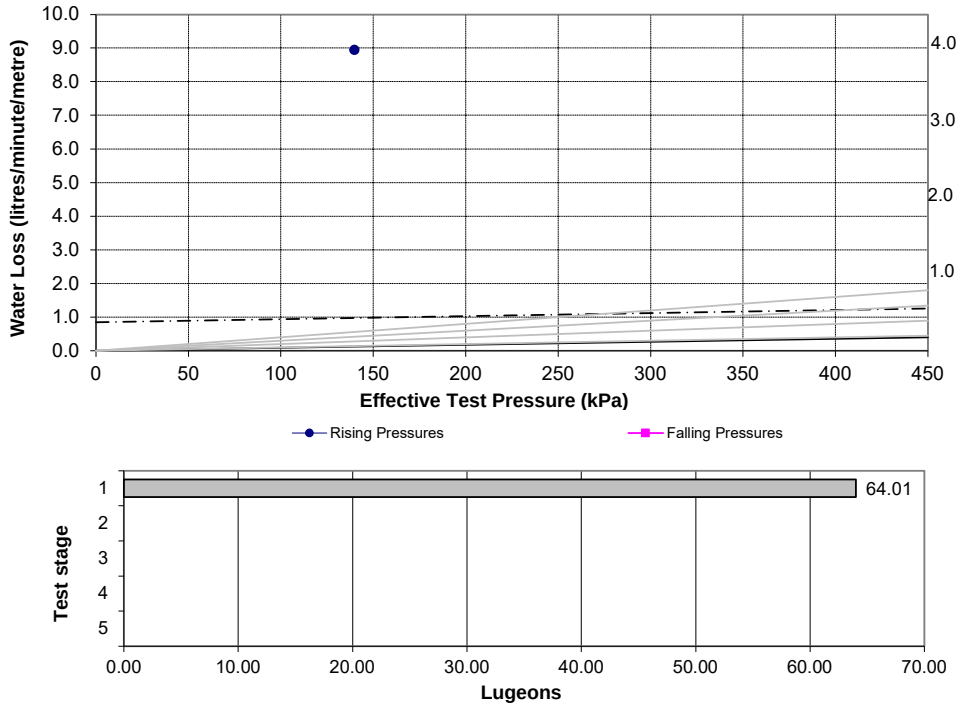
TA-DC226 : 36.5m to 39.45m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 36.5 m to 39.5 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	37.98 m
gauge height:	0.8 m	test depth converted to vertical:	34.96 m
inclination of borehole:	67 °	relative level at centre of test section:	690.64 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	130	139.80	264.00	8.95	15.4%	64.01
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.90

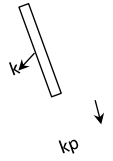
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

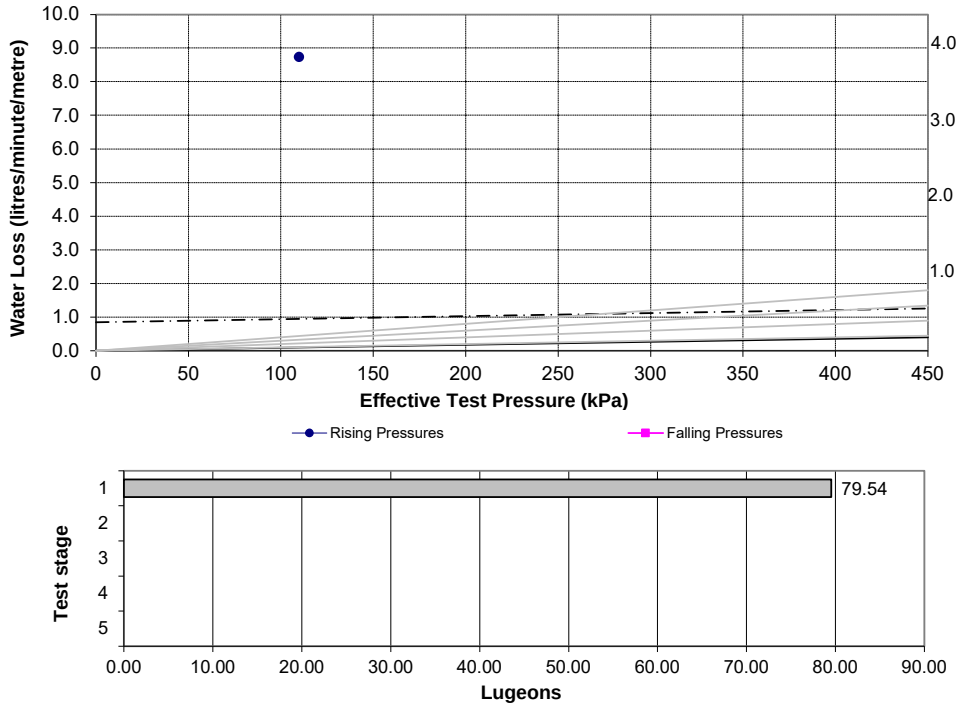
TA-DC226 : 39.45m to 42.45m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 39.5 m to 42.5 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	40.95 m
gauge height:	0.8 m	test depth converted to vertical:	37.69 m
inclination of borehole:	67 °	relative level at centre of test section:	687.91 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	100	109.80	131.00	8.73	11.2%	79.54
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

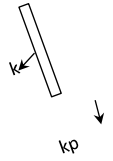
uL (Fell et al., 2005) - upper chart	0.90
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

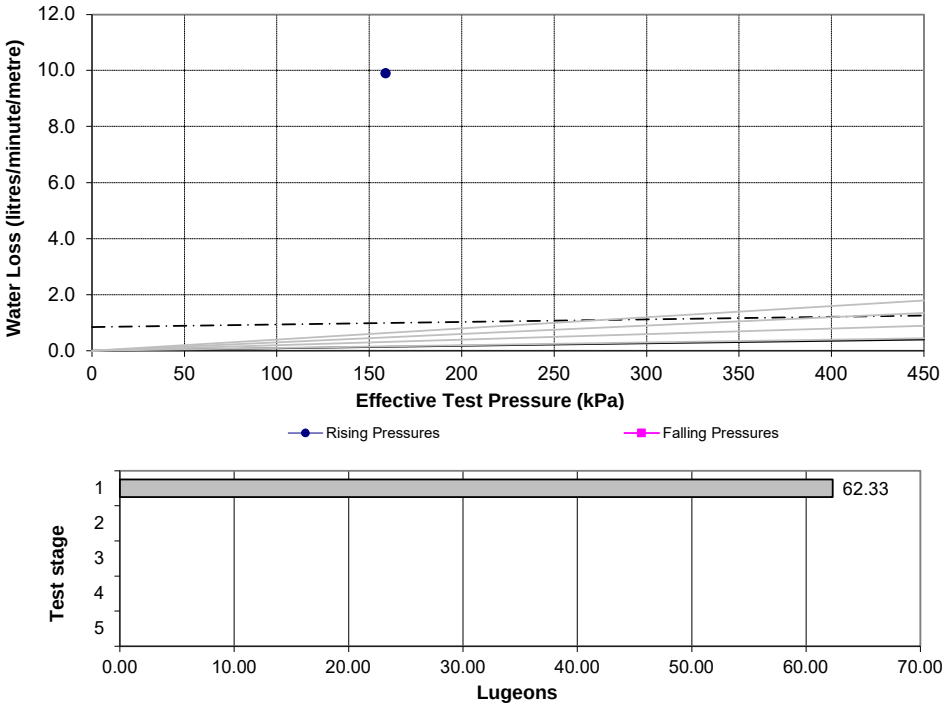
TA-DC226 : 42.5m to 45.45m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 42.5 m to 45.5 m length 3.0 m

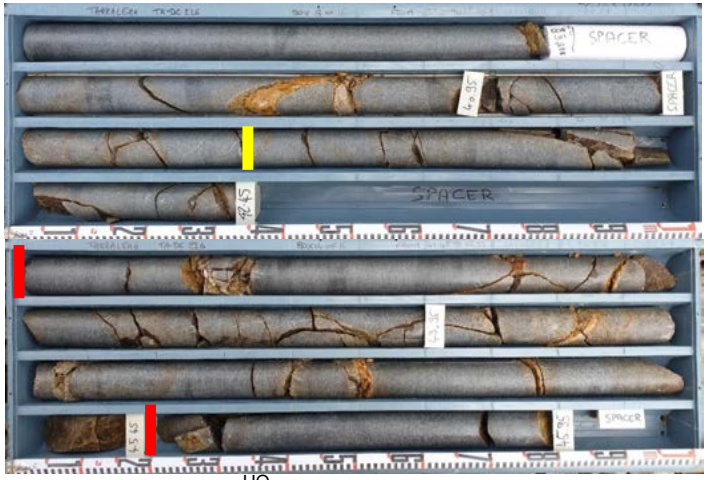
relative level at surface:	725.6 m RL	centre of test section (downhole):	43.98 m
gauge height:	0.8 m	test depth converted to vertical:	40.48 m
inclination of borehole:	67 °	relative level at centre of test section:	685.12 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	149	158.80	146.00	9.90	15.1%	62.33
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 0.90

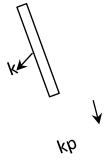
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

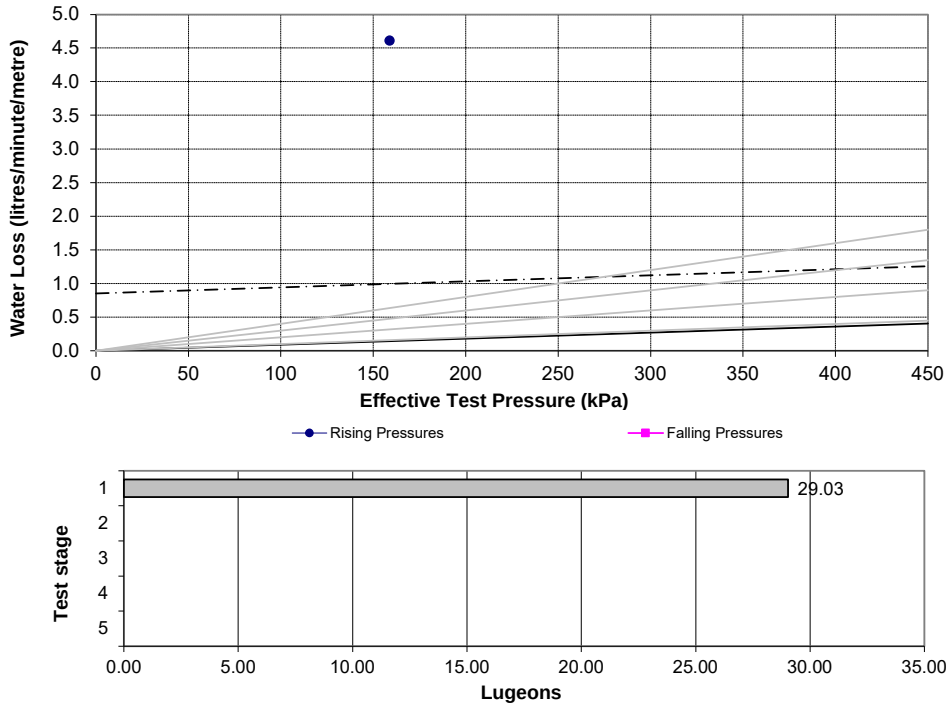
TA-DC226 : 45.5m to 48.45m

hole no:	TA-DC226	date:	21-Mar-22
project:	BOTN		
location:	Lake King William Intake	by:	JsR

section tested: from 45.5 m to 48.5 m length 3.0 m

relative level at surface:	725.6 m RL	centre of test section (downhole):	46.98 m
gauge height:	0.8 m	test depth converted to vertical:	43.24 m
inclination of borehole:	67 °	relative level at centre of test section:	682.36 m RL
inferred groundwater level:	725.4 m RL	correction to gauge pressure:	9.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	149	158.80	136.00	4.61	14.1%	29.03
			Water Leaking			



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary Packer Seal

Lugeon (uL) Assessment

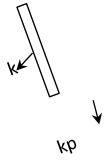
uL (Fell et al., 2005) - upper chart	0.90
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

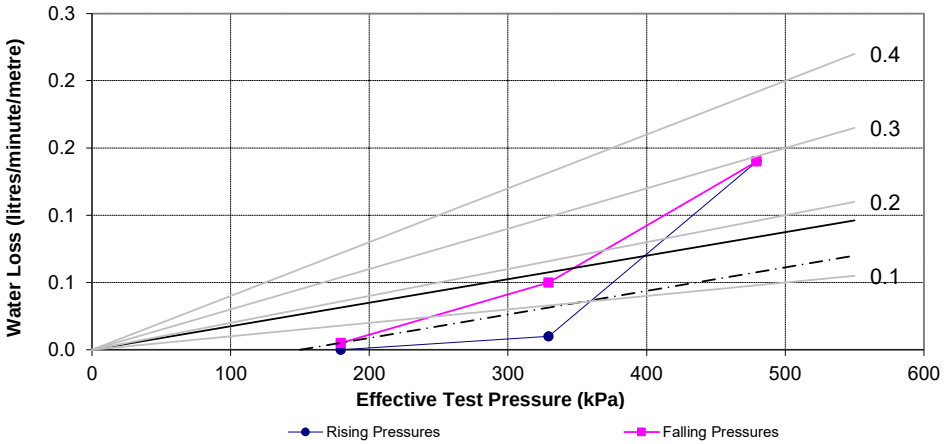
TA-DC227 : 37.6m to 42.6m

hole no:	TA-DC227	date:	20-May-22
project:	BOTN		
location:	Lake King William Tunnel	by:	JK

section tested: from 37.6 m to 42.6 m length 5.0 m

relative level at surface:	718.0 m RL	centre of test section (downhole):	40.10 m
gauge height:	0.8 m	test depth converted to vertical:	39.61 m
inclination of borehole:	81 °	relative level at centre of test section:	678.4 m RL
inferred groundwater level:	715.8 m RL	correction to gauge pressure:	29.4 kPa

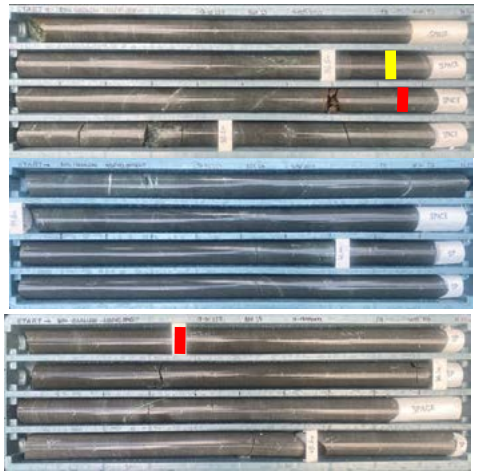
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	150	179.40	0.00	0.00	17.4%	0.00
10	300	329.40	0.50	0.01	32.0%	0.03
10	450	479.40	7.00	0.14	46.6%	0.29
10	300	329.40	2.50	0.05	32.0%	0.15
10	150	179.40	0.25	0.01	17.4%	0.03





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

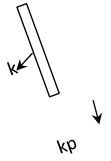
uL (Fell et al., 2005) - upper chart	0.18
uL (Houlsby, 1976) - lower chart	0.03

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.6E-08	m/sec
ke/kp = 100	2.3E-08	m/sec
ke/kp = 10	1.9E-08	m/sec
ke/kp = 1	1.5E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.6E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

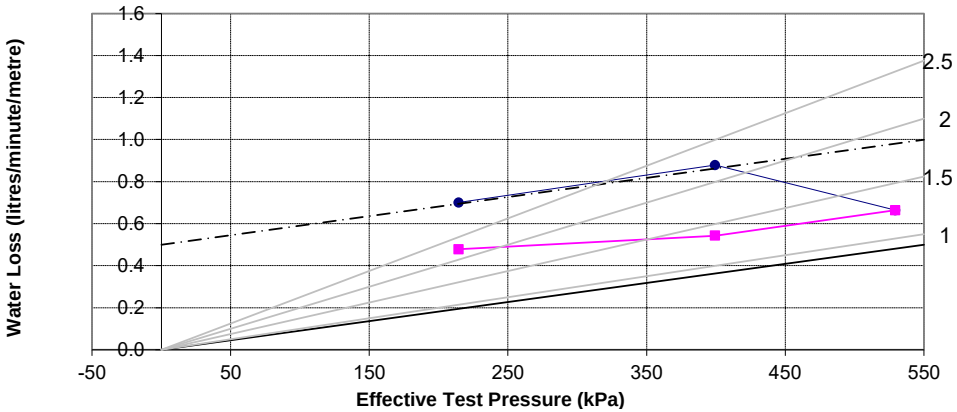
TA-DC227 : 52.6m to 56.1m

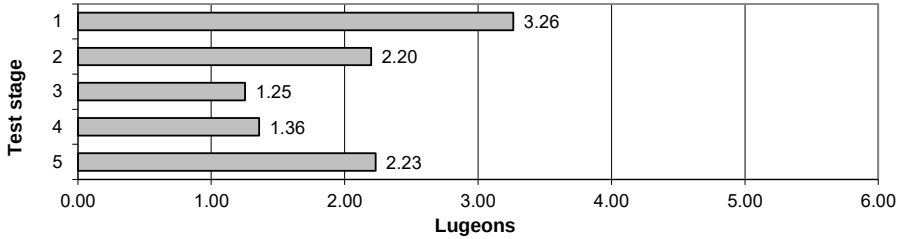
hole no:	TA-DC227	date:	20-May-22
project:	BOTN		
location:	Lake King William Tunnel	by:	JK

section tested: from 52.6 m to 56.1 m length 3.5 m

relative level at surface:	718.0 m RL	centre of test section (downhole):	54.35 m
gauge height:	0.8 m	test depth converted to vertical:	53.68 m
inclination of borehole:	81 °	relative level at centre of test section:	664.3 m RL
inferred groundwater level:	715.8 m RL	correction to gauge pressure:	29.4 kPa

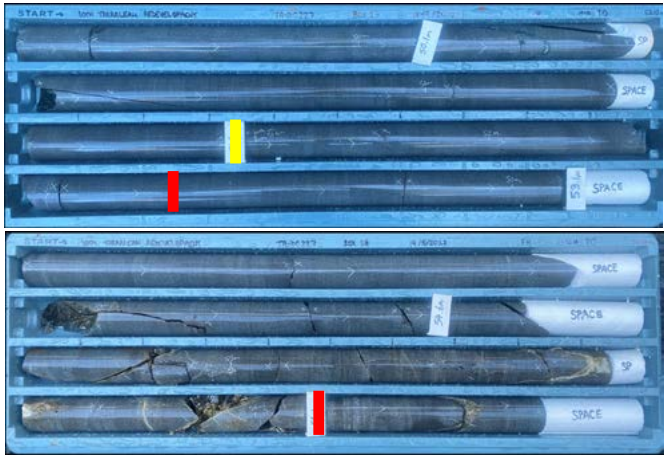
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	185	214.40	24.50	0.70	15.4%	3.26
10	370	399.40	30.75	0.88	28.6%	2.20
10	500	529.40	23.25	0.66	37.9%	1.25
10	370	399.40	19.00	0.54	28.6%	1.36
10	185	214.40	16.75	0.48	15.4%	2.23





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

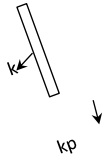
uL (Fell et al., 2005) - upper chart	0.91
uL (Houlsby, 1976) - lower chart	1.25

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	3.5E-07	m/sec
ke/kp = 100	3.0E-07	m/sec
ke/kp = 10	2.5E-07	m/sec
ke/kp = 1	2.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

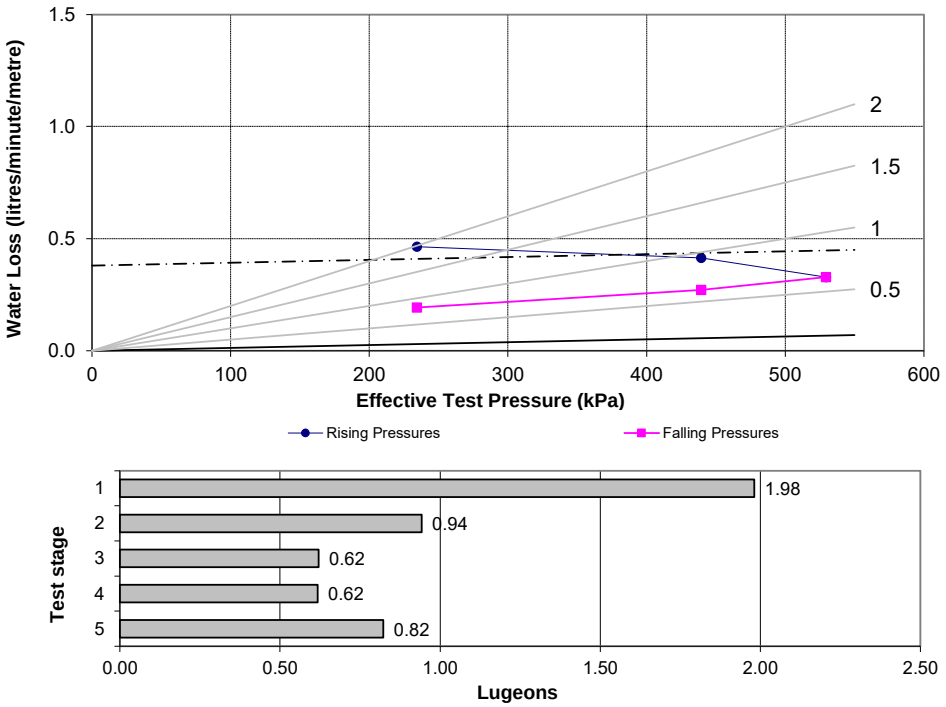
TA-DC227 : 57.1m to 60.6m

hole no:	TA-DC227	date:	20-May-22
project:	BOTN		
location:	Lake King William Tunnel	by:	JK

section tested: from 57.1 m to 60.6 m length 3.5 m

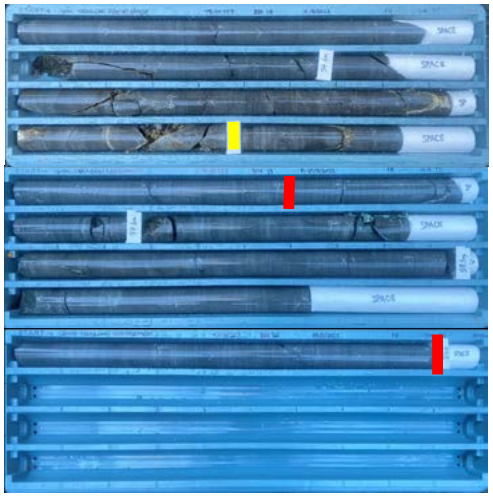
relative level at surface:	718.0 m RL	centre of test section (downhole):	58.85 m
gauge height:	0.8 m	test depth converted to vertical:	58.13 m
inclination of borehole:	81 °	relative level at centre of test section:	659.8 m RL
inferred groundwater level:	715.8 m RL	correction to gauge pressure:	29.4 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	205	234.40	16.25	0.46	15.5%	1.98
10	410	439.40	14.50	0.41	29.1%	0.94
10	500	529.40	11.50	0.33	35.0%	0.62
10	410	439.40	9.50	0.27	29.1%	0.62
10	205	234.40	6.75	0.19	15.5%	0.82



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

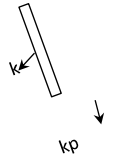
uL (Fell et al., 2005) - upper chart	0.13
uL (Houlsby, 1976) - lower chart	0.62

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.5E-07	m/sec
ke/kp = 100	1.3E-07	m/sec
ke/kp = 10	1.1E-07	m/sec
ke/kp = 1	8.4E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 9.0E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

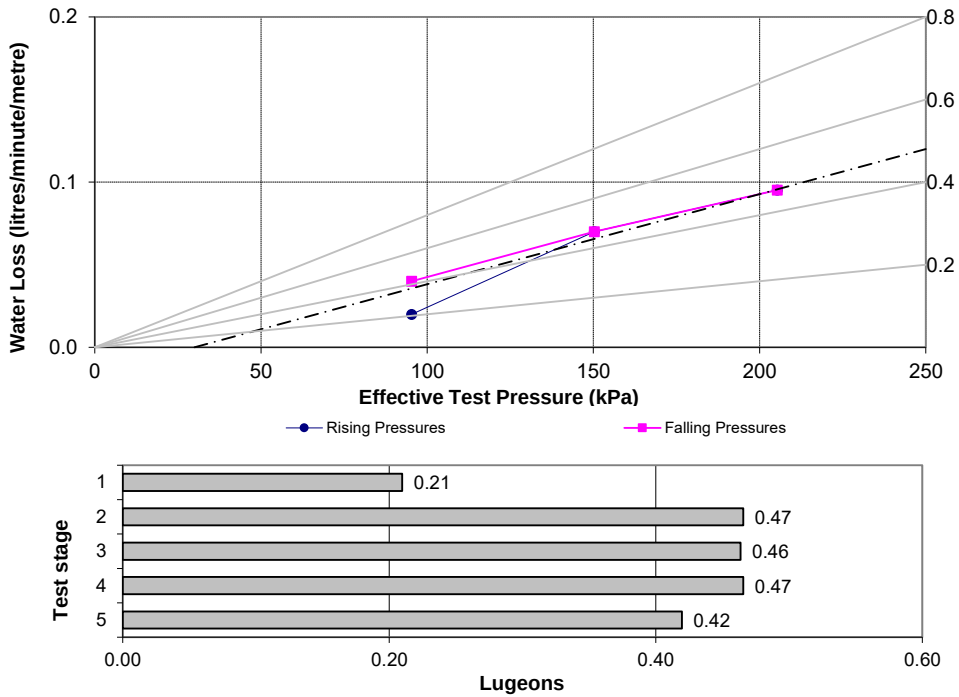
TA-DC237 : 14.8m to 19.8m

hole no:	TA-DC237	date:	29-Mar-23
project:	BoTN		
location:	Switch Yard	by:	JK

section tested: from 14.8 m to 19.8 m length 5.0 m

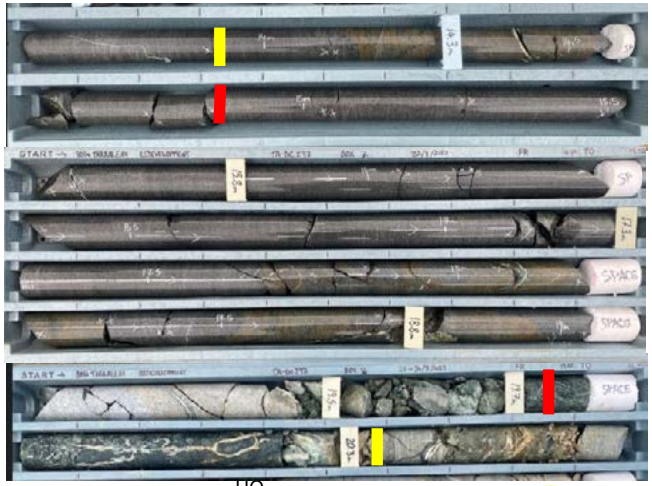
relative level at surface:	345.3 m RL	centre of test section (downhole):	17.30 m
gauge height:	0.5 m	test depth converted to vertical:	16.79 m
inclination of borehole:	76 °	relative level at centre of test section:	328.5 m RL
inferred groundwater level:	341.7 m RL	correction to gauge pressure:	40.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	95.35	0.50	0.02	21.8%	0.21
5	110	150.35	1.75	0.07	34.4%	0.47
5	165	205.35	2.38	0.10	47.1%	0.46
5	110	150.35	1.75	0.07	34.4%	0.47
5	55	95.35	1.00	0.04	21.8%	0.42



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

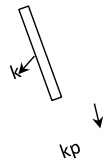
uL (Fell et al., 2005) - upper chart	0.55
uL (Houlsby, 1976) - lower chart	0.40

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	9.5E-08	m/sec
ke/kp = 100	8.2E-08	m/sec
ke/kp = 10	6.8E-08	m/sec
ke/kp = 1	5.5E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.8E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

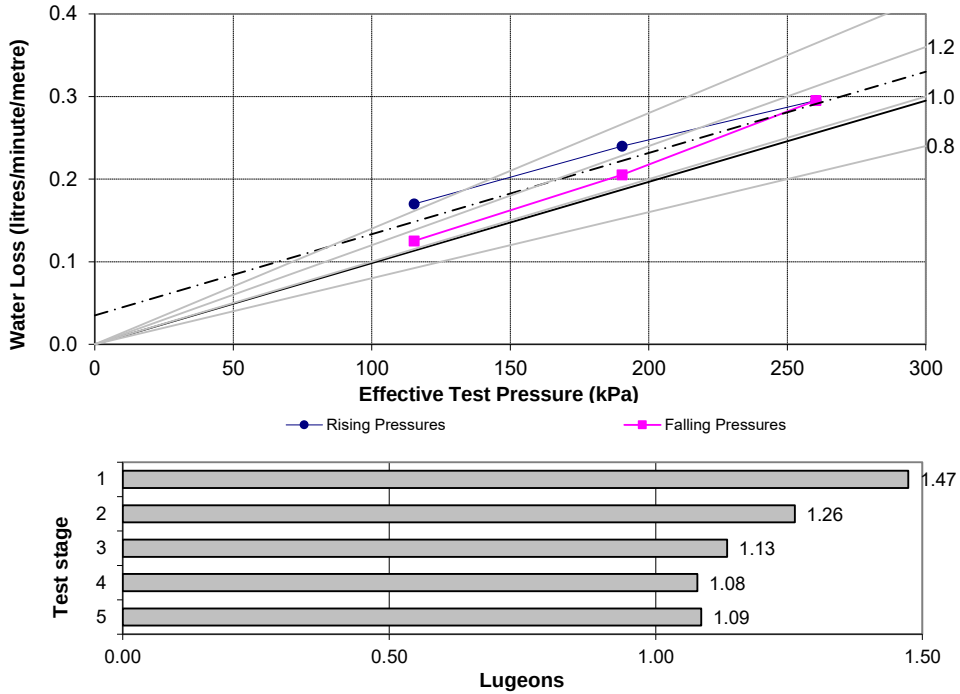
TA-DC237 : 18.3m to 23.3m

hole no:	TA-DC237	date:	29-Mar-23
project:	BoTN		
location:	Switch Yard	by:	JK

section tested: from 18.3 m to 23.3 m length 5.0 m

relative level at surface:	345.3 m RL	centre of test section (downhole):	20.80 m
gauge height:	0.5 m	test depth converted to vertical:	20.18 m
inclination of borehole:	76 °	relative level at centre of test section:	325.1 m RL
inferred groundwater level:	341.7 m RL	correction to gauge pressure:	40.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	75	115.35	4.25	0.17	22.0%	1.47
5	150	190.35	6.00	0.24	36.3%	1.26
5	220	260.35	7.38	0.30	49.6%	1.13
5	150	190.35	5.13	0.21	36.3%	1.08
5	75	115.35	3.13	0.13	22.0%	1.09



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

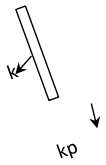
uL (Fell et al., 2005) - upper chart	0.98
uL (Houlsby, 1976) - lower chart	1.09

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.1E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.4E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

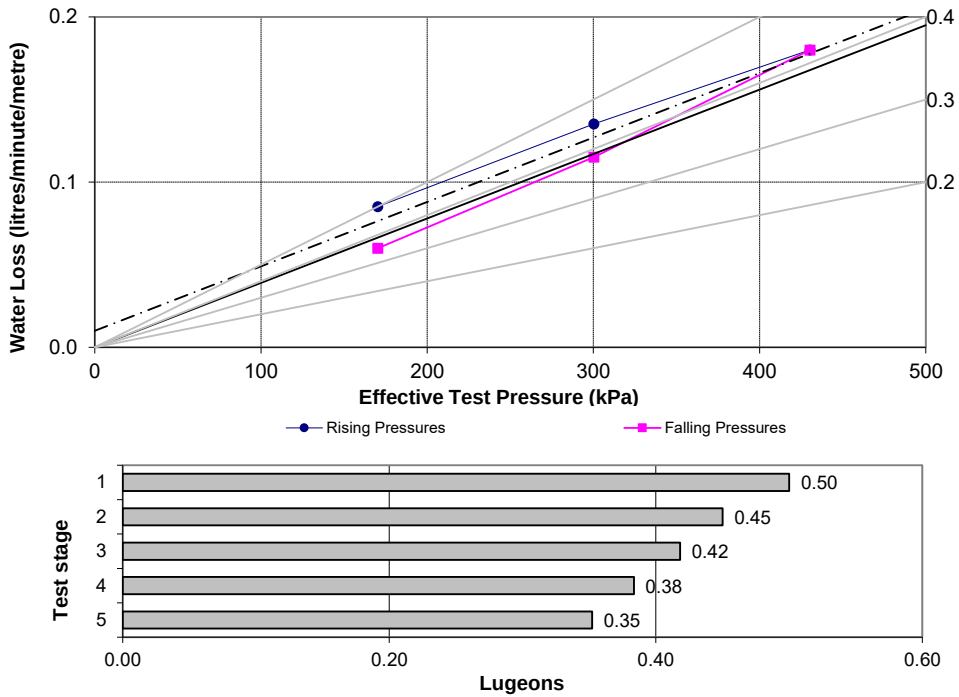
TA-DC237 : 34.8m to 39.8m

hole no:	TA-DC237	date:	29-Mar-23
project:	BoTN		
location:	Switch Yard	by:	JK

section tested: from 34.8 m to 39.8 m length 5.0 m

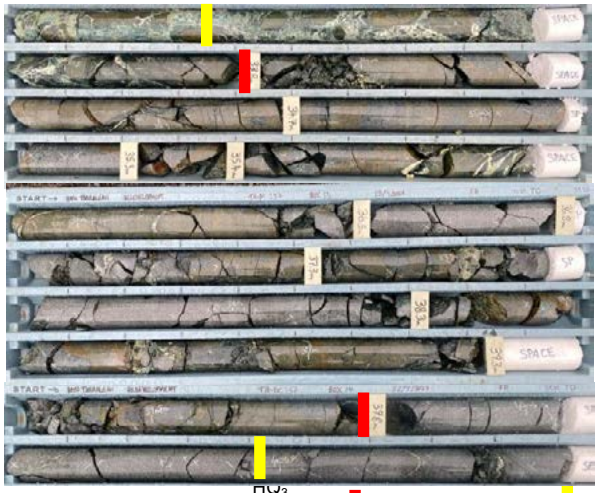
relative level at surface:	345.3 m RL	centre of test section (downhole):	37.30 m
gauge height:	0.5 m	test depth converted to vertical:	36.19 m
inclination of borehole:	76 °	relative level at centre of test section:	309.1 m RL
inferred groundwater level:	341.7 m RL	correction to gauge pressure:	40.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	130	170.35	2.13	0.09	18.1%	0.50
5	260	300.35	3.38	0.14	31.9%	0.45
5	390	430.35	4.50	0.18	45.7%	0.42
5	260	300.35	2.88	0.12	31.9%	0.38
5	130	170.35	1.50	0.06	18.1%	0.35



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

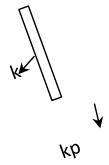
uL (Fell et al., 2005) - upper chart	0.39
uL (Houlsby, 1976) - lower chart	0.35

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	8.4E-08	m/sec
ke/kp = 100	7.2E-08	m/sec
ke/kp = 10	6.0E-08	m/sec
ke/kp = 1	4.8E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

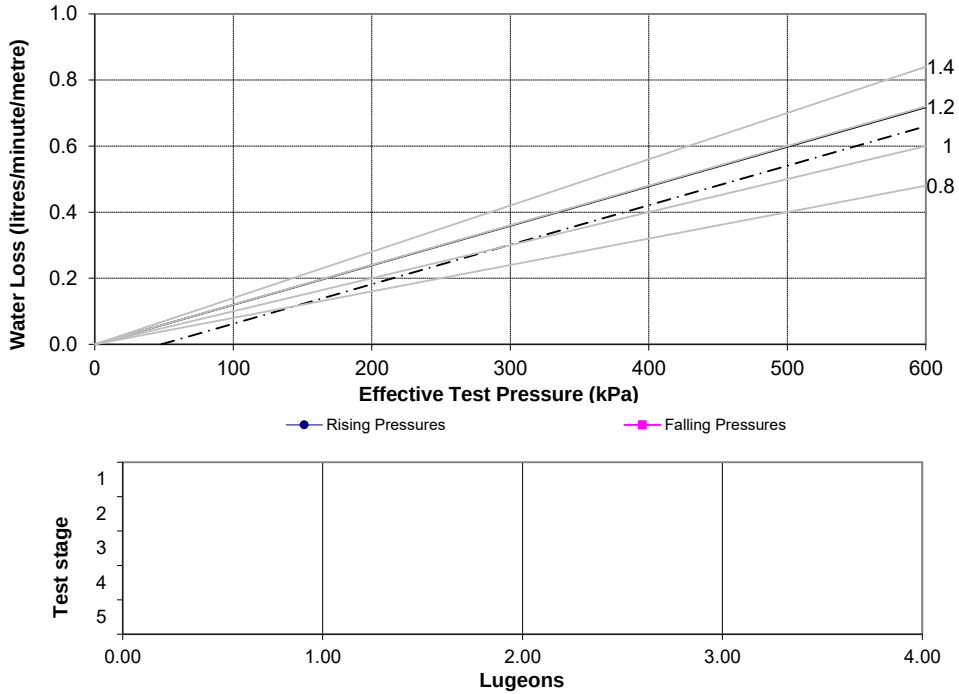
TA-DC238 : 14.6m to 16.6m

hole no:	TA-DC238	date:	19-Apr-23
project:	BOTN		
location:	Switchyard	2 by:	AT

section tested: from 14.6 m to 16.6 m length 2.0 m

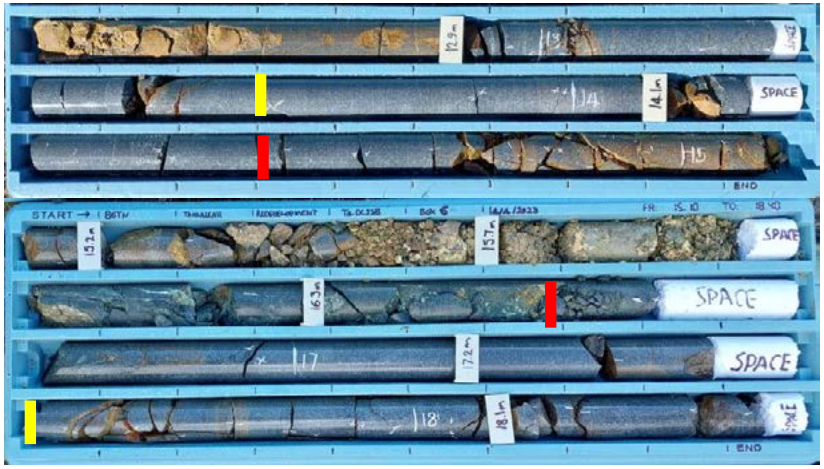
relative level at surface:	345.89 m RL	centre of test section (downhole):	15.60 m
gauge height:	0.8 m	test depth converted to vertical:	15.36 m
inclination of borehole:	80 °	relative level at centre of test section:	330.5 m RL
inferred groundwater level:	342.5 m RL	correction to gauge pressure:	41.1 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
Hung up at 13.6 no more tests						



Interpreted flow mechanism:

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

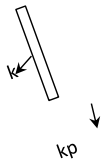
uL (Fell et al., 2005) - upper chart	1.20
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC238 : 17.6m to 20.6m

hole no: TA-DC238 date: 19-Apr-23

project: BOTN

location: Switchyard 2 by: AT

section tested: from 17.6 m to 20.6 m length 3.0 m

relative level at surface: 345.89 m RL

gauge height: 0.8 m

inclination of borehole: 80 °

inferred groundwater level: 342.5 m RL

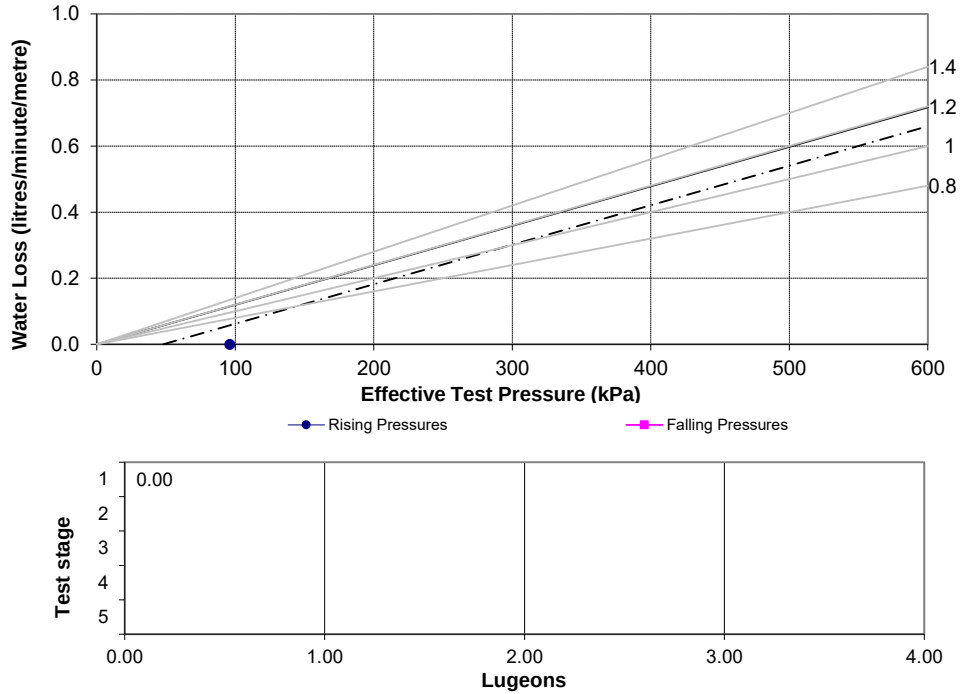
centre of test section (downhole): 19.10 m

test depth converted to vertical: 18.81 m

relative level at centre of test section: 327.1 m RL

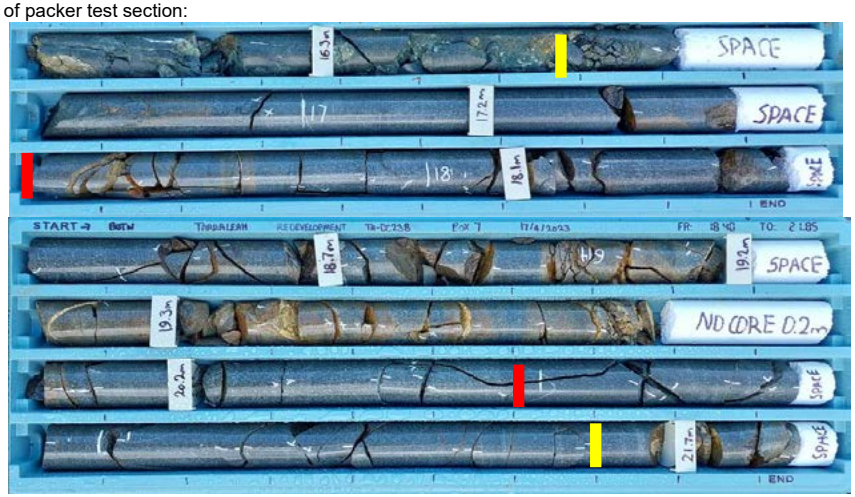
correction to gauge pressure: 41.1 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	55	96.09	0.00	0.00	19.6%	0.00
Packer burst from fractured rock						



Interpreted flow mechanism:

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 1.20

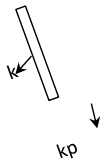
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000 #DIV/0! m/sec

ke/kp = 100 #DIV/0! m/sec

ke/kp = 10 #DIV/0! m/sec

ke/kp = 1 #DIV/0! m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC238 : 21.2m to 24.2m

hole no: TA-DC238 date: 19-Apr-23

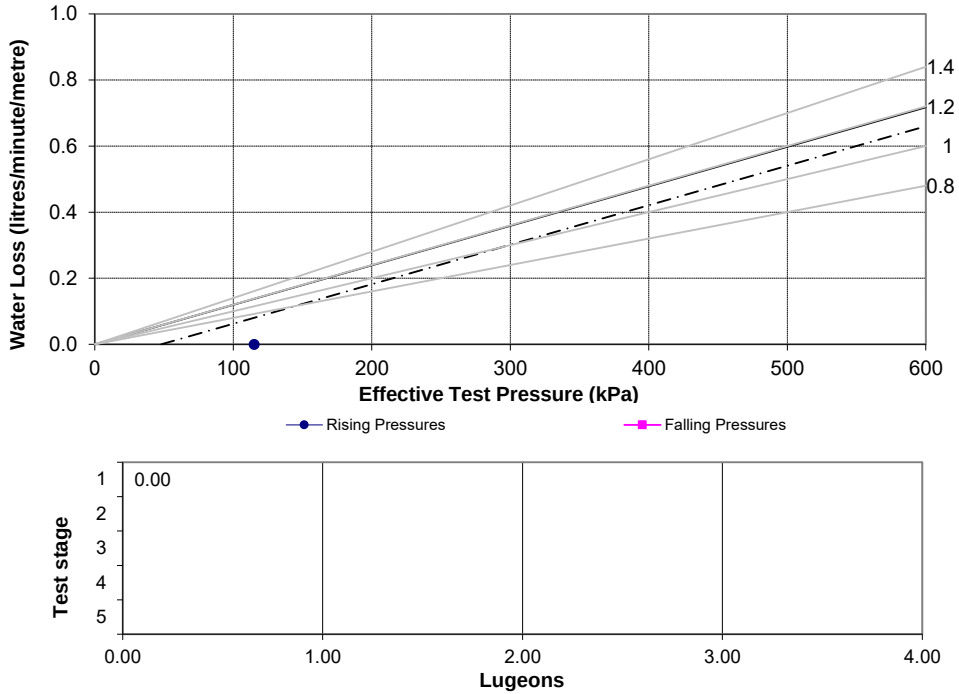
project: BOTN

location: Switchyard 2 by: AT

section tested: from 21.2 m to 24.2 m length 3.0 m

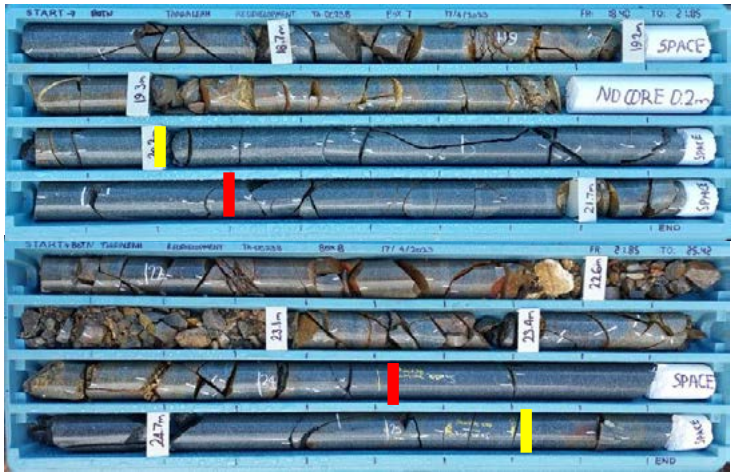
relative level at surface:	345.89 m RL	centre of test section (downhole):	22.70 m
gauge height:	0.8 m	test depth converted to vertical:	22.36 m
inclination of borehole:	80 °	relative level at centre of test section:	323.5 m RL
inferred groundwater level:	342.5 m RL	correction to gauge pressure:	41.1 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	74	115.09	0.00	0.00	19.8%	0.00
Complete water loss into unit, pack sealed but couldn't raise water injecton pressure						



Interpreted flow mechanism:

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

uL (Fell et al., 2005) - upper chart 1.20

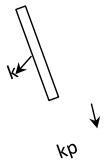
uL (Houlsby, 1976) - lower chart

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000 #DIV/0! m/sec

ke/kp = 100 #DIV/0! m/sec

ke/kp = 10 #DIV/0! m/sec

ke/kp = 1 #DIV/0! m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

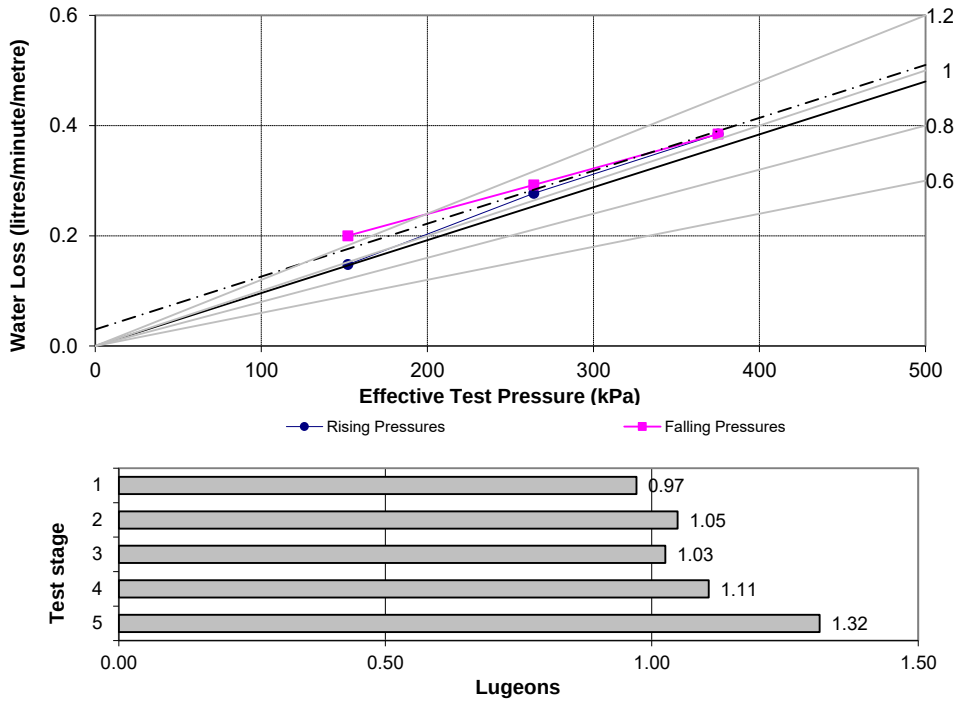
TA-DC238 : 33.2m to 39.7m

hole no:	TA-DC238	date:	19-Apr-23
project:	BOTN		
location:	Switchyard	2 by:	AT

section tested: from 33.2 m to 39.7 m length 6.5 m

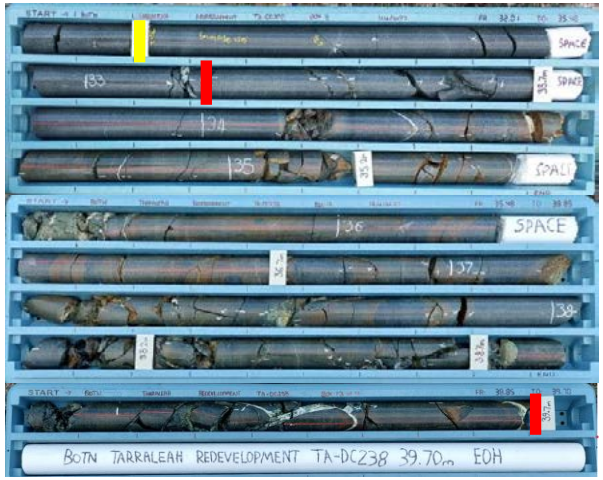
relative level at surface:	345.89 m RL	centre of test section (downhole):	36.45 m
gauge height:	0.8 m	test depth converted to vertical:	35.90 m
inclination of borehole:	80 °	relative level at centre of test section:	310.0 m RL
inferred groundwater level:	342.5 m RL	correction to gauge pressure:	41.1 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	111	152.09	4.80	0.15	16.3%	0.97
5	223	264.09	9.00	0.28	28.3%	1.05
5	334	375.09	12.50	0.38	40.2%	1.03
5	223	264.09	9.50	0.29	28.3%	1.11
5	111	152.09	6.50	0.20	16.3%	1.32



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

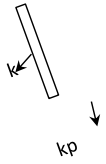
uL (Fell et al., 2005) - upper chart	1.15
uL (Houlsby, 1976) - lower chart	1.09

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.1E-07	m/sec
ke/kp = 10	1.8E-07	m/sec
ke/kp = 1	1.4E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 85.6m to 90.6m

hole no: TA-DC239 date: 23-Nov-22

project: BOTN

location: Tarraleah Hillside by: BT

section tested: from 85.6 m to 90.6 m length 5.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

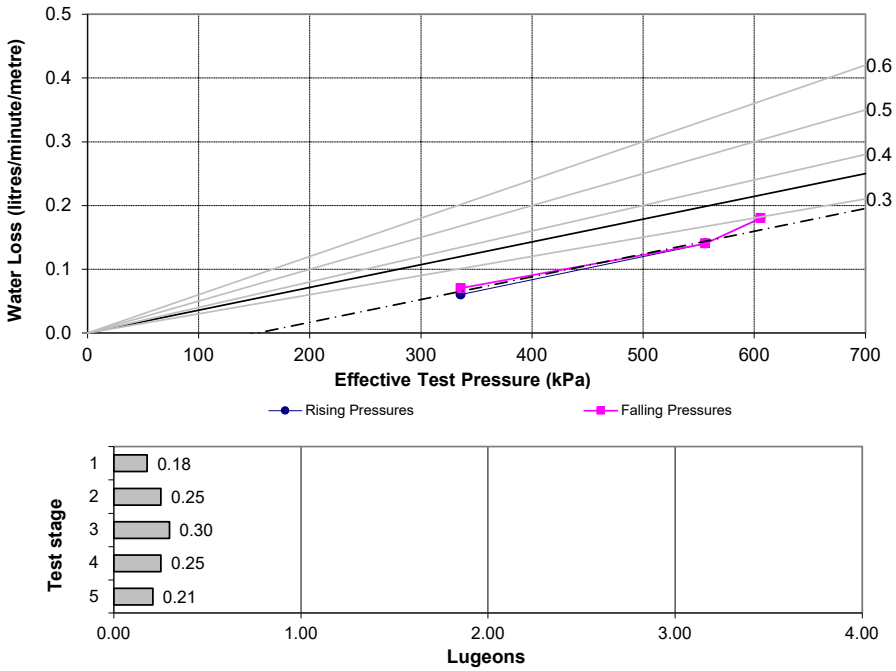
centre of test section (downhole): 88.10 m

test depth converted to vertical: 82.79 m

relative level at centre of test section: 487.2 m RL

correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	230	335.84	3.00	0.06	15.6%	0.18
10	450	555.84	7.00	0.14	25.8%	0.25
10	500	605.84	9.00	0.18	28.1%	0.30
10	450	555.84	7.00	0.14	25.8%	0.25
10	230	335.84	3.50	0.07	15.6%	0.21



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

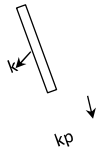
uL (Fell et al., 2005) - upper chart	0.36
uL (Houlsby, 1976) - lower chart	0.18

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.3E-08	m/sec
ke/kp = 100	4.6E-08	m/sec
ke/kp = 10	3.8E-08	m/sec
ke/kp = 1	3.0E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

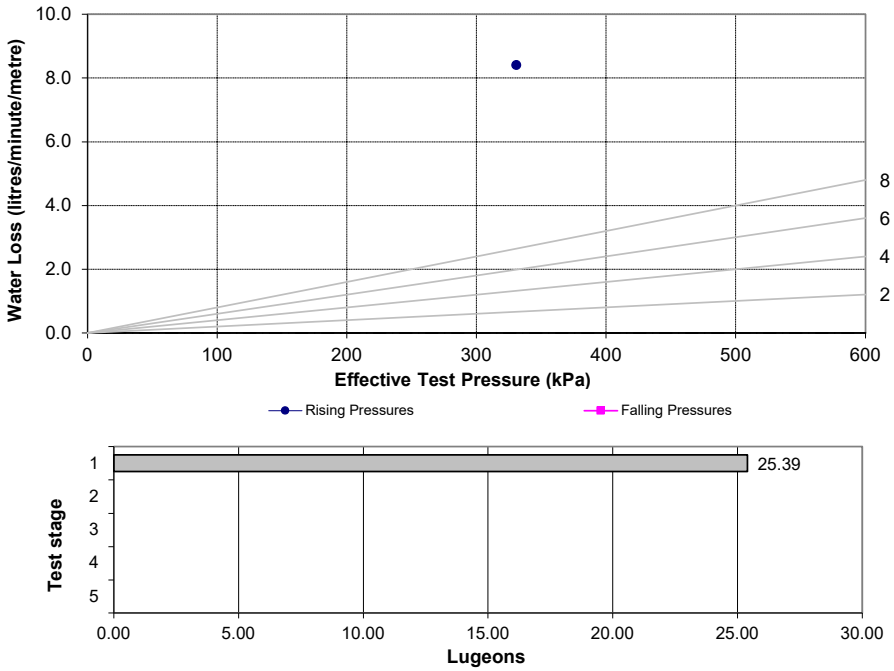
TA-DC239 : 145m to 148m

hole no:	TA-DC239	date:	9-Jan-23
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 145.0 m to 148.0 m length 3.0 m

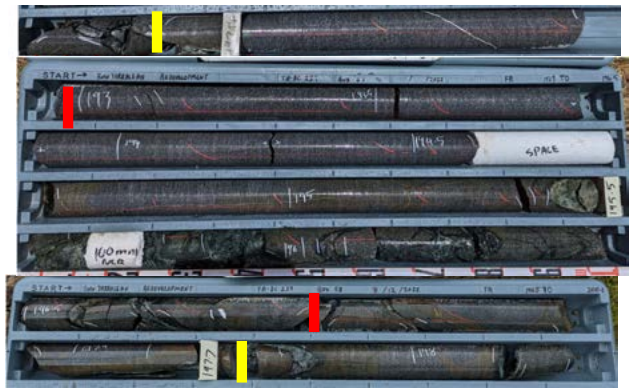
relative level at surface:	569.97 m RL	centre of test section (downhole):	146.50 m
gauge height:	0.8 m	test depth converted to vertical:	137.66 m
inclination of borehole:	70 °	relative level at centre of test section:	432.3 m RL
inferred groundwater level:	560.0 m RL	correction to gauge pressure:	105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	252.00	8.40	9.2%	25.39
	PRESSURE COULD NOT BE INCREASED					



Interpreted flow mechanism: CANCELLED

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

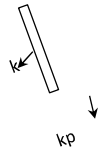
uL (Fell et al., 2005) - upper chart	0.00
uL (Houlsby, 1976) - lower chart	0.32

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 165m to 168m

hole no: TA-DC239 date: 9-Jan-23

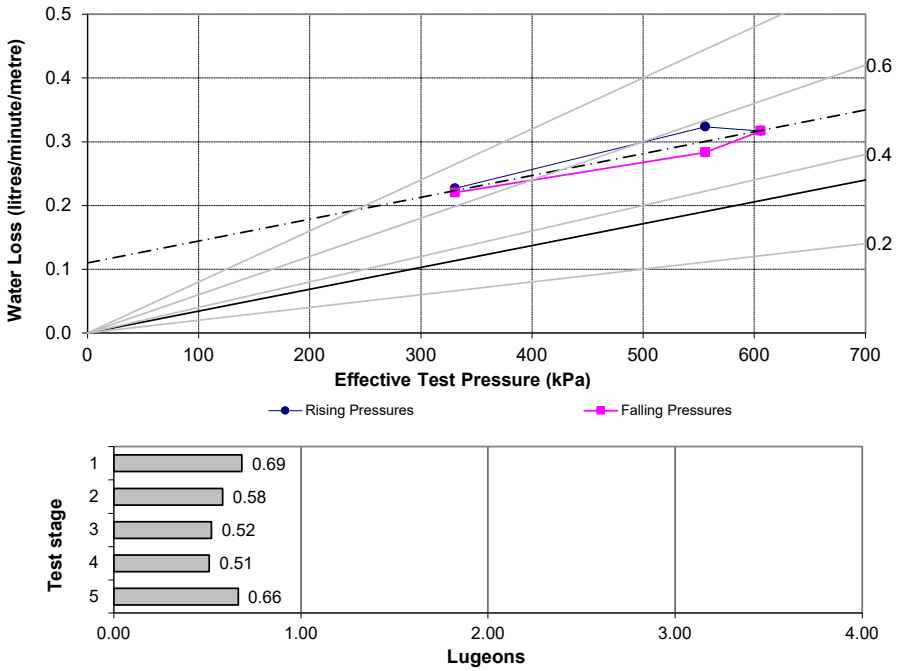
project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 165.0 m to 168.0 m length 3.0 m

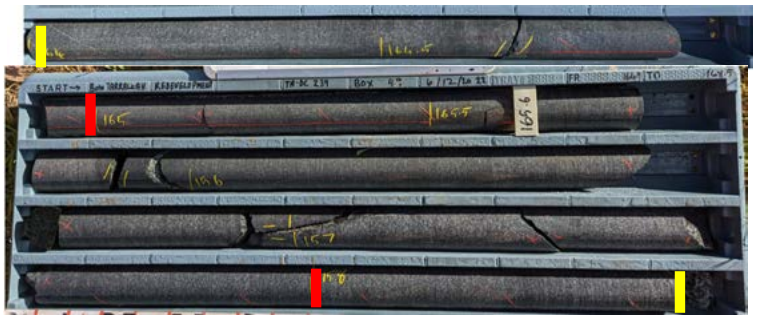
relative level at surface:	569.97 m RL	centre of test section (downhole):	166.50 m
gauge height:	0.8 m	test depth converted to vertical:	156.46 m
inclination of borehole:	70 °	relative level at centre of test section:	413.5 m RL
inferred groundwater level:	560.0 m RL	correction to gauge pressure:	105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	6.80	0.23	8.1%	0.69
10	450	555.84	9.70	0.32	13.7%	0.58
10	500	605.84	9.50	0.32	14.9%	0.52
10	450	555.84	8.50	0.28	13.7%	0.51
10	225	330.84	6.60	0.22	8.1%	0.66



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

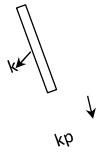
uL (Fell et al., 2005) - upper chart	0.34
uL (Houlsby, 1976) - lower chart	0.52

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.1E-07	m/sec
ke/kp = 100	9.5E-08	m/sec
ke/kp = 10	7.8E-08	m/sec
ke/kp = 1	6.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.6E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

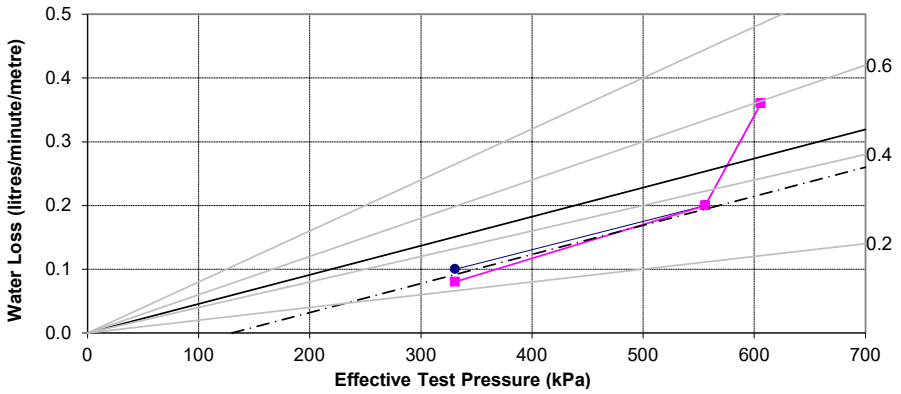
TA-DC239 : 193m to 198m

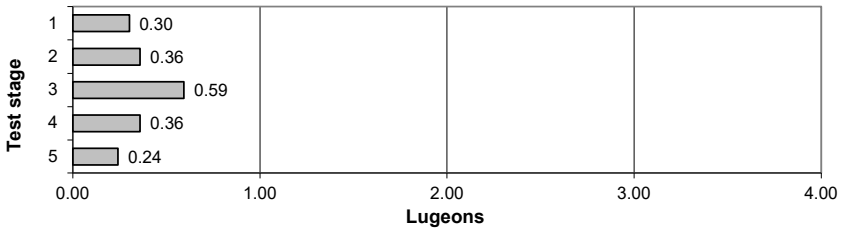
hole no:	TA-DC239	date:	23-Nov-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 193.0 m to 198.0 m length 5.0 m

relative level at surface:	569.97 m RL	centre of test section (downhole):	195.50 m
gauge height:	0.8 m	test depth converted to vertical:	183.71 m
inclination of borehole:	70 °	relative level at centre of test section:	386.3 m RL
inferred groundwater level:	560.0 m RL	correction to gauge pressure:	105.8 kPa

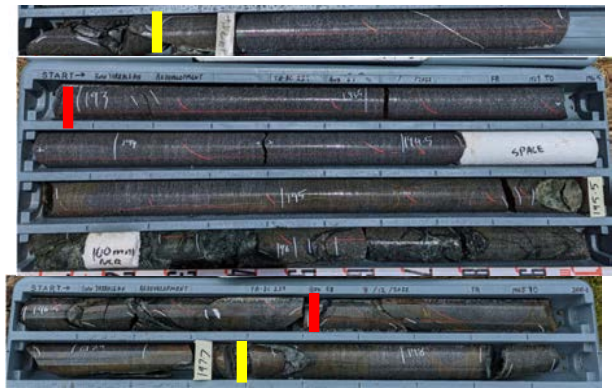
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	5.00	0.10	6.9%	0.30
10	450	555.84	10.00	0.20	11.6%	0.36
10	500	605.84	18.00	0.36	12.7%	0.59
10	450	555.84	10.00	0.20	11.6%	0.36
10	225	330.84	4.00	0.08	6.9%	0.24





Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

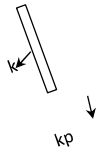
uL (Fell et al., 2005) - upper chart	0.46
uL (Houlsby, 1976) - lower chart	0.24

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	8.2E-08	m/sec
ke/kp = 100	7.0E-08	m/sec
ke/kp = 10	5.9E-08	m/sec
ke/kp = 1	4.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.0E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 202m to 207m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 202.0 m to 207.0 m length 5.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

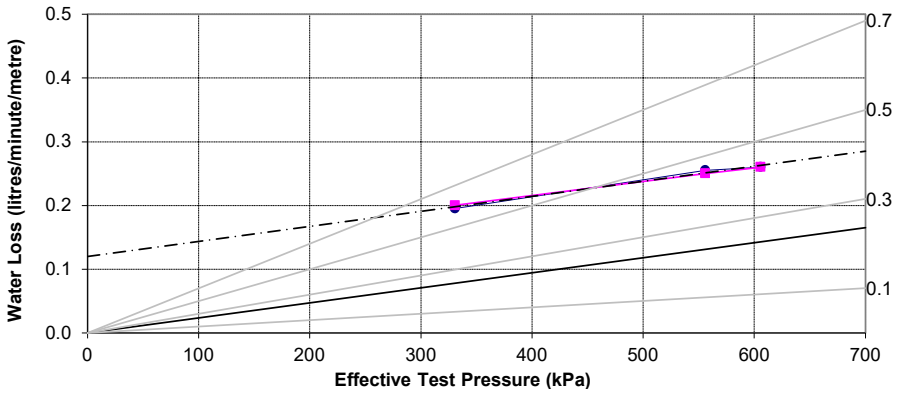
centre of test section (downhole): 204.50 m

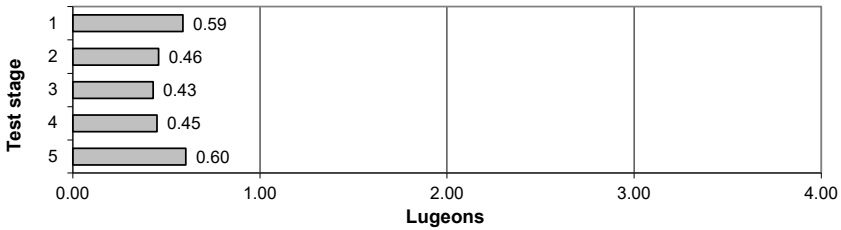
test depth converted to vertical: 192.17 m

relative level at centre of test section: 377.8 m RL

correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	9.75	0.20	6.6%	0.59
10	450	555.84	12.75	0.26	11.1%	0.46
10	500	605.84	13.00	0.26	12.1%	0.43
10	450	555.84	12.50	0.25	11.1%	0.45
10	225	330.84	10.00	0.20	6.6%	0.60





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

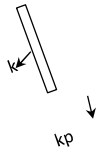
uL (Fell et al., 2005) - upper chart	0.24
uL (Houlsby, 1976) - lower chart	0.43

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.0E-07	m/sec
ke/kp = 100	8.8E-08	m/sec
ke/kp = 10	7.3E-08	m/sec
ke/kp = 1	5.9E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.3E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 214m to 219m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 214.0 m to 219.0 m length 5.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

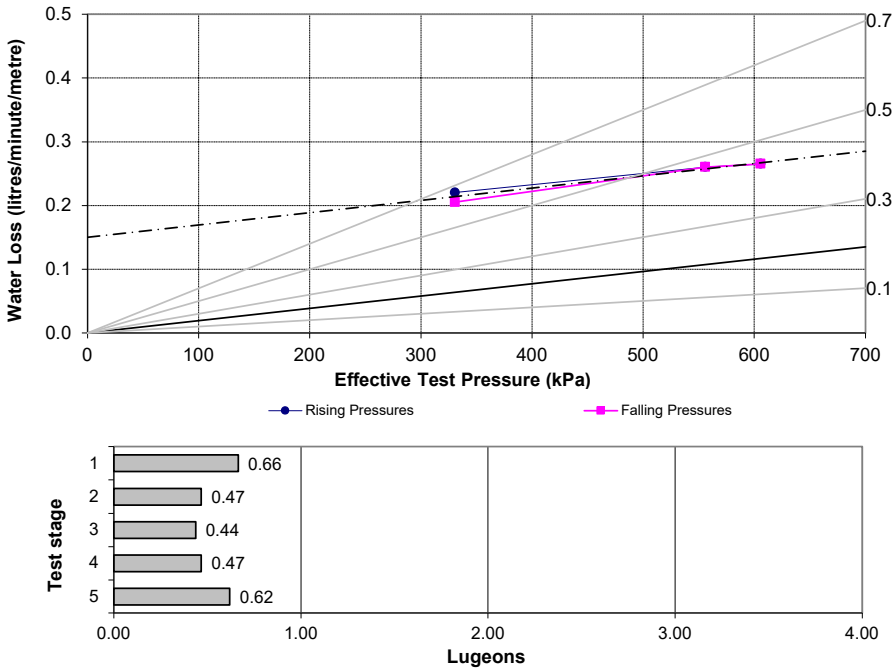
centre of test section (downhole): 216.50 m

test depth converted to vertical: 203.44 m

relative level at centre of test section: 366.5 m RL

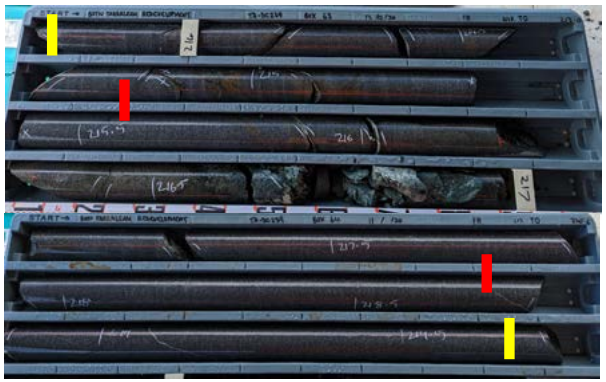
correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	11.00	0.22	6.3%	0.66
10	450	555.84	13.00	0.26	10.5%	0.47
10	500	605.84	13.25	0.27	11.5%	0.44
10	450	555.84	13.00	0.26	10.5%	0.47
10	225	330.84	10.25	0.21	6.3%	0.62



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

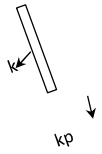
uL (Fell et al., 2005) - upper chart	0.19
uL (Houlsby, 1976) - lower chart	0.44

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.0E-07	m/sec
ke/kp = 100	9.0E-08	m/sec
ke/kp = 10	7.5E-08	m/sec
ke/kp = 1	6.0E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.4E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 220m to 223m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 220.0 m to 223.0 m length 3.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

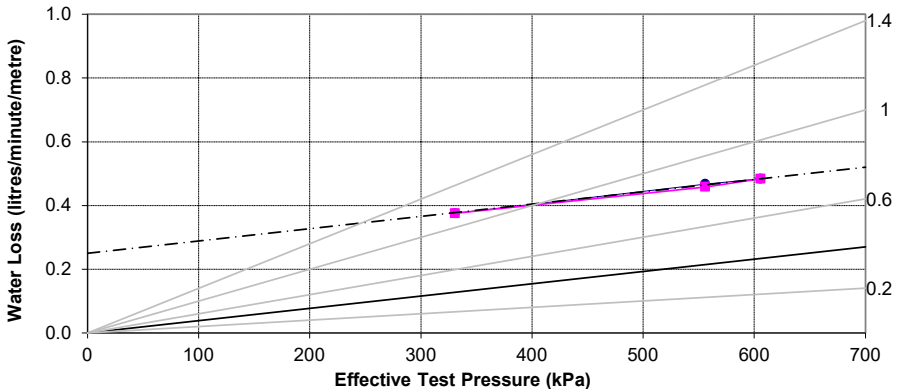
centre of test section (downhole): 221.50 m

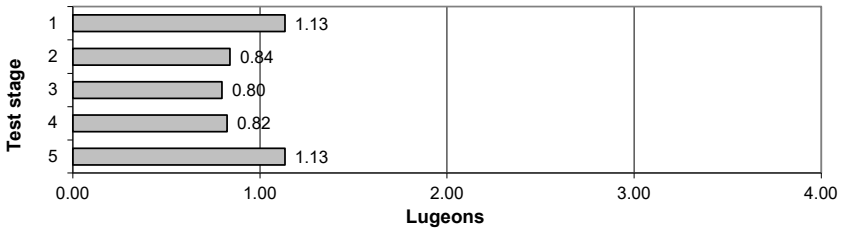
test depth converted to vertical: 208.14 m

relative level at centre of test section: 361.8 m RL

correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	11.25	0.38	6.1%	1.13
10	450	555.84	14.00	0.47	10.3%	0.84
10	500	605.84	14.50	0.48	11.2%	0.80
10	450	555.84	13.75	0.46	10.3%	0.82
10	225	330.84	11.25	0.38	6.1%	1.13





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

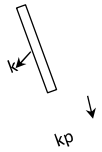
uL (Fell et al., 2005) - upper chart	0.39
uL (Houlsby, 1976) - lower chart	0.80

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.8E-07	m/sec
ke/kp = 100	1.5E-07	m/sec
ke/kp = 10	1.2E-07	m/sec
ke/kp = 1	9.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 229m to 232m

hole no: TA-DC239 date: 22-Dec-22

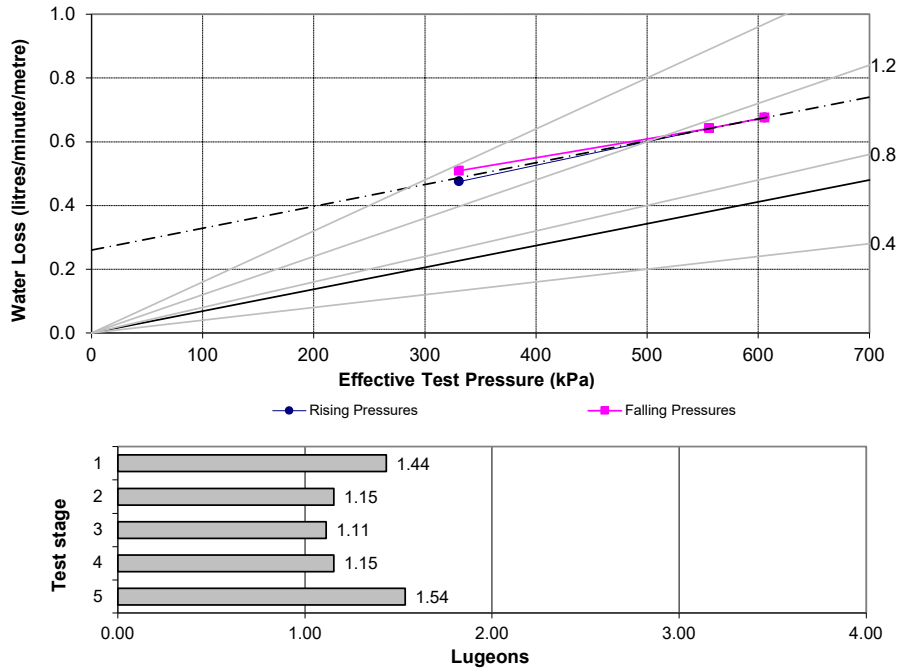
project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 229.0 m to 232.0 m length 3.0 m

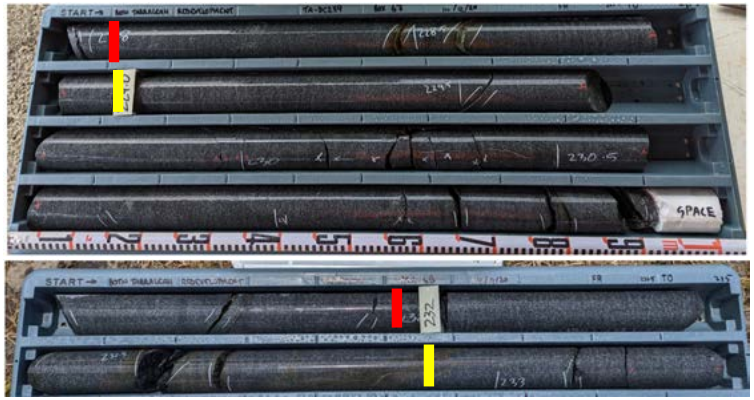
relative level at surface:	569.97 m RL	centre of test section (downhole):	230.50 m
gauge height:	0.8 m	test depth converted to vertical:	216.60 m
inclination of borehole:	70 °	relative level at centre of test section:	353.4 m RL
inferred groundwater level:	560.0 m RL	correction to gauge pressure:	105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	14.25	0.48	5.9%	1.44
10	450	555.84	19.25	0.64	9.9%	1.15
10	500	605.84	20.25	0.68	10.8%	1.11
10	450	555.84	19.25	0.64	9.9%	1.15
10	225	330.84	15.25	0.51	5.9%	1.54



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

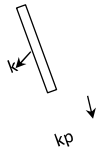
uL (Fell et al., 2005) - upper chart	0.69
uL (Houlsby, 1976) - lower chart	1.11

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.1E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 234.5m to 237.5m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 234.5 m to 237.5 m length 3.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

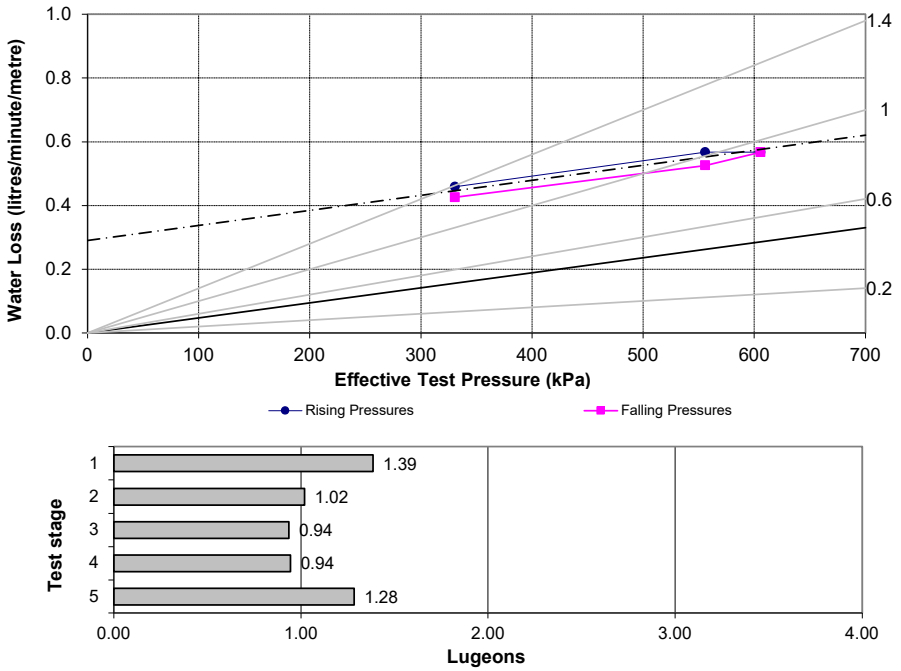
centre of test section (downhole): 236.00 m

test depth converted to vertical: 221.77 m

relative level at centre of test section: 348.2 m RL

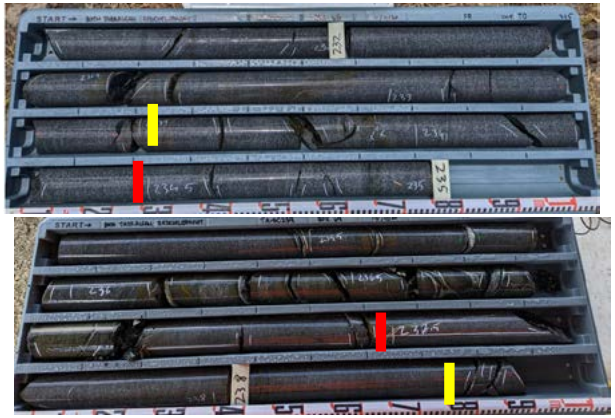
correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	13.75	0.46	5.7%	1.39
10	450	555.84	17.00	0.57	9.6%	1.02
10	500	605.84	17.00	0.57	10.5%	0.94
10	450	555.84	15.75	0.53	9.6%	0.94
10	225	330.84	12.75	0.43	5.7%	1.28



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

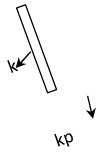
uL (Fell et al., 2005) - upper chart	0.47
uL (Houlsby, 1976) - lower chart	0.94

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.1E-07	m/sec
ke/kp = 100	1.8E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 249.1m to 254.1m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 249.1 m to 254.1 m length 5.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

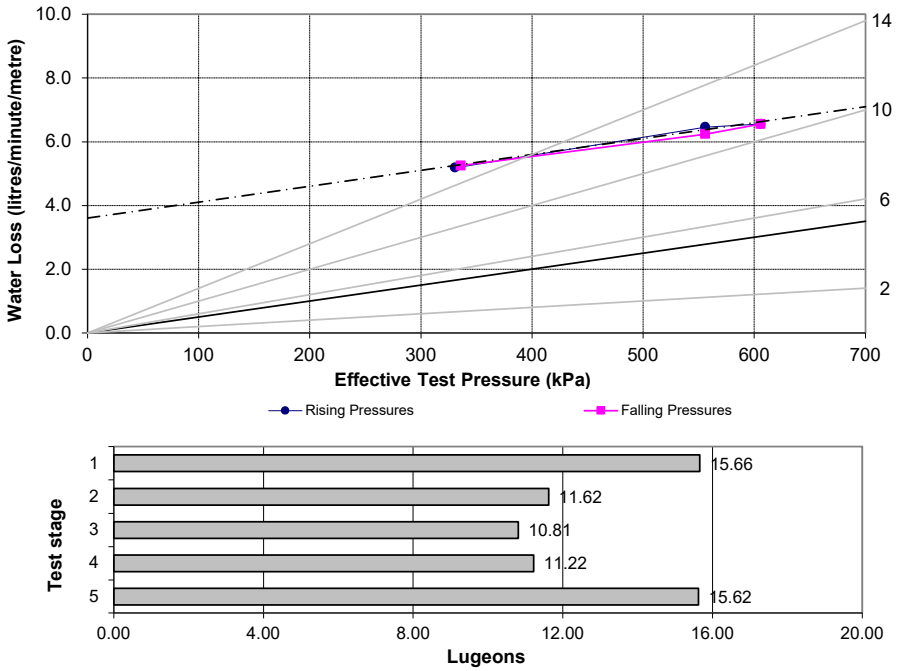
centre of test section (downhole): 251.60 m

test depth converted to vertical: 236.43 m

relative level at centre of test section: 333.5 m RL

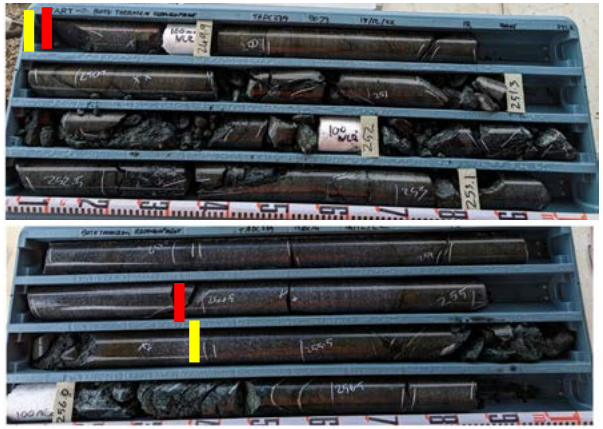
correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	259.00	5.18	5.4%	15.66
10	450	555.84	323.00	6.46	9.0%	11.62
10	500	605.84	327.50	6.55	9.9%	10.81
10	450	555.84	311.75	6.24	9.0%	11.22
10	230	335.84	262.25	5.25	5.5%	15.62



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

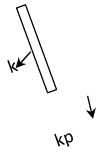
uL (Fell et al., 2005) - upper chart	5.00
uL (Houlsby, 1976) - lower chart	10.81

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.6E-06	m/sec
ke/kp = 100	2.2E-06	m/sec
ke/kp = 10	1.9E-06	m/sec
ke/kp = 1	1.5E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.6E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 255.5m to 261.2m

hole no: TA-DC239 date: 22-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 255.5 m to 261.2 m length 5.7 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 560.0 m RL

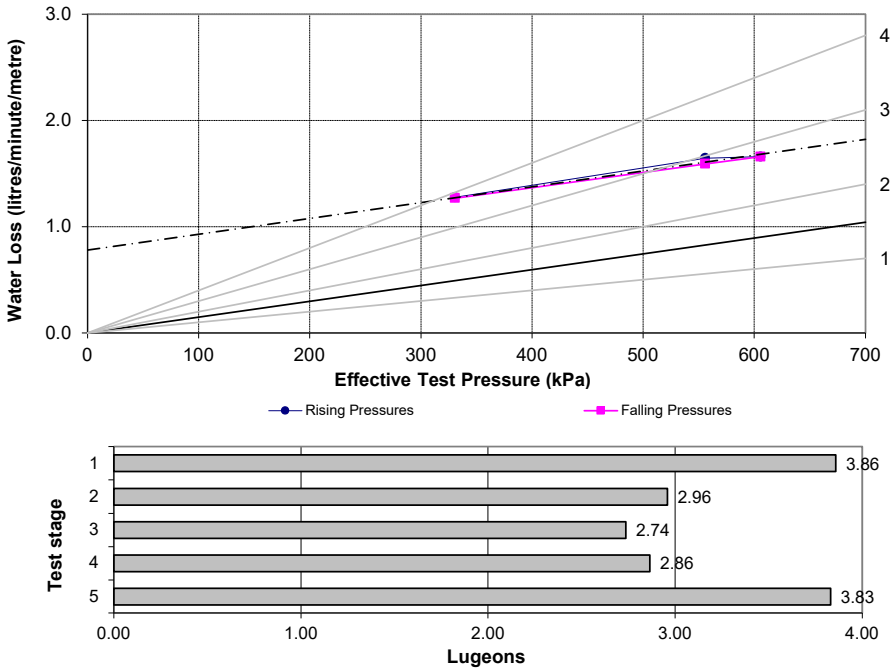
centre of test section (downhole): 258.35 m

test depth converted to vertical: 242.77 m

relative level at centre of test section: 327.2 m RL

correction to gauge pressure: 105.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	330.84	72.75	1.28	5.2%	3.86
10	450	555.84	93.75	1.64	8.8%	2.96
10	500	605.84	94.50	1.66	9.6%	2.74
10	450	555.84	90.75	1.59	8.8%	2.86
10	225	330.84	72.25	1.27	5.2%	3.83



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

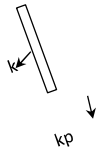
uL (Fell et al., 2005) - upper chart	1.49
uL (Houlsby, 1976) - lower chart	2.74

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.6E-07	m/sec
ke/kp = 100	5.7E-07	m/sec
ke/kp = 10	4.8E-07	m/sec
ke/kp = 1	3.8E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

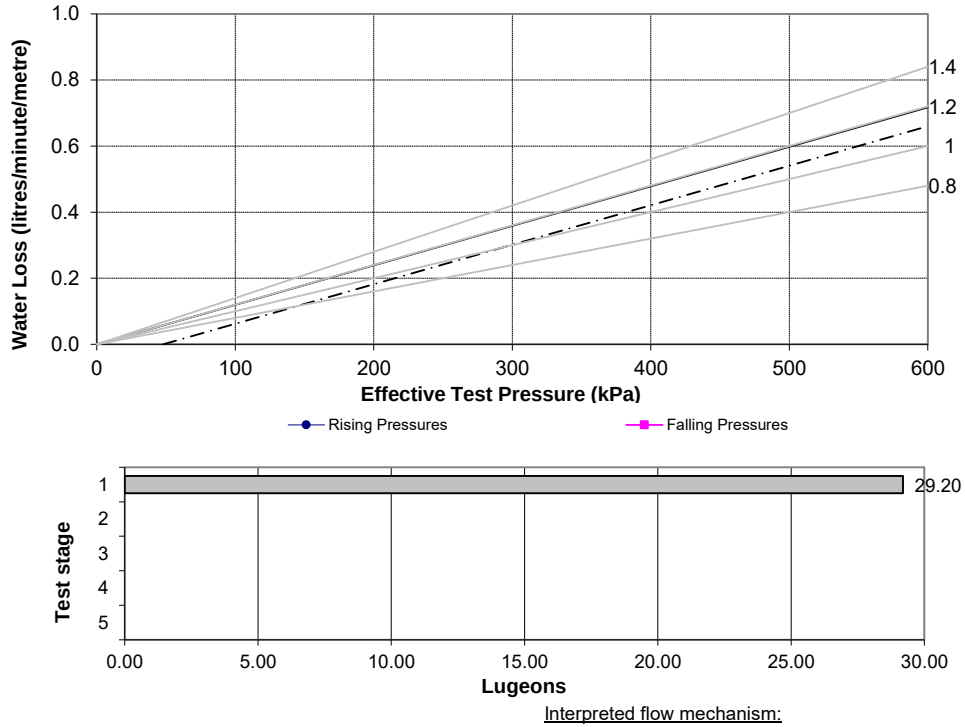
TA-DC239 : 145m to 148m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 145.0 m to 148.0 m length 3.0 m

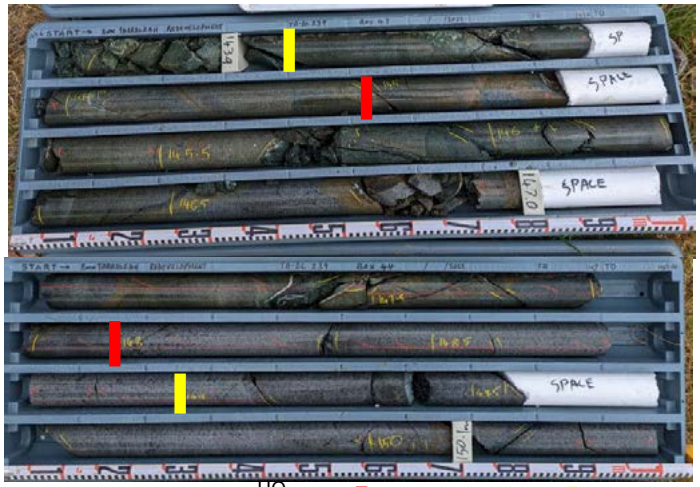
relative level at surface:	569.97 m RL	centre of test section (downhole):	146.50 m
gauge height:	0.8 m	test depth converted to vertical:	137.66 m
inclination of borehole:	70 °	relative level at centre of test section:	432.3 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	252.00	8.40	8.0%	29.20
Cannot increase water pressure past 150kPa. Represents high permeability through defects						



Interpreted flow mechanism:

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

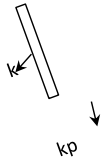
uL (Fell et al., 2005) - upper chart	1.20
uL (Houlsby, 1976) - lower chart	

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	#DIV/0!	m/sec
ke/kp = 100	#DIV/0!	m/sec
ke/kp = 10	#DIV/0!	m/sec
ke/kp = 1	#DIV/0!	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: #DIV/0! m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 165m to 168m

hole no: TA-DC239 date: 20-Dec-22

project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 165.0 m to 168.0 m length 3.0 m

relative level at surface: 569.97 m RL

gauge height: 0.8 m

inclination of borehole: 70 °

inferred groundwater level: 564.4 m RL

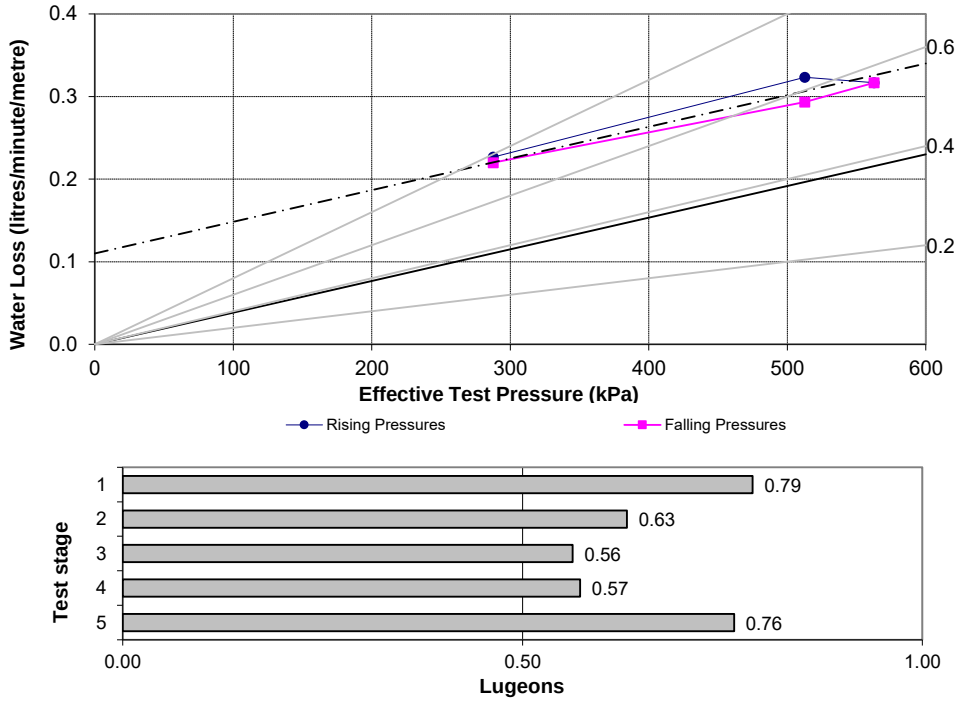
centre of test section (downhole): 166.50 m

test depth converted to vertical: 156.46 m

relative level at centre of test section: 413.5 m RL

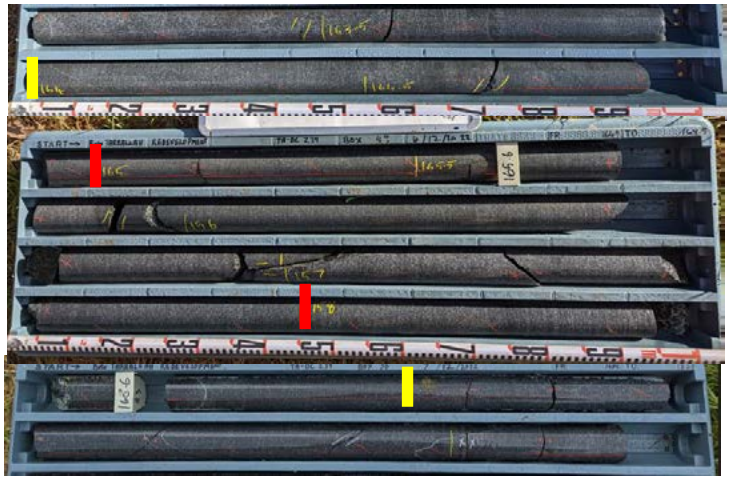
correction to gauge pressure: 62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	6.80	0.23	7.1%	0.79
10	450	512.72	9.70	0.32	12.6%	0.63
10	500	562.72	9.50	0.32	13.8%	0.56
10	450	512.72	8.50	0.29	12.6%	0.57
10	225	287.72	6.60	0.22	7.1%	0.76



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

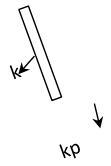
uL (Fell et al., 2005) - upper chart	0.38
uL (Houlsby, 1976) - lower chart	0.56

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.2E-07	m/sec
ke/kp = 100	1.1E-07	m/sec
ke/kp = 10	8.6E-08	m/sec
ke/kp = 1	6.7E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.2E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

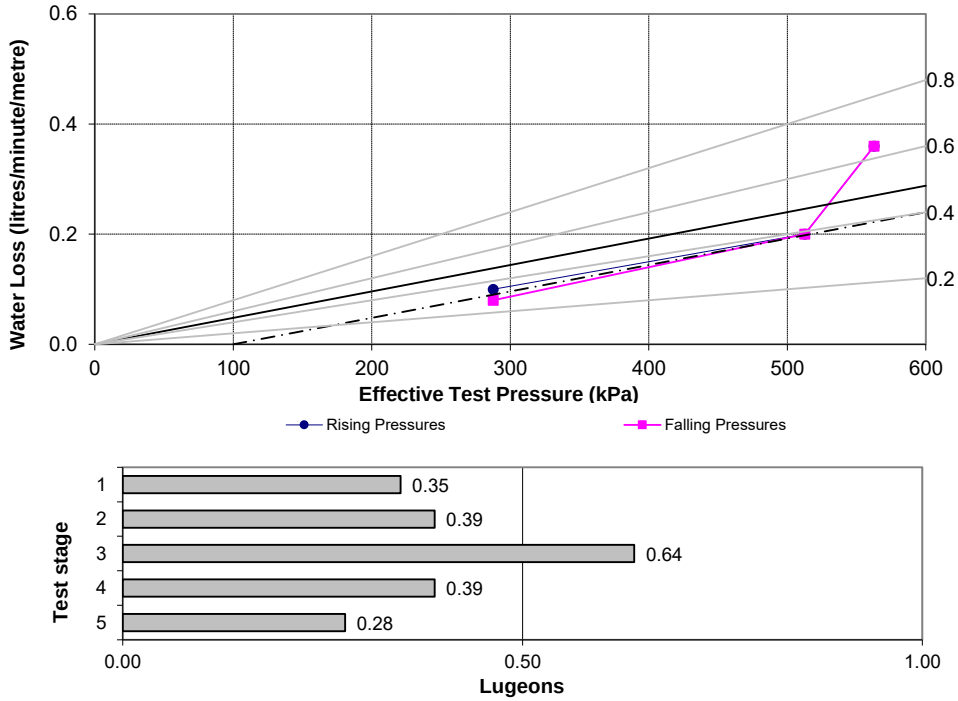
TA-DC239 : 193m to 198m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 193.0 m to 198.0 m length 5.0 m

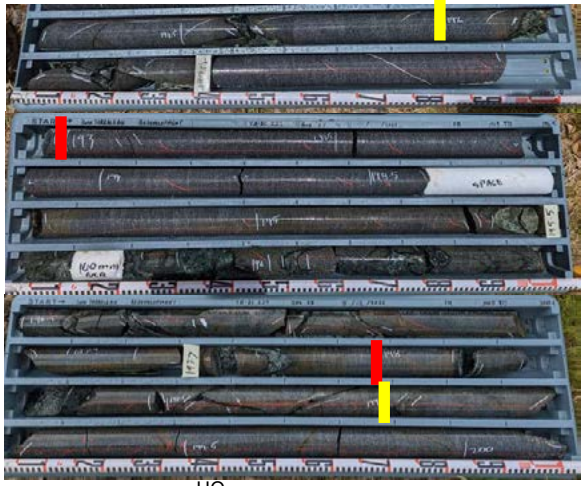
relative level at surface:	569.97 m RL	centre of test section (downhole):	195.50 m
gauge height:	0.8 m	test depth converted to vertical:	183.71 m
inclination of borehole:	70 °	relative level at centre of test section:	386.3 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	5.00	0.10	6.0%	0.35
10	450	512.72	10.00	0.20	10.7%	0.39
10	500	562.72	18.00	0.36	11.8%	0.64
10	450	512.72	10.00	0.20	10.7%	0.39
10	225	287.72	4.00	0.08	6.0%	0.28



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

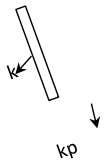
uL (Fell et al., 2005) - upper chart	0.48
uL (Houlsby, 1976) - lower chart	0.28

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	8.9E-08	m/sec
ke/kp = 100	7.7E-08	m/sec
ke/kp = 10	6.4E-08	m/sec
ke/kp = 1	5.1E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.5E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC239 : 202m to 207m

hole no: TA-DC239 date: 20-Dec-22

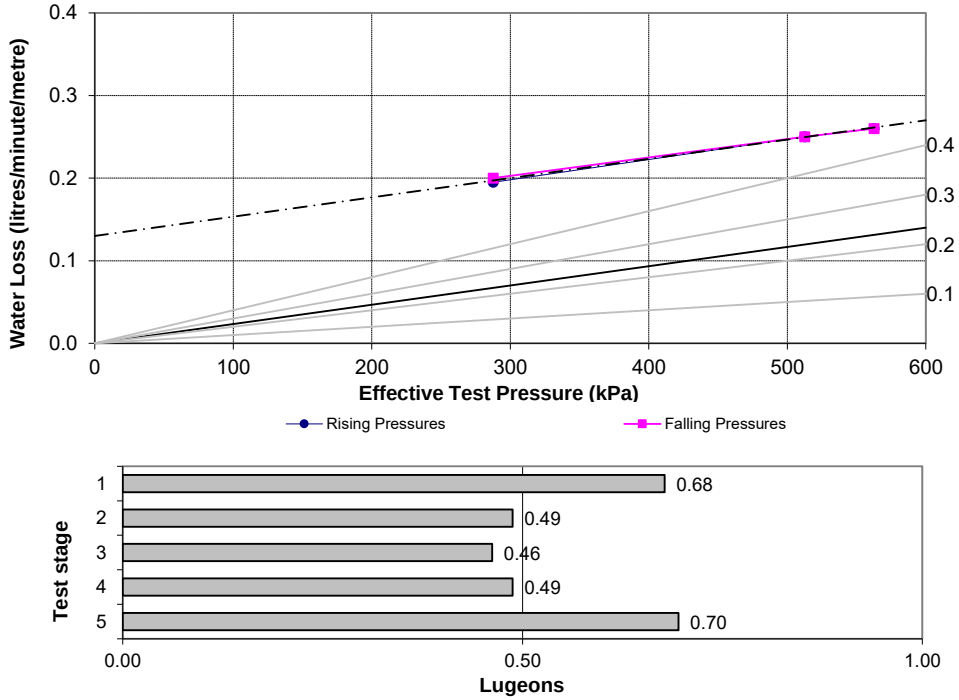
project: BOTN

location: Tarraleah Hillside by: JK

section tested: from 202.0 m to 207.0 m length 5.0 m

relative level at surface:	569.97 m RL	centre of test section (downhole):	204.50 m
gauge height:	0.8 m	test depth converted to vertical:	192.17 m
inclination of borehole:	70 °	relative level at centre of test section:	377.8 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	9.75	0.20	5.8%	0.68
20	450	512.72	25.00	0.25	10.3%	0.49
10	500	562.72	13.00	0.26	11.3%	0.46
10	450	512.72	12.50	0.25	10.3%	0.49
10	225	287.72	10.00	0.20	5.8%	0.70



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

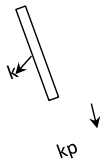
uL (Fell et al., 2005) - upper chart	0.23
uL (Houlsby, 1976) - lower chart	0.46

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.1E-07	m/sec
ke/kp = 100	9.6E-08	m/sec
ke/kp = 10	8.0E-08	m/sec
ke/kp = 1	6.4E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 6.9E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

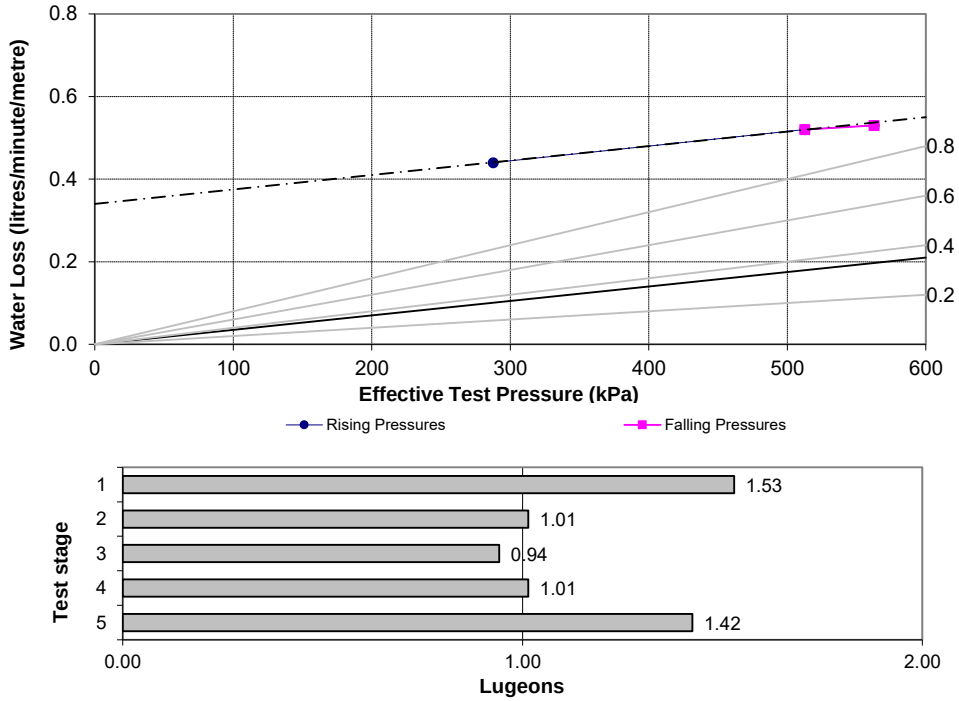
TA-DC239 : 214m to 219m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 214.0 m to 219.0 m length 5.0 m

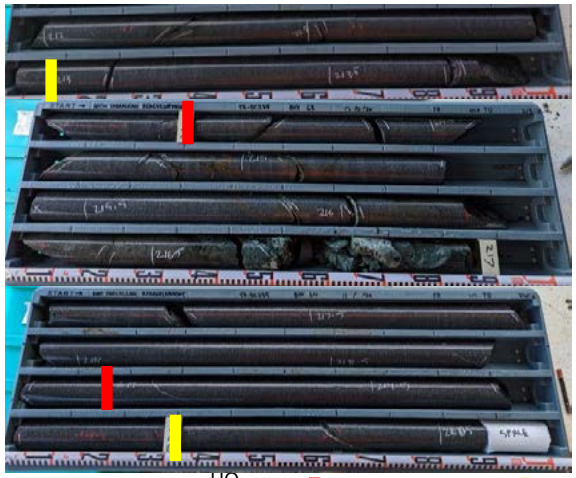
relative level at surface:	569.97 m RL	centre of test section (downhole):	216.50 m
gauge height:	0.8 m	test depth converted to vertical:	203.44 m
inclination of borehole:	70 °	relative level at centre of test section:	366.5 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	287.72	11.00	0.44	5.4%	1.53
5	450	512.72	13.00	0.52	9.7%	1.01
5	500	562.72	13.25	0.53	10.6%	0.94
5	450	512.72	13.00	0.52	9.7%	1.01
5	225	287.72	10.25	0.41	5.4%	1.42



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

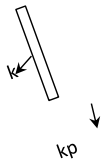
uL (Fell et al., 2005) - upper chart	0.35
uL (Houlsby, 1976) - lower chart	0.94

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.3E-07	m/sec
ke/kp = 100	2.0E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

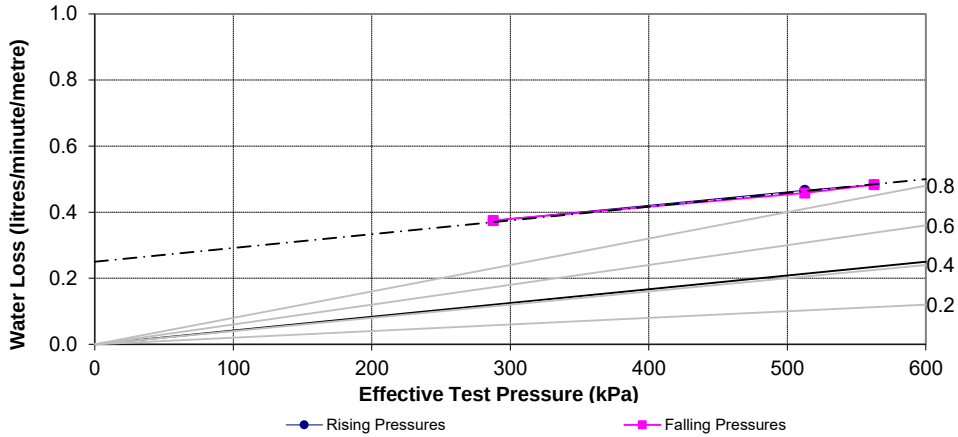
TA-DC239 : 220m to 223m

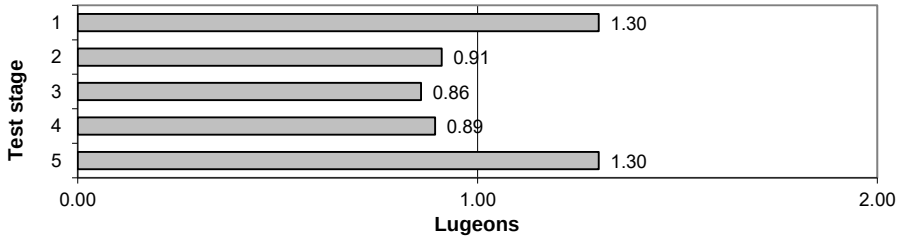
hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 220.0 m to 223.0 m length 3.0 m

relative level at surface:	569.97 m RL	centre of test section (downhole):	221.50 m
gauge height:	0.8 m	test depth converted to vertical:	208.14 m
inclination of borehole:	70 °	relative level at centre of test section:	361.8 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

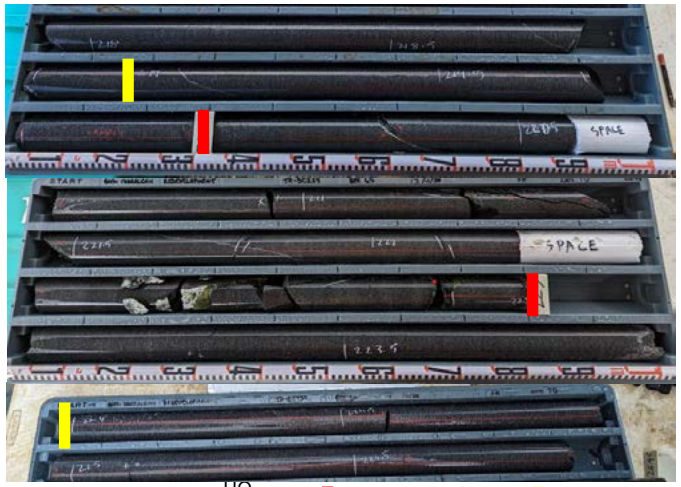
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	11.25	0.38	5.3%	1.30
10	450	512.72	14.00	0.47	9.5%	0.91
10	500	562.72	14.50	0.48	10.4%	0.86
10	450	512.72	13.75	0.46	9.5%	0.89
10	225	287.72	11.25	0.38	5.3%	1.30





Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ$_3$

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

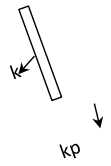
uL (Fell et al., 2005) - upper chart	0.42
uL (Houlsby, 1976) - lower chart	1.05

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.0E-07	m/sec
ke/kp = 100	1.7E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

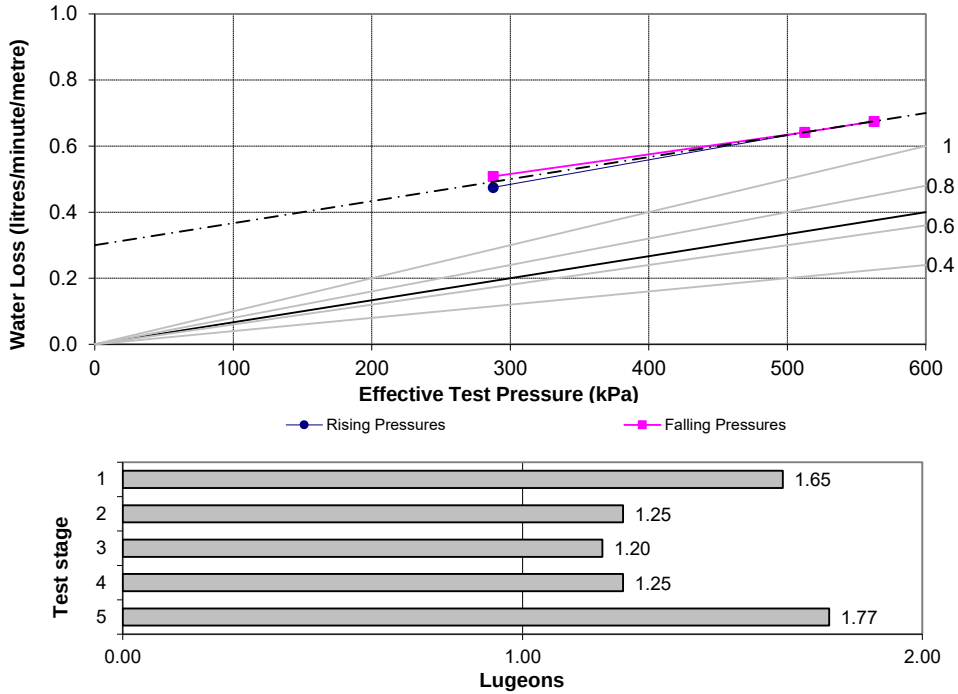
TA-DC239 : 229m to 232m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 229.0 m to 232.0 m length 3.0 m

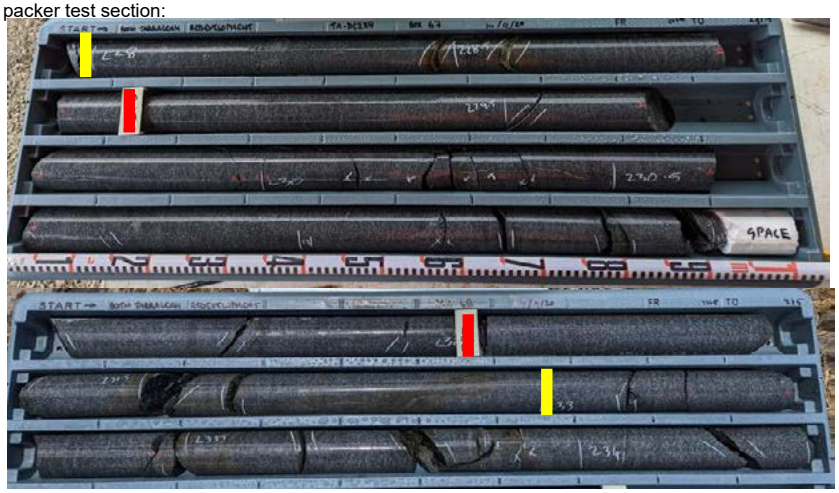
relative level at surface:	569.97 m RL	centre of test section (downhole):	230.50 m
gauge height:	0.8 m	test depth converted to vertical:	216.60 m
inclination of borehole:	70 °	relative level at centre of test section:	353.4 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	14.25	0.48	5.1%	1.65
10	450	512.72	19.25	0.64	9.1%	1.25
10	500	562.72	20.25	0.68	10.0%	1.20
10	450	512.72	19.25	0.64	9.1%	1.25
10	225	287.72	15.25	0.51	5.1%	1.77



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

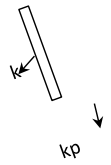
uL (Fell et al., 2005) - upper chart	0.67
uL (Houlsby, 1976) - lower chart	1.20

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.7E-07	m/sec
ke/kp = 100	2.3E-07	m/sec
ke/kp = 10	1.9E-07	m/sec
ke/kp = 1	1.5E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.6E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

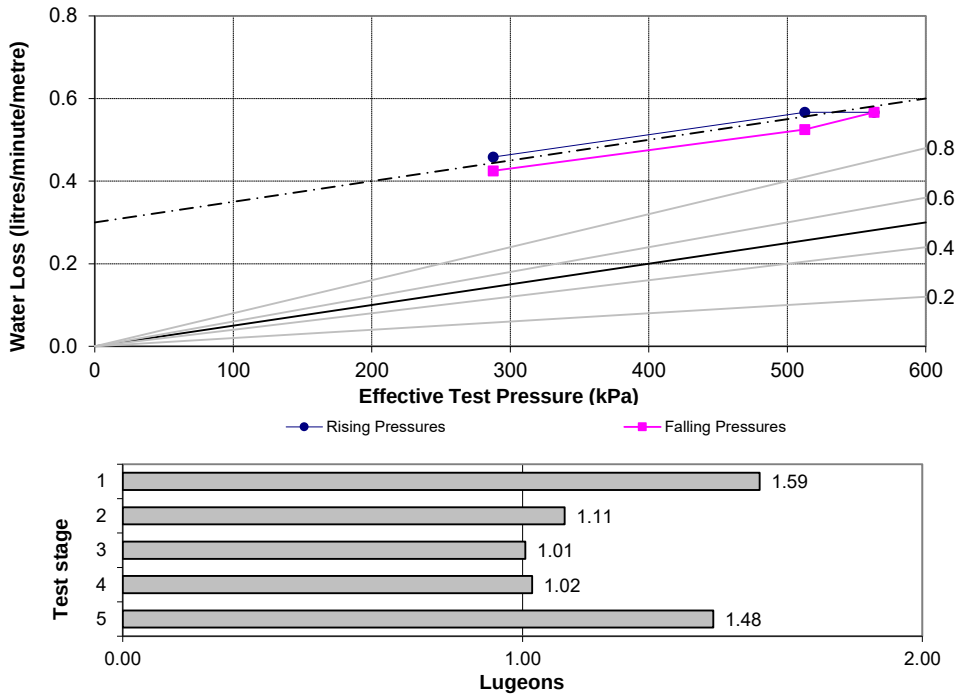
TA-DC239 : 234.5m to 237.5m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 234.5 m to 237.5 m length 3.0 m

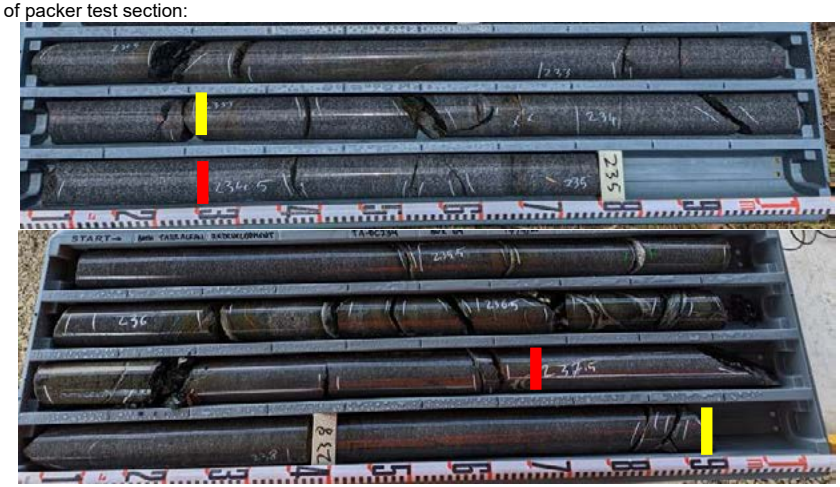
relative level at surface:	569.97 m RL	centre of test section (downhole):	236.00 m
gauge height:	0.8 m	test depth converted to vertical:	221.77 m
inclination of borehole:	70 °	relative level at centre of test section:	348.2 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	13.75	0.46	5.0%	1.59
10	450	512.72	17.00	0.57	8.9%	1.11
10	500	562.72	17.00	0.57	9.8%	1.01
10	450	512.72	15.75	0.53	8.9%	1.02
10	225	287.72	12.75	0.43	5.0%	1.48



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

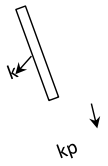
uL (Fell et al., 2005) - upper chart	0.50
uL (Houlsby, 1976) - lower chart	1.01

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.3E-07	m/sec
ke/kp = 100	1.9E-07	m/sec
ke/kp = 10	1.6E-07	m/sec
ke/kp = 1	1.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.3E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

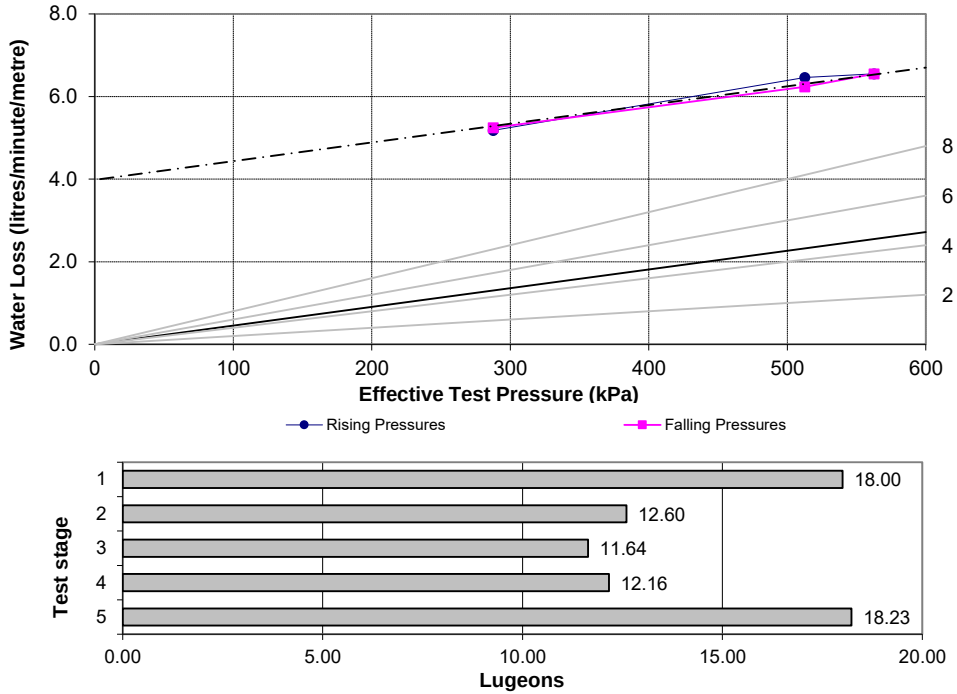
TA-DC239 : 249.1m to 254.1m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 249.1 m to 254.1 m length 5.0 m

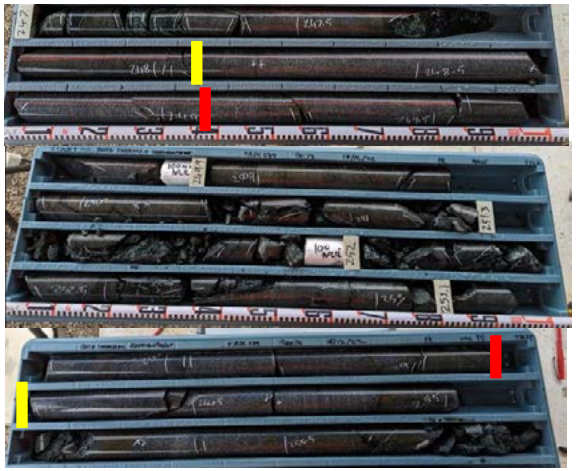
relative level at surface:	569.97 m RL	centre of test section (downhole):	251.60 m
gauge height:	0.8 m	test depth converted to vertical:	236.43 m
inclination of borehole:	70 °	relative level at centre of test section:	333.5 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	259.00	5.18	4.7%	18.00
10	450	512.72	323.00	6.46	8.3%	12.60
10	500	562.72	327.50	6.55	9.2%	11.64
10	450	512.72	311.75	6.24	8.3%	12.16
10	225	287.72	262.25	5.25	4.7%	18.23



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

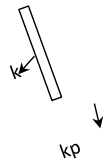
uL (Fell et al., 2005) - upper chart	4.53
uL (Houlsby, 1976) - lower chart	11.64

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.9E-06	m/sec
ke/kp = 100	2.5E-06	m/sec
ke/kp = 10	2.1E-06	m/sec
ke/kp = 1	1.6E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.8E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

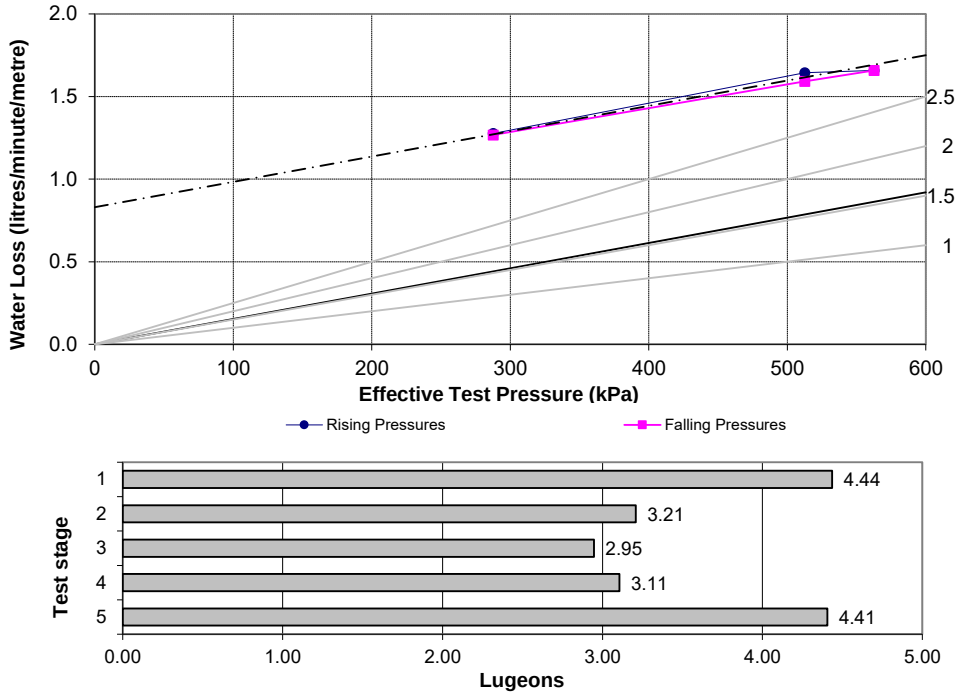
TA-DC239 : 255.5m to 261.2m

hole no:	TA-DC239	date:	20-Dec-22
project:	BOTN		
location:	Tarraleah Hillside	by:	JK

section tested: from 255.5 m to 261.2 m length 5.7 m

relative level at surface:	569.97 m RL	centre of test section (downhole):	258.35 m
gauge height:	0.8 m	test depth converted to vertical:	242.77 m
inclination of borehole:	70 °	relative level at centre of test section:	327.2 m RL
inferred groundwater level:	564.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	225	287.72	72.75	1.28	4.6%	4.44
10	450	512.72	93.75	1.64	8.1%	3.21
10	500	562.72	94.50	1.66	8.9%	2.95
10	450	512.72	90.75	1.59	8.1%	3.11
10	225	287.72	72.25	1.27	4.6%	4.41



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

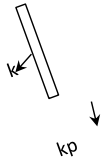
uL (Fell et al., 2005) - upper chart	1.53
uL (Houlsby, 1976) - lower chart	2.95

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.3E-07	m/sec
ke/kp = 100	6.3E-07	m/sec
ke/kp = 10	5.3E-07	m/sec
ke/kp = 1	4.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC241 : 22m to 25m

hole no: TA-DC241 date: 22-Feb-23

project: BOTN

location: Surge Shaft by: BA

section tested: from 22.0 m to 25.0 m length 3.0 m

relative level at surface: 657.62 m RL

gauge height: 0.8 m

inclination of borehole: 71 °

inferred groundwater level: 655.57 m RL

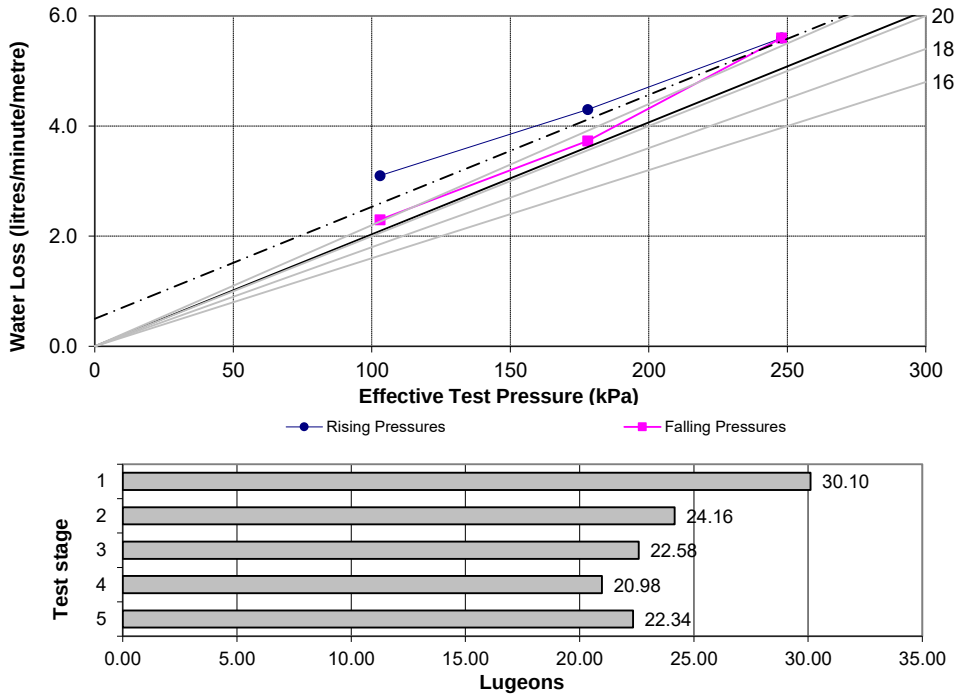
centre of test section (downhole): 23.50 m

test depth converted to vertical: 22.22 m

relative level at centre of test section: 635.4 m RL

correction to gauge pressure: 28.0 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
10	75	102.98	93.00	3.10	17.8%	30.10
10	150	177.98	129.00	4.30	30.8%	24.16
10	220	247.98	168.00	5.60	42.9%	22.58
10	150	177.98	112.00	3.73	30.8%	20.98
10	75	102.98	69.00	2.30	17.8%	22.34



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

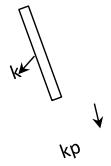
uL (Fell et al., 2005) - upper chart	20.33
uL (Houlsby, 1976) - lower chart	22.34

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.4E-06	m/sec
ke/kp = 100	3.8E-06	m/sec
ke/kp = 10	3.1E-06	m/sec
ke/kp = 1	2.4E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.6E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

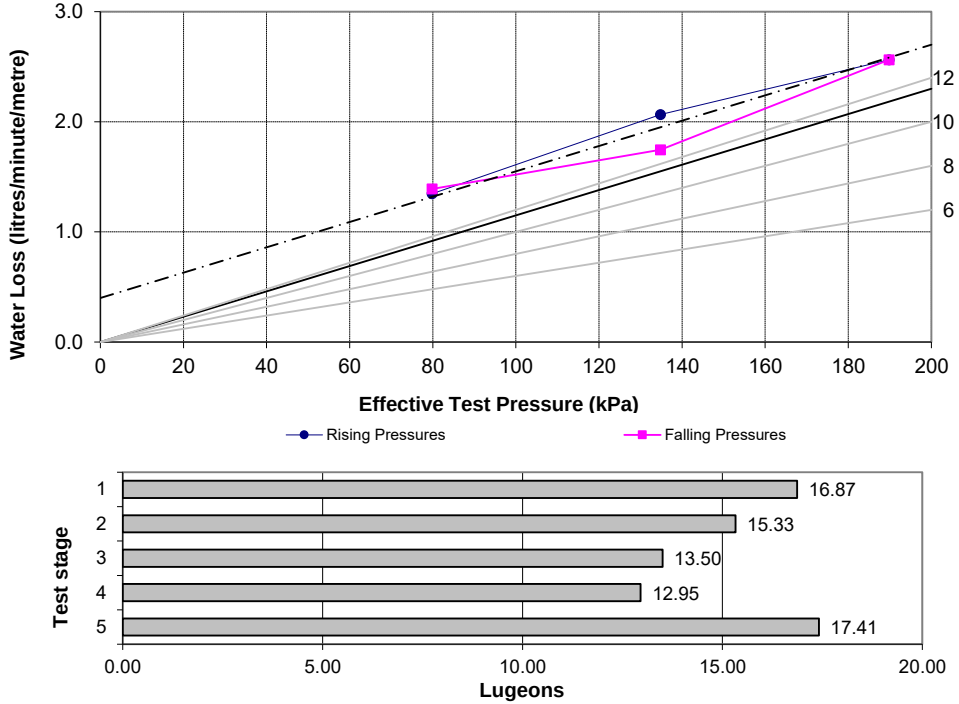
TA-DC247 : 14.5m to 17.5m

hole no:	TA-DC247	date:	2-Mar-23
project:	BOTN		
location:	Mossy Marsh	by:	BA

section tested: from 14.5 m to 17.5 m length 3.0 m

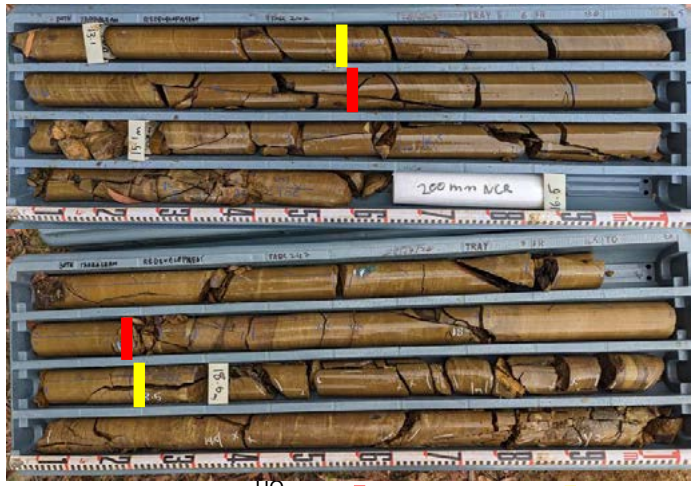
relative level at surface:	680.81 m RL	centre of test section (downhole):	16.00 m
gauge height:	0.8 m	test depth converted to vertical:	15.45 m
inclination of borehole:	75 °	relative level at centre of test section:	665.4 m RL
inferred groundwater level:	679.08 m RL	correction to gauge pressure:	24.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	79.83	20.20	1.35	19.9%	16.87
5	110	134.83	31.00	2.07	33.6%	15.33
5	165	189.83	38.45	2.56	47.2%	13.50
5	110	134.83	26.20	1.75	33.6%	12.95
5	55	79.83	20.85	1.39	19.9%	17.41



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: SILTSTONE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

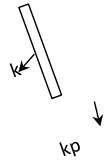
uL (Fell et al., 2005) - upper chart	11.50
uL (Houlsby, 1976) - lower chart	13.50

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.9E-06	m/sec
ke/kp = 100	2.5E-06	m/sec
ke/kp = 10	2.0E-06	m/sec
ke/kp = 1	1.6E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.7E-06 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC247 : 18.8m to 21.6m

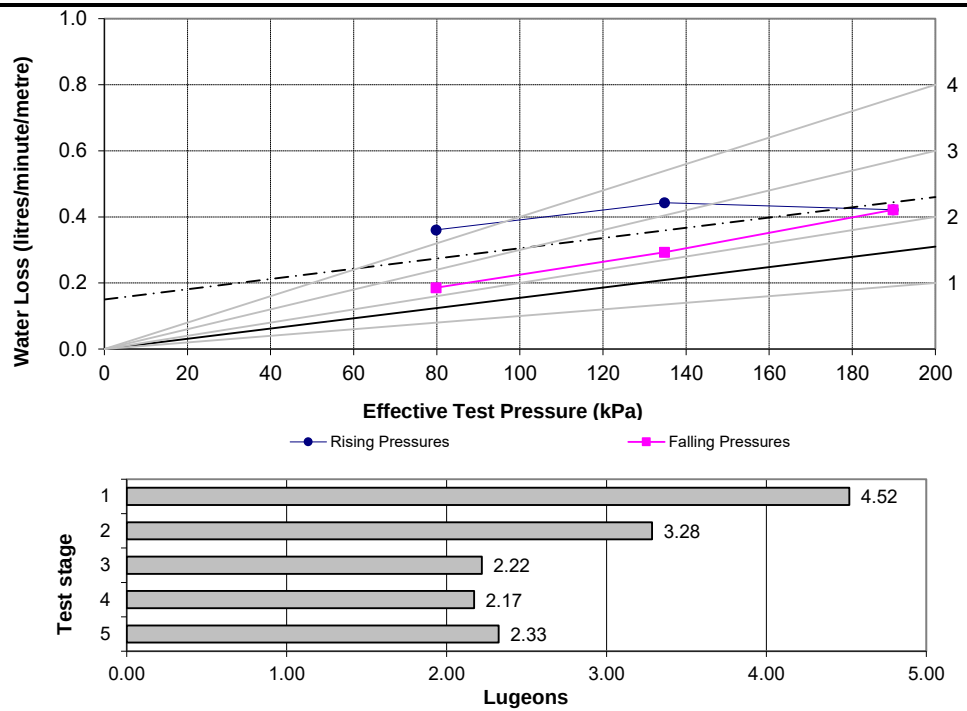
hole no: TA-DC247 date: 2-Mar-23
project: BOTN
location: Mossy Marsh by: BA

section tested: from 18.8 m to 21.6 m length 2.8 m

relative level at surface: 680.81 m RL
gauge height: 0.8 m
inclination of borehole: 75 °
inferred groundwater level: 679.08 m RL

centre of test section (downhole): 20.20 m
test depth converted to vertical: 19.51 m
relative level at centre of test section: 661.3 m RL
correction to gauge pressure: 24.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	55	79.83	5.05	0.36	15.7%	4.52
5	110	134.83	6.20	0.44	26.6%	3.28
5	165	189.83	5.90	0.42	37.4%	2.22
5	110	134.83	4.10	0.29	26.6%	2.17
5	55	79.83	2.60	0.19	15.7%	2.33



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3
Lithology: SILTSTONE

Packer boundary Packer Seal

Lugeon (uL) Assessment

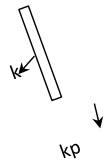
uL (Fell et al., 2005) - upper chart	1.55
uL (Houlsby, 1976) - lower chart	2.33

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.9E-07	m/sec
ke/kp = 100	4.1E-07	m/sec
ke/kp = 10	3.4E-07	m/sec
ke/kp = 1	2.6E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.8E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

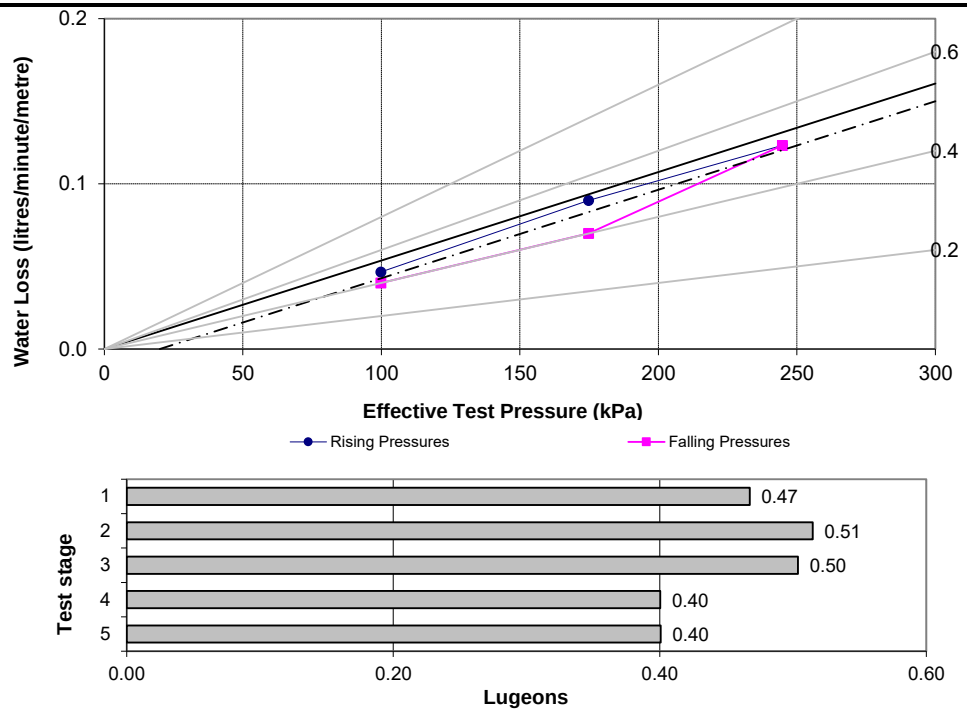
TA-DC247 : 22.5m to 25.5m

hole no:	TA-DC247	date:	2-Mar-23
project:	BOTN		
location:	Mossy Marsh	by:	BA

section tested: from 22.5 m to 25.5 m length 3.0 m

relative level at surface:	680.81 m RL	centre of test section (downhole):	24.00 m
gauge height:	0.8 m	test depth converted to vertical:	23.18 m
inclination of borehole:	75 °	relative level at centre of test section:	657.6 m RL
inferred groundwater level:	679.08 m RL	correction to gauge pressure:	24.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	75	99.83	0.70	0.05	16.6%	0.47
5	150	174.83	1.35	0.09	29.0%	0.51
5	220	244.83	1.85	0.12	40.6%	0.50
5	150	174.83	1.05	0.07	29.0%	0.40
5	75	99.83	0.60	0.04	16.6%	0.40



Interpreted flow mechanism: Dilation

Image of packer test section:



Core size: HQ_3

Lithology: SILTSTONE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

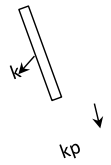
uL (Fell et al., 2005) - upper chart	0.54
uL (Houlsby, 1976) - lower chart	0.40

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	9.0E-08	m/sec
ke/kp = 100	7.6E-08	m/sec
ke/kp = 10	6.2E-08	m/sec
ke/kp = 1	4.9E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 5.3E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

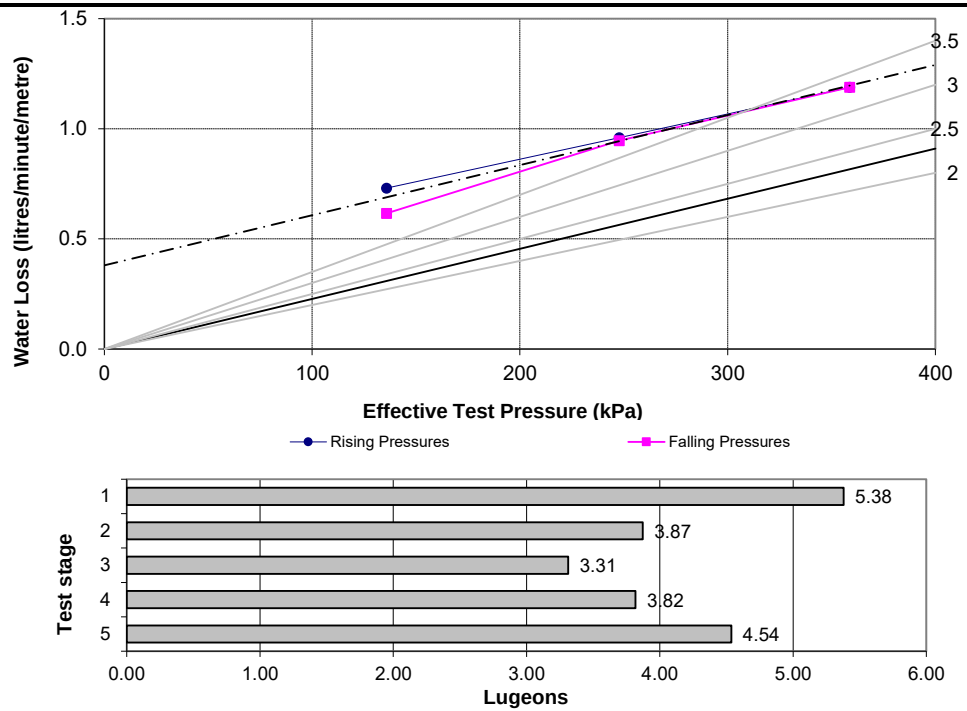
TA-DC247 : 30.33m to 33.3m

hole no:	TA-DC247	date:	2-Mar-23
project:	BOTN		
location:	Mossy Marsh	by:	BA

section tested: from 30.3 m to 33.3 m length 3.0 m

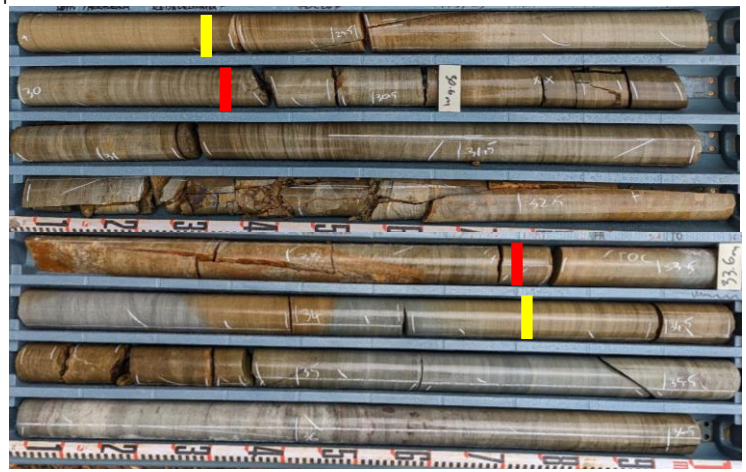
relative level at surface:	680.81 m RL	centre of test section (downhole):	31.82 m
gauge height:	0.8 m	test depth converted to vertical:	30.73 m
inclination of borehole:	75 °	relative level at centre of test section:	650.1 m RL
inferred groundwater level:	679.08 m RL	correction to gauge pressure:	24.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	111	135.83	10.85	0.73	17.0%	5.38
5	223	247.83	14.25	0.96	31.0%	3.87
5	334	358.83	17.65	1.19	44.9%	3.31
5	223	247.83	14.05	0.95	31.0%	3.82
5	111	135.83	9.15	0.62	17.0%	4.54



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: SILTSTONE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

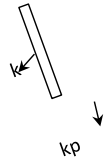
uL (Fell et al., 2005) - upper chart	2.28
uL (Houlsby, 1976) - lower chart	3.31

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.7E-07	m/sec
ke/kp = 100	6.5E-07	m/sec
ke/kp = 10	5.3E-07	m/sec
ke/kp = 1	4.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.5E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

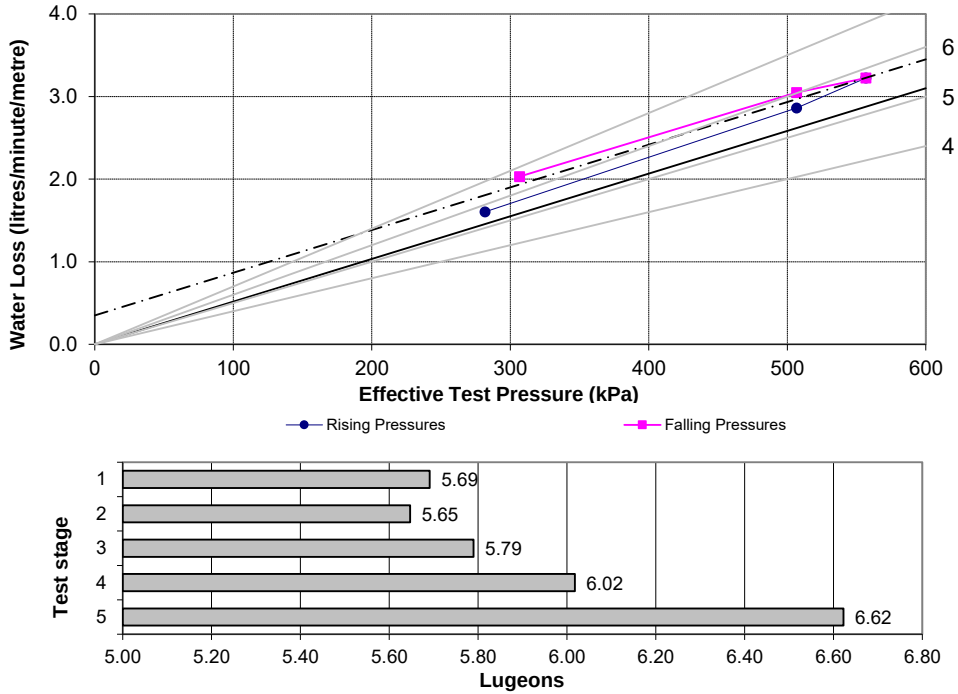
TA-DC249B : 105m to 110m

hole no:	TA-DC249B	date:	4-Apr-23
project:	BOTN		
location:	Tunnel alignment (Hornes Dam Road)	by:	OW

section tested: from 105.0 m to 110.0 m length 5.0 m

relative level at surface:	771.30 m RL	centre of test section (downhole):	107.50 m
gauge height:	0.8 m	test depth converted to vertical:	107.50 m
inclination of borehole:	90 °	relative level at centre of test section:	663.8 m RL
inferred groundwater level:	766.3 m RL	correction to gauge pressure:	56.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	281.84	40.10	1.60	10.1%	5.69
5	450	506.84	71.55	2.86	18.1%	5.65
5	500	556.84	80.60	3.22	19.9%	5.79
5	450	506.84	76.25	3.05	18.1%	6.02
5	250	306.84	50.80	2.03	11.0%	6.62



Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

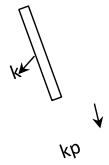
uL (Fell et al., 2005) - upper chart	5.17
uL (Houlsby, 1976) - lower chart	6.62

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.3E-06	m/sec
ke/kp = 100	1.1E-06	m/sec
ke/kp = 10	9.1E-07	m/sec
ke/kp = 1	7.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 7.7E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

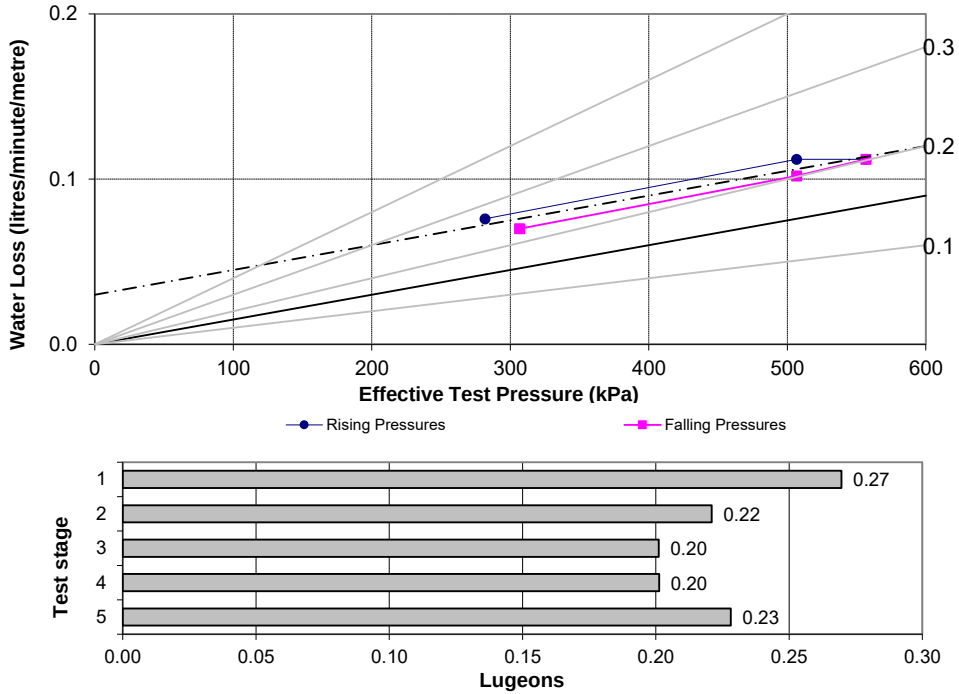
TA-DC249B : 154m to 159m

hole no:	TA-DC249B	date:	4-Apr-23
project:	BOTN		
location:	Tunnel alignment (Hornes Dam Road)	by:	OW

section tested: from 154.0 m to 159.0 m length 5.0 m

relative level at surface:	771.30 m RL	centre of test section (downhole):	156.50 m
gauge height:	0.8 m	test depth converted to vertical:	156.50 m
inclination of borehole:	90 °	relative level at centre of test section:	614.8 m RL
inferred groundwater level:	766.3 m RL	correction to gauge pressure:	56.8 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	281.84	1.90	0.08	6.9%	0.27
5	450	506.84	2.80	0.11	12.5%	0.22
5	500	556.84	2.80	0.11	13.7%	0.20
5	450	506.84	2.55	0.10	12.5%	0.20
5	250	306.84	1.75	0.07	7.5%	0.23



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

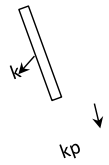
uL (Fell et al., 2005) - upper chart	0.15
uL (Houlsby, 1976) - lower chart	0.20

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.5E-08	m/sec
ke/kp = 100	3.8E-08	m/sec
ke/kp = 10	3.2E-08	m/sec
ke/kp = 1	2.6E-08	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.7E-08 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

TA-DC249B : 166m to 171m

hole no: TA-DC249B date: 4-Apr-23

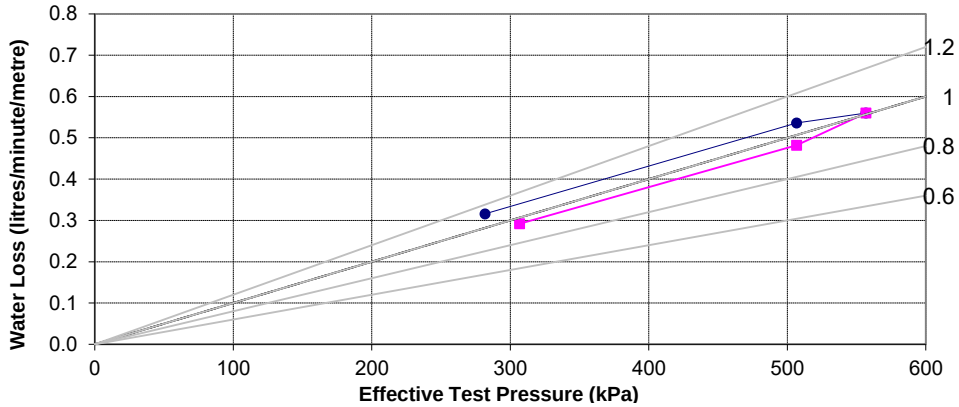
project: BOTN

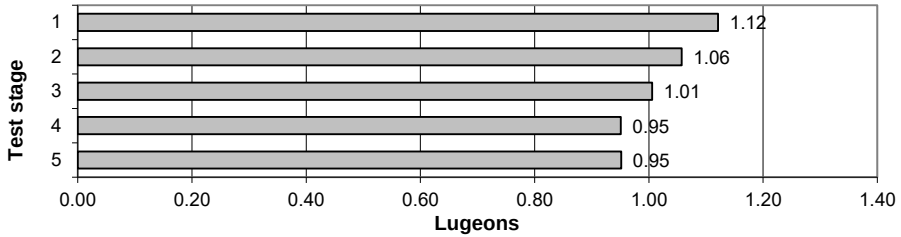
location: Tunnel alignment (Hornes Dam Road) by: OW

section tested: from 166.0 m to 171.0 m length 5.0 m

relative level at surface:	771.30 m RL	centre of test section (downhole):	168.50 m
gauge height:	0.8 m	test depth converted to vertical:	168.50 m
inclination of borehole:	90 °	relative level at centre of test section:	602.8 m RL
inferred groundwater level:	766.3 m RL	correction to gauge pressure:	56.8 kPa

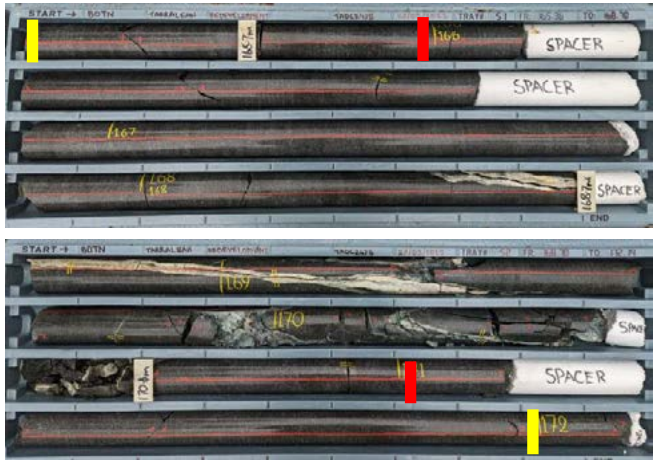
test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	281.84	7.90	0.32	6.4%	1.12
5	450	506.84	13.40	0.54	11.6%	1.06
5	500	556.84	14.00	0.56	12.7%	1.01
5	450	506.84	12.05	0.48	11.6%	0.95
5	250	306.84	7.30	0.29	7.0%	0.95





Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary Packer Seal

Lugeon (uL) Assessment

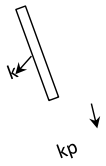
uL (Fell et al., 2005) - upper chart	1.00
uL (Houlsby, 1976) - lower chart	0.95

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.1E-07	m/sec
ke/kp = 100	1.8E-07	m/sec
ke/kp = 10	1.5E-07	m/sec
ke/kp = 1	1.2E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.3E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

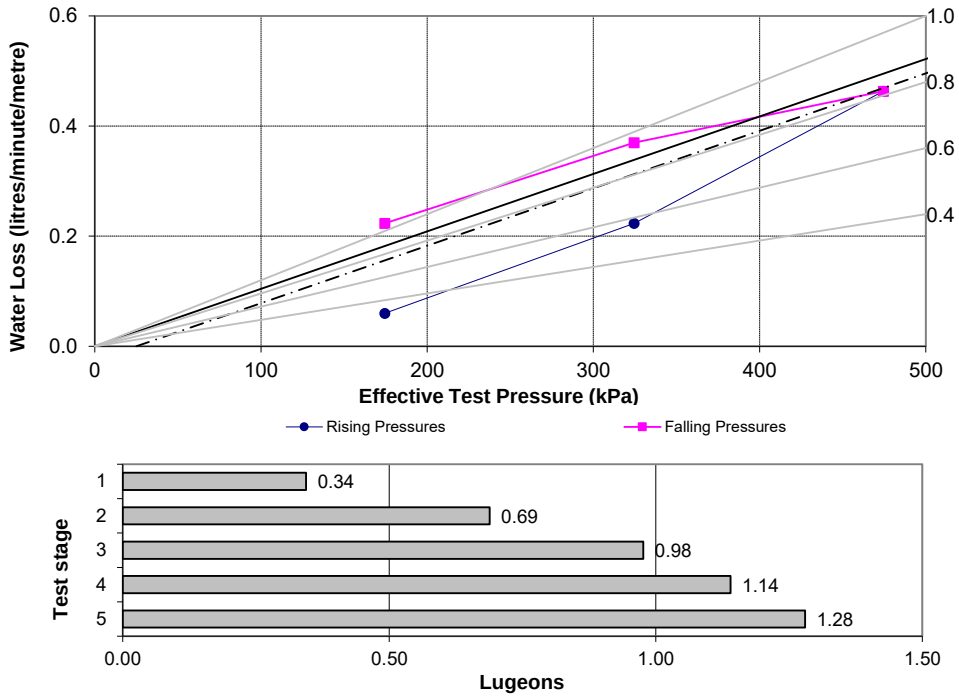
TA-DC250 : 40.6m to 43.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 40.6 m to 43.6 m length 3.0 m

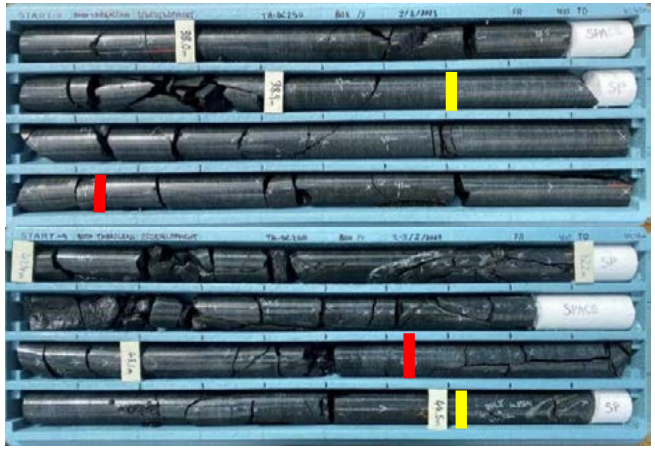
relative level at surface:	675.0 m RL	centre of test section (downhole):	42.10 m
gauge height:	0.5 m	test depth converted to vertical:	40.85 m
inclination of borehole:	76 °	relative level at centre of test section:	634.2 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	150	174.50	0.90	0.06	16.4%	0.34
5	300	324.50	3.35	0.22	30.6%	0.69
5	450	474.50	6.95	0.46	44.7%	0.98
5	300	324.50	5.55	0.37	30.6%	1.14
5	150	174.50	3.35	0.22	16.4%	1.28



Interpreted flow mechanism: Wash out

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

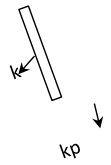
uL (Fell et al., 2005) - upper chart	1.04
uL (Houlsby, 1976) - lower chart	1.28

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.0E-07	m/sec
ke/kp = 100	1.7E-07	m/sec
ke/kp = 10	1.4E-07	m/sec
ke/kp = 1	1.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.2E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

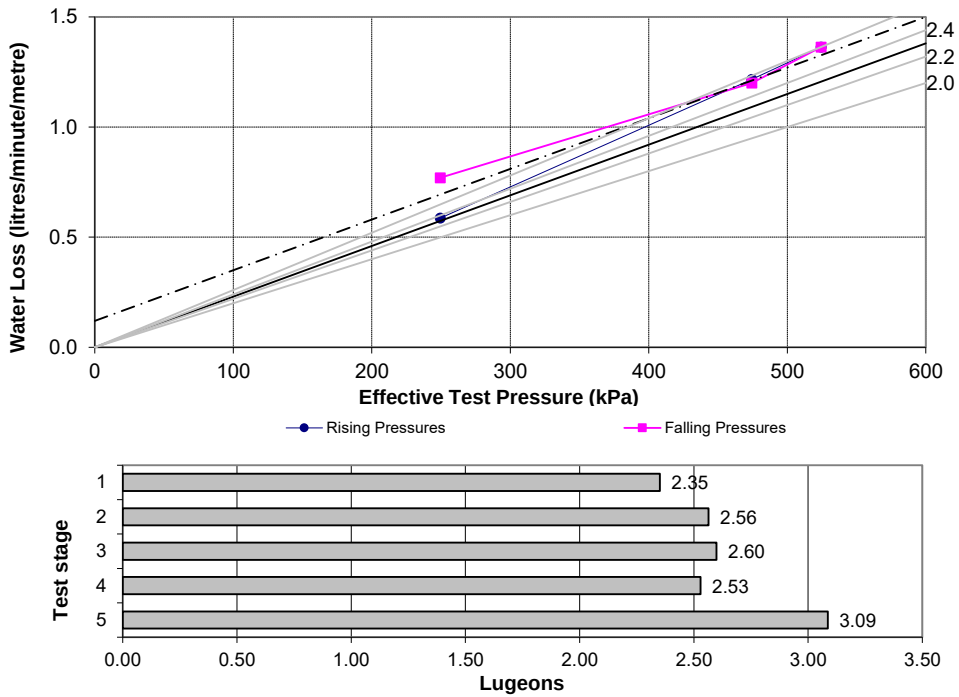
TA-DC250 : 80.6m to 83.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 80.6 m to 83.6 m length 3.0 m

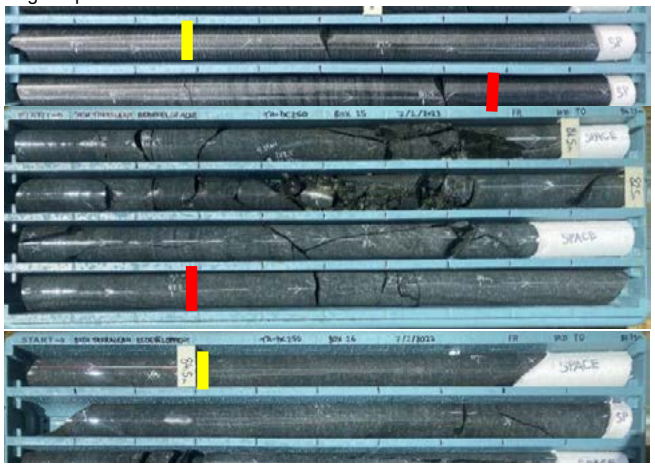
relative level at surface:	675.0 m RL	centre of test section (downhole):	82.10 m
gauge height:	0.5 m	test depth converted to vertical:	79.66 m
inclination of borehole:	76 °	relative level at centre of test section:	595.3 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	249.50	8.80	0.59	12.0%	2.35
5	450	474.50	18.25	1.22	22.9%	2.56
5	500	524.50	20.45	1.36	25.3%	2.60
5	450	474.50	18.00	1.20	22.9%	2.53
5	225	249.50	11.55	0.77	12.0%	3.09



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

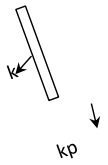
uL (Fell et al., 2005) - upper chart	2.30
uL (Houlsby, 1976) - lower chart	3.09

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	5.3E-07	m/sec
ke/kp = 100	4.5E-07	m/sec
ke/kp = 10	3.7E-07	m/sec
ke/kp = 1	2.9E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

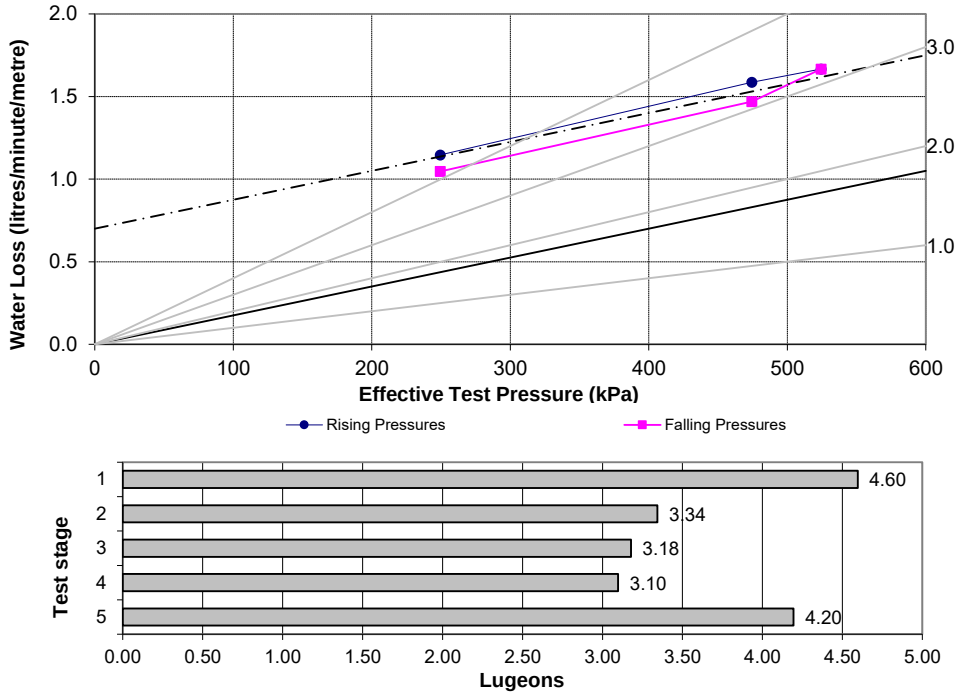
TA-DC250 : 91.6m to 94.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 91.6 m to 94.6 m length 3.0 m

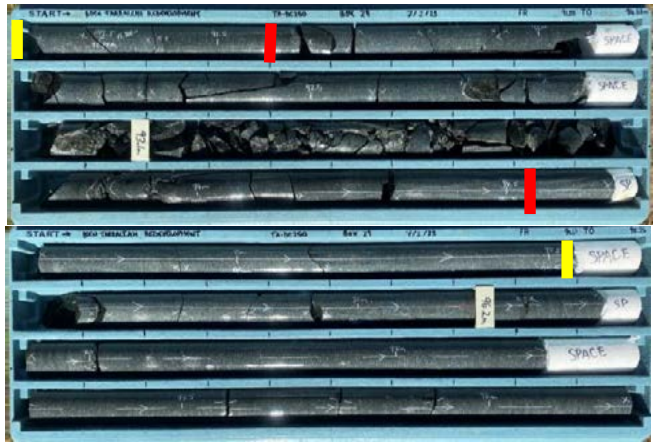
relative level at surface:	675.0 m RL	centre of test section (downhole):	93.10 m
gauge height:	0.5 m	test depth converted to vertical:	90.33 m
inclination of borehole:	76 °	relative level at centre of test section:	584.7 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	249.50	17.20	1.15	10.6%	4.60
5	450	474.50	23.80	1.59	20.2%	3.34
5	500	524.50	25.00	1.67	22.3%	3.18
5	450	474.50	22.05	1.47	20.2%	3.10
5	225	249.50	15.70	1.05	10.6%	4.20



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

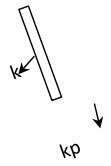
uL (Fell et al., 2005) - upper chart	1.75
uL (Houlsby, 1976) - lower chart	3.18

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	6.8E-07	m/sec
ke/kp = 100	5.8E-07	m/sec
ke/kp = 10	4.7E-07	m/sec
ke/kp = 1	3.7E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.0E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

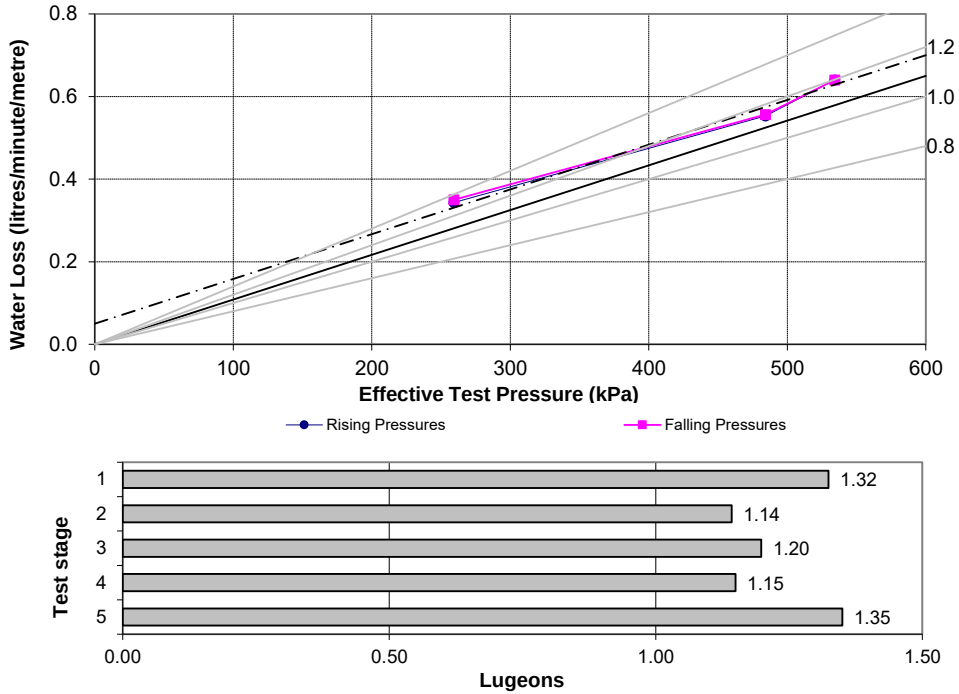
TA-DC250 : 111.6m to 114.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 111.6 m to 114.6 m length 3.0 m

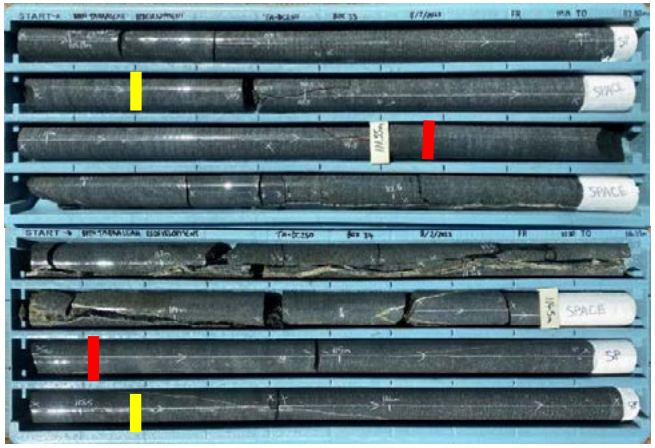
relative level at surface:	675.0 m RL	centre of test section (downhole):	113.10 m
gauge height:	1.5 m	test depth converted to vertical:	109.74 m
inclination of borehole:	76 °	relative level at centre of test section:	565.3 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	34.3 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	259.30	5.15	0.34	9.1%	1.32
5	450	484.30	8.30	0.55	17.0%	1.14
5	500	534.30	9.60	0.64	18.7%	1.20
5	450	484.30	8.35	0.56	17.0%	1.15
5	225	259.30	5.25	0.35	9.1%	1.35



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

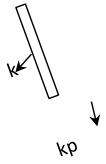
uL (Fell et al., 2005) - upper chart	1.08
uL (Houlsby, 1976) - lower chart	1.23

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.4E-07	m/sec
ke/kp = 100	2.0E-07	m/sec
ke/kp = 10	1.7E-07	m/sec
ke/kp = 1	1.3E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

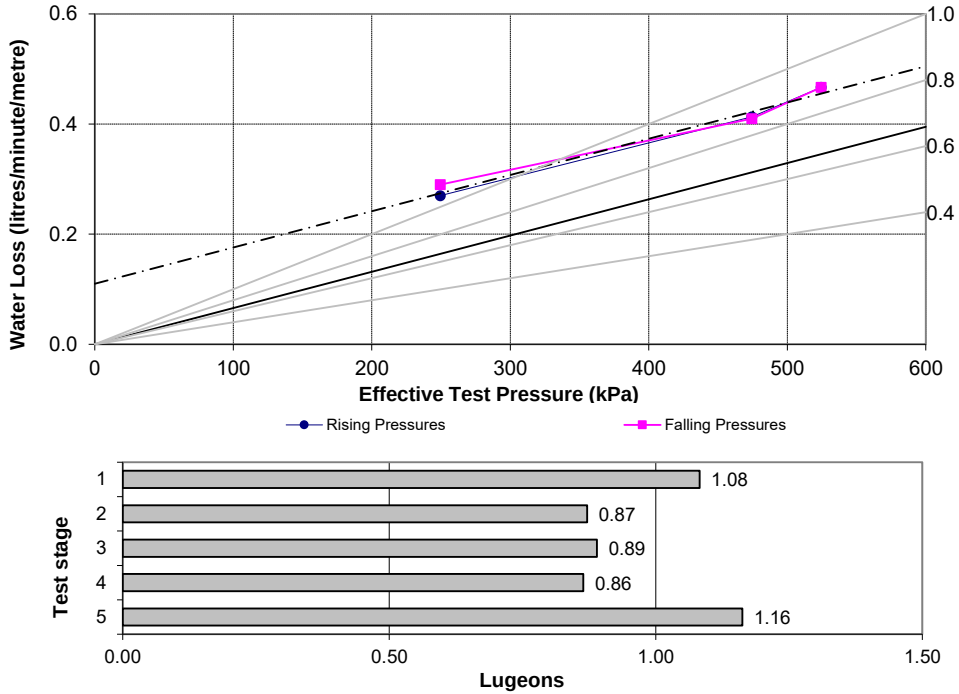
TA-DC250 : 124.6m to 127.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 124.6 m to 127.6 m length 3.0 m

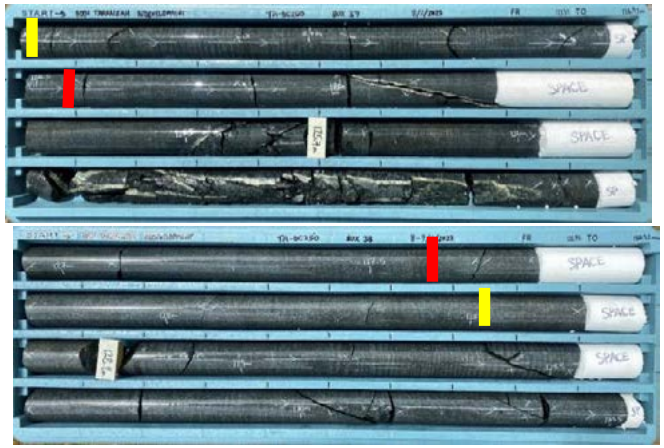
relative level at surface:	675.0 m RL	centre of test section (downhole):	126.10 m
gauge height:	0.5 m	test depth converted to vertical:	122.35 m
inclination of borehole:	76 °	relative level at centre of test section:	552.6 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	249.50	4.05	0.27	7.8%	1.08
5	450	474.50	6.20	0.41	14.9%	0.87
5	500	524.50	7.00	0.47	16.5%	0.89
5	450	474.50	6.15	0.41	14.9%	0.86
5	225	249.50	4.35	0.29	7.8%	1.16



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

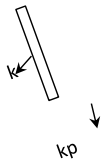
uL (Fell et al., 2005) - upper chart	0.66
uL (Houlsby, 1976) - lower chart	0.97

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.9E-07	m/sec
ke/kp = 100	1.6E-07	m/sec
ke/kp = 10	1.3E-07	m/sec
ke/kp = 1	1.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

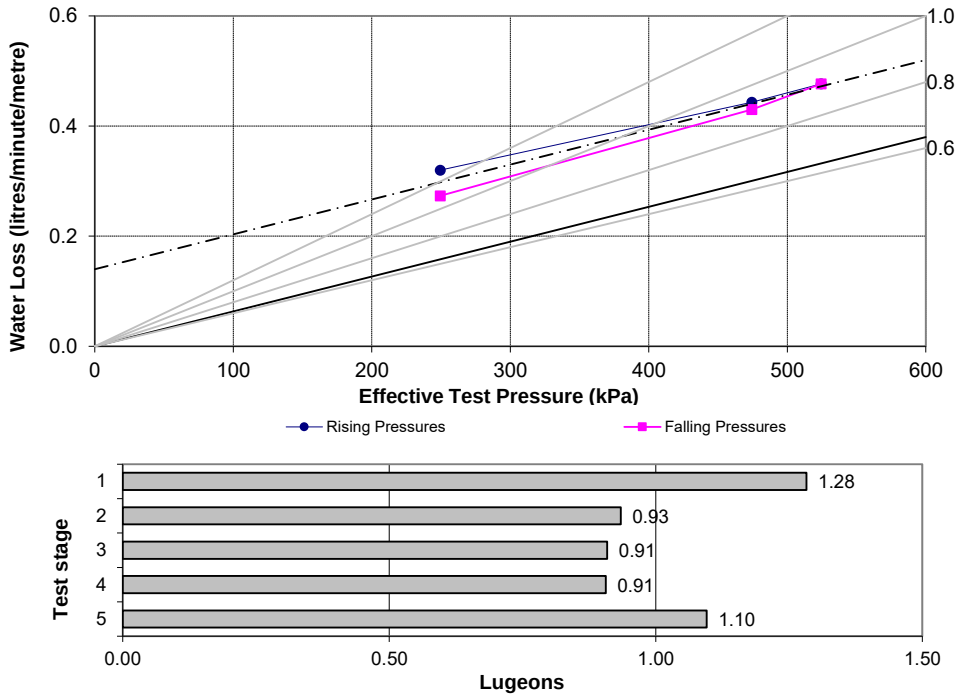
TA-DC250 : 139.6m to 142.6m

hole no:	TA-DC250	date:	22-Feb-23
project:	BoTN		
location:	TAPS2 Footprint	by:	BA

section tested: from 139.6 m to 142.6 m length 3.0 m

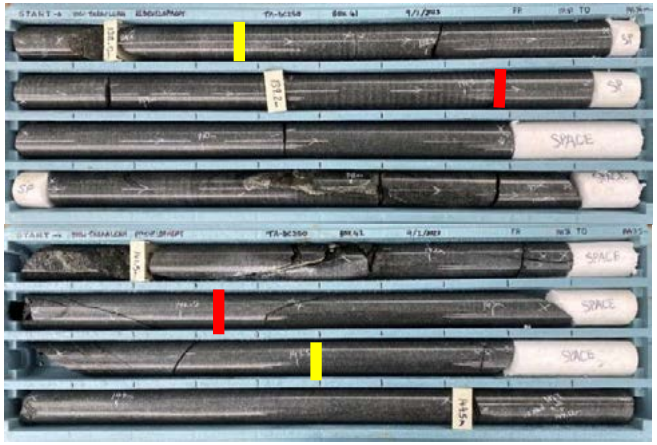
relative level at surface:	675.0 m RL	centre of test section (downhole):	141.10 m
gauge height:	0.5 m	test depth converted to vertical:	136.91 m
inclination of borehole:	76 °	relative level at centre of test section:	538.1 m RL
inferred groundwater level:	673.0 m RL	correction to gauge pressure:	24.5 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	249.50	4.80	0.32	7.0%	1.28
5	450	474.50	6.65	0.44	13.3%	0.93
5	500	524.50	7.15	0.48	14.7%	0.91
5	450	474.50	6.45	0.43	13.3%	0.91
5	225	249.50	4.10	0.27	7.0%	1.10



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

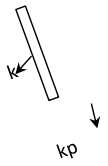
uL (Fell et al., 2005) - upper chart	0.63
uL (Houlsby, 1976) - lower chart	0.91

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	1.9E-07	m/sec
ke/kp = 100	1.6E-07	m/sec
ke/kp = 10	1.3E-07	m/sec
ke/kp = 1	1.0E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.1E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

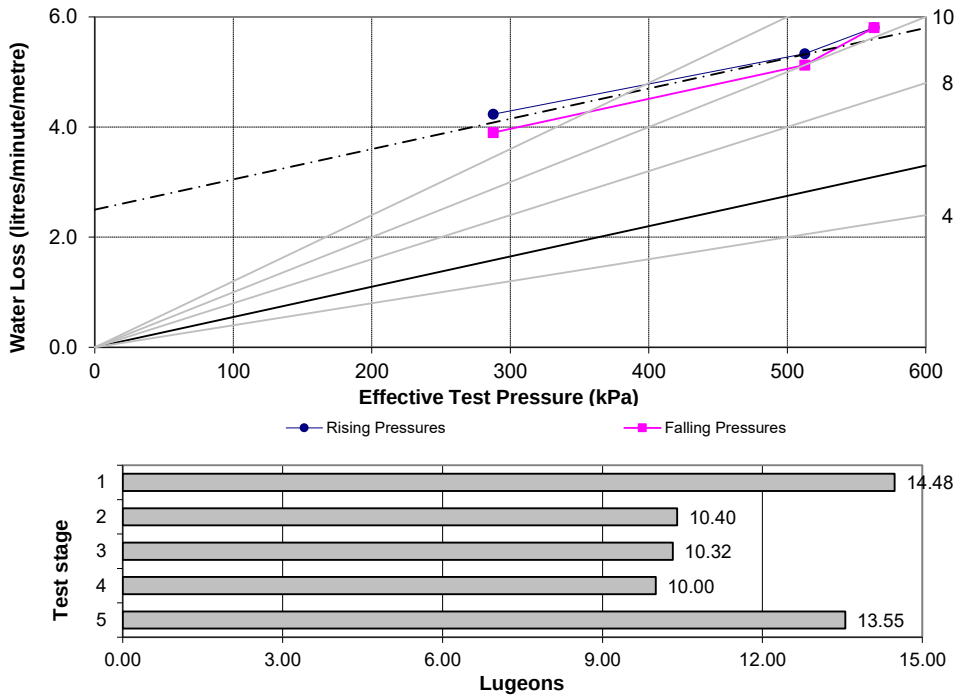
TA-DC266A : 98.7m to 101.7m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 98.7 m to 101.7 m length 3.0 m

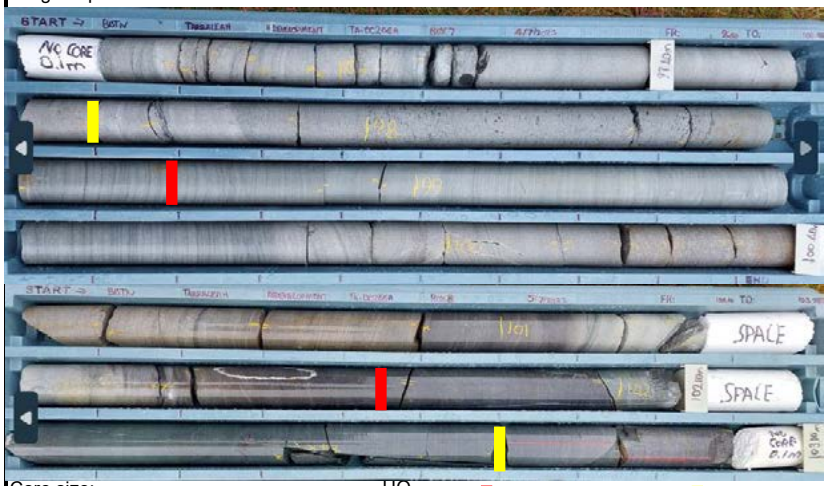
relative level at surface:	468.99 m RL	centre of test section (downhole):	100.20 m
gauge height:	0.8 m	test depth converted to vertical:	97.63 m
inclination of borehole:	77 °	relative level at centre of test section:	371.4 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	225	287.72	63.50	4.23	11.3%	14.71
5	225	287.72	62.50	4.17	11.3%	14.48
5	450	512.72	80.00	5.33	20.2%	10.40
5	450	512.72	72.50	4.83	20.2%	9.43
5	500	562.72	85.90	5.73	22.2%	10.18
5	500	562.72	87.1	5.81	22.2%	10.32
5	450	512.72	76.9	5.13	20.2%	10.00
5	450	512.72	75.6	5.04	20.2%	9.83
5	225	287.72	58.5	3.90	11.3%	13.55
5	225	287.72	58.1	3.87	11.3%	13.46



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

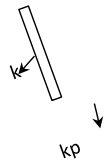
uL (Fell et al., 2005) - upper chart	5.50
uL (Houlsby, 1976) - lower chart	10.32

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	2.2E-06	m/sec
ke/kp = 100	1.9E-06	m/sec
ke/kp = 10	1.5E-06	m/sec
ke/kp = 1	1.2E-06	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 1.3E-06 m/sec

Pells Sullivan Meynink

ISSUE

Job no. PSM4346

Borehole Water Pressure Test Summary

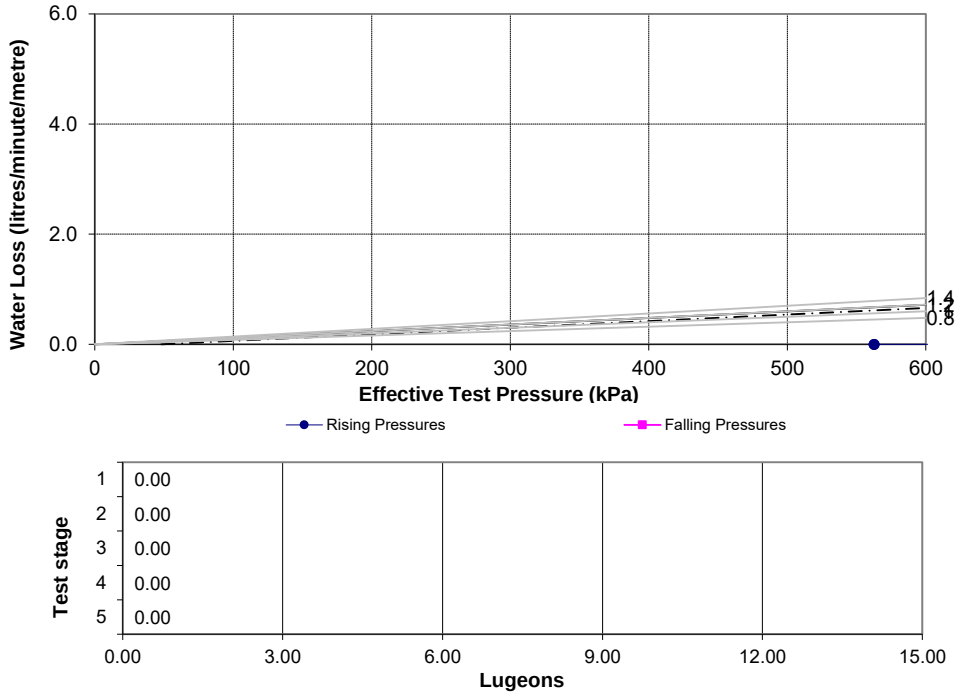
TA-DC266A : 122.2m to 125.2m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 122.2 m to 125.2 m length 3.0 m

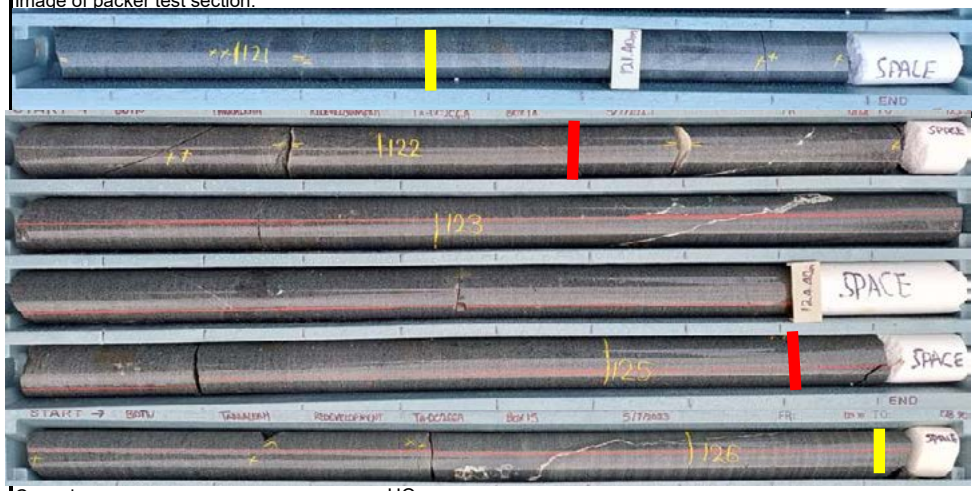
relative level at surface:	468.99 m RL	centre of test section (downhole):	123.70 m
gauge height:	0.8 m	test depth converted to vertical:	120.53 m
inclination of borehole:	77 °	relative level at centre of test section:	348.5 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	500	562.72	0.00	0.00	18.0%	0.00
5	500	562.72	0.00	0.00	18.0%	0.00
5	1000	1062.72	0.00	0.00	33.9%	0.00
5	1000	1062.72	0.00	0.00	33.9%	0.00
5	1500	1562.72	0.00	0.00	49.9%	0.00
5	1500	1562.72	0.00	0.00	49.9%	0.00
5	2000	2062.72	0.00	0.00	65.8%	0.00
5	2000	2062.72	0.00	0.00	65.8%	0.00
5	1500	1562.72	0.00	0.00	49.9%	0.00
5	1500	1562.72	0.00	0.00	49.9%	0.00
5	1000	1062.72	0.00	0.00	33.9%	0.00
5	1000	1062.72	0.00	0.00	33.9%	0.00
5	500	562.72	0.00	0.00	18.0%	0.00
5	500	562.72	0.00	0.00	18.0%	0.00



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

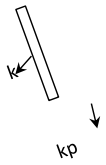
uL (Fell et al., 2005) - upper chart	1.20
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

ISSUE

Job no. PSM4346

Borehole Water Pressure Test Summary

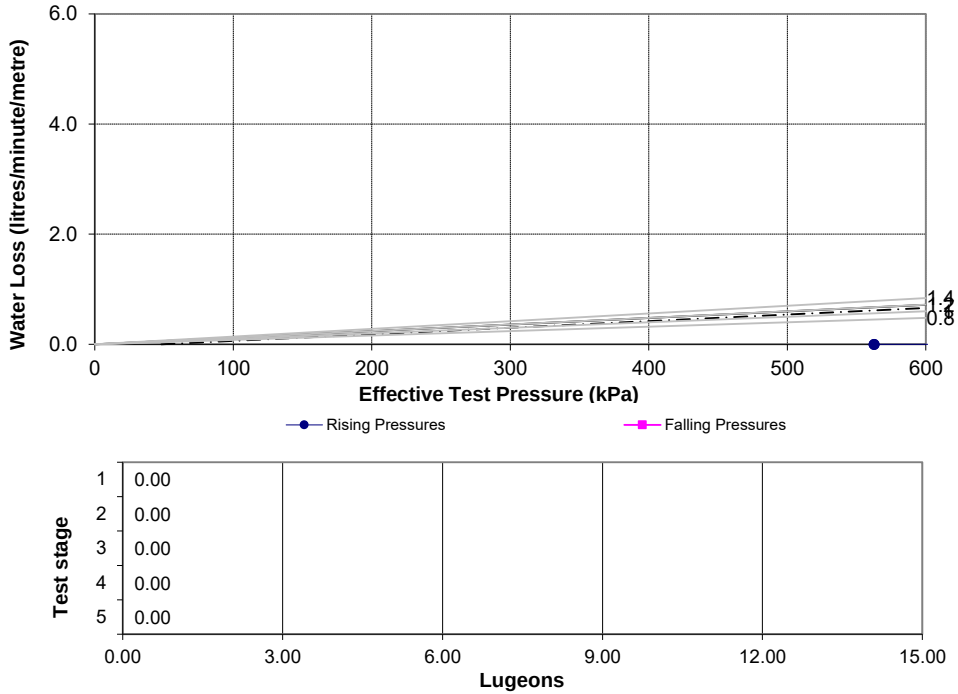
TA-DC266A : 134.2m to 137.2m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 134.2 m to 137.2 m length 3.0 m

relative level at surface:	468.99 m RL	centre of test section (downhole):	135.70 m
gauge height:	0.8 m	test depth converted to vertical:	132.22 m
inclination of borehole:	77 °	relative level at centre of test section:	336.8 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	500	562.72	0.00	0.00	16.4%	0.00
5	500	562.72	0.00	0.00	16.4%	0.00
5	1000	1062.72	0.00	0.00	30.9%	0.00
5	1000	1062.72	0.00	0.00	30.9%	0.00
5	1500	1562.72	0.00	0.00	45.5%	0.00
5	1500	1562.72	0.00	0.00	45.5%	0.00
5	2000	2062.72	0.00	0.00	60.0%	0.00
5	2000	2062.72	0.00	0.00	60.0%	0.00
5	1500	1562.72	0.00	0.00	45.5%	0.00
5	1500	1562.72	0.00	0.00	45.5%	0.00
5	1000	1062.72	0.00	0.00	30.9%	0.00
5	1000	1062.72	0.00	0.00	30.9%	0.00
5	500	562.72	0.00	0.00	16.4%	0.00
5	500	562.72	0.00	0.00	16.4%	0.00



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

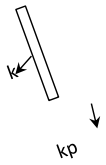
uL (Fell et al., 2005) - upper chart	1.20
uL (Houlsby, 1976) - lower chart	0.00

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	0.0E+00	m/sec
ke/kp = 100	0.0E+00	m/sec
ke/kp = 10	0.0E+00	m/sec
ke/kp = 1	0.0E+00	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 0.0E+00 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

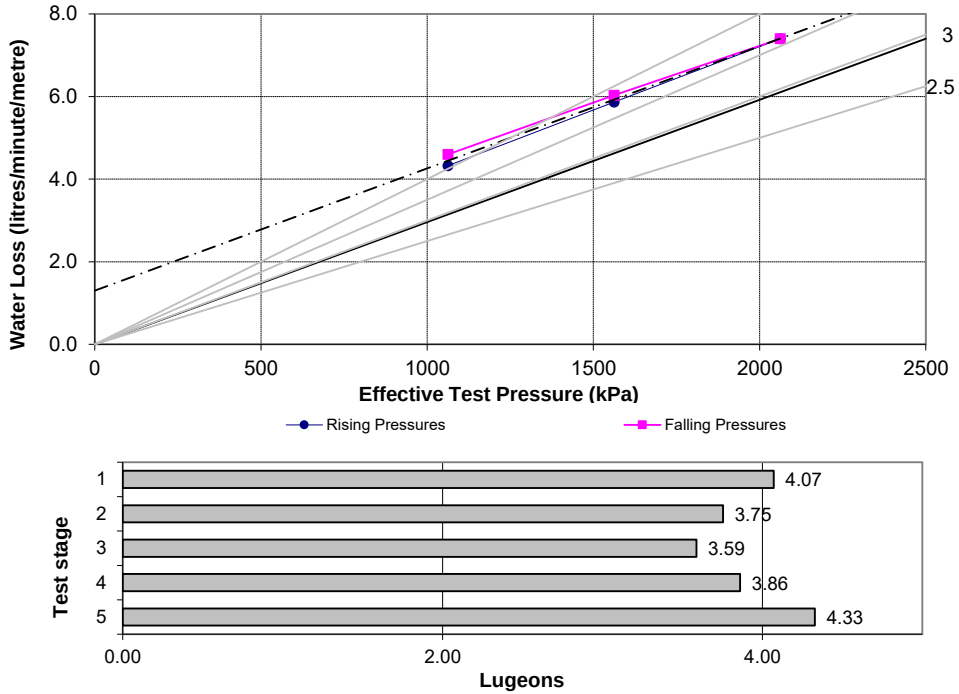
TA-DC266A : 152.2m to 155.2m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 152.2 m to 155.2 m length 3.0 m

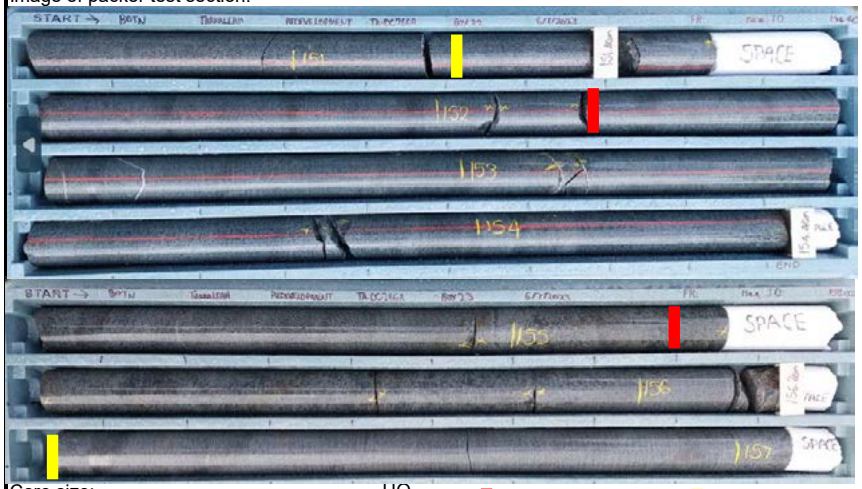
relative level at surface:	468.99 m RL	centre of test section (downhole):	153.70 m
gauge height:	0.8 m	test depth converted to vertical:	149.76 m
inclination of borehole:	77 °	relative level at centre of test section:	319.2 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	500	562.72	32.00	2.13	14.5%	3.79
5	500	562.72	31.80	2.12	14.5%	3.77
5	1000	1062.72	61.20	4.08	27.3%	3.84
5	1000	1062.72	64.90	4.33	27.3%	4.07
5	1500	1562.72	87.10	5.81	40.1%	3.72
5	1500	1562.72	88	5.87	40.1%	3.75
5	2000	2062.72	109.5	7.30	53.0%	3.54
5	2000	2062.72	111	7.40	53.0%	3.59
5	1500	1562.72	90.5	6.03	40.1%	3.86
5	1500	1562.72	90.5	6.03	40.1%	3.86
5	1000	1062.72	69	4.60	27.3%	4.33
5	1000	1062.72	68	4.53	27.3%	4.27
5	500	562.72	49.8	3.32	14.5%	5.90
5	500	562.72	51.7	3.45	14.5%	6.13



Interpreted flow mechanism: Turbulent

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

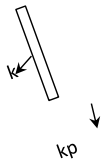
uL (Fell et al., 2005) - upper chart	2.96
uL (Houlsby, 1976) - lower chart	3.59

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	7.6E-07	m/sec
ke/kp = 100	6.4E-07	m/sec
ke/kp = 10	5.3E-07	m/sec
ke/kp = 1	4.1E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 4.4E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

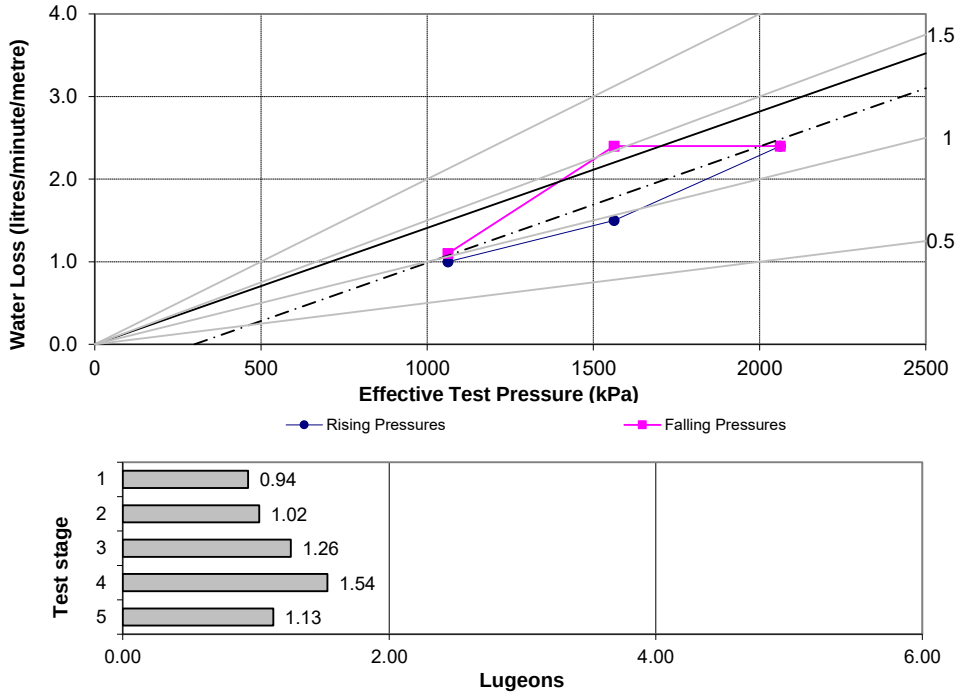
TA-DC266A : 159.2m to 162.2m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 159.2 m to 162.2 m length 3.0 m

relative level at surface:	468.99 m RL	centre of test section (downhole):	160.70 m
gauge height:	0.8 m	test depth converted to vertical:	156.58 m
inclination of borehole:	77 °	relative level at centre of test section:	312.4 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	500	562.72	1.20	1.20	13.8%	2.13
5	500	562.72	0.70	0.70	13.8%	1.24
5	500	562.72	0.70	0.70	13.8%	1.24
5	1000	1062.72	64.90	1.00	26.1%	0.94
5	1000	1062.72	87.10	1.00	26.1%	0.94
5	1500	1562.72	88	1.60	38.4%	1.02
5	1500	1562.72	109.5	1.50	38.4%	0.96
5	2000	2062.72	111	2.40	50.7%	1.16
5	2000	2062.72	90.5	2.60	50.7%	1.26
5	1500	1562.72	90.5	2.40	38.4%	1.54
5	1000	1062.72	69	1.10	26.1%	1.04
5	1000	1062.72	68	1.20	26.1%	1.13
5	500	562.72	49.8	0.60	13.8%	1.07
5	500	562.72	51.7	0.70	13.8%	1.24



Interpreted flow mechanism: Laminar

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

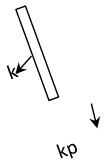
uL (Fell et al., 2005) - upper chart	1.41
uL (Houlsby, 1976) - lower chart	1.18

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

Estimated permeability (ke):

ke value using Hoek & Bray Method (1981) for:



ke/kp = 1000	4.8E-07	m/sec
ke/kp = 100	4.1E-07	m/sec
ke/kp = 10	3.3E-07	m/sec
ke/kp = 1	2.6E-07	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 2.8E-07 m/sec

Pells Sullivan Meynink

Borehole Water Pressure Test Summary

Job no. PSM4346

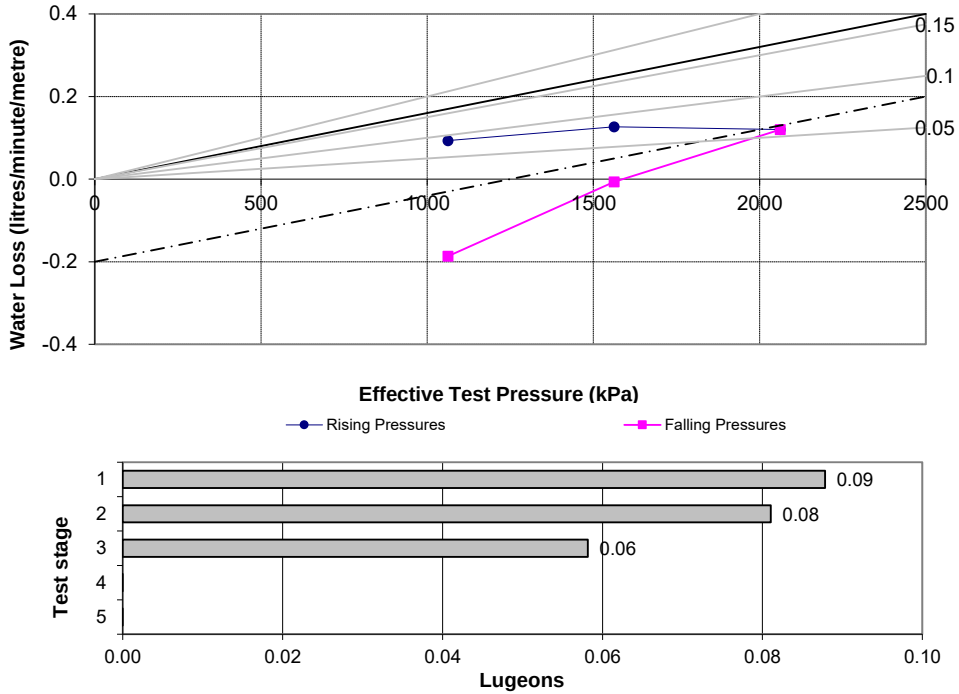
TA-DC266A : 200.2m to 203.2m

hole no:	TA-DC266A	date:	10-Jul-22
project:	BOTN		
location:	Golf Course	by:	BA

section tested: from 200.2 m to 203.2 m length 3.0 m

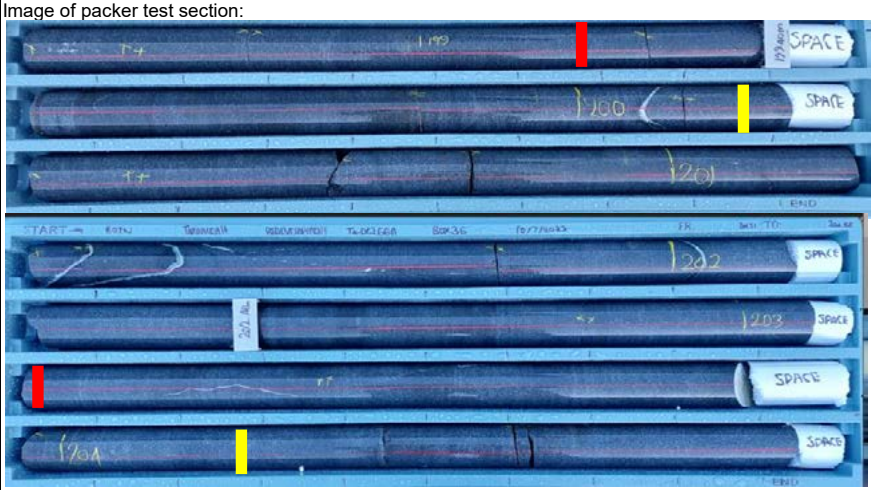
relative level at surface:	468.99 m RL	centre of test section (downhole):	201.70 m
gauge height:	0.8 m	test depth converted to vertical:	196.53 m
inclination of borehole:	77 °	relative level at centre of test section:	272.5 m RL
inferred groundwater level:	463.4 m RL	correction to gauge pressure:	62.7 kPa

test duration (min)	gauge pressure (kPa)	effective test pressure (kPa)	average water loss (L)	water loss litres/min/m	corrected / overburden pressure	lugeons
5	1000	1062.72	1.40	0.09	20.8%	0.09
5	1000	1062.72	0.40	0.03	20.8%	0.03
5	1000	1062.72	-0.50	-0.03	20.8%	-0.03
5	1500	1562.72	1.90	0.13	30.6%	0.08
5	1500	1562.72	0.80	0.05	30.6%	0.03
5	1500	1562.72	0.8	0.05	30.6%	0.03
5	2000	2062.72	1.8	0.12	40.4%	0.06
5	2000	2062.72	1.6	0.11	40.4%	0.05
5	1500	1562.72	-1.4	-0.09	30.6%	-0.06
5	1500	1562.72	-0.1	-0.01	30.6%	0.00
5	1500	1562.72	-0.1	-0.01	30.6%	0.00
5	1000	1062.72	-8	-0.53	20.8%	-0.50
5	1000	1062.72	-2.8	-0.19	20.8%	-0.18
5	1000	1062.72	-4	-0.27	20.8%	-0.25



Interpreted flow mechanism: Void Filling

Image of packer test section:



Core size: HQ_3

Lithology: DOLERITE

Packer boundary

Packer Seal

Lugeon (uL) Assessment

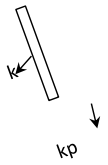
uL (Fell et al., 2005) - upper chart	0.16
uL (Houlsby, 1976) - lower chart	0.06

Lugeon Classification

Lugeon	Range	Condition
<1	Low	Joints tight
1-5	Low/Mod	Small joint openings
5-50	Mod/High	Some open joints
>50	High	Many open joints

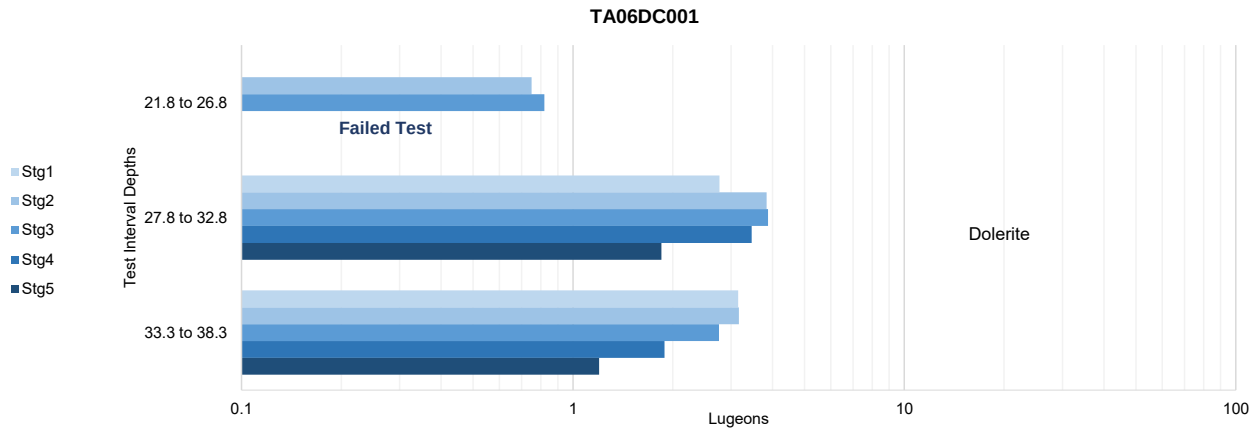
Estimated permeability (ke):

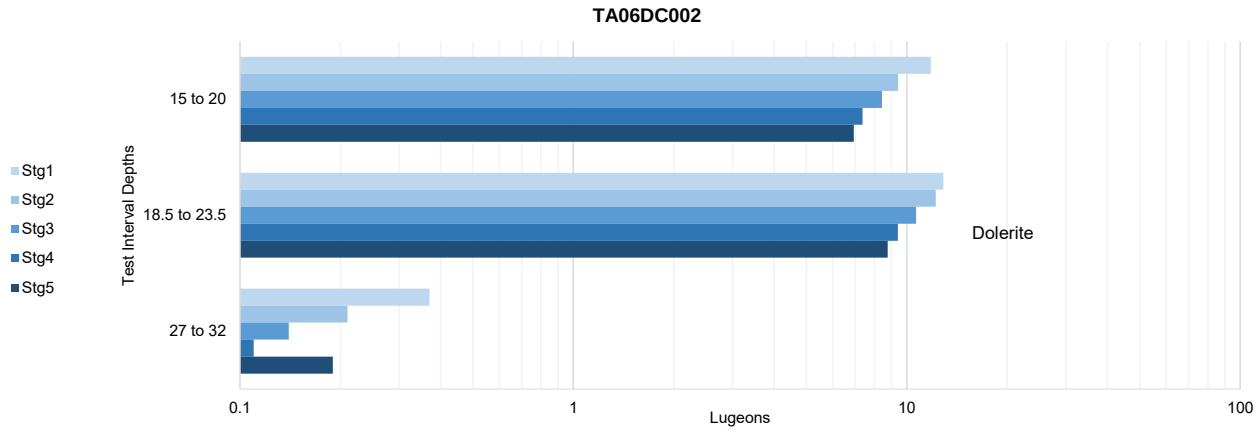
ke value using Hoek & Bray Method (1981) for:

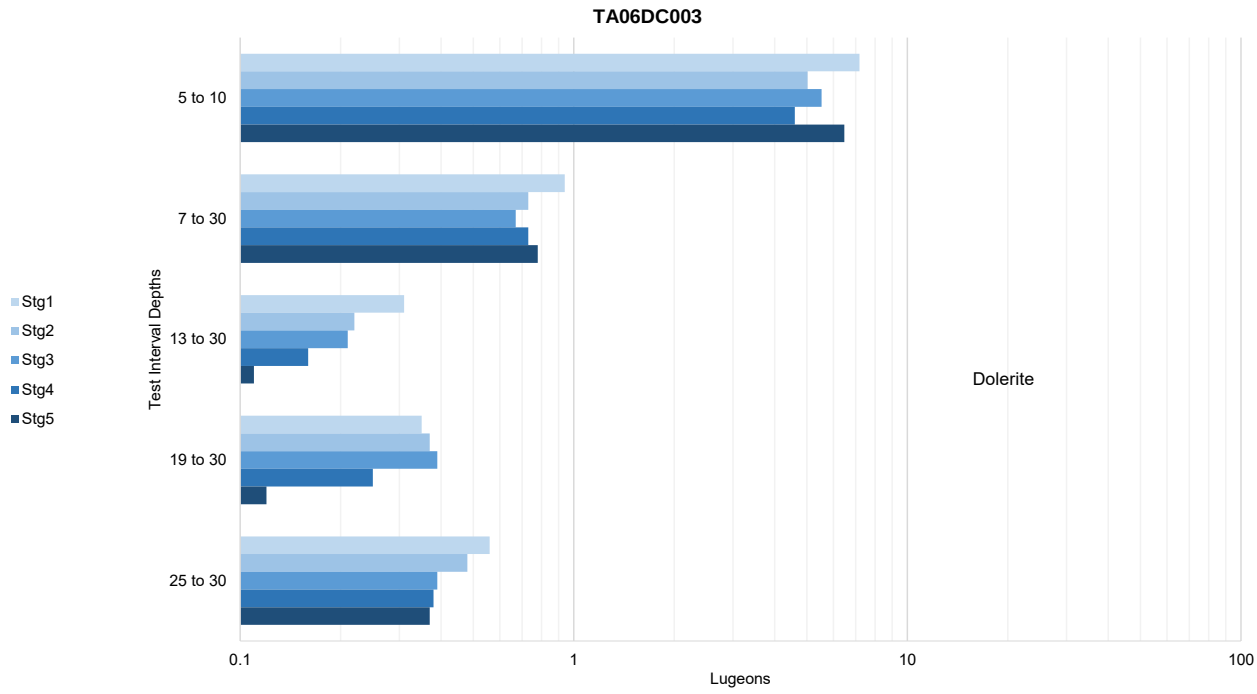


ke/kp = 1000	5.4E-09	m/sec
ke/kp = 100	4.6E-09	m/sec
ke/kp = 10	3.7E-09	m/sec
ke/kp = 1	2.9E-09	m/sec

ke value using Moye Method (1967) - equivalent to ke/kp = 1: 3.1E-09 m/sec







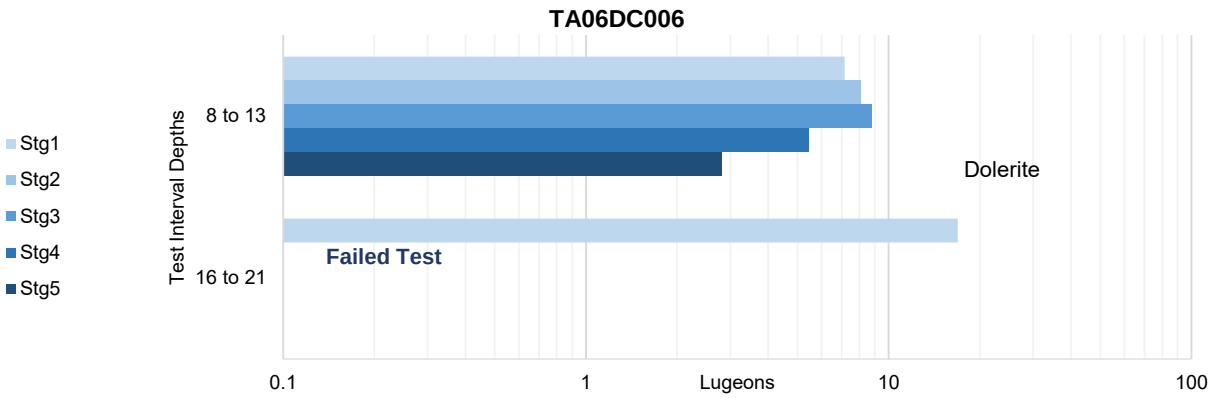
Hydro Tasmania

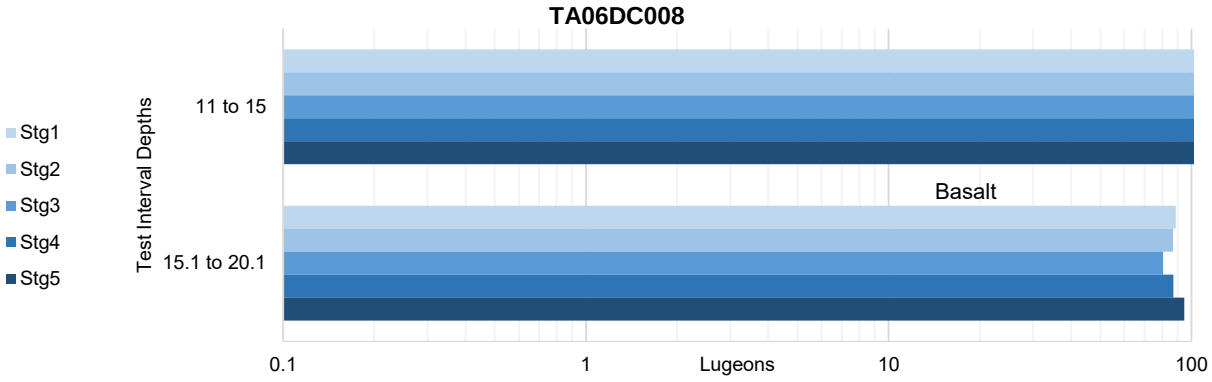
Tarraleah Redevelopment Project

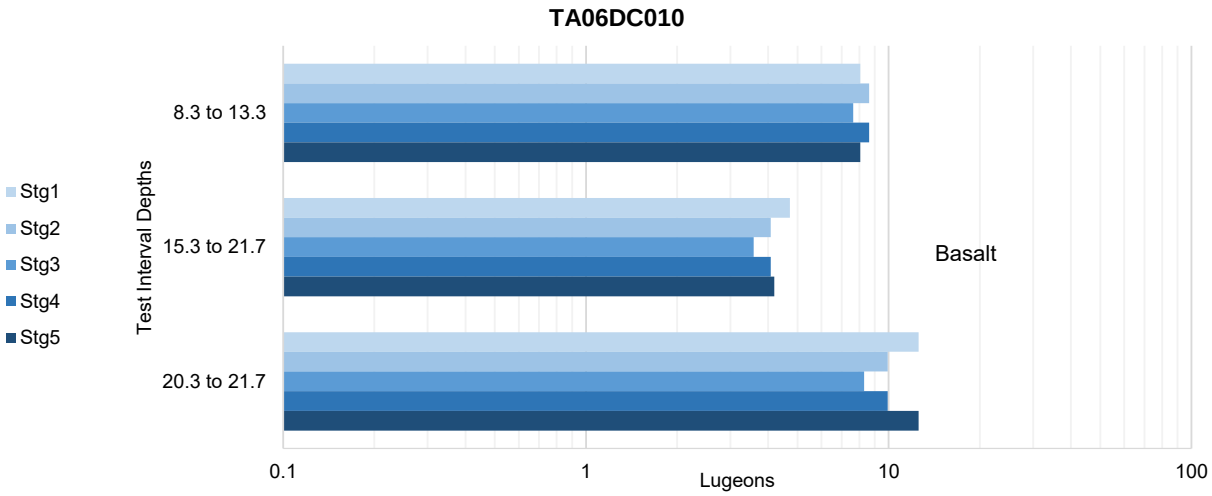
Tarraleah, Tasmania

Packer Test Depth Plots
TA06DC001 & TA06DC002 & TA06DC003

PSM4346-115R	Appendix D







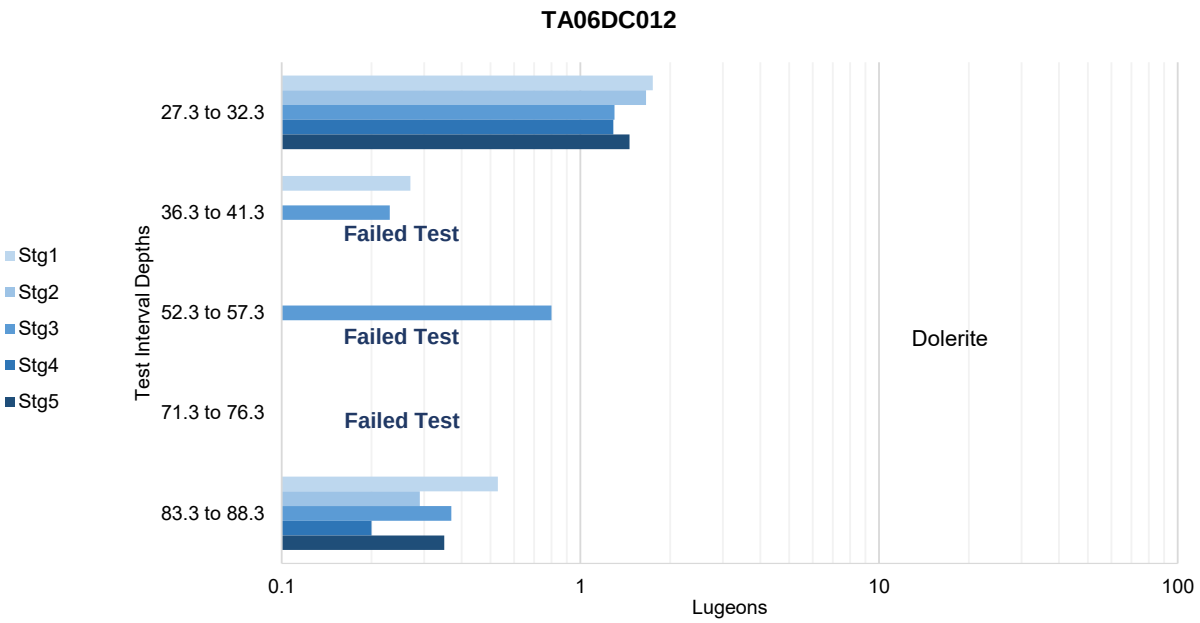
Hydro Tasmania

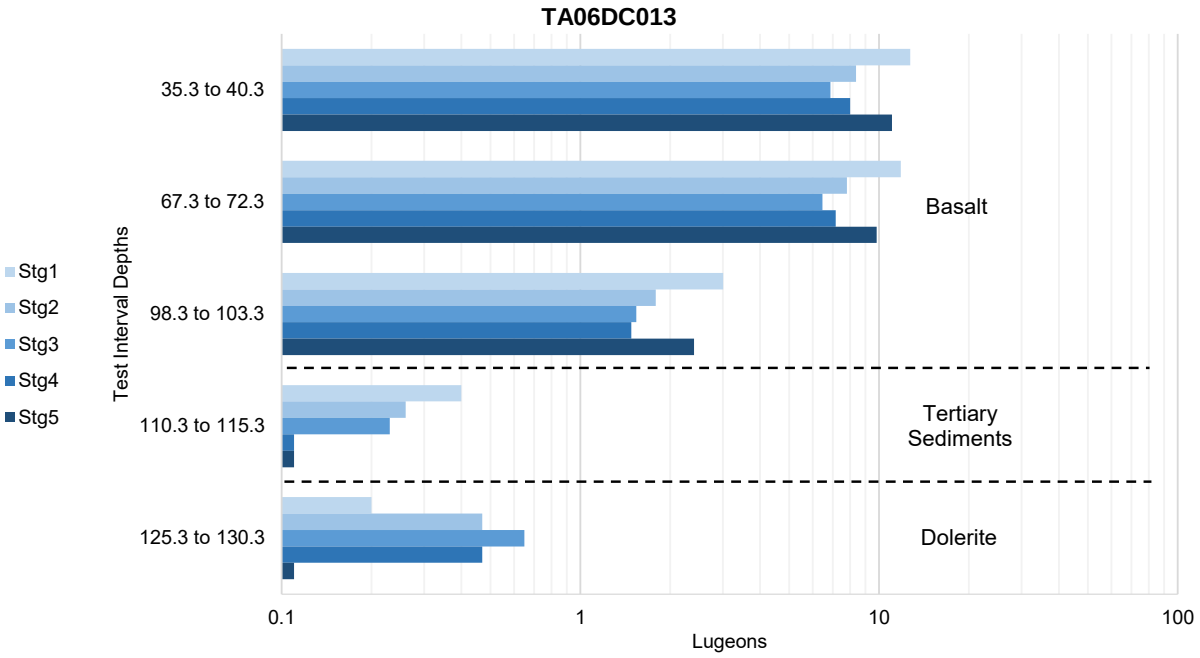
Tarraleah Redevelopment Project

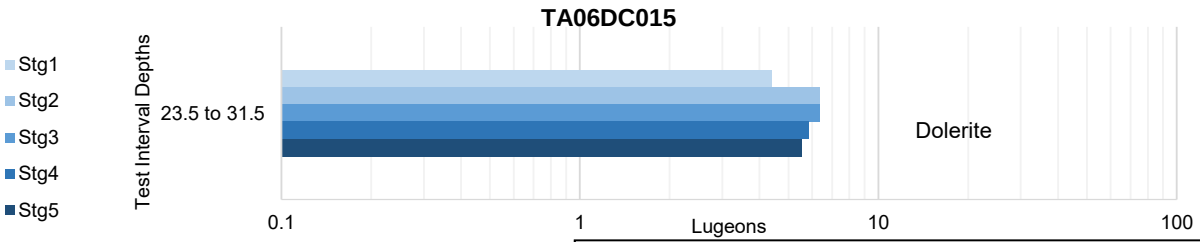
Tarraleah, Tasmania

Packer Test Depth Plots
TA06DC006 & TA06DC008 & TA06DC010

PSM4346-115R	Appendix D







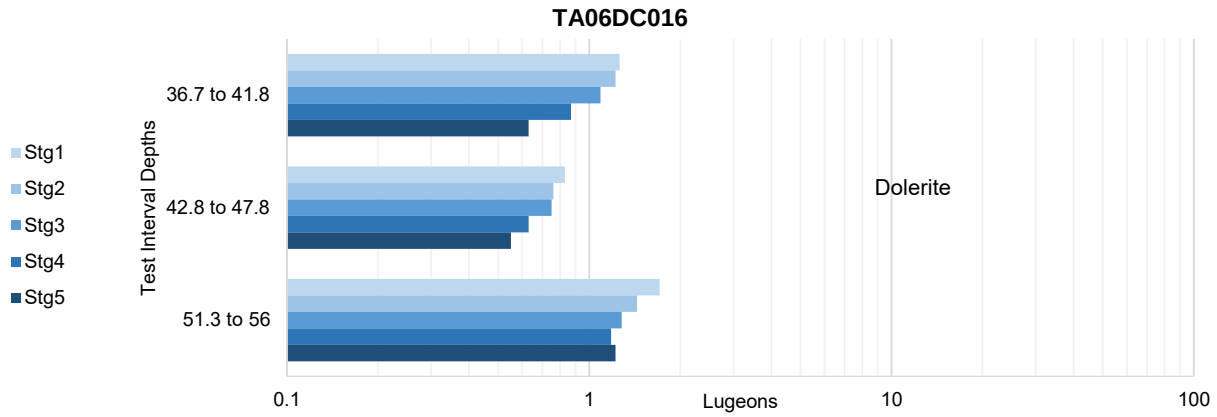
Hydro Tasmania

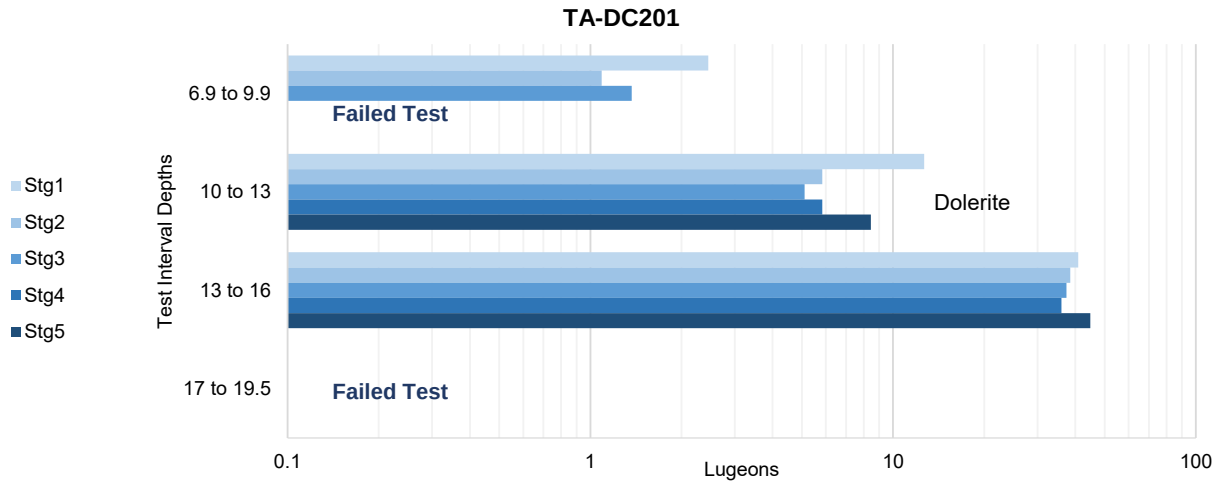
Tarraleah Redevelopment Project

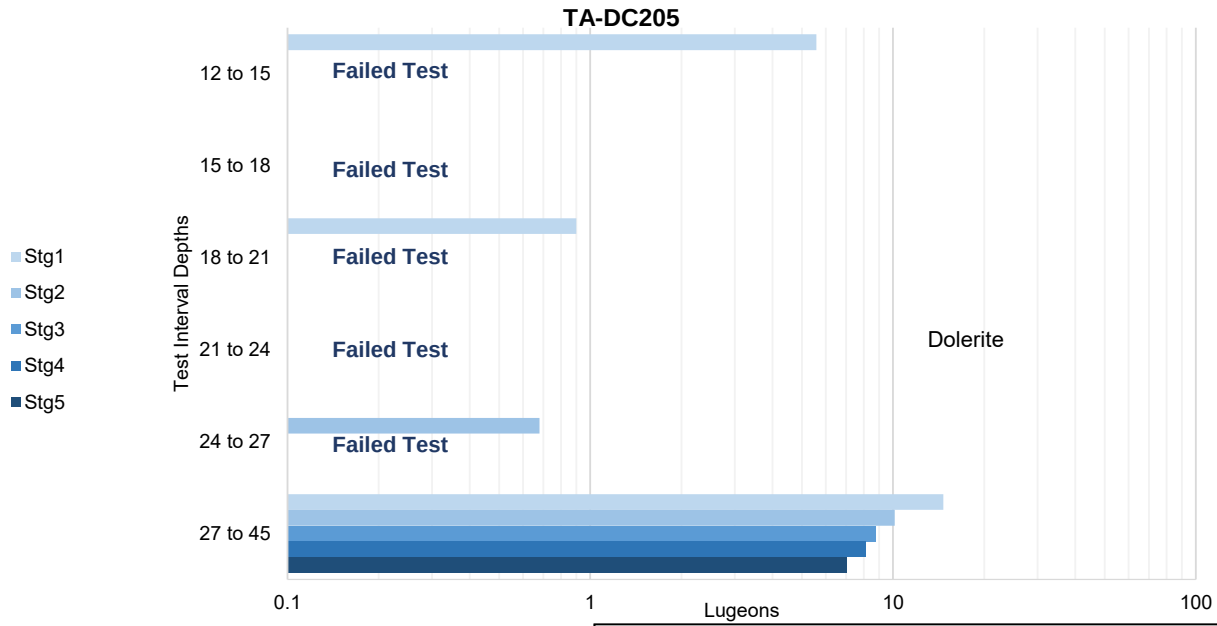
Tarraleah, Tasmania

Packer Test Depth Plots
TA06DC012 & TA06DC013 & TA06DC015

PSM4346-115R	Appendix D







Hydro Tasmania

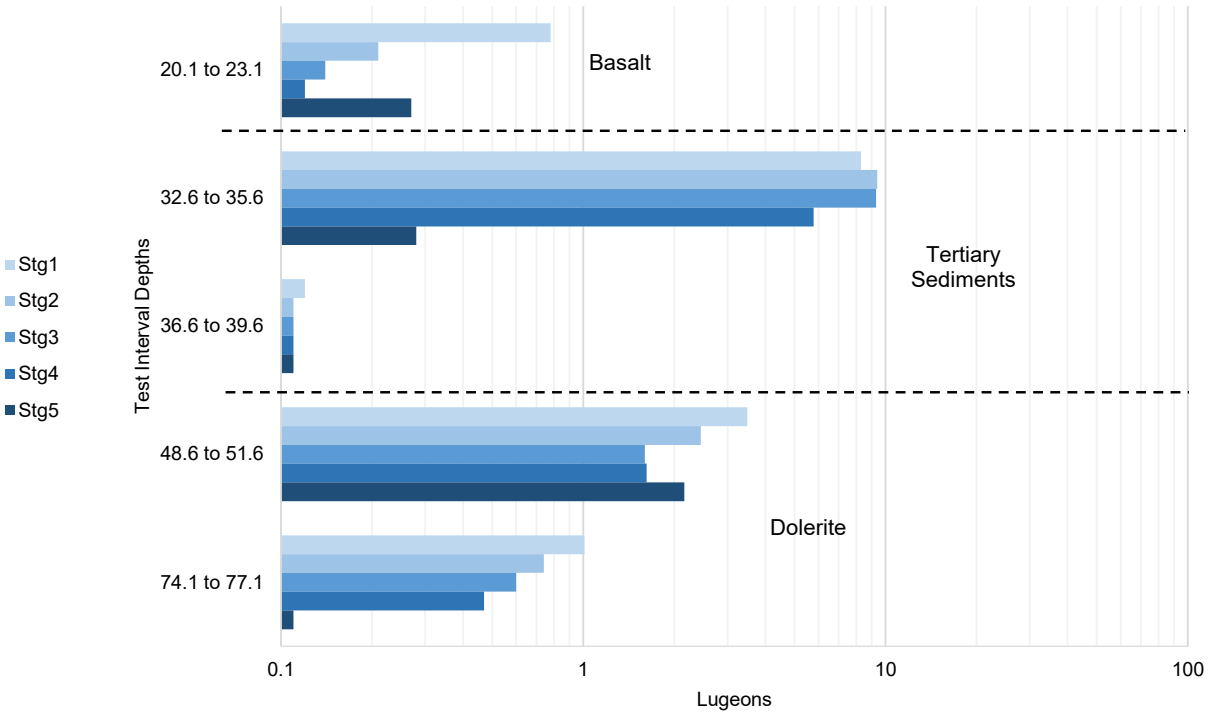
Tarraleah Redevelopment Project

Tarraleah, Tasmania

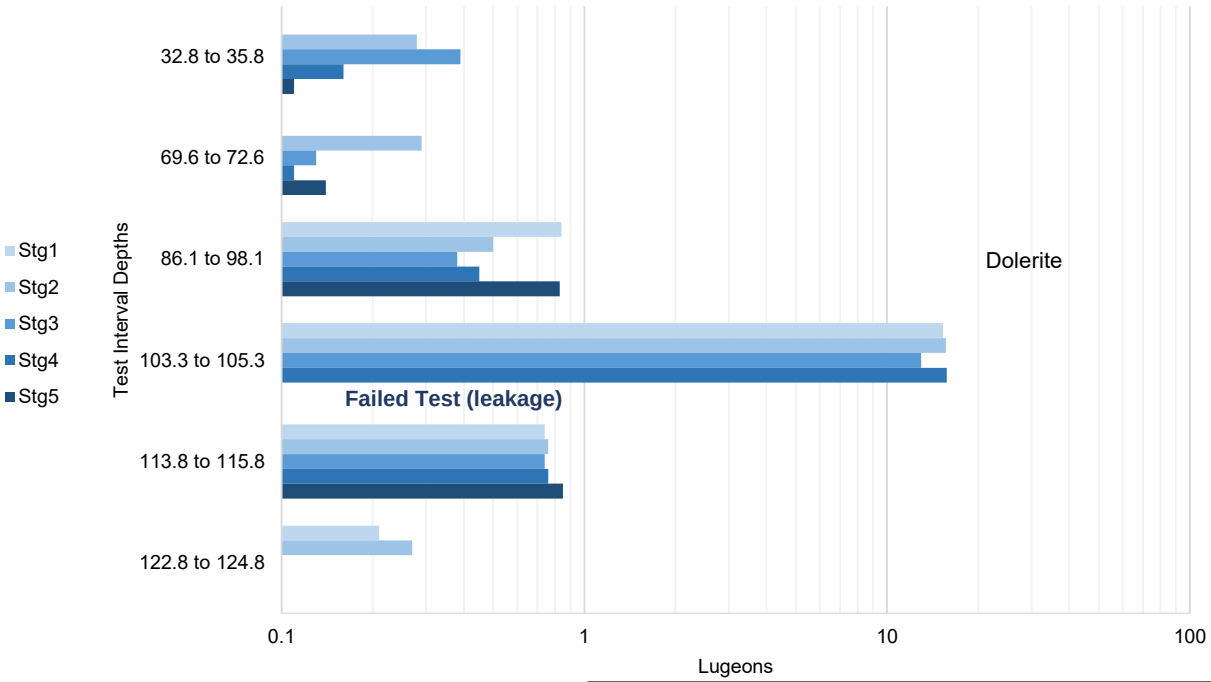
Packer Test Depth Plots
TA06DC016 & TA-DC201 & TA-DC205

PSM4346-115R	Appendix D

TA-DC207



TA-DC208



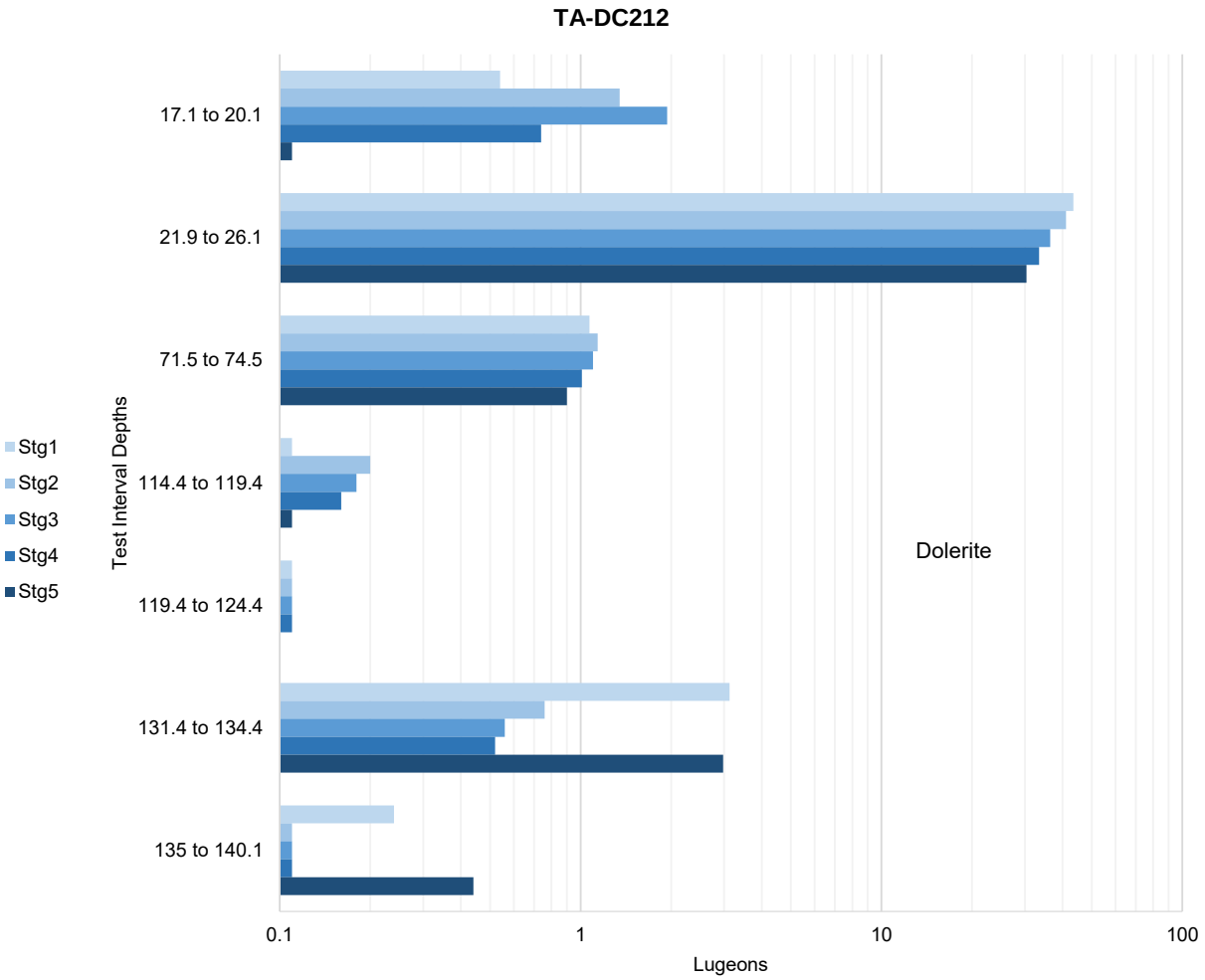
Hydro Tasmania

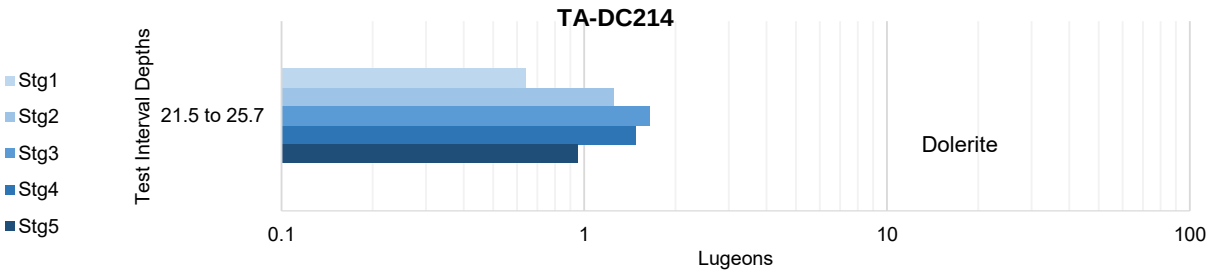
Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC207 & TA-DC208

PSM4346-115R	Appendix D





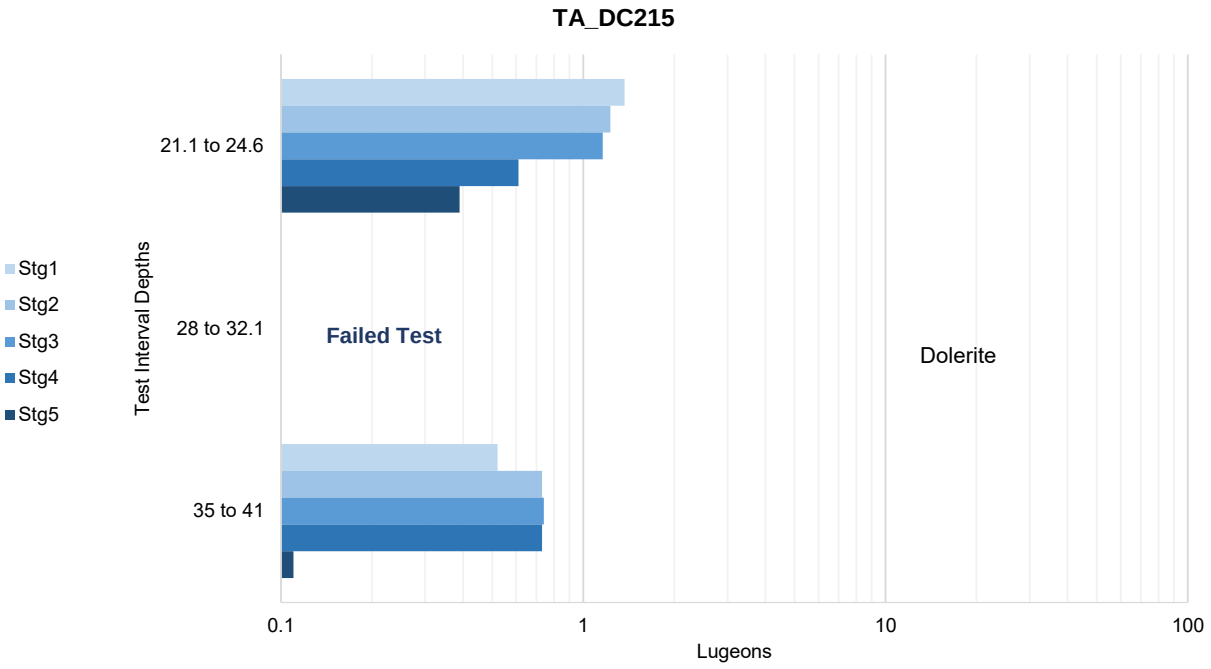
Hydro Tasmania

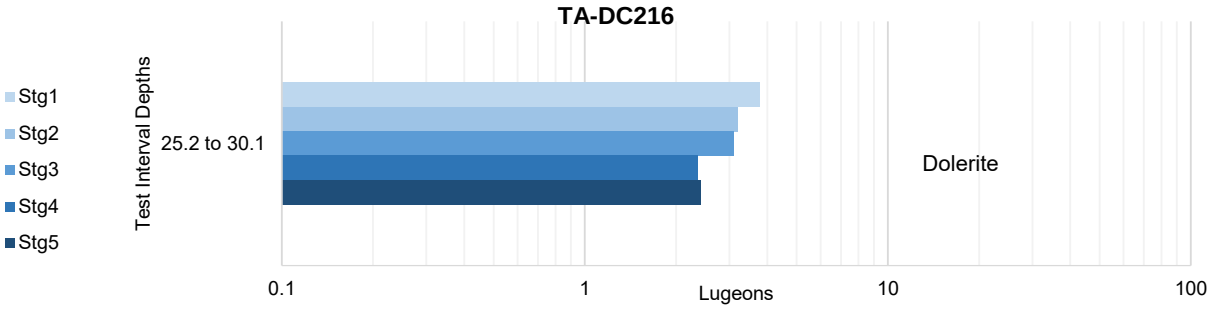
Tarraleah Redevelopment Project

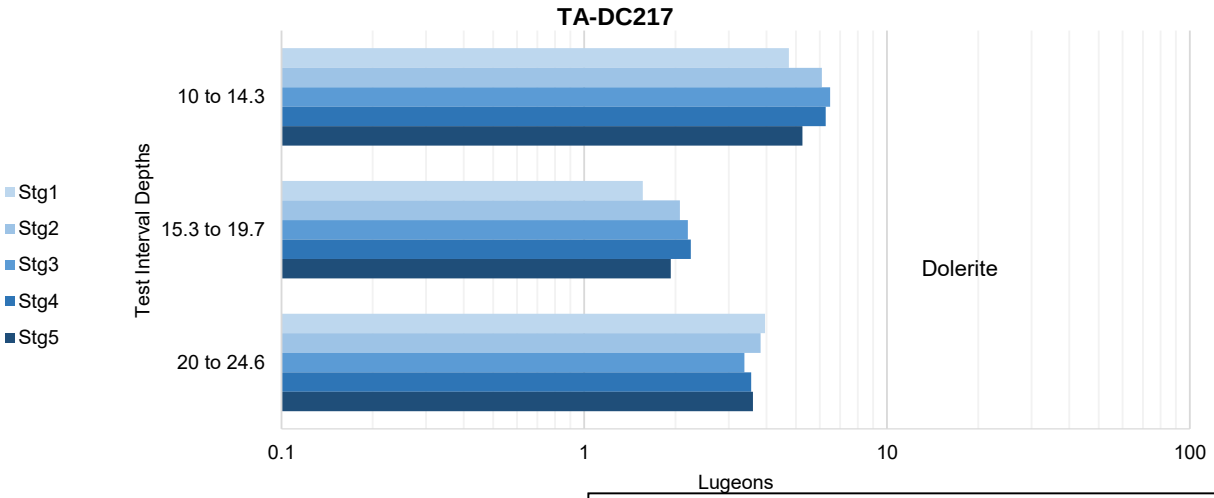
Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC212 &TA-DC214

PSM4346-115R	Appendix D







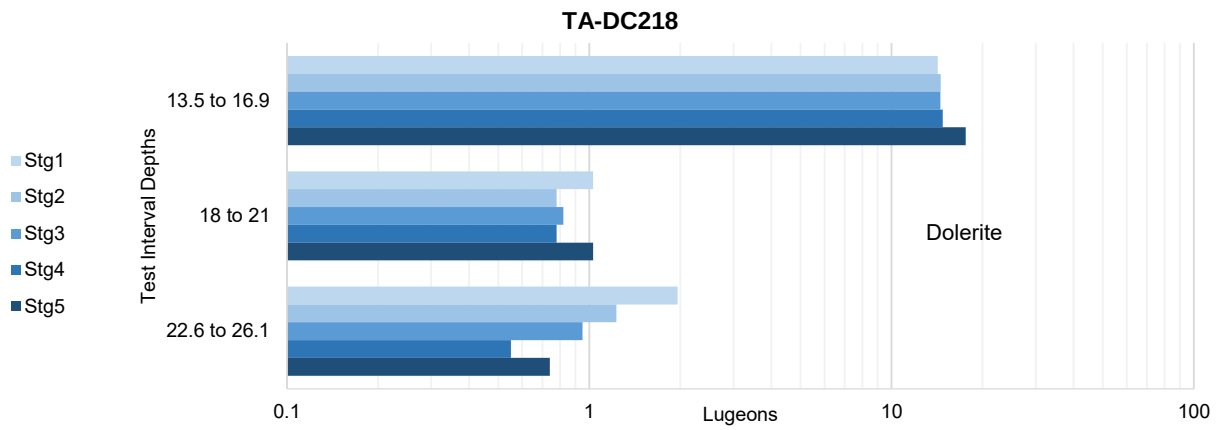
Hydro Tasmania

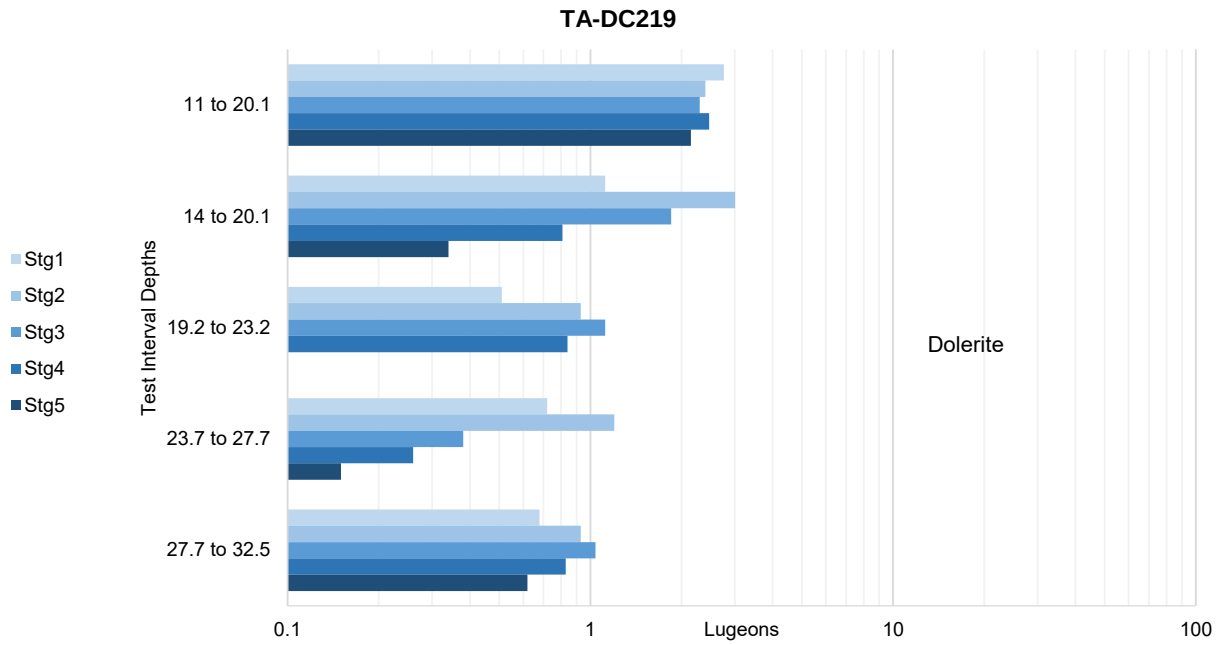
Tarraleah Redevelopment Project

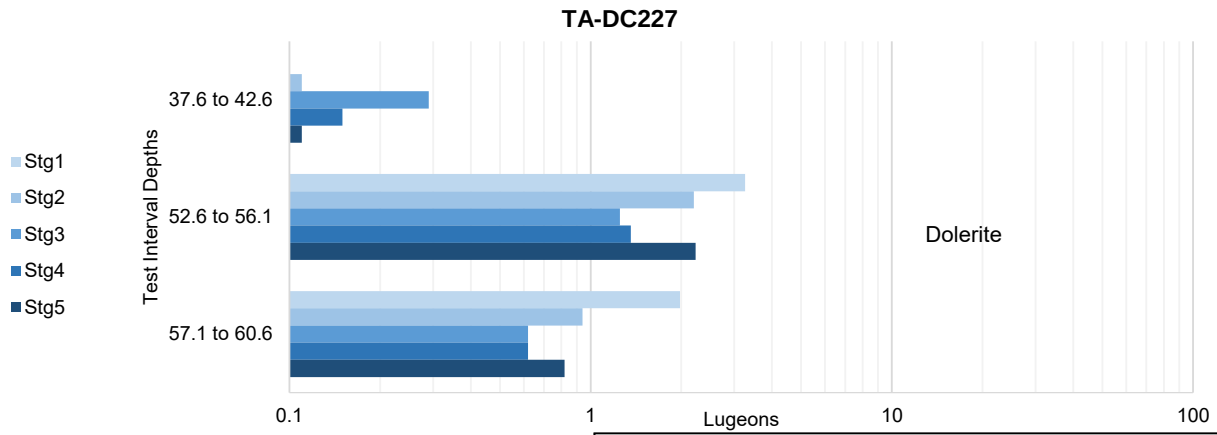
Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC215 & TA-DC216 & TA-DC217

PSM4346-115R	Appendix D







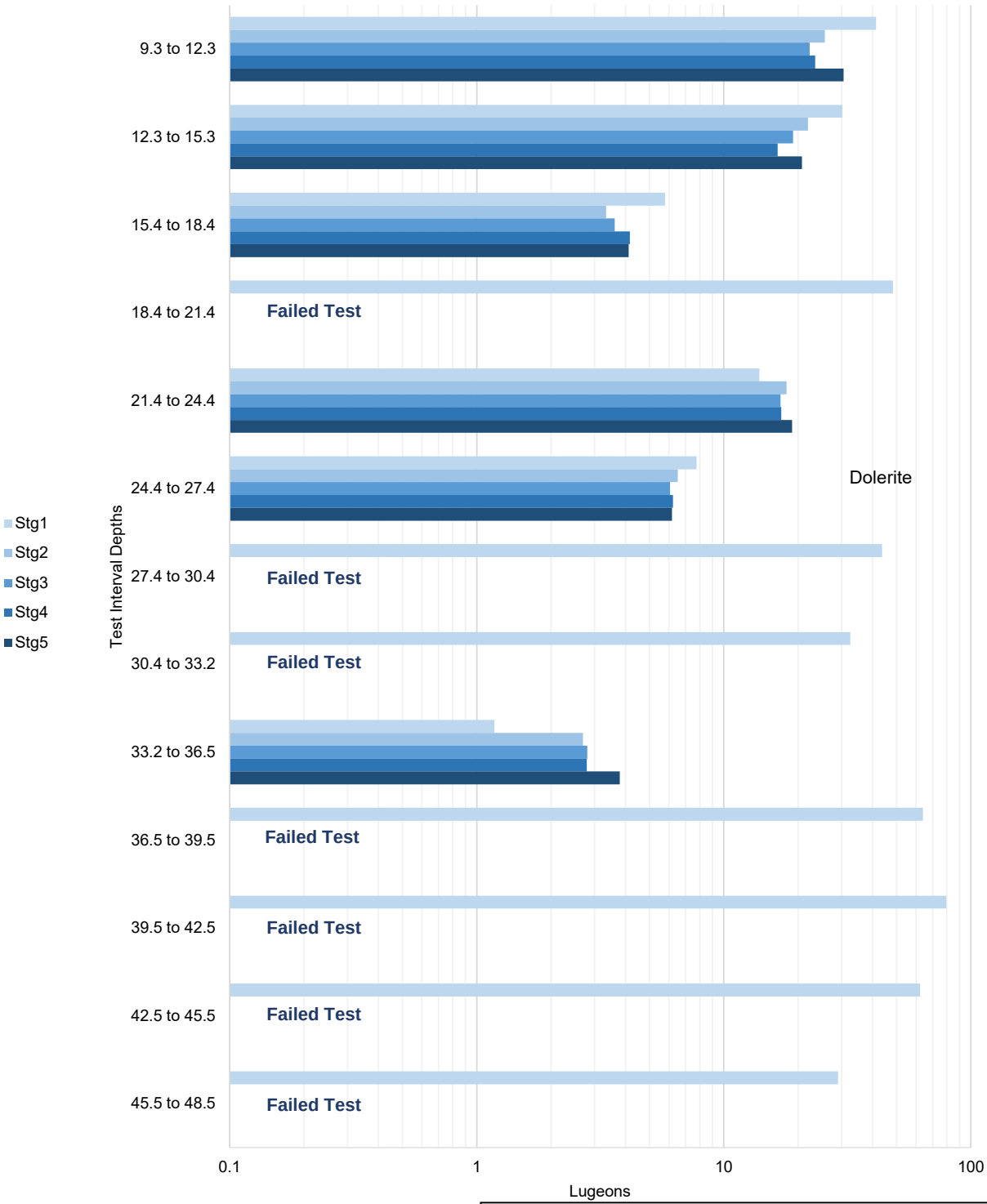
Hydro Tasmania

Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC218 & TA-DC219 & TA-DC227

PSM4346-115R	Appendix D



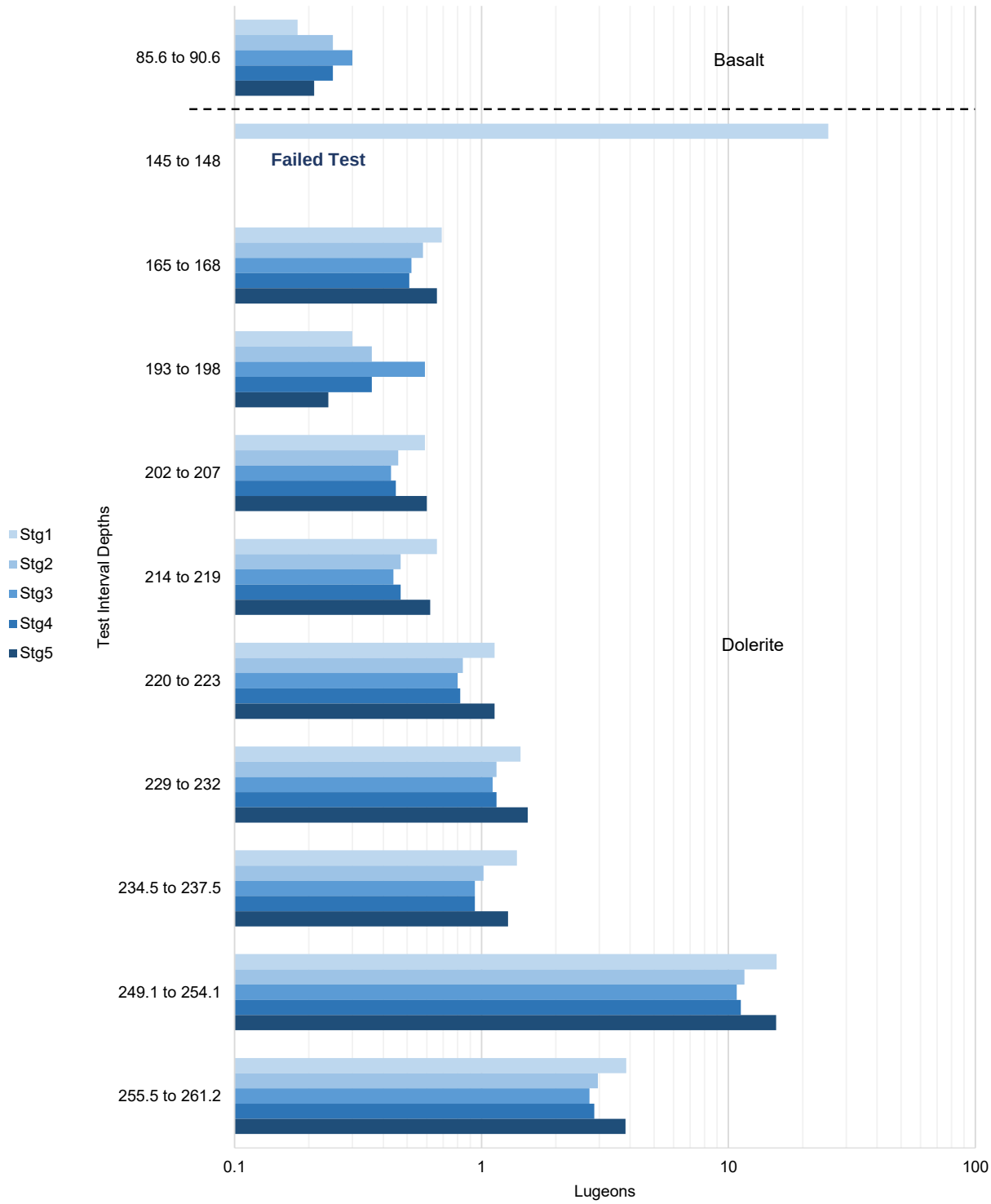
Hydro Tasmania

Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC226

PSM4346-115R	Appendix D



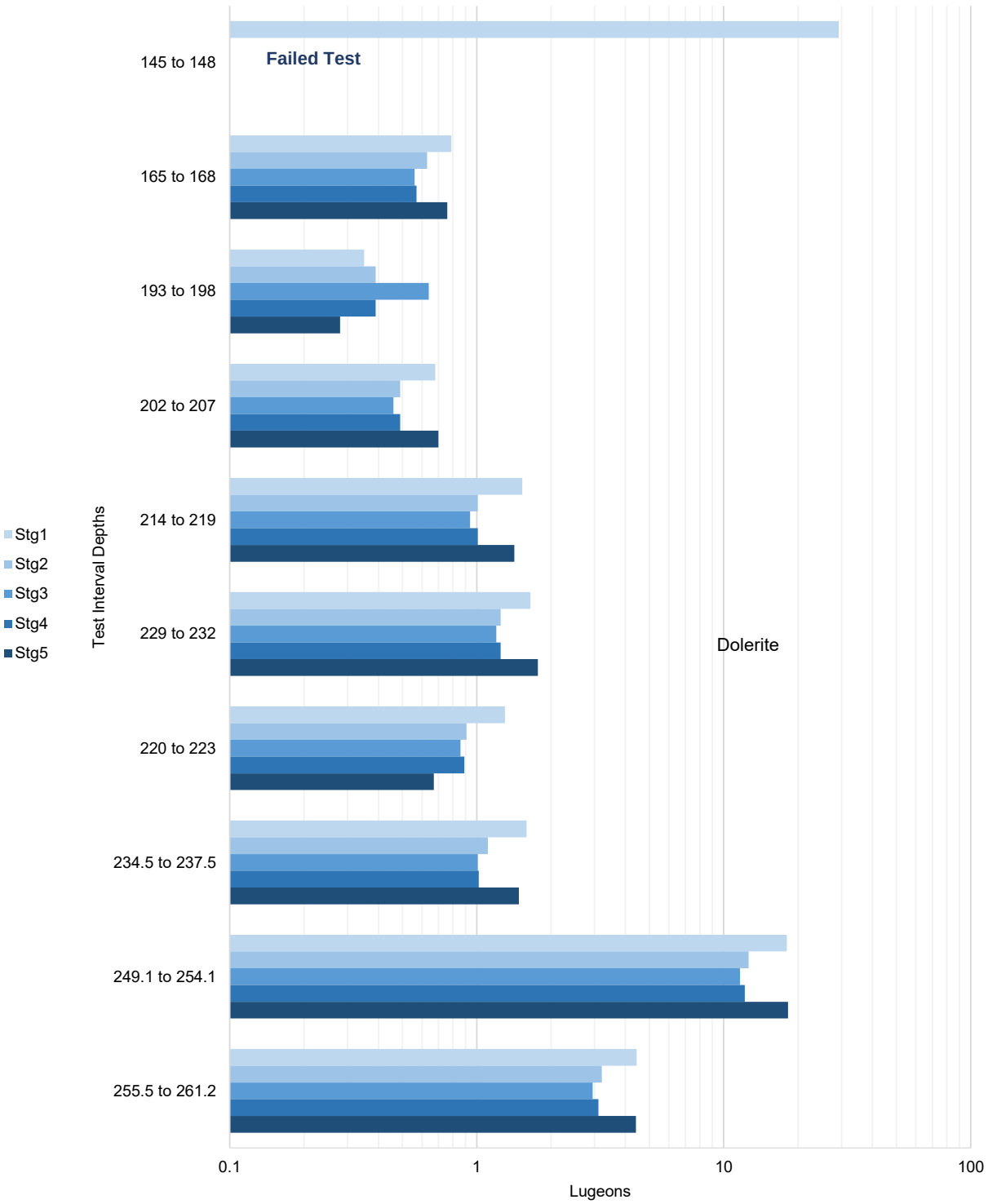
Hydro Tasmania

Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC239_Round1

PSM4346-115R	Appendix D



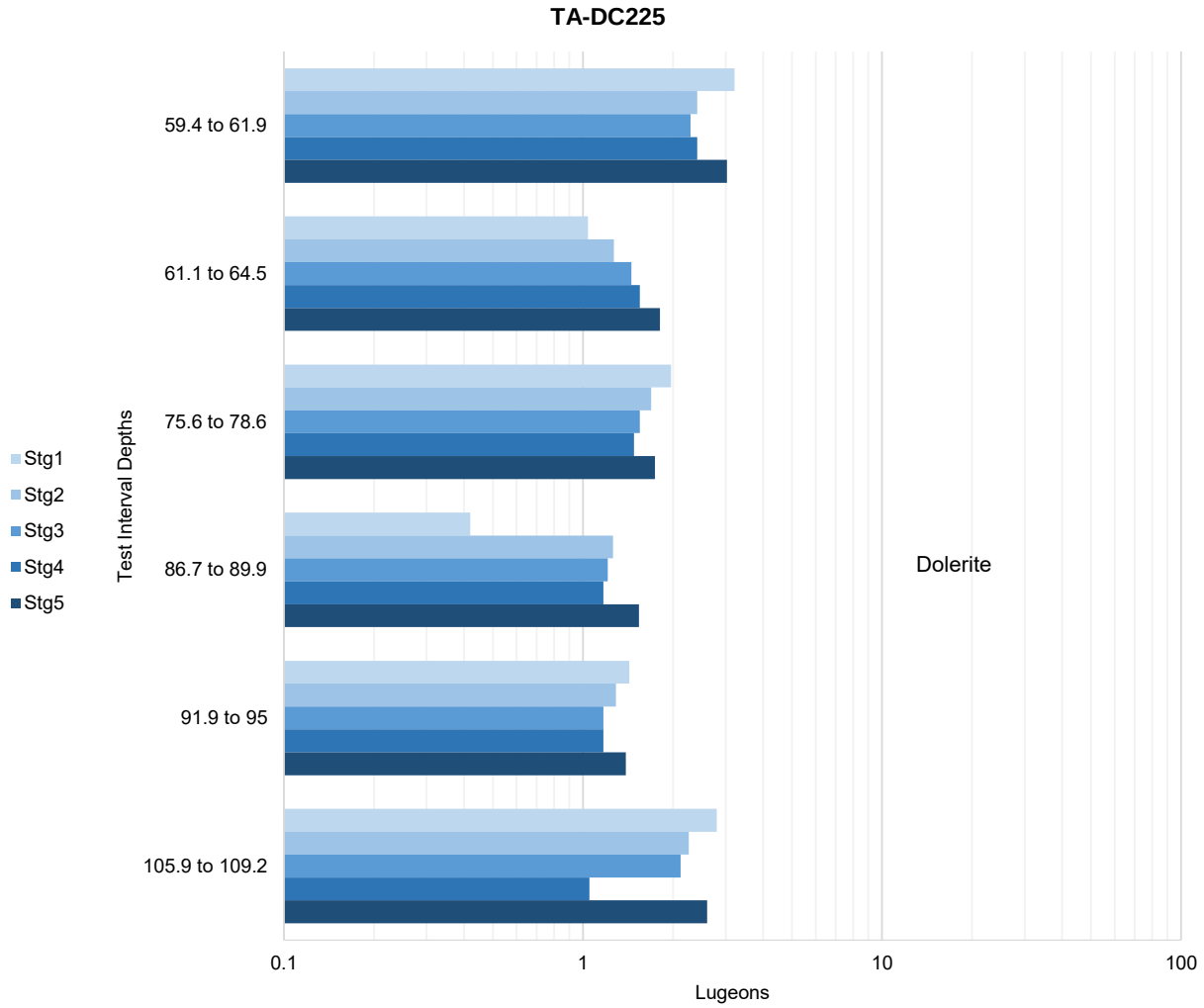
Hydro Tasmania

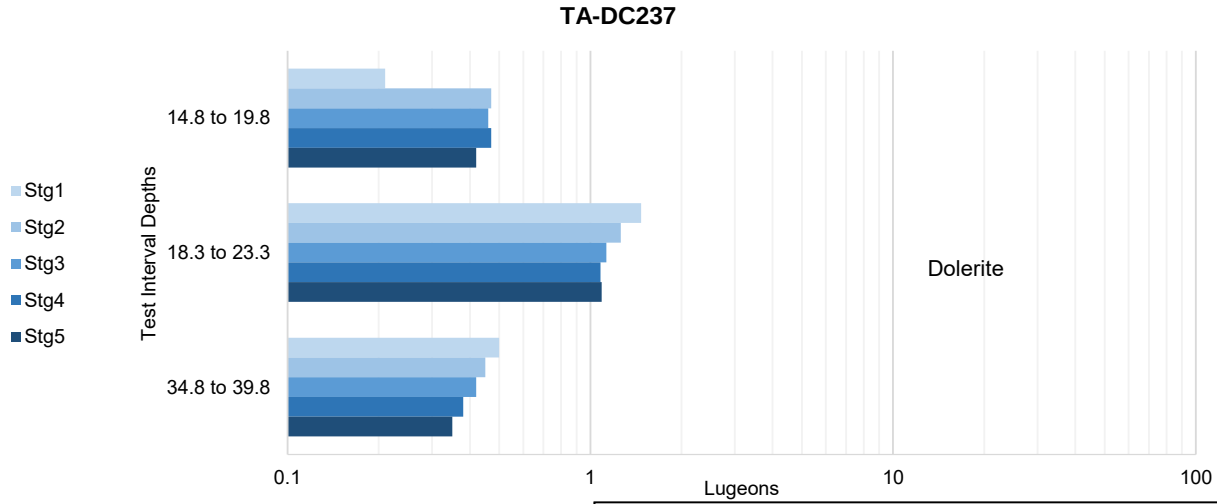
Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC239_Round2

PSM4346-115R	Appendix D





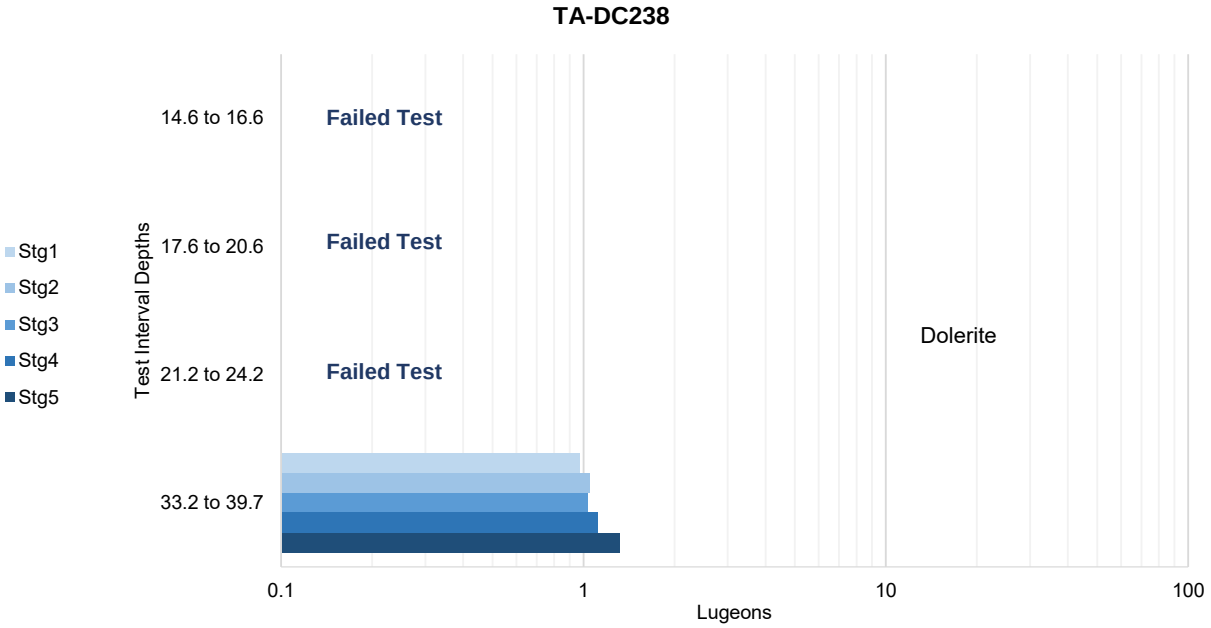
Hydro Tasmania

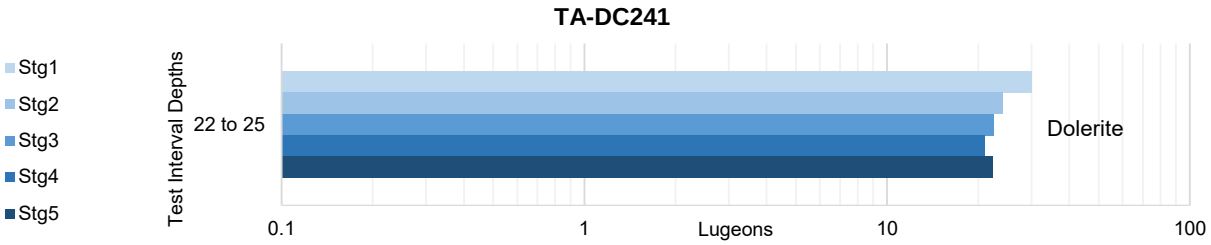
Tarraleah Redevelopment Project

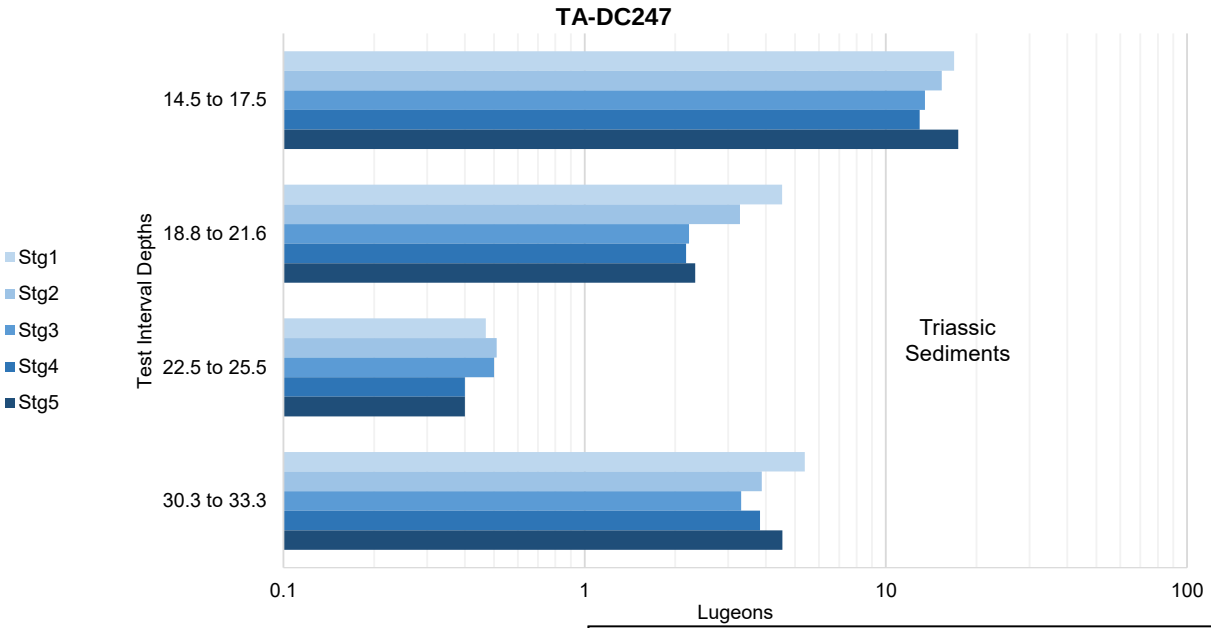
Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC225 & TA-DC237

PSM4346-115R	Appendix D







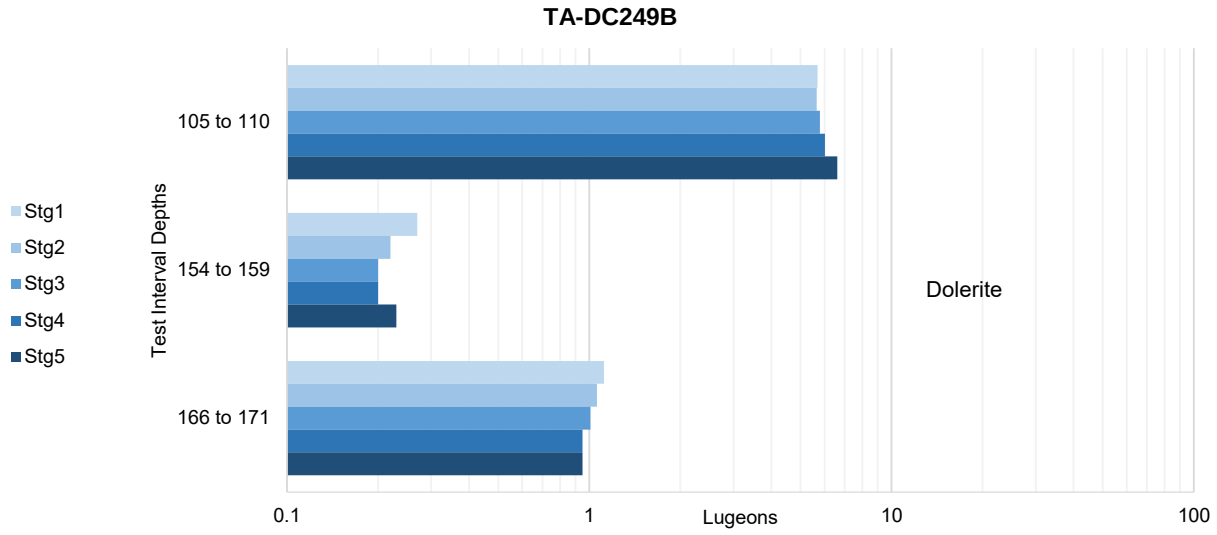
Hydro Tasmania

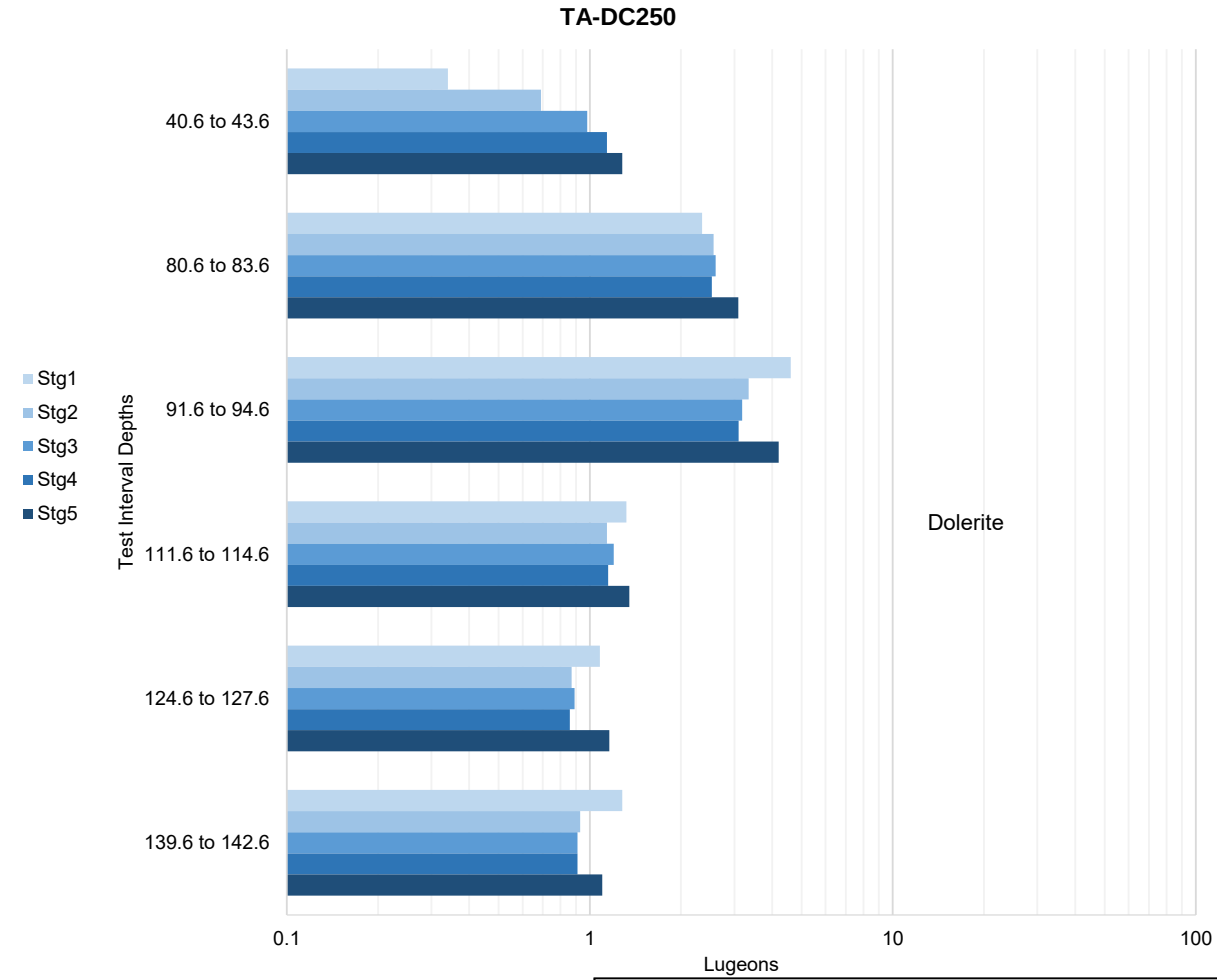
Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC238 & TA-DC241 & TA-DC247

PSM4346-115R	Appendix D





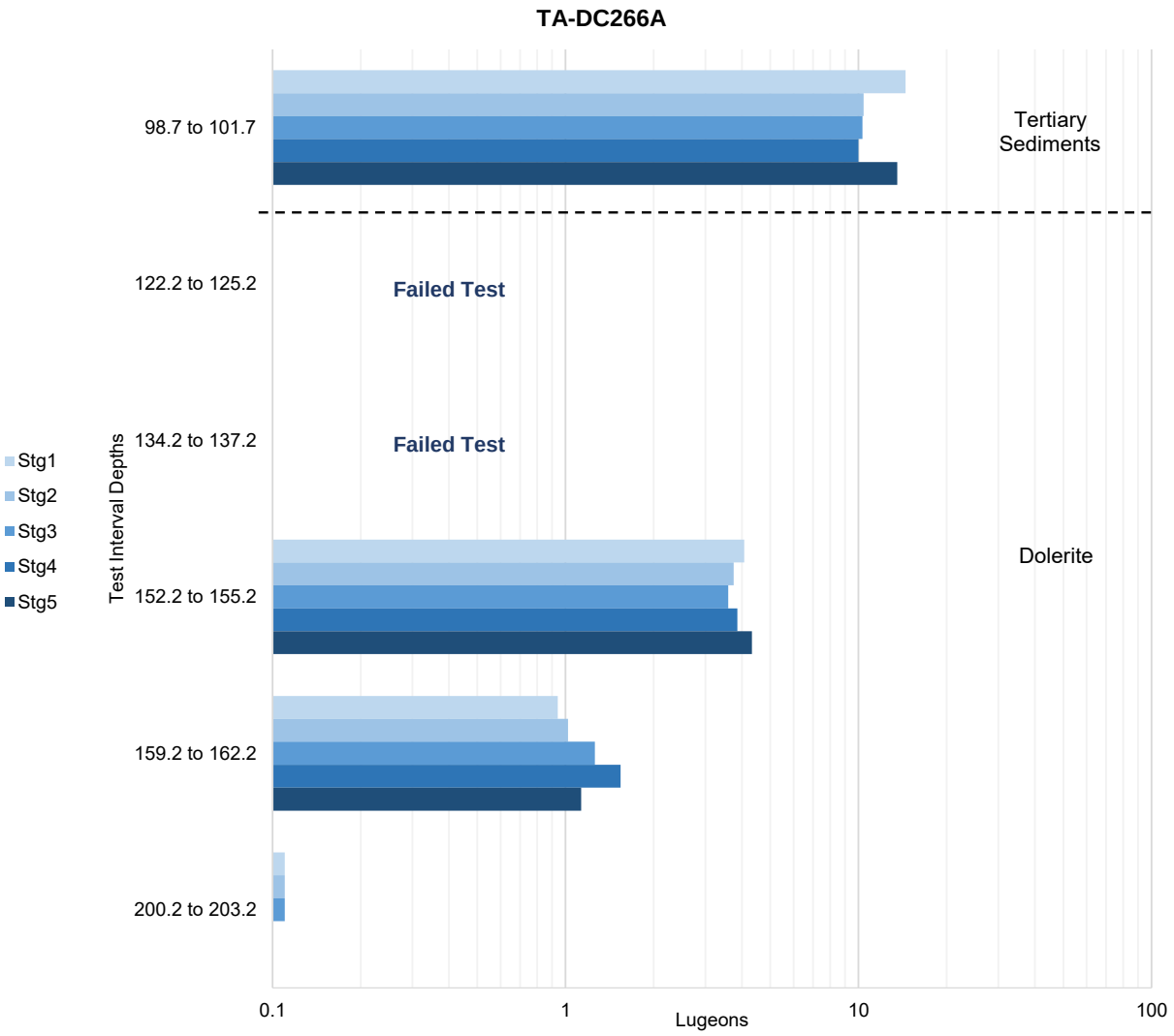
Hydro Tasmania

Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC249B & TA-DC250

PSM4346-115R	Appendix D



Hydro Tasmania

Tarraleah Redevelopment Project

Tarraleah, Tasmania

Packer Test Depth Plots
TA-DC266A

PSM4346-115R	Appendix D

entura
Hydro Tasmania

Constant Head Test

Date: 17/07/2019

Test by: Matt Ferguson

Project: Tarraleah hillside penstocks drilling

Contractor: KMR

Location: Tarraleah hillside penstocks, anchor S area

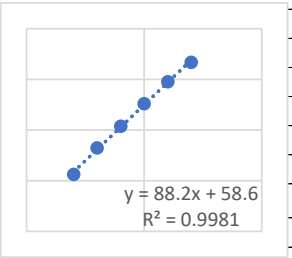
Hole # PW20d

Vegetation at test site: Minimal, earth and civil works area for penstocks, site regularly sprayed to kill vegetation

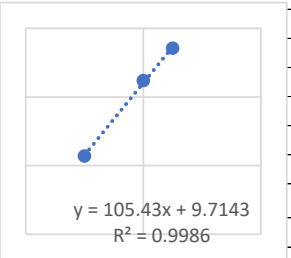
General site comments (seasonal waterlogging, soil structure, etc): Extreme rainfall in week prior to drilling, landslide deposit comprised of gravel to boulder basalt fragments in fine grained soil

Test #	1, PQ bored to 6.1m depth and tested shortly after at 1604, PW casing to 2.4m at 1330		Test #	2, PQ bored to 11.0 m depth, retracted rods 3m and tested shortly after at 1020, pumping at max rate bud could not see water in drill rod string	
Depth of bore hole:	610	cm	Depth of bore hole:	1100	cm
Test interval height (H):	370	cm	Test interval height (H):	300	cm
Average radius of bore hole (r):	5.875	cm	Average radius of bore hole (r):	5.875	cm
Depth to any impermeable layer:	NA	cm	Depth to any impermeable layer:	NA	cm
Time since first filling and start of measurement:		Hrs	Time since first filling and start of measurement:	~2 hrs since 8m	
Soil condition at excavation:	Wet		Soil condition at excavation:	Wet	

Time (min)	Water meter reading (litres)
2	225
3	330
4	415
5	504
6	591
7	668
1	**88.2**



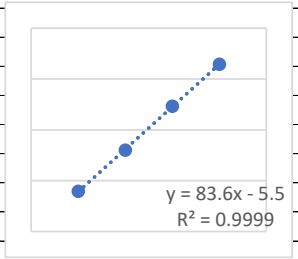
Time (min)	Water meter reading (litres)
1	114
2	224
2.5	271
1	**105.43**



Q =		**88200**	Q =		**105430**
K_{sat} (cm/sec)		**0.009448**	K_{sat} (cm/sec)		**0.007334**
K_{sat} (cm/min)		**0.566891**	K_{sat} (cm/min)		**0.440015**
K_{sat} (cm/hour)		**34.01347**	K_{sat} (cm/hour)		**26.4009**
K_{sat} (cm/day)		**816.3232**	K_{sat} (cm/day)		**633.6217**

Test #	3, PQ bored to 20.6m depth, retracted rods 2m and tested shortly after at 1510		Test #		
Depth of bore hole:	2060	cm	Depth of bore hole:		cm
Test interval height (H):	200	cm	Test interval height (H):		cm
Average radius of bore hole (r):	5.875	cm	Average radius of bore hole (r):		cm
Depth to any impermeable layer:	NA	cm	Depth to any impermeable layer:		cm
Time since first filling and start of measurement:			Time since first filling and start of measurement:		
Soil condition at excavation:	Moist		Soil condition at excavation:		

Time (min)	Water meter reading (litres)
1	79
2	160
3	246
4	329



Time (min)	Water meter reading (litres)

Q =		**83600**	Q =		
K_{sat} (cm/sec)		**0.004178**	K_{sat} (cm/sec)		
K_{sat} (cm/min)		**0.250691**	K_{sat} (cm/min)		
K_{sat} (cm/hour)		**15.04145**	K_{sat} (cm/hour)		
K_{sat} (cm/day)		**360.9947**	K_{sat} (cm/day)		

Q = rate of loss of water from the reservoir in cm^3/min

NOTE: Permeability calculations include a factor to correct for increasing water head pressure with increasing test depth.

This factor is the product of the AS1547-2012 permeability calculation and the test interval (H) divided by the depth of water in the borehole.

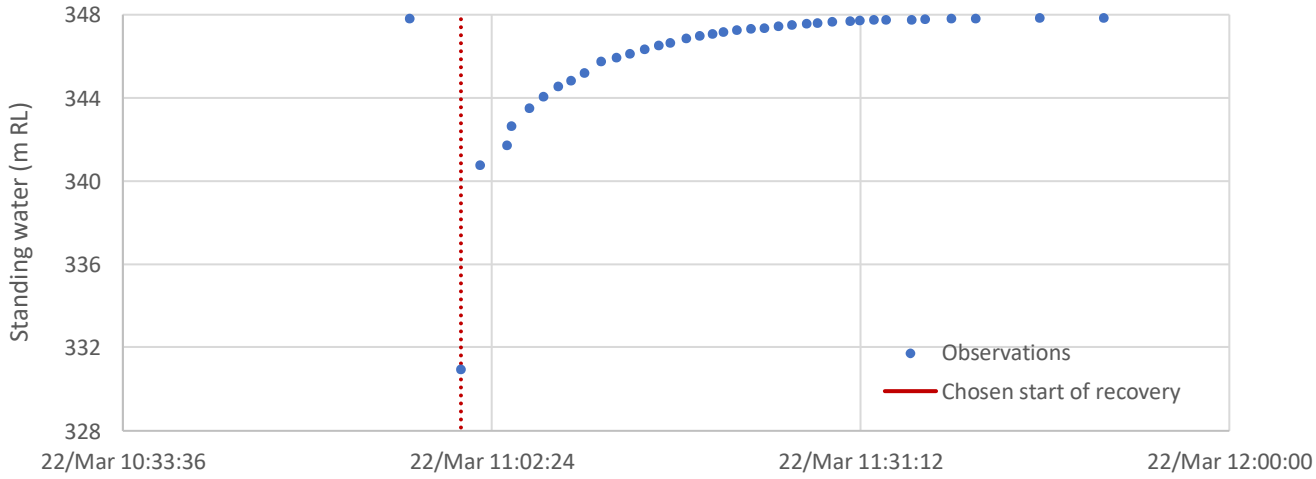
Pells Sullivan Meynink
Engineering Consultants
Rock - Soil - Water

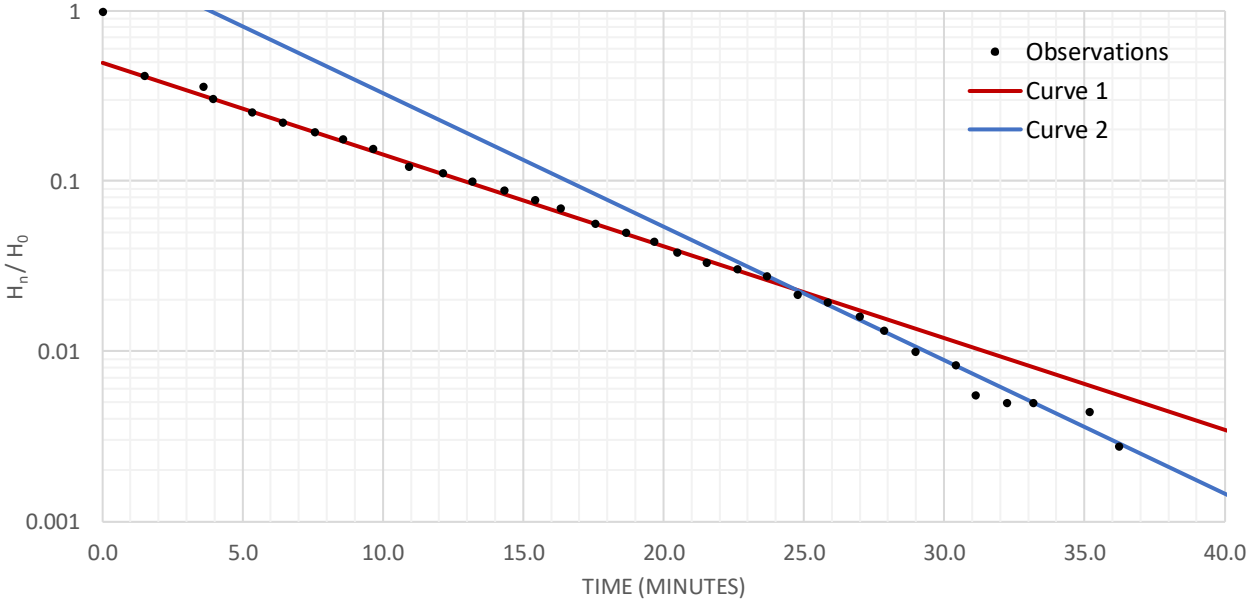
JOB no.: **PSM4346**

PROJECT: **TAPS2**

Slug Test

HOLE NUMBER:	**TA-DC216**	DEPTH OF HOLE (m):	**30.05**
BORE EASTING:	**455017.0**	SCREEN LENGTH 'L' (m):	**18.7**
BORE NORTHING:	**5317214.0**	INTERNAL DIAMETER 'D_i' (m):	**0.06**
COLLAR RL(m):	**359.18**	EXTERNAL DIAMETER 'Do' (m):	**0.10**
DATUM:	**m AHD**	SCREEN SHAPE FACTOR 'F'	**19.70**
CONTRACTOR	**Entura**	WATER DIP (m below collar)	**11.35**
WELL INSTALLED BY:	**PSM**	STANDING WATER (m AHD)	**347.83**
SCREENED LITHOLOGY:	**Quaternary & Dolerite**	DATE	**22-Mar-22**





	Time lag 'T'	Hydraulic conductivity 'k'	
	mins	m/s	m/day
Curve 1	8.1	3.1E-07	0.03
Curve 2	5.5	4.5E-07	0.04

From Hvorslev (1951) $k = \frac{A}{FT}$

where $A = \pi D_i^2 / 4$

$$F = \frac{2\pi L}{\ln\left(\frac{L}{D_o} + \sqrt{1 + \left(\frac{L}{D_o}\right)^2}\right)}$$

$$T = \frac{t_2 - t_1}{\ln(H_1/H_0) - \ln(H_2/H_0)}$$

H_n = drawdown at time t_n

COMMENTS:
Air displacement slug testing

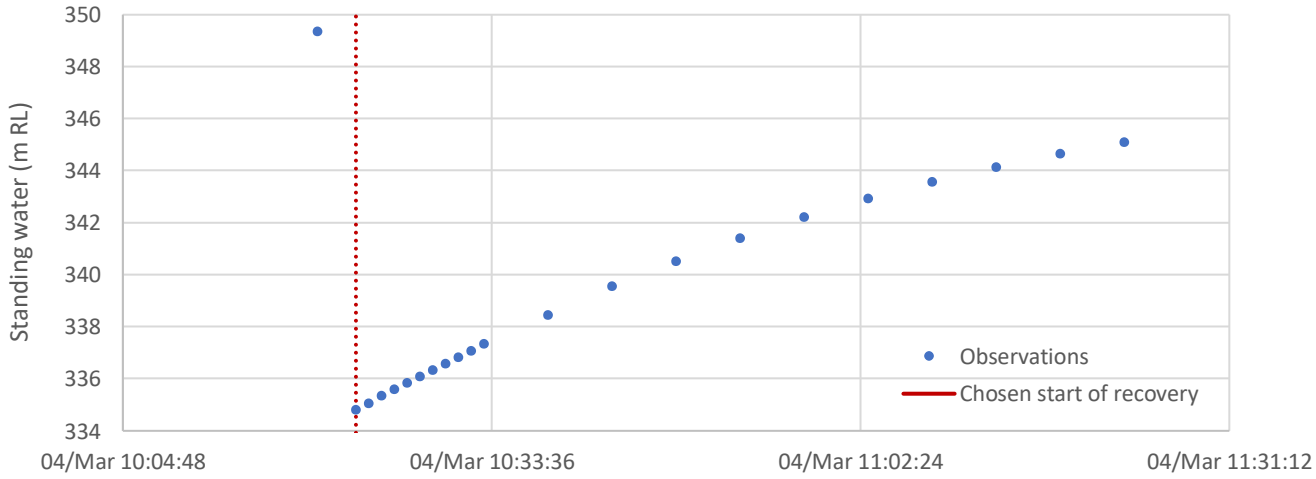
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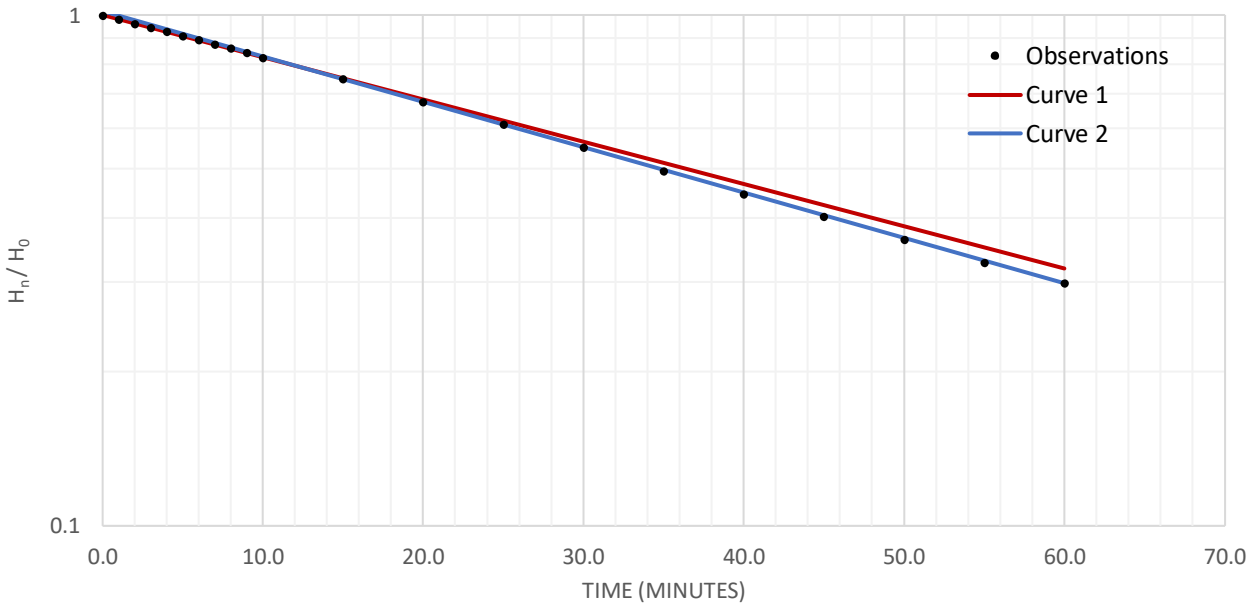
JOB no.: **PSM4346**

PROJECT: **TAPS2**

Slug Test

HOLE NUMBER:	**TA-DC219**	DEPTH OF HOLE (m):	**32.50**
BORE EASTING:	**455048.3**	SCREEN LENGTH 'L' (m):	**24.1**
BORE NORTHING:	**5317187.7**	INTERNAL DIAMETER 'D_i' (m):	**0.06**
COLLAR RL(m):	**357.90**	EXTERNAL DIAMETER 'Do' (m):	**0.10**
DATUM:	**m AHD**	SCREEN SHAPE FACTOR 'F'	**24.34**
CONTRACTOR	**Entura**	WATER DIP (m below collar)	**8.41**
WELL INSTALLED BY:	**JK**	STANDING WATER (m AHD)	**349.49**
SCREENED LITHOLOGY:	**Quaternary & Dolerite**	DATE	**4-Mar-22**





	Time lag 'T'	Hydraulic conductivity 'k'	
	mins	m/s	m/day
Curve 1	52.5	3.8E-08	3.30E-03
Curve 2	49.0	4.1E-08	3.54E-03

From Hvorslev (1951) $k = \frac{A}{FT}$

where $A = \pi D_i^2/4$

$$F = \frac{2\pi L}{\ln\left(\frac{L}{D_o} + \sqrt{1 + \left(\frac{L}{D_o}\right)^2}\right)}$$

$$T = \frac{t_2 - t_1}{\ln(H_1/H_0) - \ln(H_2/H_0)}$$

H_n = drawdown at time t_n

COMMENTS:
Air displacement slug testing

Appendix E
Interpreted Hydraulic Properties

- Table E1 – Summary of Project Packer Tests
- Table E2 – Summary of Project Slug Tests

Table E1 – Summary of Project Packer Tests

BHID	Collar Easting (m)	Collar Northing (m)	Date	Test Interval Depth (m BGL)		Test Interval RL (m AHD)		Packer Length (m)	Test Easting (m)	Test Northing (m)	Lithology	Hydrogeological Rock Mass Unit	Flow Type	Sign	Lugeon (m/d)	Overlapping Test Interval (Y/N)
				From	To	From	To									
TA06DC001	440716.1	5320525.2	14/02/2019	21.8	26.8	683.3	688.3	24.3	24.3	680.8	Dolerite	-	Fail	=	-	N
TA06DC001	440716.1	5320525.2	14/02/2019	27.8	32.8	689.3	694.2	30.3	30.3	686.8	Dolerite	D3	Dilation	=	0.016	N
TA06DC001	440716.1	5320525.2	14/02/2019	33.3	38.3	694.7	699.6	35.8	35.8	692.2	Dolerite	D4	Void Filling	=	0.010	N
TA06DC002	440487.4	5320522.4	14/02/2019	15.0	20.0	700.2	705.2	17.5	17.5	697.7	Dolerite	D4	Void Filling	=	0.060	N
TA06DC002	440487.4	5320522.4	14/02/2019	18.5	23.5	703.7	708.6	21.0	21.0	701.2	Dolerite	D4	Void Filling	=	0.076	N
TA06DC002	440487.4	5320522.4	14/02/2019	27.0	32.0	712.1	717.0	29.5	29.5	709.6	Dolerite	D3	Void Filling	=	0.002	N
TA06DC003	445825.0	5318755.5	1/03/2019	5.0	10.0	691.8	696.7	7.5	7.5	689.3	Dolerite	D2	Laminar	=	0.050	N
TA06DC003	445825.0	5318755.5	1/03/2019	7.0	30.0	693.7	716.4	18.5	18.5	682.2	Dolerite	D2	Laminar	=	0.006	N
TA06DC003	445825.0	5318755.5	1/03/2019	13.0	30.0	699.7	716.4	21.5	21.5	691.2	Dolerite	D1	Void Filling	=	0.001	N
TA06DC003	445825.0	5318755.5	1/03/2019	19.0	30.0	705.6	716.4	24.5	24.5	700.1	Dolerite	D1	Laminar	=	0.003	N
TA06DC003	445825.0	5318755.5	1/03/2019	25.0	30.0	711.5	716.4	27.5	27.5	709.0	Dolerite	D1	Void Filling	=	0.003	N
TA06DC006	445725.3	5318751.4	1/03/2019	8.0	13.0	688.2	693.1	10.5	10.5	685.7	Dolerite	D5	Void Filling	=	0.024	N
TA06DC006	445725.3	5318751.4	1/03/2019	16.0	21.0	696.1	701.0	18.5	18.5	693.6	Dolerite	-	Fail	=	-	N
TA06DC008	451955.4	5316337.1	21/03/2019	11.0	15.0	654.5	658.0	13.0	13.0	652.5	Basalt	B4	Laminar	=	1.322	N
TA06DC008	451955.4	5316337.1	21/03/2019	15.1	20.1	658.1	662.6	17.6	17.6	655.6	Basalt	B3	Turbulent	=	0.697	N
TA06DC010	452030.6	5316088.9	6/03/2019	8.3	13.3	652.2	656.8	10.8	10.8	649.7	Basalt	B4	Laminar	=	0.071	N
TA06DC010	452030.6	5316088.9	6/03/2019	15.3	21.7	658.6	664.4	18.5	18.5	655.4	Basalt	B4	Turbulent	=	0.031	N
TA06DC010	452030.6	5316088.9	6/03/2019	20.3	21.7	663.1	664.4	21.0	21.0	662.4	Basalt	B4	Turbulent	=	0.072	N
TA06DC012	454856.4	5317024.5	26/03/2019	27.3	32.3	489.7	494.7	29.8	29.8	487.2	Dolerite	D3	Turbulent	=	0.011	N
TA06DC012	454856.4	5317024.5	26/03/2019	36.3	41.3	498.6	503.5	38.8	38.8	496.1	Dolerite	-	Fail	=	-	N
TA06DC012	454856.4	5317024.5	26/03/2019	52.3	57.3	514.4	519.3	54.8	54.8	511.9	Dolerite	-	Fail	=	-	N
TA06DC012	454856.4	5317024.5	26/03/2019	71.3	76.3	533.1	538.0	73.8	73.8	530.6	Dolerite	-	Fail	=	-	N
TA06DC012	454856.4	5317024.5	26/03/2019	83.3	88.3	544.9	549.8	85.8	85.8	542.4	Dolerite	D3	Laminar	=	0.003	N
TA06DC013	454015.2	5316624.9	6/03/2019	35.3	40.3	643.6	648.5	37.8	37.8	641.1	Basalt	B3	Turbulent	=	0.059	N
TA06DC013	454015.2	5316624.9	6/03/2019	67.3	72.3	675.1	680.0	69.8	69.8	672.6	Basalt	B3	Turbulent	=	0.056	N
TA06DC013	454015.2	5316624.9	6/03/2019	98.3	103.3	705.6	710.6	100.8	100.8	703.1	Basalt	B3	Turbulent	=	0.013	N
TA06DC013	454015.2	5316624.9	6/03/2019	110.3	115.3	717.5	722.4	112.8	112.8	715.0	Tertiary Sediments	IS1	Void Filling	=	0.001	N
TA06DC013	454015.2	5316624.9	6/03/2019	125.3	130.3	732.2	737.2	127.8	127.8	729.7	Dolerite	D1	Dilation	=	0.001	N
TA06DC015	455059.0	5317145.5	13/03/2019	23.5	31.5	390.2	398.1	27.5	27.5	386.2	Dolerite	D2	Dilation	=	0.038	N
TA06DC016	447626.0	5318345.0	4/03/2019	36.7	41.8	744.3	749.1	39.3	39.3	741.7	Dolerite	D3	Void Filling	=	0.005	N
TA06DC016	447626.0	5318345.0	4/03/2019	42.8	47.8	750.0	754.8	45.3	45.3	747.5	Dolerite	D5	Void Filling	=	0.005	N
TA06DC016	447626.0	5318345.0	4/03/2019	51.3	56.0	758.1	762.5	53.7	53.7	755.7	Dolerite	D5	Turbulent	=	0.011	N
TA-DC201	439561.5	5321064.0	6/04/2022	6.9	9.9	717.9	720.9	8.4	8.4	716.4	Dolerite	-	Fail	=	-	N
TA-DC201	439561.5	5321064.0	6/04/2022	10.0	13.0	721.0	724.0	11.5	11.5	719.5	Dolerite	D3	Turbulent	=	0.04	N
TA-DC201	439561.5	5321064.0	6/04/2022	13.0	16.0	724.0	726.9	14.5	14.5	722.5	Dolerite	D4	Laminar	=	0.34	N
TA-DC201	439561.5	5321064.0	6/04/2022	17.0	19.5	727.9	730.4	18.3	18.3	726.7	Dolerite	-	Fail	=	-	N
TA-DC202	439600.1	5321013.7	8/02/2022	7.5	10.5	725.1	727.9	9.0	9.0	723.6	Dolerite	-	Fail	=	-	N
TA-DC205	439663.4	5320923.6	3/02/2022	12.0	15.0	737.8	740.8	13.5	13.5	736.3	Dolerite	-	Fail	=	-	N
TA-DC205	439663.4	5320923.6	3/02/2022	15.0	18.0	740.8	743.7	16.5	16.5	739.3	Dolerite	-	Fail	=	-	N

BHID	Collar Easting (m)	Collar Northing (m)	Date	Test Interval Depth (m BGL)		Test Interval RL (m AHD)		Packer Length (m)	Test Easting (m)	Test Northing (m)	Lithology	Hydrogeological Rock Mass Unit	Flow Type	Sign	Lugeon (m/d)	Overlapping Test Interval (Y/N)
				From	To	From	To									
TA-DC205	439663.4	5320923.6	3/02/2022	18.0	21.0	743.7	746.7	19.5	19.5	742.2	Dolerite	-	Fail	=	-	N
TA-DC205	439663.4	5320923.6	3/02/2022	21.0	24.0	746.7	749.6	22.5	22.5	745.2	Dolerite	-	Fail	=	-	N
TA-DC205	439663.4	5320923.6	3/02/2022	24.0	27.0	749.6	752.6	25.5	25.5	748.1	Dolerite	-	Fail	=	-	N
TA-DC205	439663.4	5320923.6	3/02/2022	27.0	45.0	752.6	770.3	36.0	36.0	743.6	Dolerite	D4	Void Filling	=	0.061	N
TA-DC207	449255.9	5318287.2	4/05/2022	20.1	23.1	679.9	682.9	21.6	21.6	678.4	Basalt	B1	Turbulent	=	0.001	N
TA-DC207	449255.9	5318287.2	4/05/2022	32.6	35.6	692.4	695.4	34.1	34.1	690.9	Tertiary Sediments	IS1	Dilation	=	0.050	N
TA-DC207	449255.9	5318287.2	4/05/2022	36.6	39.6	696.4	699.4	38.1	38.1	694.9	Tertiary Sediments	IS1	Laminar	=	0.001	N
TA-DC207	449255.9	5318287.2	4/05/2022	48.6	51.6	708.4	711.4	50.1	50.1	706.9	Dolerite	D2	Turbulent	=	0.014	N
TA-DC207	449255.9	5318287.2	4/05/2022	74.1	77.1	733.8	736.8	75.6	75.6	732.3	Dolerite	D3	Void Filling	=	0.001	N
TA-DC208	449702.4	5317895.7	1/06/2022	32.8	35.8	689.7	692.5	34.3	34.3	688.2	Dolerite	D1	Dilation	=	0.001	N
TA-DC208	449702.4	5317895.7	1/06/2022	69.6	72.6	723.8	726.6	71.1	71.1	722.3	Dolerite	D1	Void Filling	=	0.001	N
TA-DC208	449702.4	5317895.7	1/06/2022	86.1	98.1	739.1	750.2	92.1	92.1	733.1	Dolerite	D1	Turbulent	=	0.003	N
TA-DC208	449702.4	5317895.7	1/06/2022	103.3	105.3	755.1	756.9	104.3	104.3	754.1	Dolerite	-	Fail	=	-	N
TA-DC208	449702.4	5317895.7	1/06/2022	113.8	115.8	764.8	766.7	114.8	114.8	763.8	Dolerite	D3	Laminar	=	0.007	N
TA-DC208	449702.4	5317895.7	1/06/2022	122.8	124.8	773.1	775.0	123.8	123.8	772.1	Dolerite	D1	Dilation	=	0.001	N
TA-DC212	454705.1	5317128.4	6/04/2022	17.1	20.1	485.1	487.9	18.6	18.6	483.6	Dolerite	D3	Dilation	=	0.005	N
TA-DC212	454705.1	5317128.4	6/04/2022	21.9	26.1	489.6	493.5	24.0	24.0	487.5	Dolerite	D4	Void Filling	=	0.262	N
TA-DC212	454705.1	5317128.4	6/04/2022	71.5	74.5	536.2	539.0	73.0	73.0	534.7	Dolerite	D3	Laminar	=	0.009	N
TA-DC212	454705.1	5317128.4	6/04/2022	114.4	119.4	576.5	581.2	116.9	116.9	574.0	Dolerite	D1	Laminar	=	0.001	N
TA-DC212	454705.1	5317128.4	6/04/2022	119.4	124.4	581.2	585.9	121.9	121.9	578.7	Dolerite	D1	Laminar	=	0.000	N
TA-DC212	454705.1	5317128.4	6/04/2022	131.4	134.4	592.5	595.3	132.9	132.9	591.0	Dolerite	D1	Void Filling	=	0.004	N
TA-DC212	454705.1	5317128.4	6/04/2022	135.0	140.1	595.8	600.6	137.6	137.6	593.3	Dolerite	D1	Turbulent	=	0.001	N
TA-DC214	454893.9	5317170.0	13/04/2022	21.5	25.7	422.4	426.6	23.6	23.6	420.3	Dolerite	D2	Dilation	=	0.006	N
TA-DC215	455015.9	5317168.5	22/03/2022	21.1	24.6	391.2	394.6	22.9	22.9	389.4	Dolerite	D1	Void Filling	=	0.003	N
TA-DC215	455015.9	5317168.5	22/03/2022	28.0	32.1	397.9	401.8	30.1	30.1	395.8	Dolerite	-	Fail	=	-	N
TA-DC215	455015.9	5317168.5	22/03/2022	35.0	41.0	404.6	410.5	38.0	38.0	401.6	Dolerite	D4	Laminar	=	0.006	N
TA-DC216	455021.7	5317215.1	11/03/2022	25.2	30.1	382.9	387.5	27.7	27.7	380.4	Dolerite	D4	Void Filling	=	0.021	N
TA-DC217	455024.8	5317248.0	29/03/2022	10.0	14.3	357.4	361.7	12.2	12.2	355.3	Dolerite	D2	Dilation	=	0.041	N
TA-DC217	455024.8	5317248.0	29/03/2022	15.3	19.7	362.7	367.0	17.5	17.5	360.5	Dolerite	D2	Laminar	=	0.017	N
TA-DC217	455024.8	5317248.0	29/03/2022	20.0	24.6	367.3	371.9	22.3	22.3	365.0	Dolerite	D4	Laminar	=	0.031	N
TA-DC218	455122.4	5317150.1	23/03/2022	13.5	16.9	359.1	362.4	15.2	15.2	357.4	Dolerite	D4	Laminar	=	0.128	N
TA-DC218	455122.4	5317150.1	23/03/2022	18.0	21.0	363.5	366.5	19.5	19.5	362.0	Dolerite	D4	Laminar	=	0.008	N
TA-DC218	455122.4	5317150.1	23/03/2022	22.6	26.1	368.0	371.5	24.4	24.4	366.3	Dolerite	D5	Void Filling	=	0.005	N
TA-DC219	455048.7	5317189.2	28/02/2022	11.0	20.1	368.7	377.6	15.6	15.6	364.1	Dolerite	D4	Laminar	=	0.021	N
TA-DC219	455048.7	5317189.2	28/02/2022	14.0	20.1	371.6	377.6	17.1	17.1	368.6	Dolerite	D4	Void Filling	=	0.007	N
TA-DC219	455048.7	5317189.2	28/02/2022	19.2	23.2	376.7	380.6	21.2	21.2	374.7	Dolerite	D5	Dilation	=	0.004	N
TA-DC219	455048.7	5317189.2	28/02/2022	23.7	27.7	381.1	385.1	25.7	25.7	379.1	Dolerite	D5	Void Filling	=	0.001	N
TA-DC219	455048.7	5317189.2	28/02/2022	27.7	32.5	385.1	389.8	30.1	30.1	382.7	Dolerite	D4	Dilation	=	0.005	N
TA-DC226	439663.6	5320926.5	21/03/2022	9.3	12.3	734.2	737.0	10.8	10.8	732.7	Dolerite	D2	Turbulent	=	0.193	N
TA-DC226	439663.6	5320926.5	21/03/2022	12.3	15.3	737.0	739.7	13.8	13.8	735.5	Dolerite	D3	Turbulent	=	0.165	N

BHID	Collar Easting (m)	Collar Northing (m)	Date	Test Interval Depth (m BGL)		Test Interval RL (m AHD)		Packer Length (m)	Test Easting (m)	Test Northing (m)	Lithology	Hydrogeological Rock Mass Unit	Flow Type	Sign	Lugeon (m/d)	Overlapping Test Interval (Y/N)
				From	To	From	To									
TA-DC226	439663.6	5320926.5	21/03/2022	15.4	18.4	739.8	742.6	16.9	16.9	738.3	Dolerite	D3	Laminar	=	0.036	N
TA-DC226	439663.6	5320926.5	21/03/2022	18.4	21.4	742.6	745.3	19.9	19.9	741.1	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	21.4	24.4	745.3	748.1	22.9	22.9	743.8	Dolerite	D4	Laminar	=	0.147	N
TA-DC226	439663.6	5320926.5	21/03/2022	24.4	27.4	748.1	750.9	25.9	25.9	746.6	Dolerite	D4	Laminar	=	0.057	N
TA-DC226	439663.6	5320926.5	21/03/2022	27.4	30.4	750.9	753.6	28.9	28.9	749.4	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	30.4	33.2	753.6	756.2	31.8	31.8	752.2	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	33.2	36.5	756.2	759.2	34.9	34.9	754.6	Dolerite	D4	Wash Out	=	0.033	N
TA-DC226	439663.6	5320926.5	21/03/2022	36.5	39.5	759.2	762.0	38.0	38.0	757.7	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	39.5	42.5	762.0	764.8	41.0	41.0	760.5	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	42.5	45.5	764.8	767.5	44.0	44.0	763.3	Dolerite	-	Fail	=	-	N
TA-DC226	439663.6	5320926.5	21/03/2022	45.5	48.5	767.5	770.3	47.0	47.0	766.0	Dolerite	-	Fail	=	-	N
TA-DC227	440313.3	5320613.8	20/05/2022	37.6	42.6	758.4	763.3	40.1	40.1	755.9	Dolerite	D1	Dilation	=	0.0003	N
TA-DC227	440313.3	5320613.8	20/05/2022	52.6	56.1	773.2	776.6	54.4	54.4	771.4	Dolerite	D3	Turbulent	=	0.011	N
TA-DC227	440313.3	5320613.8	20/05/2022	57.1	60.6	777.6	781.1	58.9	58.9	775.9	Dolerite	D1	Turbulent	=	0.005	N
TA-DC239	454746.7	5316799.0	23/11/2022	85.6	90.6	650.4	655.1	88.1	88.1	647.9	Basalt	B1	Dilation	=	0.002	N
TA-DC239	454746.7	5316799.0	23/11/2022	145.0	148.0	706.2	709.0	146.5	146.5	704.7	Dolerite	-	Fail	=	-	N
TA-DC239	454746.7	5316799.0	23/11/2022	165.0	168.0	725.0	727.8	166.5	166.5	723.5	Dolerite	D3	Turbulent	=	0.004	N
TA-DC239	454746.7	5316799.0	23/11/2022	193.0	198.0	751.3	756.0	195.5	195.5	748.8	Dolerite	D5	Dilation	=	0.002	N
TA-DC239	454746.7	5316799.0	23/11/2022	202.0	207.0	759.8	764.5	204.5	204.5	757.3	Dolerite	D4	Turbulent	=	0.004	N
TA-DC239	454746.7	5316799.0	23/11/2022	214.0	219.0	771.1	775.8	216.5	216.5	768.6	Dolerite	D5	Turbulent	=	0.004	N
TA-DC239	454746.7	5316799.0	23/11/2022	220.0	223.0	776.7	779.5	221.5	221.5	775.2	Dolerite	D3	Turbulent	=	0.007	N
TA-DC239	454746.7	5316799.0	23/11/2022	229.0	232.0	785.2	788.0	230.5	230.5	783.7	Dolerite	D3	Turbulent	=	0.010	N
TA-DC239	454746.7	5316799.0	23/11/2022	234.5	237.5	790.3	793.1	236.0	236.0	788.8	Dolerite	D4	Turbulent	=	0.008	N
TA-DC239	454746.7	5316799.0	23/11/2022	249.1	254.1	804.0	808.7	251.6	251.6	801.5	Dolerite	D4	Turbulent	=	0.093	N
TA-DC239	454746.7	5316799.0	23/11/2022	255.5	261.2	810.1	815.4	258.4	258.4	807.2	Dolerite	D4	Turbulent	=	0.024	N
TA-DC225	455249.7	5316790.9	1/07/2023	59.4	61.9	437.7	440.1	60.7	60.7	436.4	Dolerite	D4	Turbulent	=	0.020	N
TA-DC225	455249.7	5316790.9	1/07/2023	61.1	64.5	439.4	442.7	62.8	62.8	437.7	Dolerite	D5	Wash Out	=	0.016	N
TA-DC225	455249.7	5316790.9	1/07/2023	75.6	78.6	453.6	456.6	77.1	77.1	452.1	Dolerite	D5	Turbulent	=	0.013	N
TA-DC225	455249.7	5316790.9	1/07/2023	86.7	89.9	464.6	467.7	88.3	88.3	463.0	Dolerite	D4	Wash Out	=	0.013	N
TA-DC225	455249.7	5316790.9	1/07/2023	91.9	95.0	469.7	472.7	93.5	93.5	468.1	Dolerite	D3	Turbulent	=	0.010	N
TA-DC225	455249.7	5316790.9	1/07/2023	105.9	109.2	483.5	486.7	107.6	107.6	481.8	Dolerite	D5	Turbulent	=	0.018	N
TA-DC237	455341.4	5316728.5	29/03/2023	14.8	19.8	359.7	364.5	17.3	17.3	357.2	Dolerite	D4	Laminar	=	0.003	N
TA-DC237	455341.4	5316728.5	29/03/2023	18.3	23.3	363.1	367.9	20.8	20.8	360.6	Dolerite	D4	Void Filling	=	0.009	N
TA-DC237	455341.4	5316728.5	29/03/2023	34.8	39.8	379.1	383.9	37.3	37.3	376.6	Dolerite	D5	Void Filling	=	0.003	N
TA-DC238	455330.9	5316773.4	29/03/2023	14.6	16.6	360.4	362.4	15.6	15.6	359.4	Dolerite	-	Fail	=	-	N
TA-DC238	455330.9	5316773.4	29/03/2023	17.6	20.6	363.3	366.3	19.1	19.1	361.8	Dolerite	-	Fail	=	-	N
TA-DC238	455330.9	5316773.4	29/03/2023	21.2	24.2	366.8	369.8	22.7	22.7	365.3	Dolerite	-	Fail	=	-	N
TA-DC238	455330.9	5316773.4	19/04/2023	33.2	39.7	378.6	385.0	36.5	36.5	375.3	Dolerite	D4	Laminar	=	0.009	N
TA-DC239	454746.7	5316799.0	20/12/2022	145.0	148.0	706.2	709.0	146.5	146.5	704.7	Dolerite	-	Fail	=	-	N
TA-DC239	454746.7	5316799.0	20/12/2022	165.0	168.0	725.0	727.8	166.5	166.5	723.5	Dolerite	D1	Turbulent	=	0.005	N

BHID	Collar Easting (m)	Collar Northing (m)	Date	Test Interval Depth (m BGL)		Test Interval RL (m AHD)		Packer Length (m)	Test Easting (m)	Test Northing (m)	Lithology	Hydrogeological Rock Mass Unit	Flow Type	Sign	Lugeon (m/d)	Overlapping Test Interval (Y/N)
				From	To	From	To									
TA-DC239	454746.7	5316799.0	20/12/2022	193.0	198.0	751.3	756.0	195.5	195.5	748.8	Dolerite	D3	Dilation	=	0.002	N
TA-DC239	454746.7	5316799.0	20/12/2022	202.0	207.0	759.8	764.5	204.5	204.5	757.3	Dolerite	D3	Turbulent	=	0.004	N
TA-DC239	454746.7	5316799.0	20/12/2022	214.0	219.0	771.1	775.8	216.5	216.5	768.6	Dolerite	D5	Turbulent	=	0.008	N
TA-DC239	454746.7	5316799.0	20/12/2022	229.0	232.0	785.2	788.0	230.5	230.5	783.7	Dolerite	D3	Turbulent	=	0.010	N
TA-DC239	454746.7	5316799.0	20/12/2022	220.0	223.0	776.7	779.5	221.5	221.5	775.2	Dolerite	D3	Turbulent	=	0.007	N
TA-DC239	454746.7	5316799.0	20/12/2022	234.5	237.5	790.3	793.1	236.0	236.0	788.8	Dolerite	D4	Turbulent	=	0.009	N
TA-DC239	454746.7	5316799.0	20/12/2022	249.1	254.1	804.0	808.7	251.6	251.6	801.5	Dolerite	D4	Turbulent	=	0.101	N
TA-DC239	454746.7	5316799.0	20/12/2022	255.5	261.2	810.1	815.4	258.4	258.4	807.2	Dolerite	D4	Turbulent	=	0.025	N
TA-DC241	453032.0	5317608.0	22/02/2023	22.0	25.0	678.4	681.3	23.5	23.5	676.9	Dolerite	D4	Void Filling	=	0.193	N
TA-DC247	444281.6	5320451.9	2/03/2023	14.5	17.5	694.8	697.7	16.0	16.0	693.3	Triassic	TS	Turbulent	=	0.117	N
TA-DC247	444281.6	5320451.9	2/03/2023	18.8	21.6	699.0	701.7	20.2	20.2	697.6	Triassic	TS	Void Filling	=	0.020	N
TA-DC247	444281.6	5320451.9	2/03/2023	22.5	25.5	702.5	705.4	24.0	24.0	701.0	Triassic	TS	Dilation	=	0.003	N
TA-DC247	444281.6	5320451.9	2/03/2023	30.3	33.3	710.1	713.0	31.8	31.8	708.6	Triassic	TS	Turbulent	=	0.029	N
TA-DC249B	447080.0	5319868.0	4/04/2023	105.0	110.0	876.3	881.3	107.5	107.5	873.8	Dolerite	D3	Wash Out	=	0.057	N
TA-DC249B	447080.0	5319868.0	4/04/2023	154.0	159.0	925.3	930.3	156.5	156.5	922.8	Dolerite	D1	Turbulent	=	0.002	N
TA-DC249B	447080.0	5319868.0	4/04/2023	166.0	171.0	937.3	942.3	168.5	168.5	934.8	Dolerite	D3	Void Filling	=	0.008	N
TA-DC250	449962.9	5318873.6	22/02/2023	40.6	43.6	714.4	717.3	42.1	42.1	712.9	Dolerite	D4	Wash Out	=	0.011	N
TA-DC250	449962.9	5318873.6	22/02/2023	80.6	83.6	753.2	756.1	82.1	82.1	751.7	Dolerite	D3	Laminar	=	0.027	N
TA-DC250	449962.9	5318873.6	22/02/2023	91.6	94.6	763.9	766.8	93.1	93.1	762.4	Dolerite	D4	Turbulent	=	0.027	N
TA-DC250	449962.9	5318873.6	22/02/2023	111.6	114.6	783.3	786.2	113.1	113.1	781.8	Dolerite	D3	Laminar	=	0.011	N
TA-DC250	449962.9	5318873.6	22/02/2023	124.6	127.6	795.9	798.8	126.1	126.1	794.4	Dolerite	D3	Laminar	=	0.008	N
TA-DC250	449962.9	5318873.6	22/02/2023	139.6	142.6	810.5	813.4	141.1	141.1	809.0	Dolerite	D3	Turbulent	=	0.008	N
TA-DC266A	453380.0	5316712.4	10/07/2022	98.7	101.7	565.2	568.1	100.2	100.2	563.7	Tertiary Sediments	IS1	Turbulent	=	0.089	N
TA-DC266A	453380.0	5316712.4	10/07/2022	122.2	125.2	588.1	591.0	123.7	123.7	586.6	Dolerite	-	Fail	=	-	N
TA-DC266A	453380.0	5316712.4	10/07/2022	134.2	137.2	599.8	602.7	135.7	135.7	598.3	Dolerite	-	Fail	=	-	N
TA-DC266A	453380.0	5316712.4	10/07/2022	152.2	155.2	617.3	620.2	153.7	153.7	615.8	Dolerite	D3	Turbulent	=	0.031	N
TA-DC266A	453380.0	5316712.4	10/07/2022	159.2	162.2	624.1	627.0	160.7	160.7	622.6	Dolerite	D1	Laminar	=	0.010	N
TA-DC266A	453380.0	5316712.4	10/07/2022	200.2	203.2	664.1	667.0	201.7	201.7	662.6	Dolerite	D1	Void Filling	=	0.001	N

Notes:
(1) K = hydraulic conductivity. One Lugeon assumed to equal 1E-7 m/s.
(2) '-'= Failed Test.
(3) T = Transmissivity.
(4) Statistics assume non detect (K < 1e-8 m/s is K=1e-8 m/s).

Statistic	From	To	From	To	Length	K	T
	mbgl	mbgl	m AHD	m AHD	m	(m/d)	(m2/d)
Min	5.0	9.9	357.4	361.7	7.5	0.0003	0.01
Max	255.5	261.2	937.3	942.3	258.4	1.32	25.3
Geomean	43.4	50.1	625.4	629.8	46.9	0.009	0.6
Average	71.0	75.4	645.7	649.9	73.2	0.067	1.8

Table E2 – Summary of Project Slug Tests

BHID	Domain	Easting (m)	Northing (m)	Date	Lithology	Curve Portion	Kh (m/day)	Note
TA-DC202	LKW Intake	439600	5321012	10/02/2022	-	Early	0.205	slug test performed in open hole, only 3 data points
						Late	0.055	
TA-DC205		439663	5320922	10/02/2022	-	Early	0.184	slug test performed in standpipe
						Late	0.022	
TA-DC203		439631	5320972	16/02/2022	-	Early	0.006	slug test performed in open hole
						Late	0.002	
TA-DC219	TAPS2 Power Station	455049	5317189	4/03/2022	Dolerite	Early	0.003	slug test performed in open hole
						Late	0.004	
TA-DC216		455022	5317215	22/03/2022	Dolerite	Early	0.027	slug test performed in open hole
						Late	0.039	

Appendix F
History Matching

- Figure F1 – Sensitivity Analyses: Simulated Hydraulic Head Residuals - Tarraleah Tunnel
- Figure F2 – Sensitivity Analyses: Simulated Hydraulic Head Residuals - Power Tunnel
- Figure F3 – Sensitivity Analyses: Simulated Hydraulic Head Residuals - Tarraleah Tunnel
- Figure F4 – Transient History Matching – Hydraulic Head

Target Heads

TA-DC247 678.8
TA-MB301 - VWP4 664.8
TA-DC250 - VWP3 662.1
TA06DC006 677
TA-MB312 659.6
TA-DC252 659.3
TA-DC208 658.2
TA-DC241 575
TA-DC246 599.4
TA06DC013 - VWP3 598.4
TA-DC242 656.3

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

Base Case

Lower Bound

Upper Bound

444000 446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix F\Figure F1 Sensitivity Analyses Simulated Hydraulic Head Residuals Tarraleah Tunnel.mxd

Legend

- Tarraleah Redevelopment Alignment
- Boreholes - BHID, Target Head (m)
- Simulated Water Table (m AHD)

Calibration Residual (m)

- < -5
- -5 to -1
- -1 to 1
- 1 to 5
- > 5

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Note:
Positive residuals = Over predicted
Negative residuals = Under predicted

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: B	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 29 Jan 2025	Paper Size: A3	SENSITIVITY ANALYSES SIMULATED HYDRAULIC HEAD RESIDUALS TARRALEAH TUNNEL	
		PSM4346-115R	Figure F1

Target Heads

TA-DC217 346.6
TA-DC216 349.4
TA06DC014 345.6
TA-DC214 385.6
TA-DC219 345.5
TA-DC218 344.1
TA-DC212 463.4
TA06DC012 451.1
TA-DC271 383
TA-MB309 - VWP3 475.3
TA-DC243 344.1
TA-DC238 342.3
TA-DC237 341.4
TA-DC234 341.5
TA-DC235 341.4
TA06DC013 - VWP3 598.4
PW20d_deep 465

Base Case

Lower Bound

Upper Bound

454000 454250 454500 454750 455000 455250 455500
5317250 5317000 5316750 5316500

Legend

- Tarraleah Redevelopment Alignment
- Boreholes - BHID, Target Head (m)
- Simulated Water Table (m AHD)

Calibration Residual (m)

- < -5
- -5 to -1
- -1 to 1
- 1 to 5
- > 5

- Model Domain
- Waterbodies

Note:
Positive residuals = Over predicted
Negative residuals = Under predicted

OVERVIEW

N

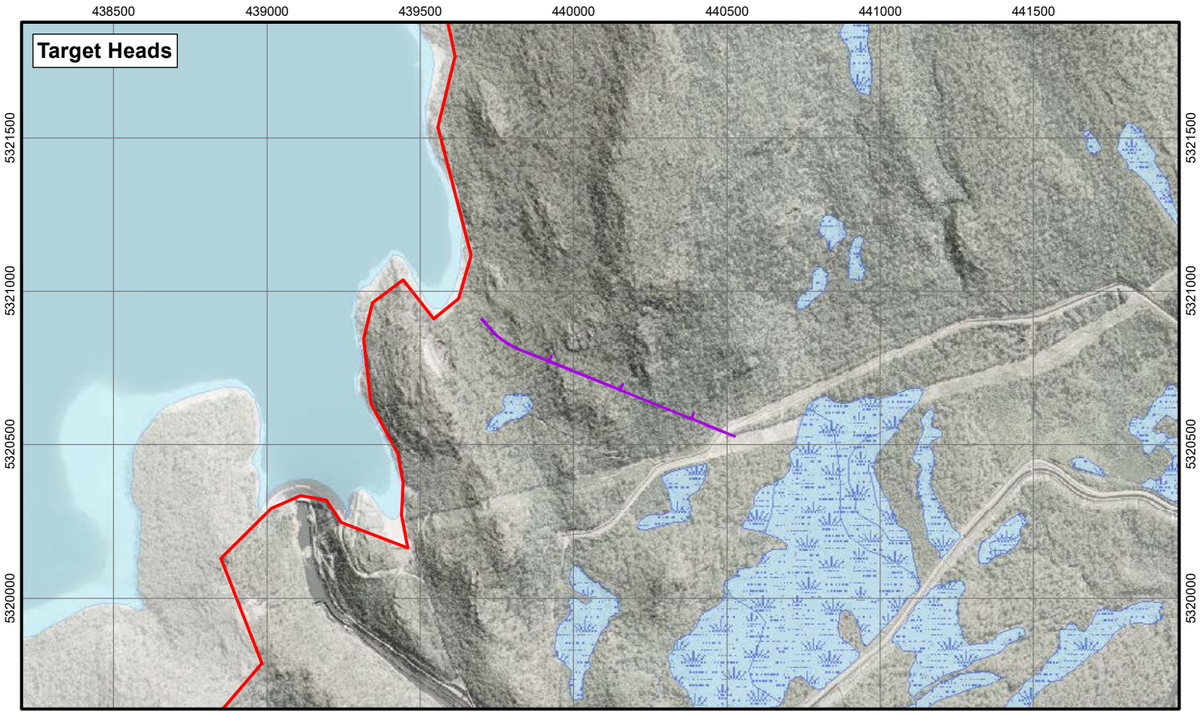
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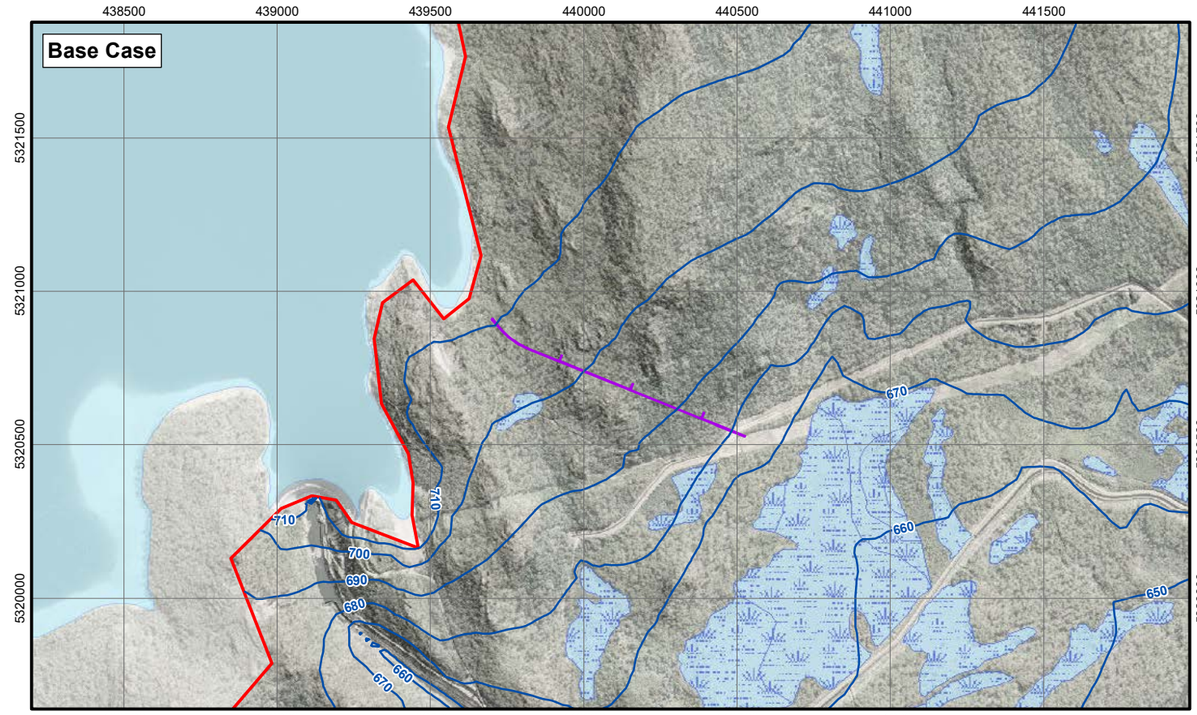
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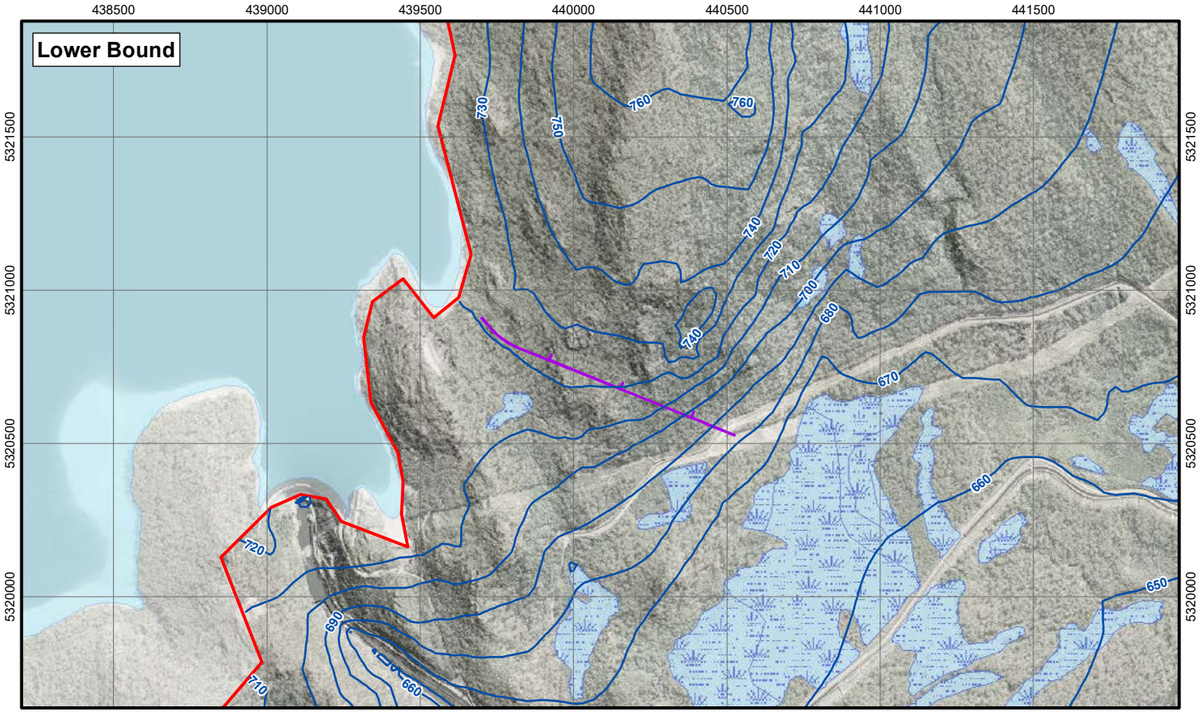
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Grid: GDA2020 MGA Zone 55

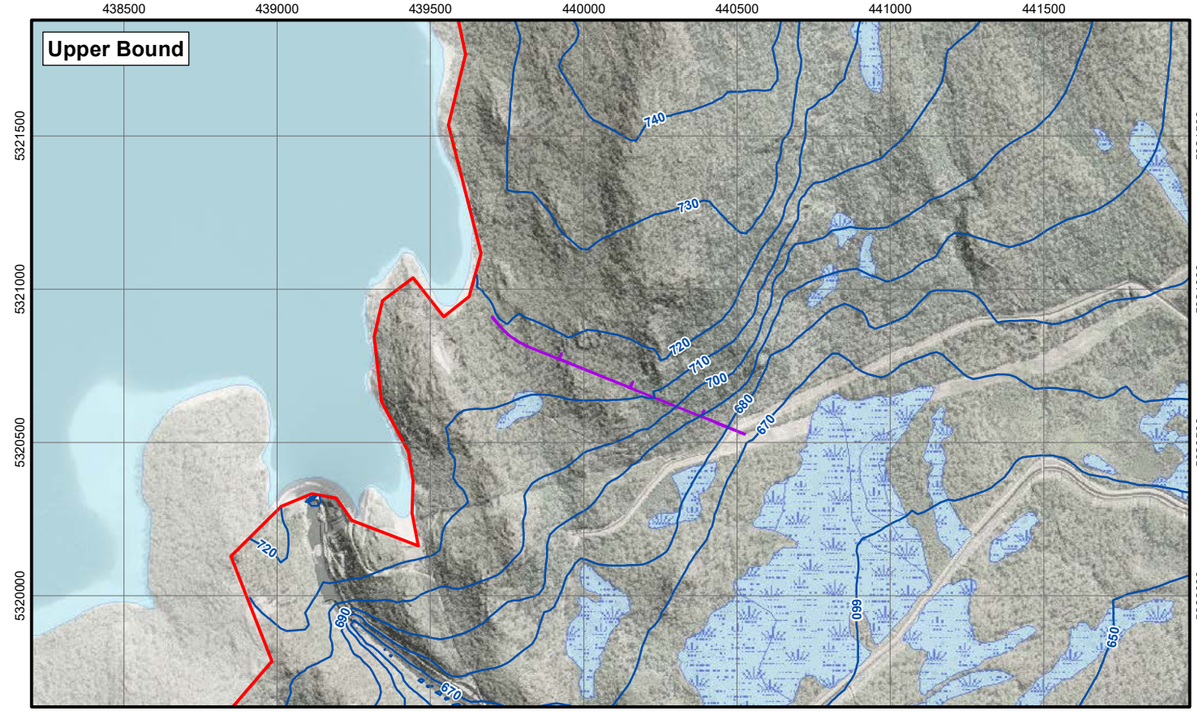
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	Date: 29 Jan 2025	Paper Size: A3	SENSITIVITY ANALYSES SIMULATED HYDRAULIC HEAD RESIDUALS POWER TUNNEL
			PSM4346-115R | Figure F2

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix F\Figure F2 Sensitivity Analyses Simulated Hydraulic Head Residuals Power Tunnel.mxd









Legend

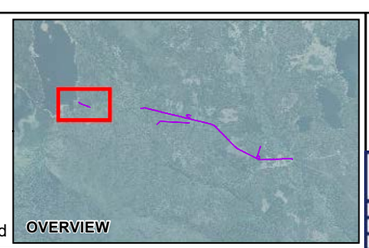
- Tarraleah Redevelopment
- Boreholes - BHID, Target Head (m)
- Simulated Water Table (m AHD)

Calibration Residual (m)

- < -5
- -5 to -1
- -1 to 1
- 1 to 5
- > 5

- Model Domain
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Note:
Positive residuals = Over predicted
Negative residuals = Under predicted



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

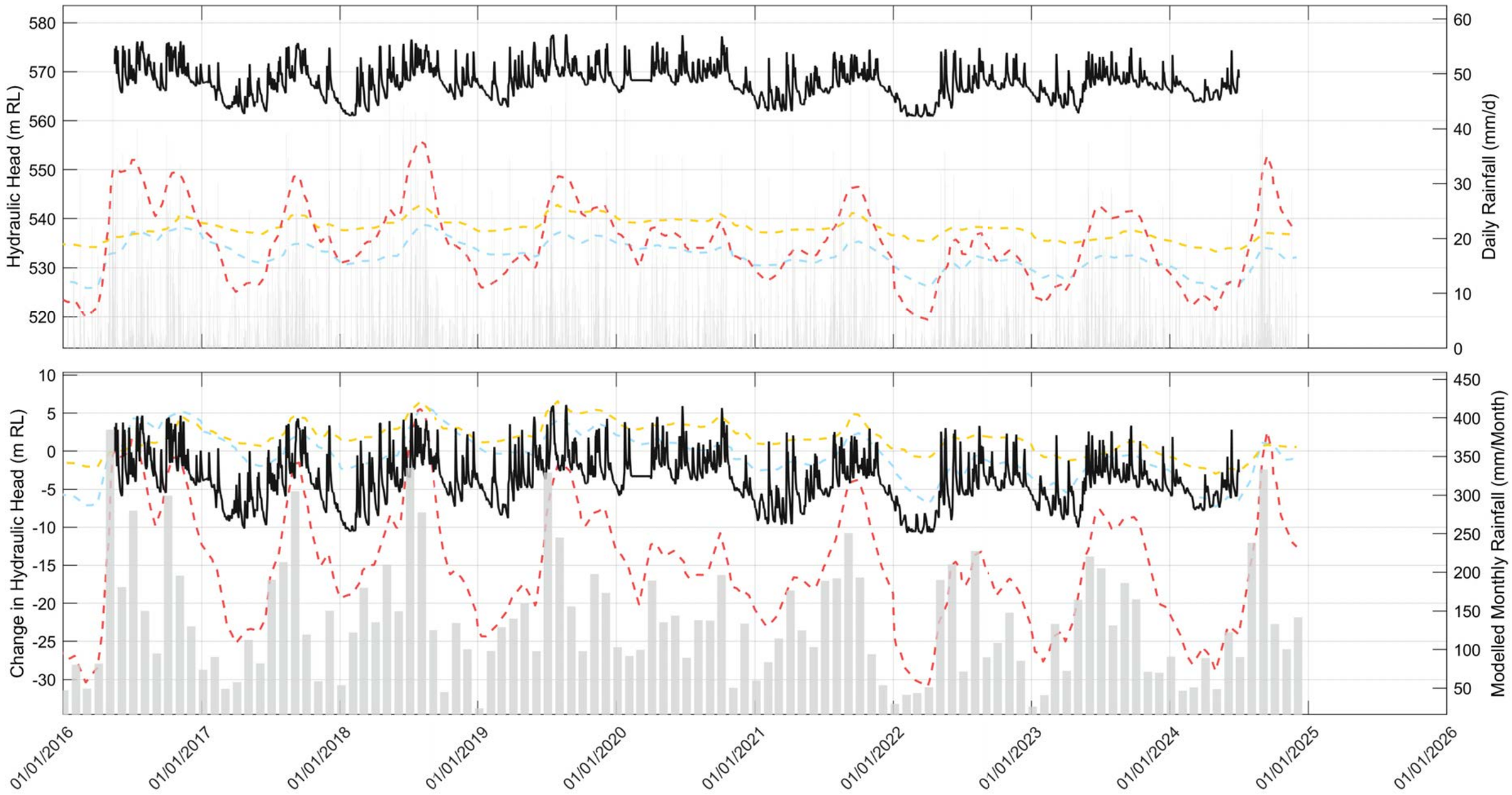
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Hydro Tasmania
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Hydrogeological Interpretative Report

SENSITIVITY ANALYSES
SIMULATED HYDRAULIC HEAD RESIDUALS
LAKE KING WILLIAM TUNNEL

PSM4346-115R | Figure F3

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix F\Figure F3 Sensitivity Analyses Simulated Hydraulic Head Residuals Lake King William Tunnel.mxd



Daily Average (Logger)

Base Case

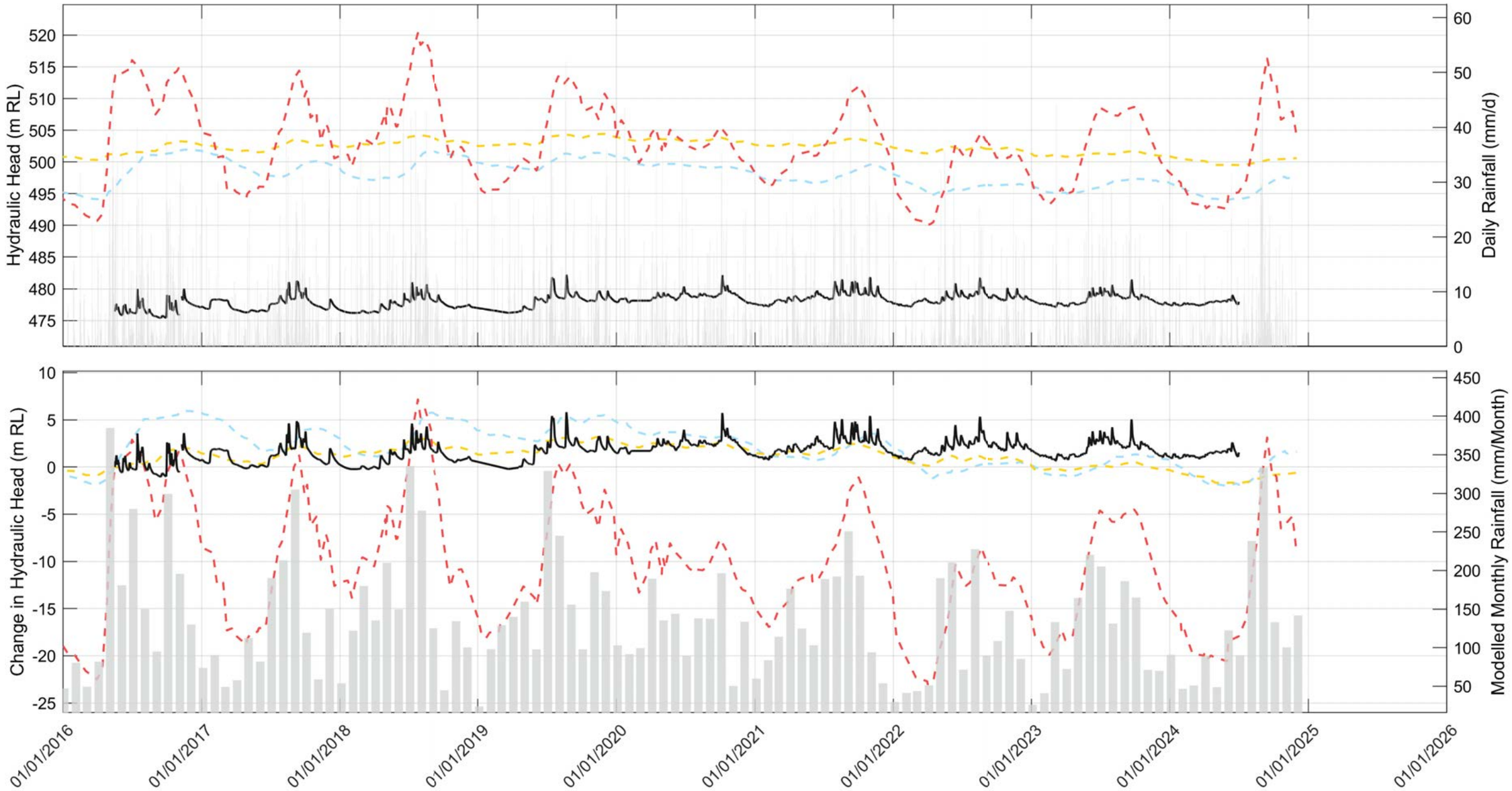
Lower Bound

Upper Bound

Notes:

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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-1

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Daily Average (Logger)

Base Case

Lower Bound

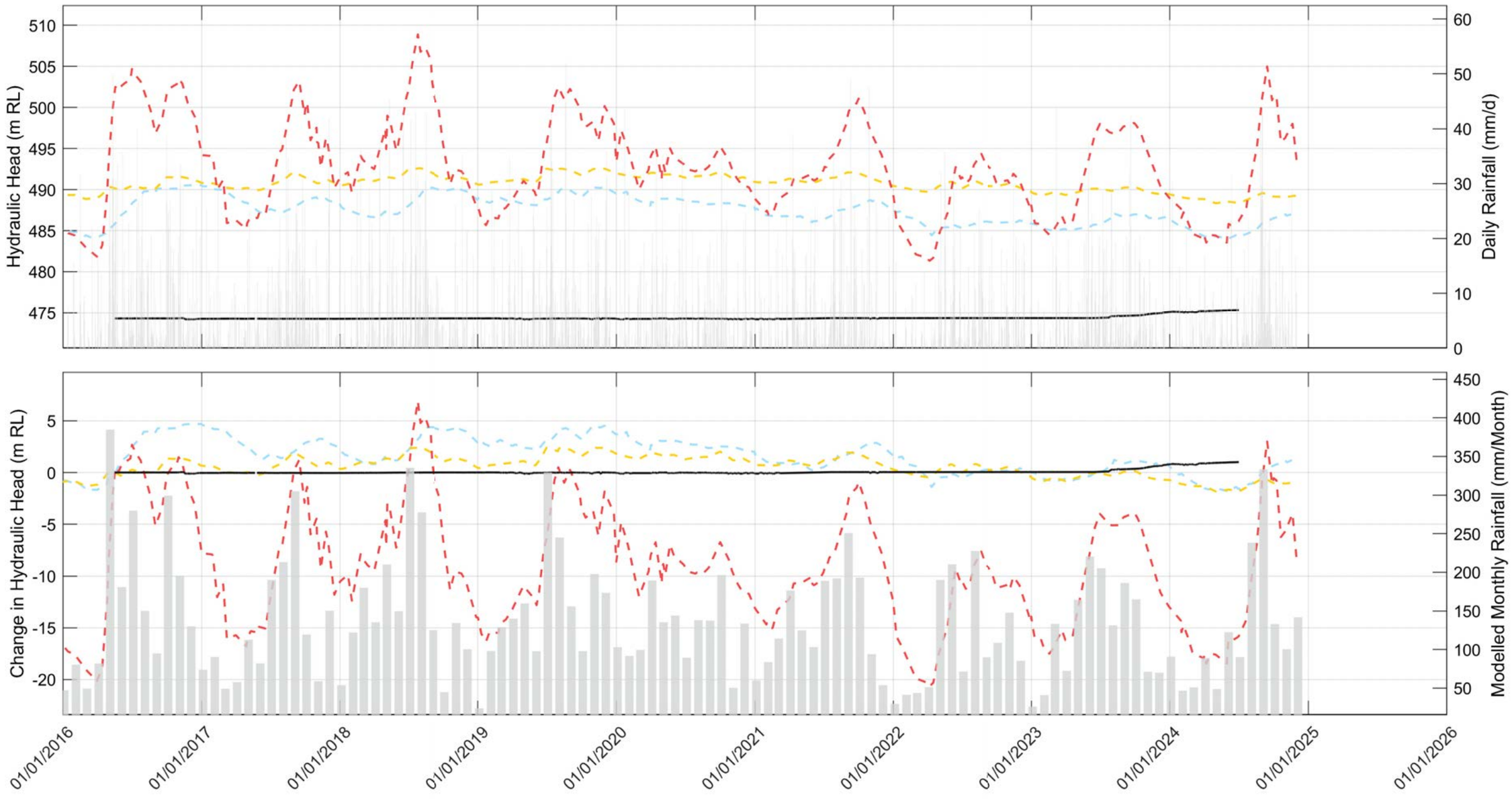
Upper Bound

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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-2

Hydro Tasmania
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Hydrogeological Interpretive Report
Transient History Matching
Hydraulic Head
R-SP1

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Daily Average (Logger)

Base Case

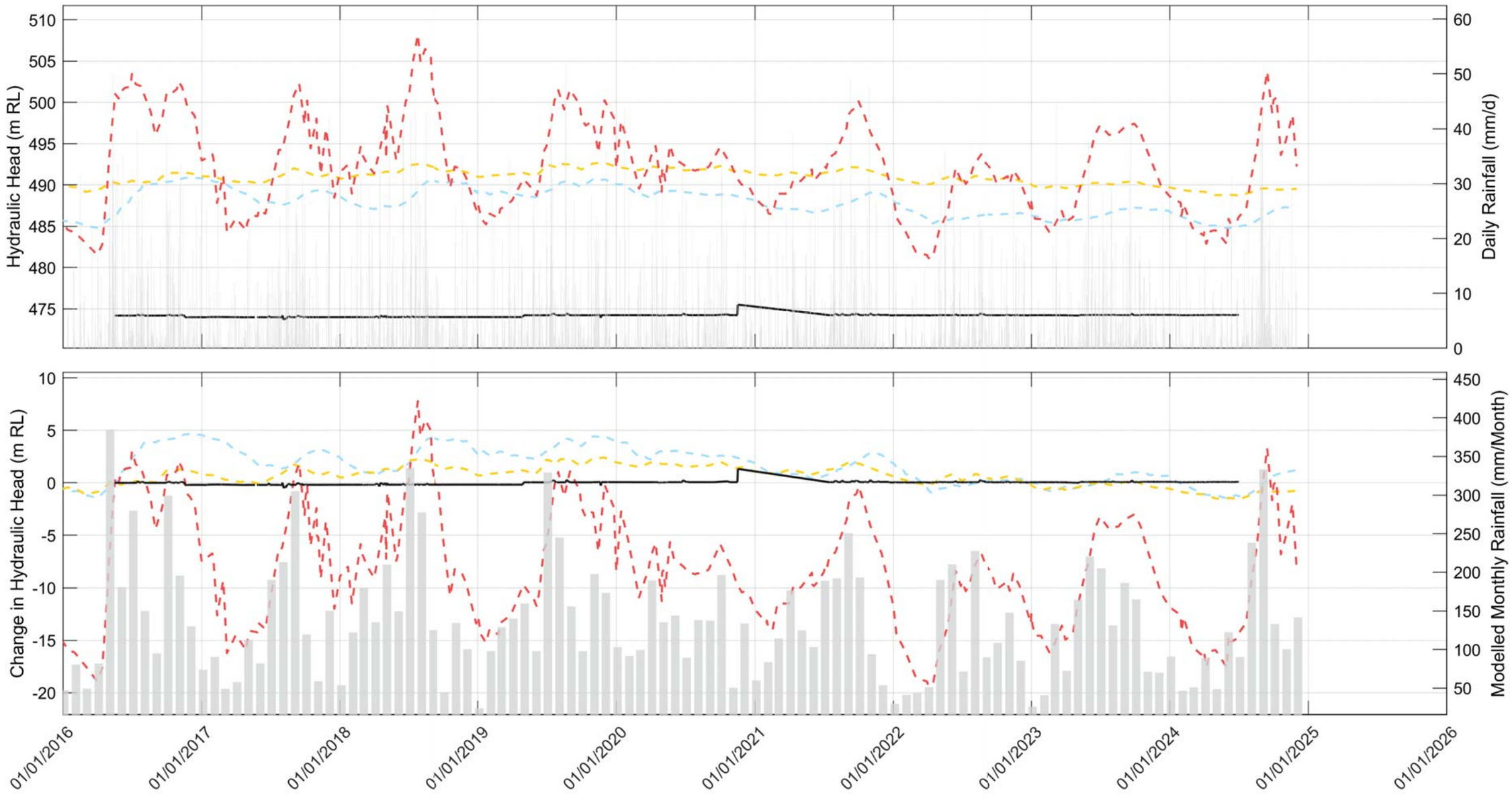
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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-3

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Daily Average (Logger)

Base Case

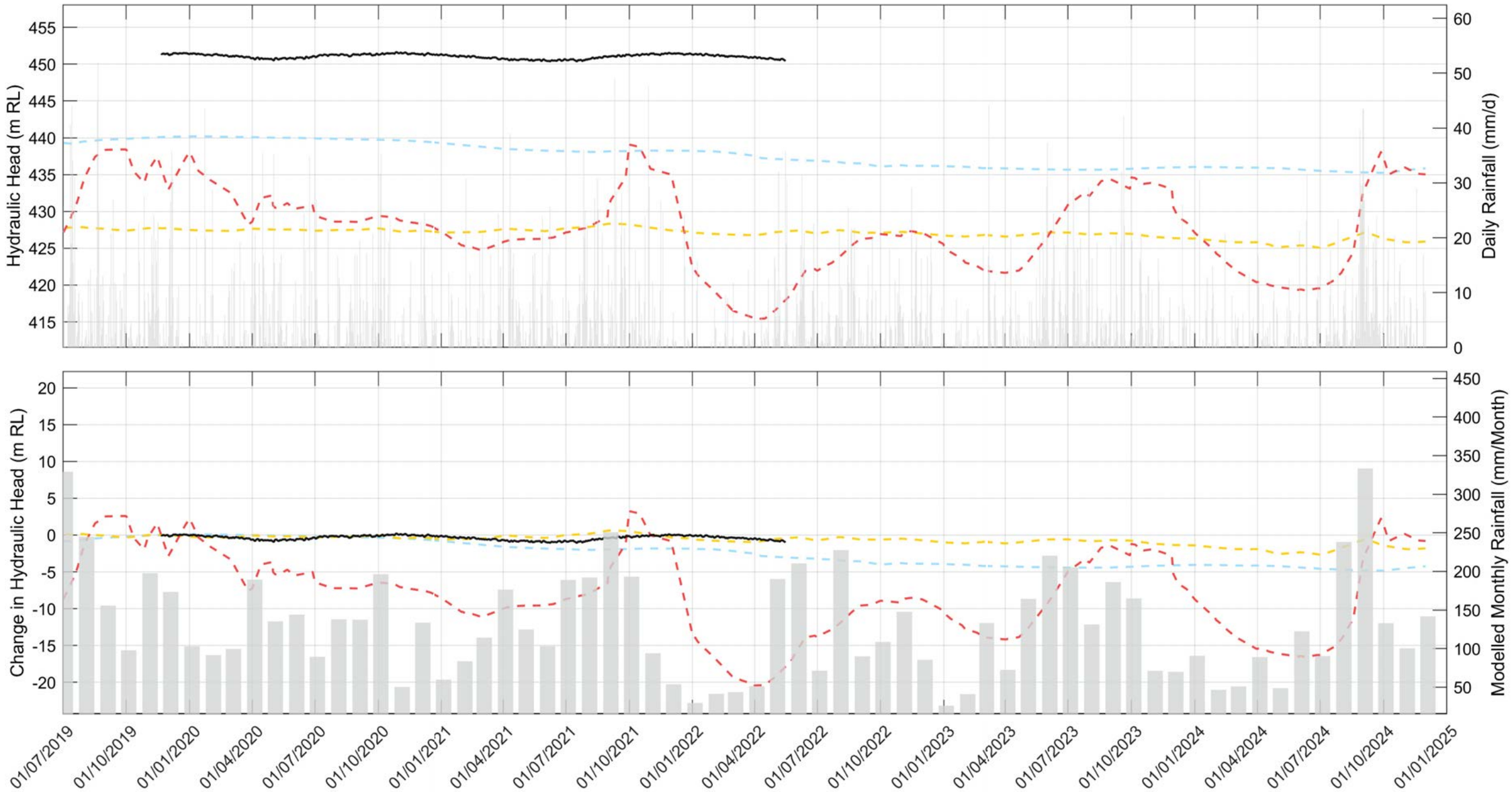
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Daily Average (Logger)

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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-5

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Hydraulic Head (m RL)

595
590
585
580
575
570
565
560
555

Daily Rainfall (mm/d)

60
50
40
30
20
10
0

Change in Hydraulic Head (m RL)

20
10
0
-10
-20
-30

Modelled Monthly Rainfall (mm/Month)

450
400
350
300
250
200
150
100
50

01/07/2019
01/10/2019
01/01/2020
01/04/2020
01/07/2020
01/10/2020
01/01/2021
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Daily Average (Logger)

Base Case

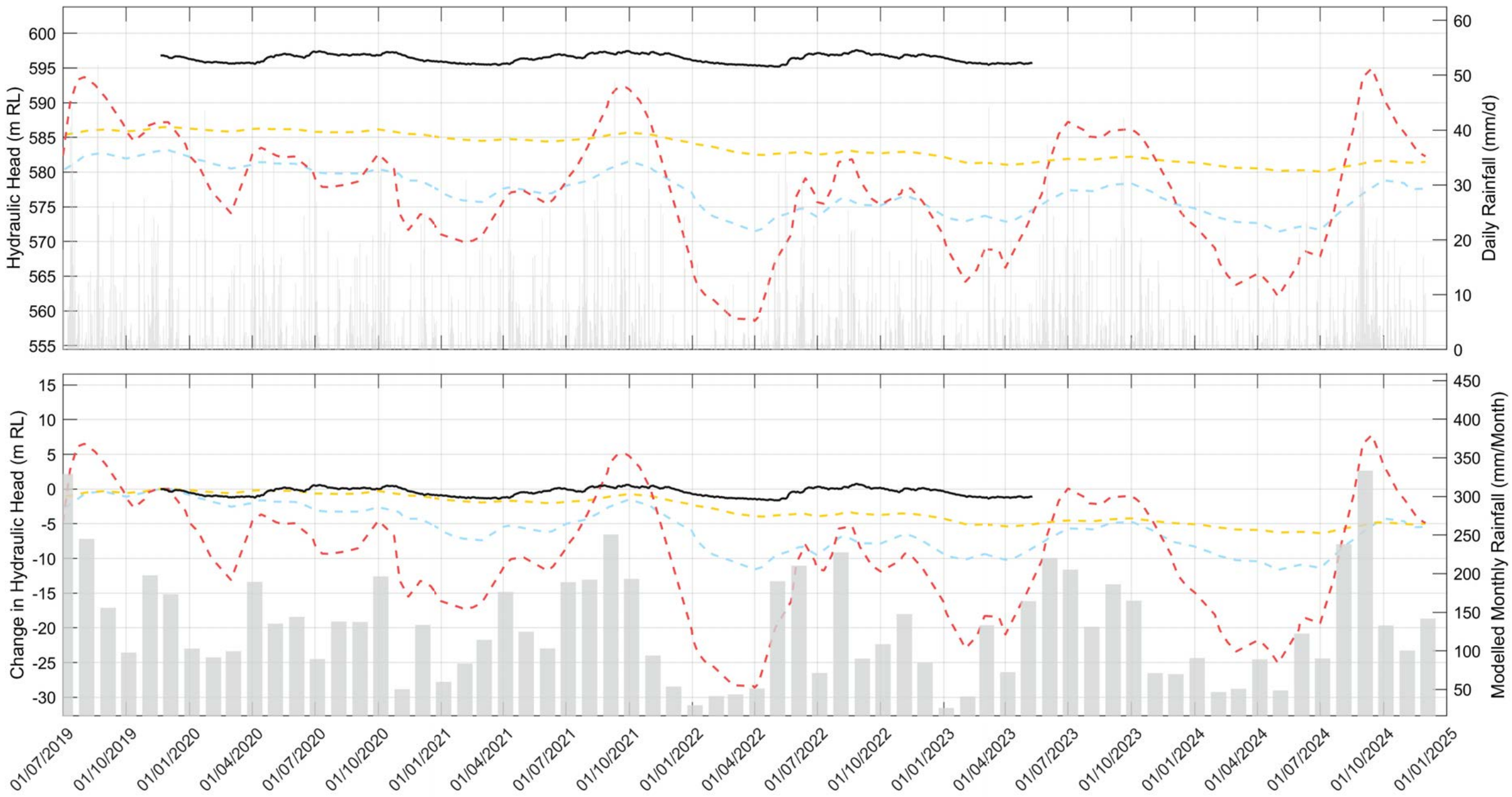
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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-6 (a)

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Daily Average (Logger)

Base Case

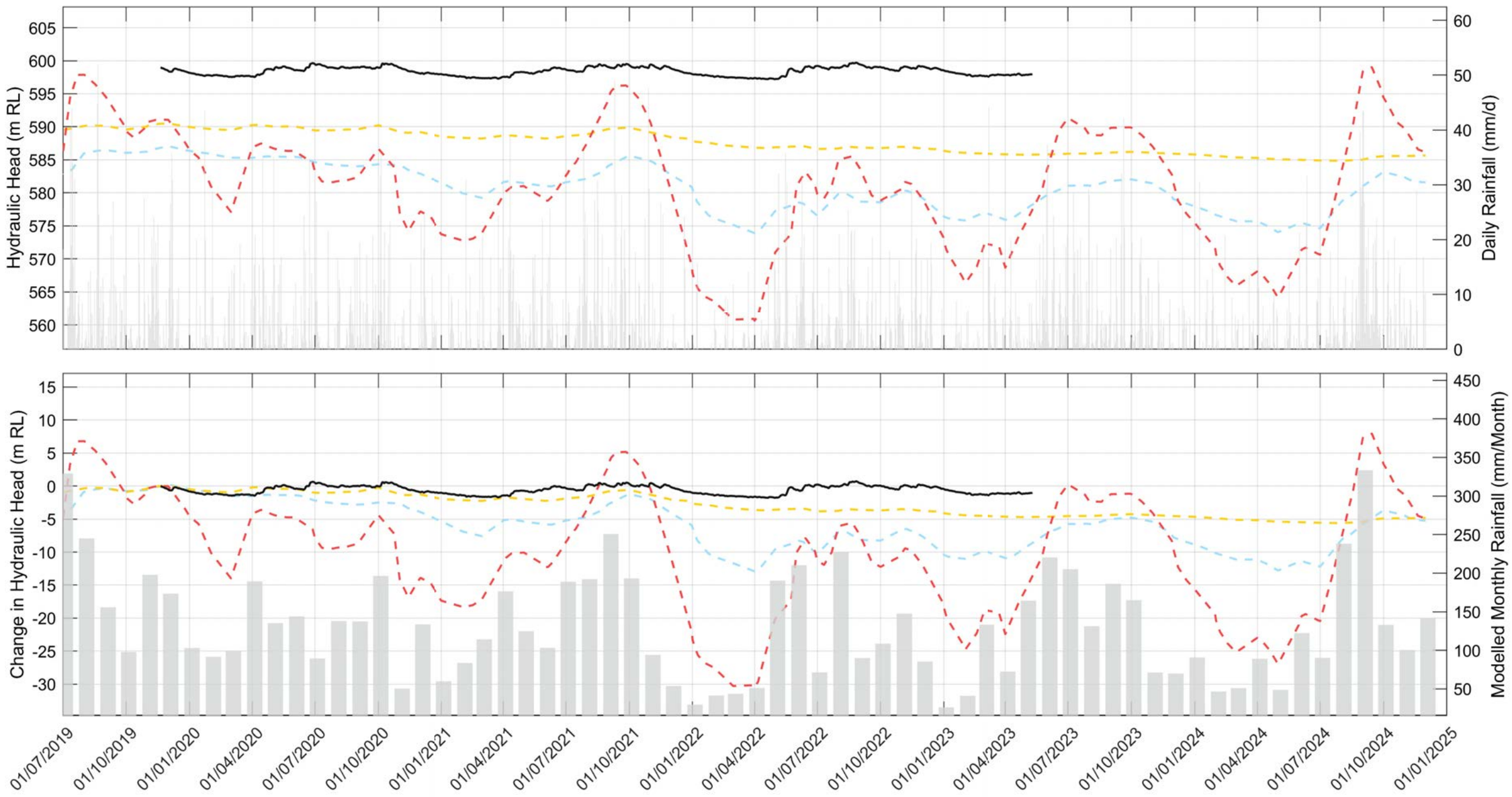
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Daily Average (Logger)

Base Case

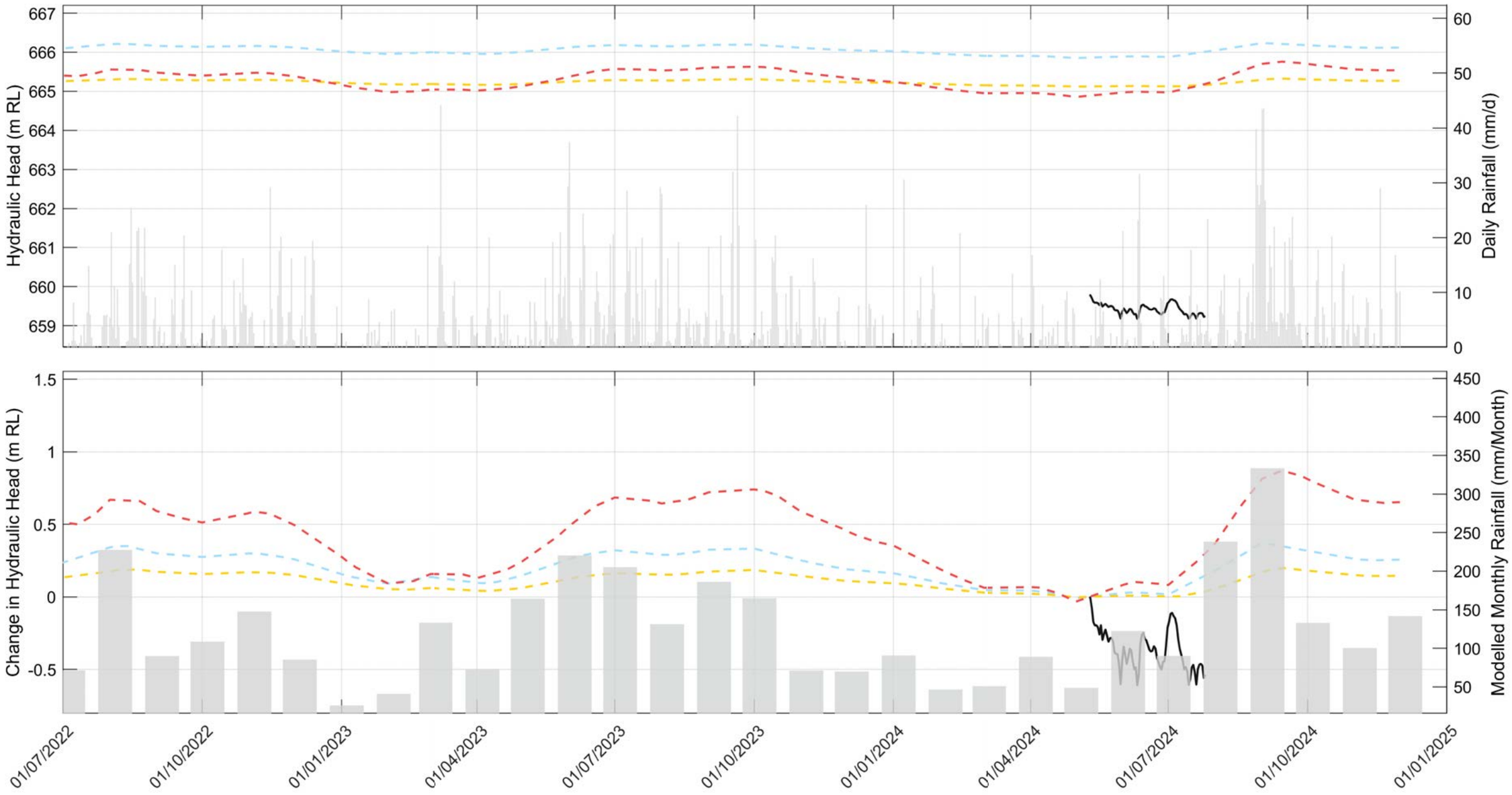
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Daily Average (Logger)

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

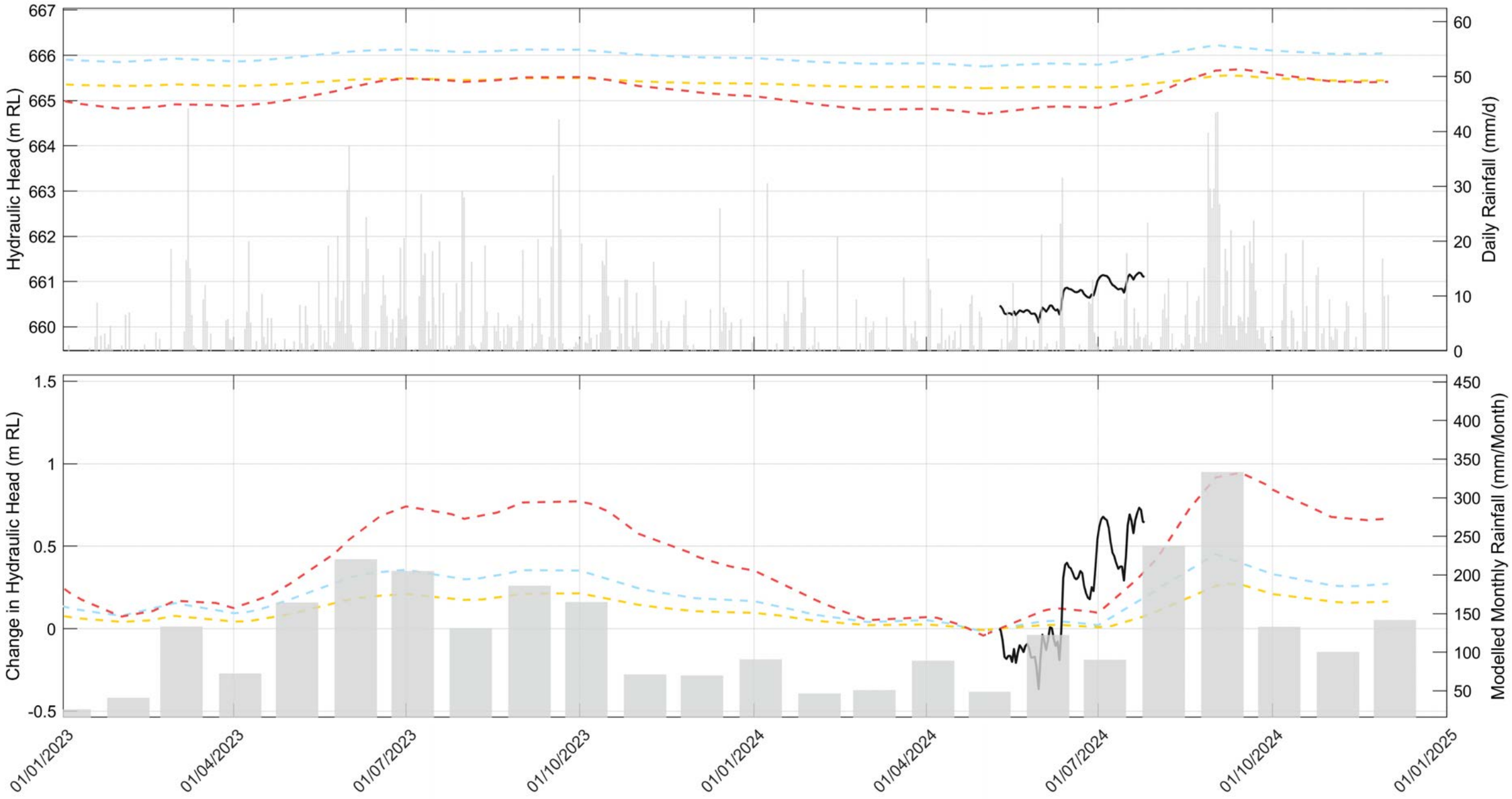
Transient History Matching
Hydraulic Head
TA-DC250-VWP1

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	Date: 28-Jan-2025	Paper Size: A4

PSM4346-115R

Figure F4-7 (a)

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Daily Average (Logger)

Base Case

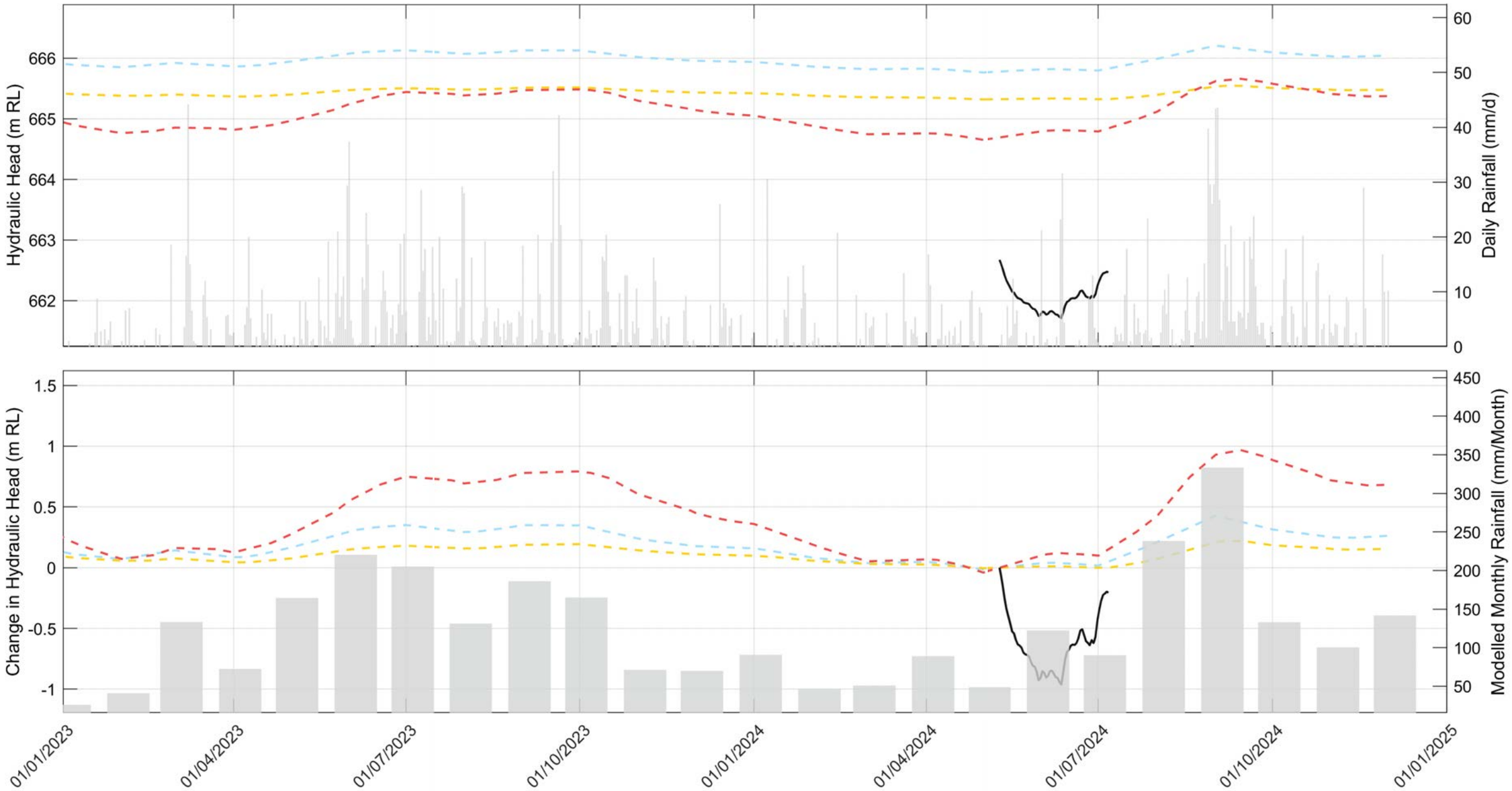
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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-7 (b)

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Daily Average (Logger)

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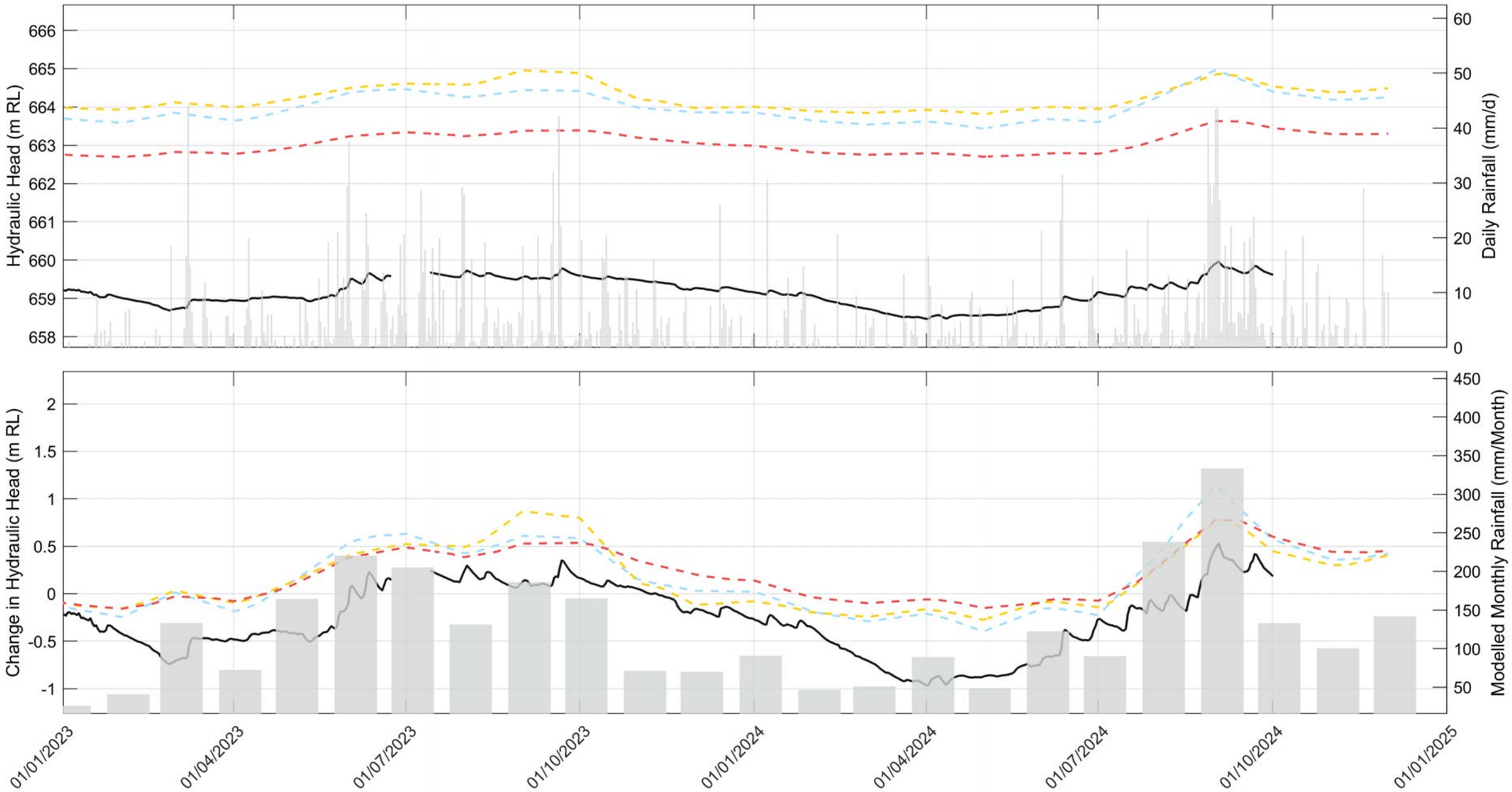
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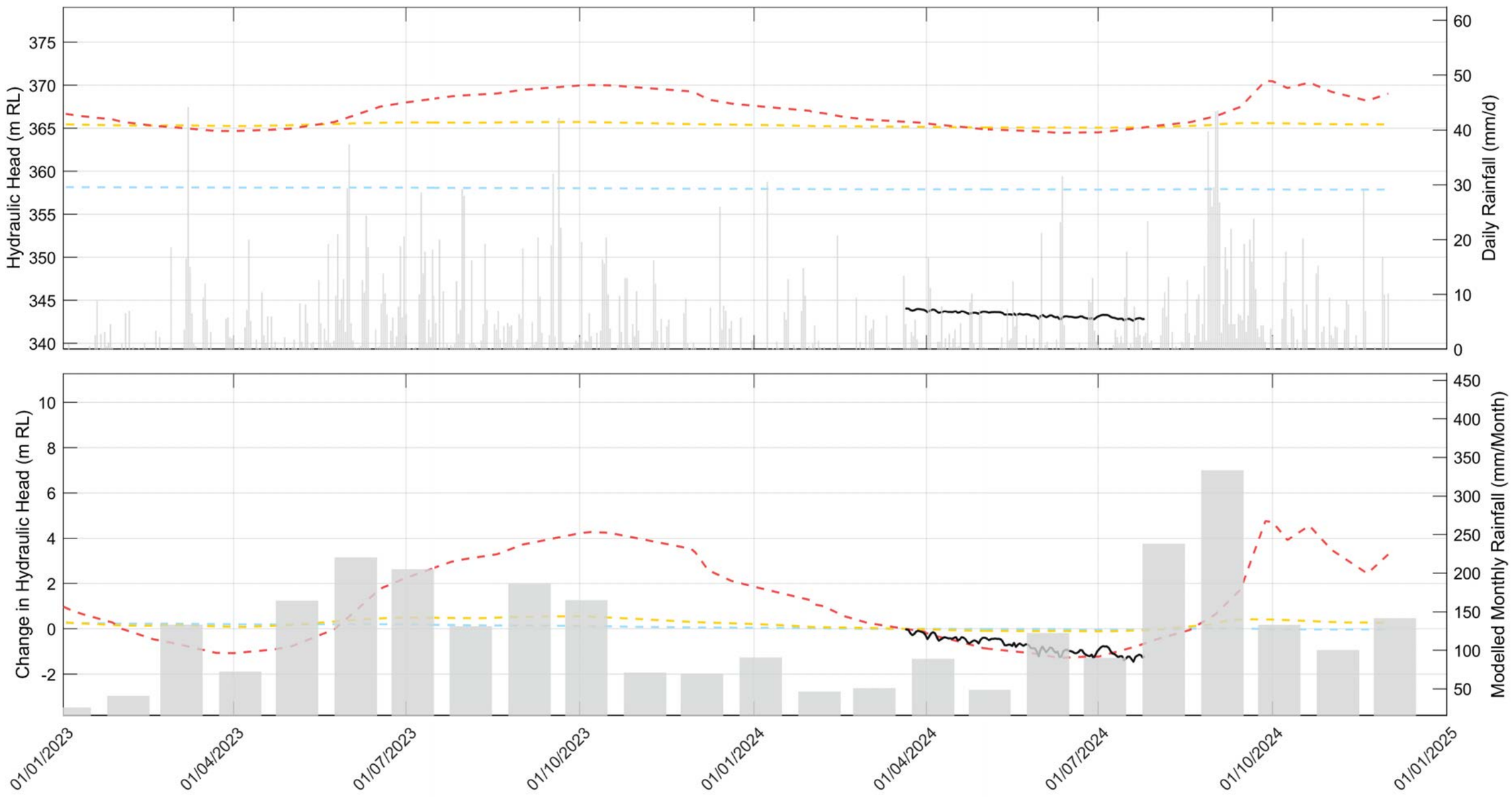
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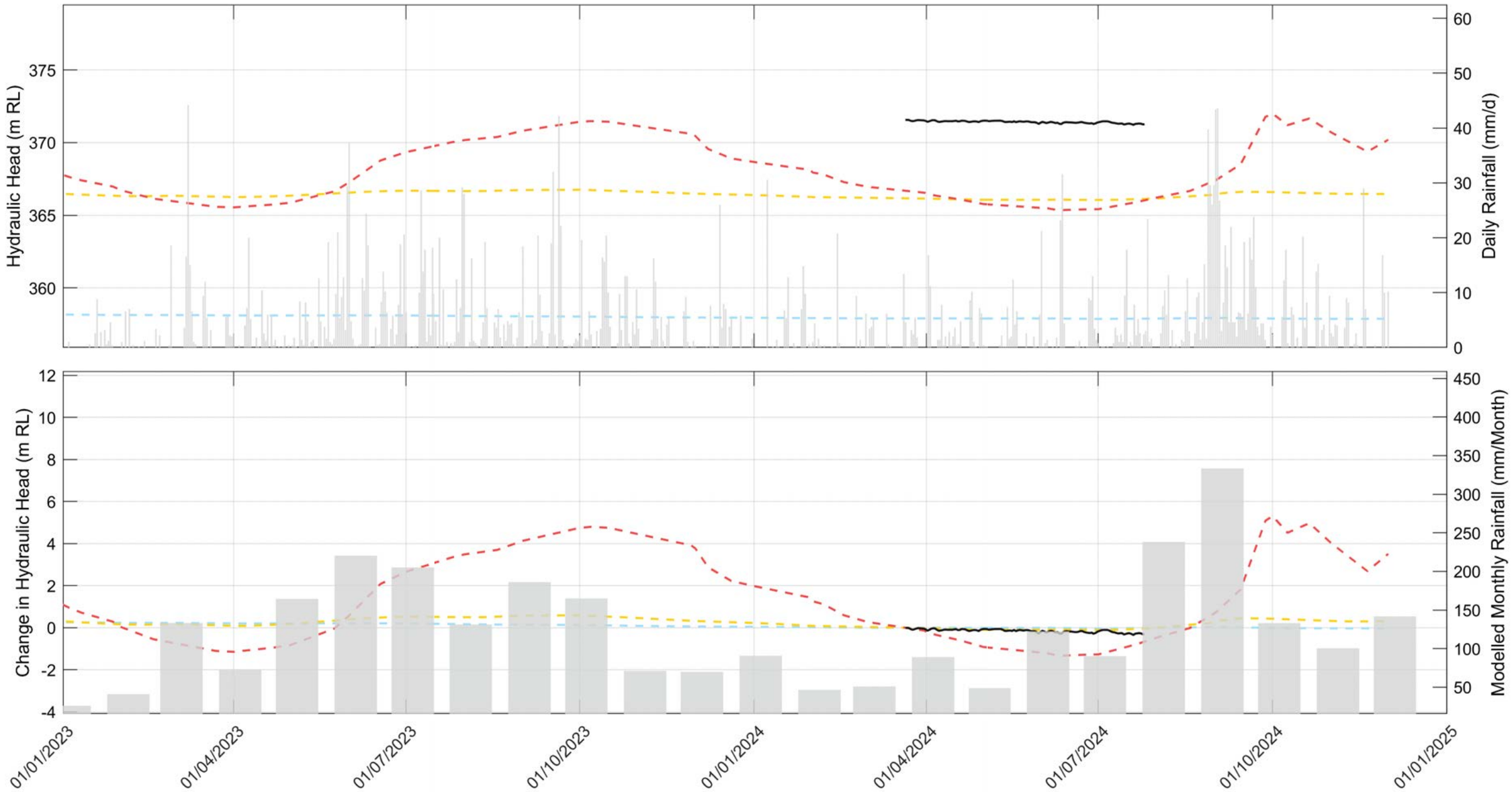
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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-9 (a)

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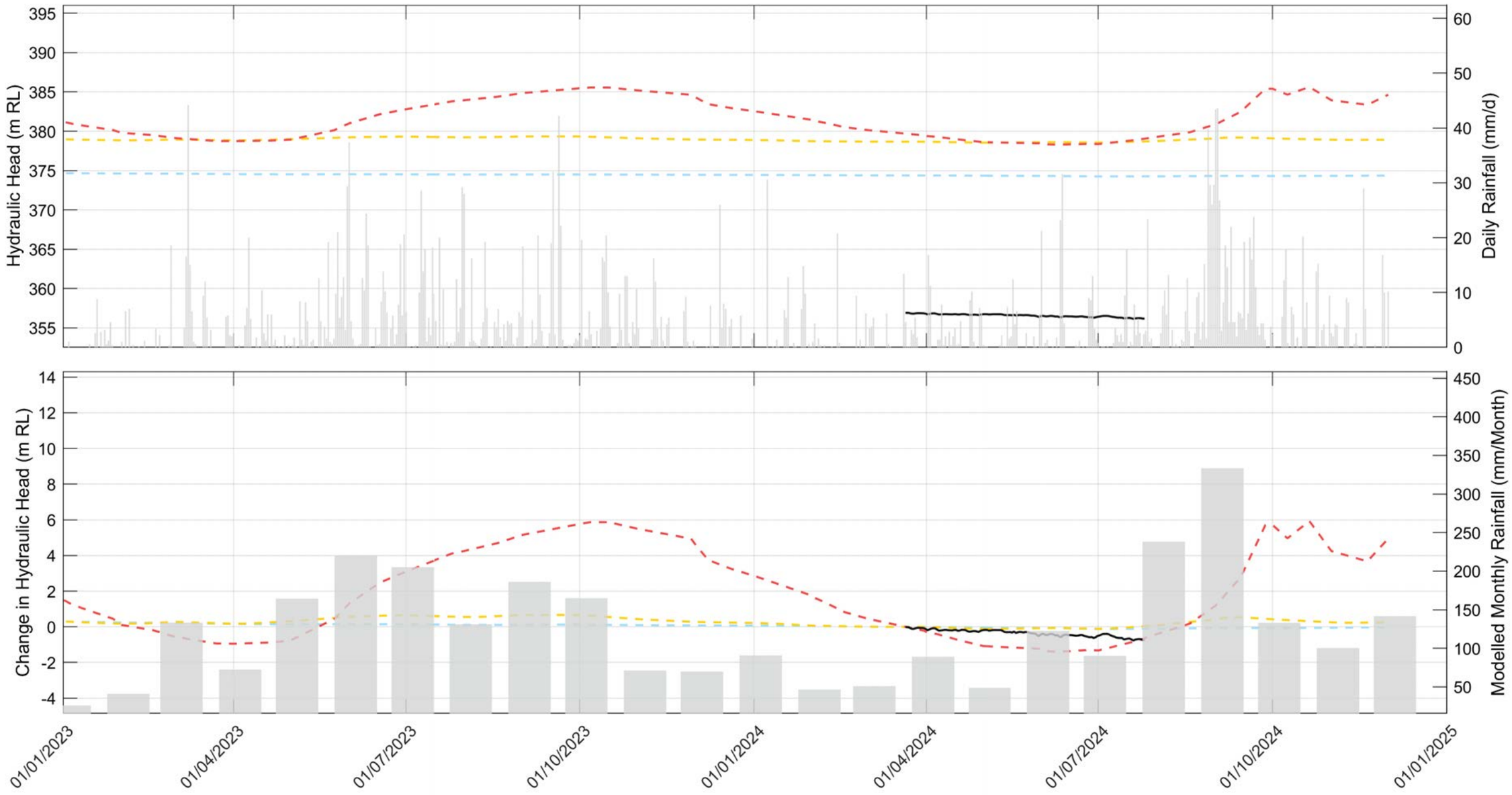
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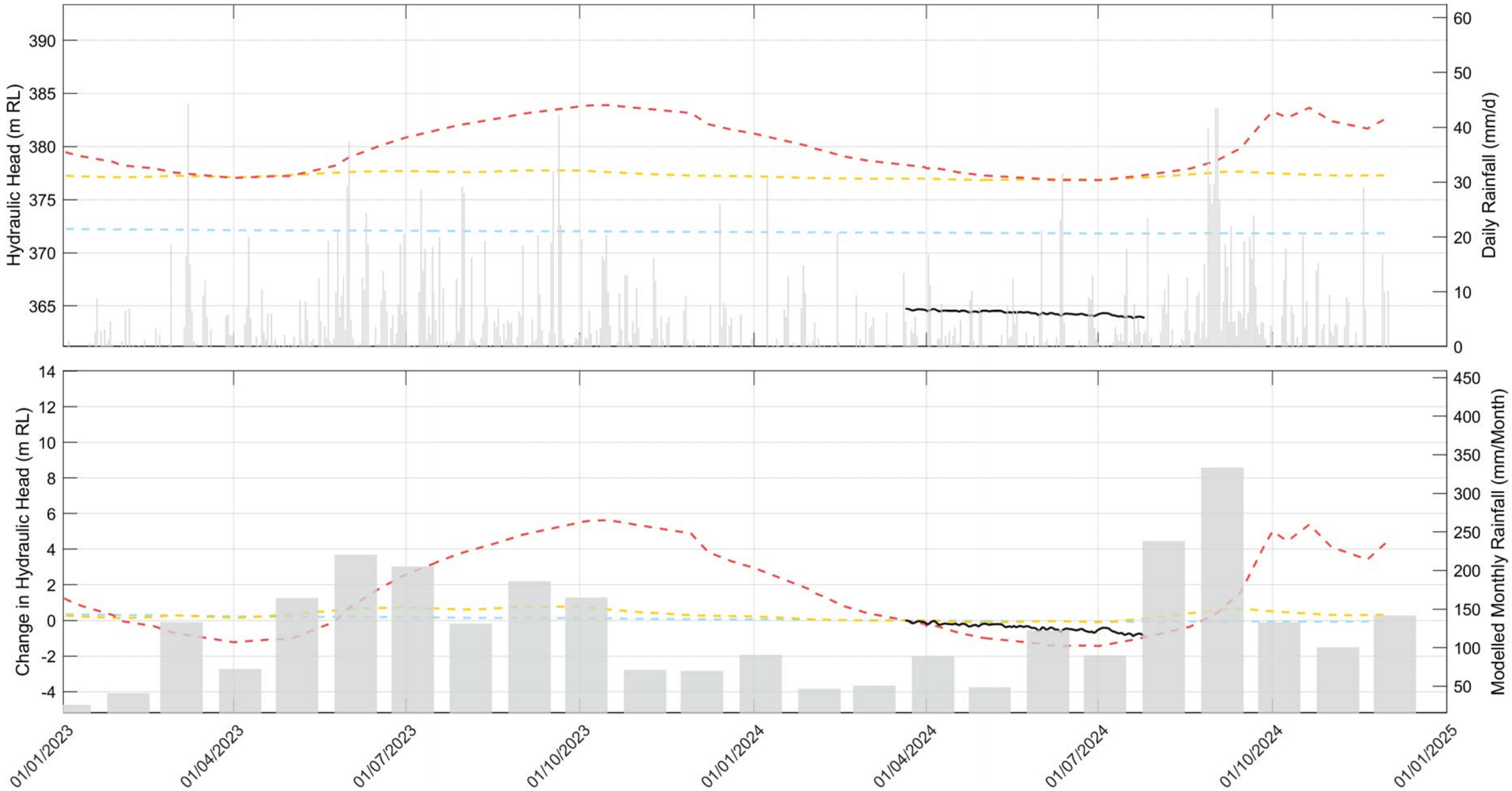
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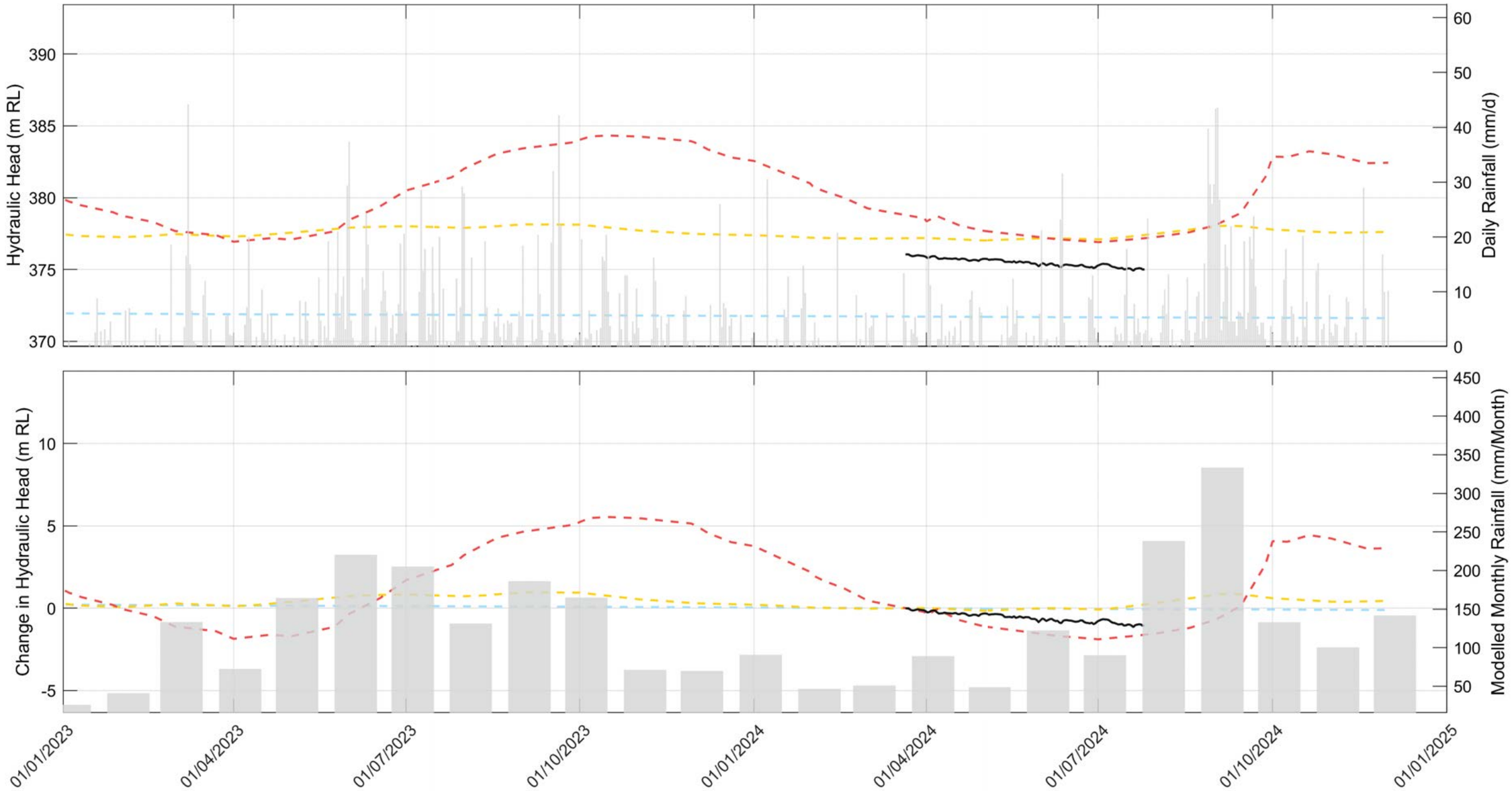
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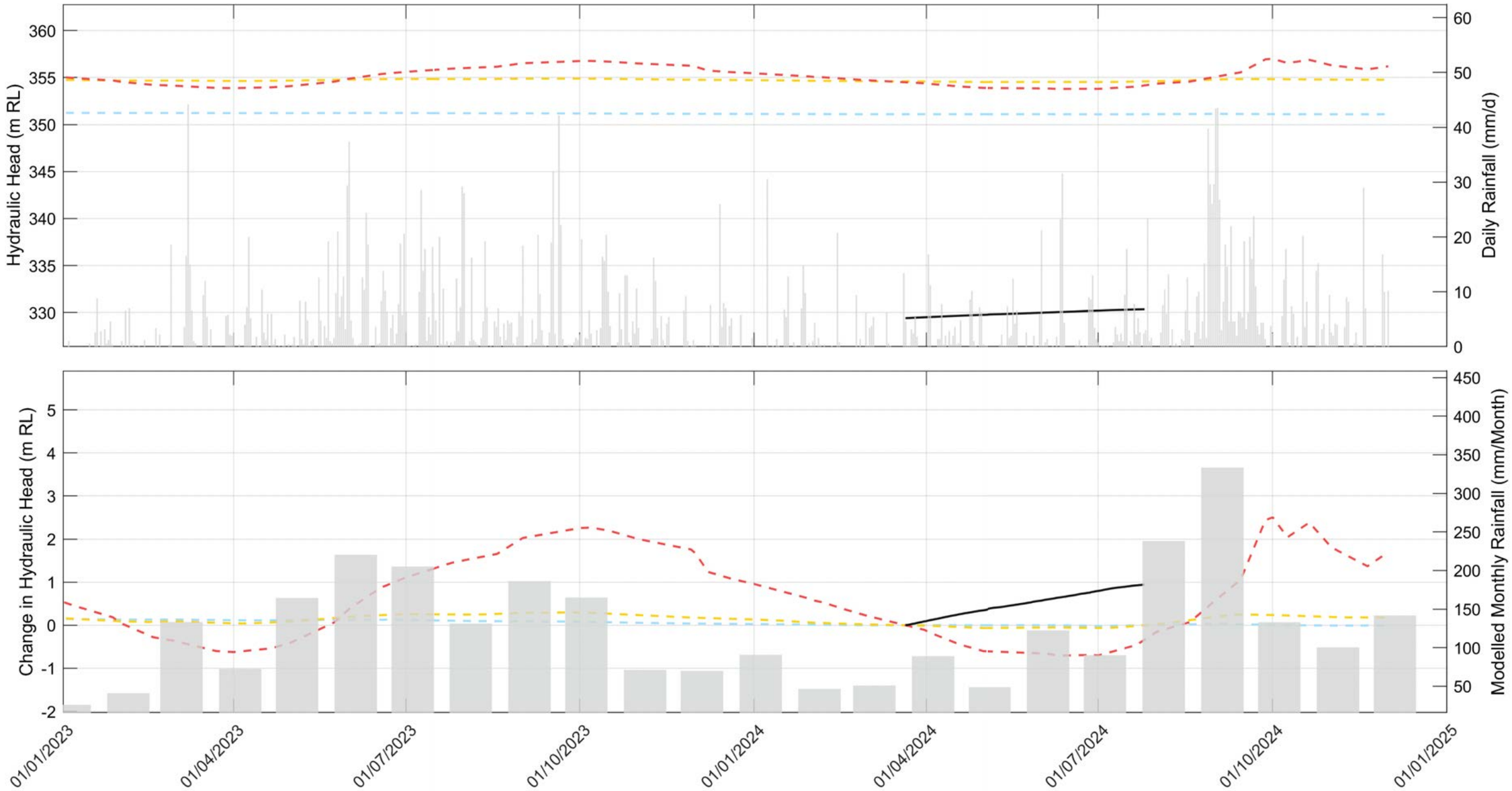
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Daily Average (Logger)

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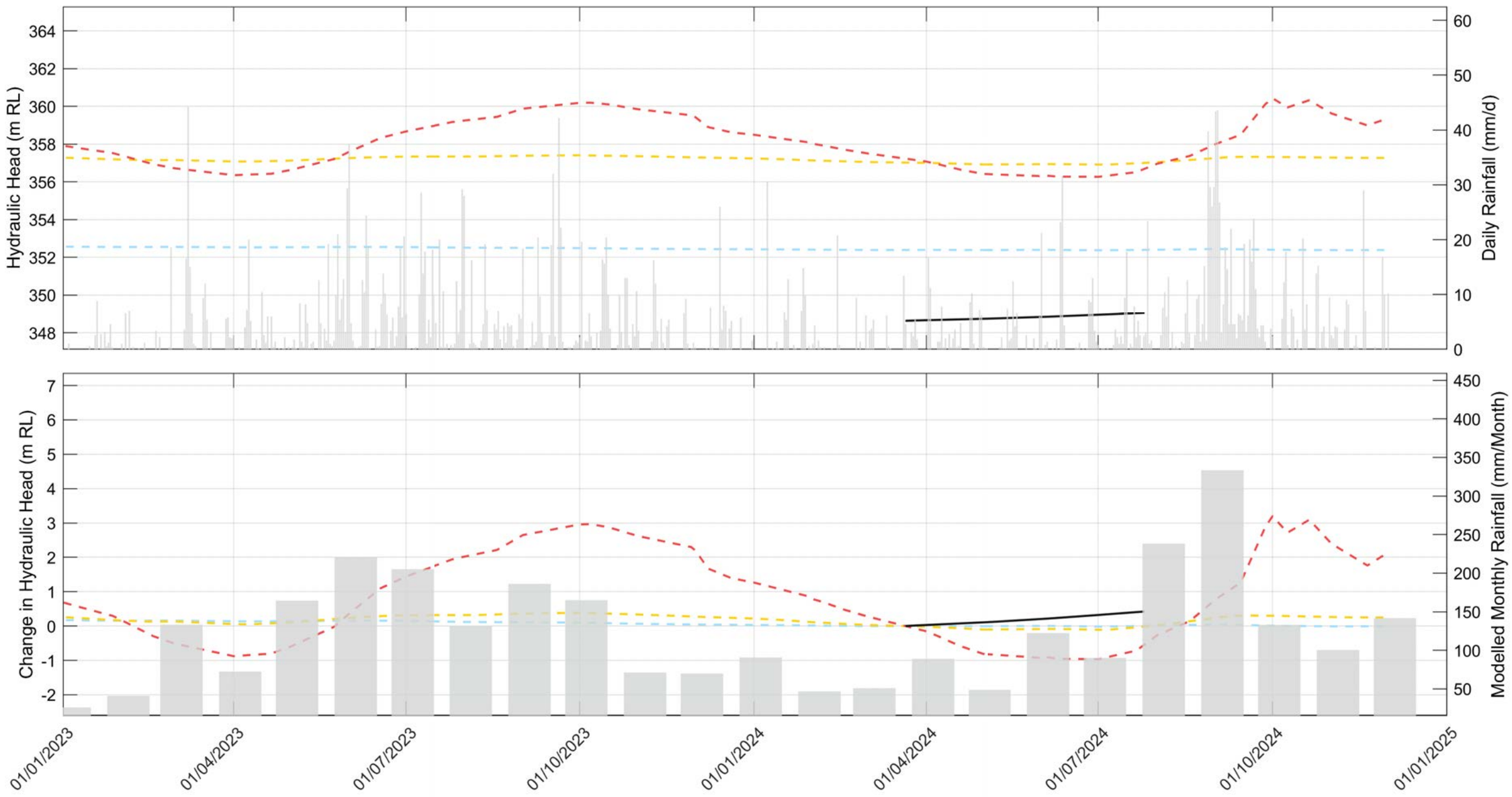
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

Transient History Matching
Hydraulic Head
TA-DC270-VWP1

PSM4346-115R | Figure F4-11 (a)

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Daily Average (Logger)

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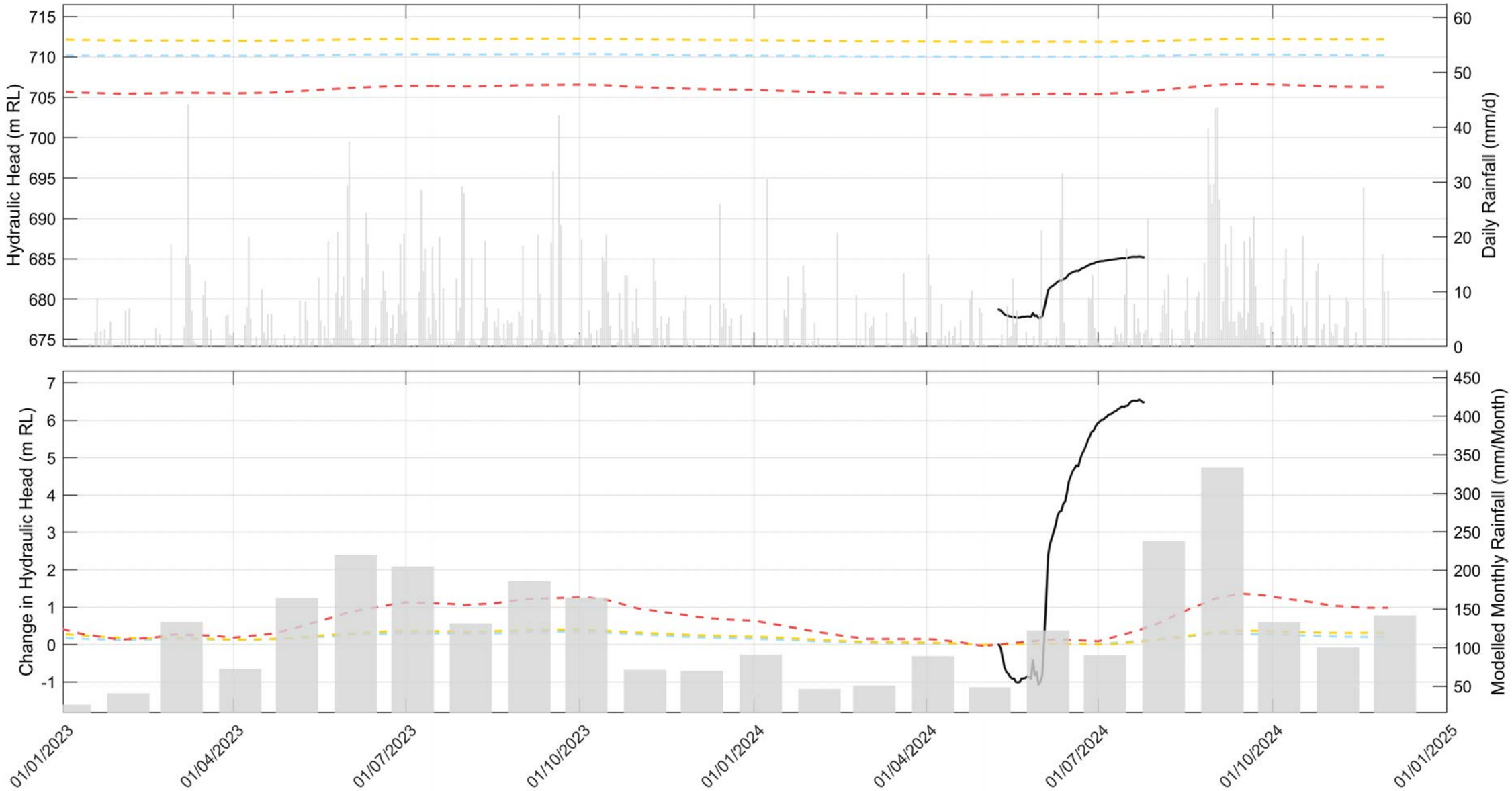
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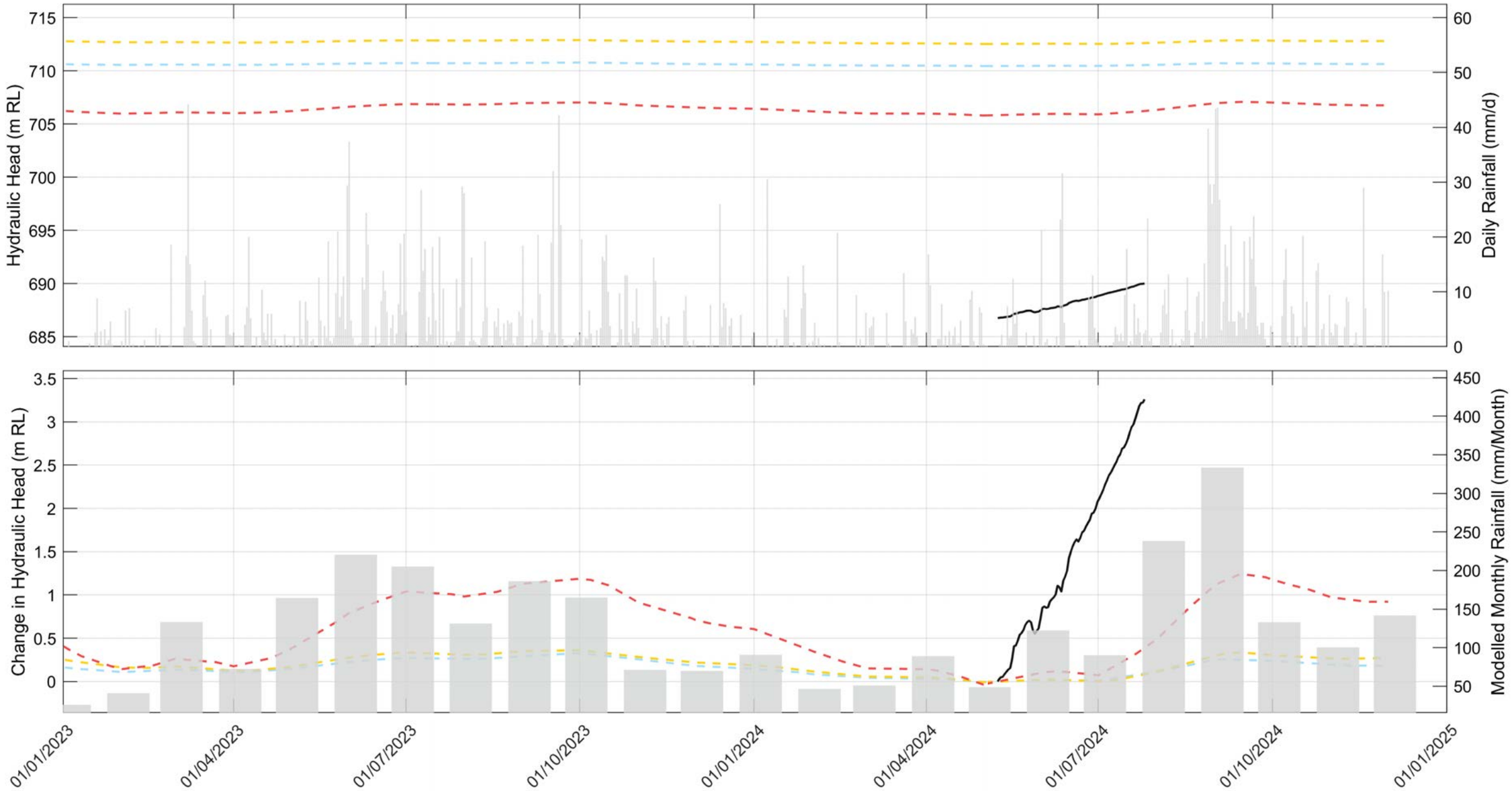
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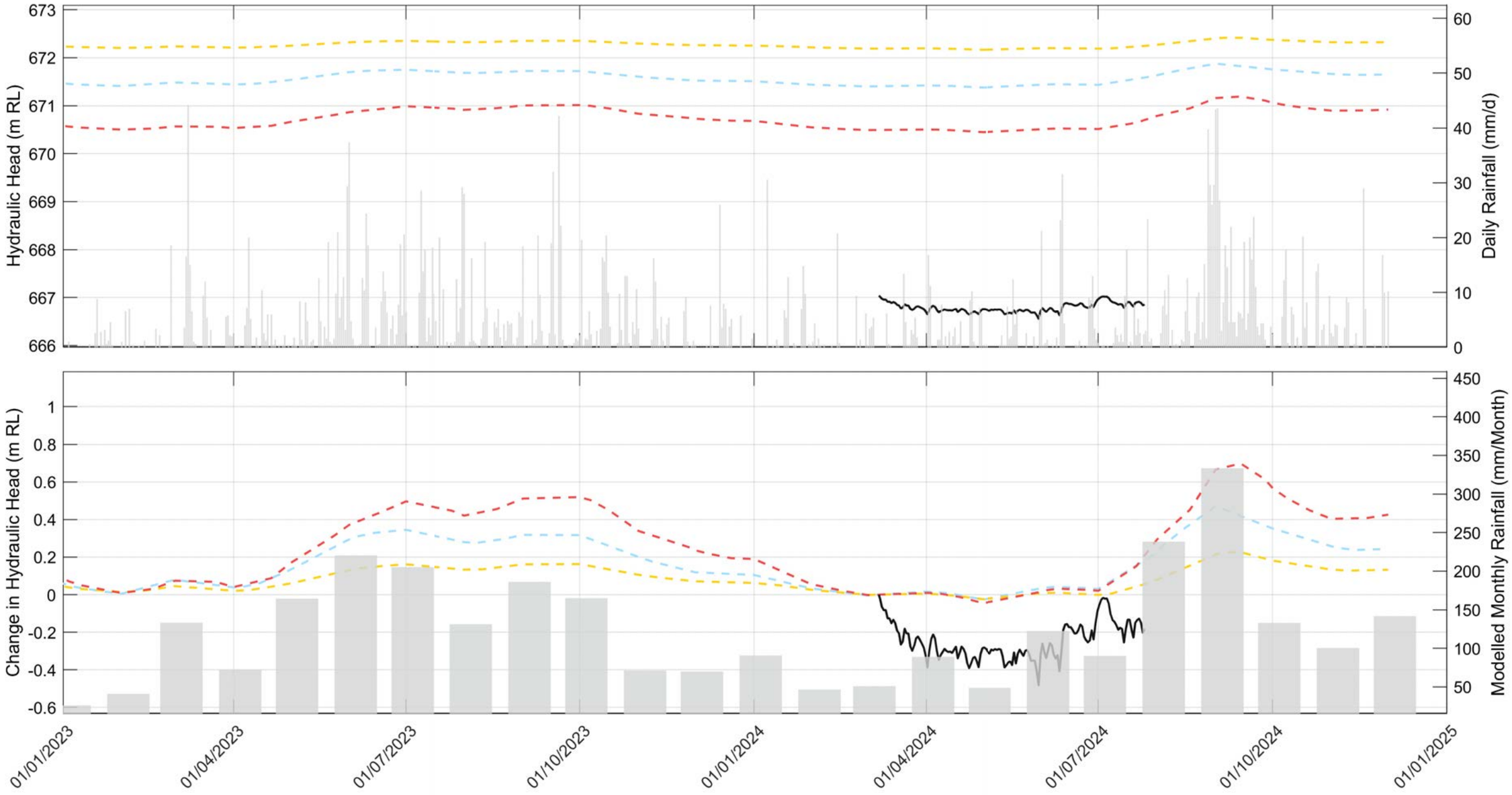
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Daily Average (Logger)

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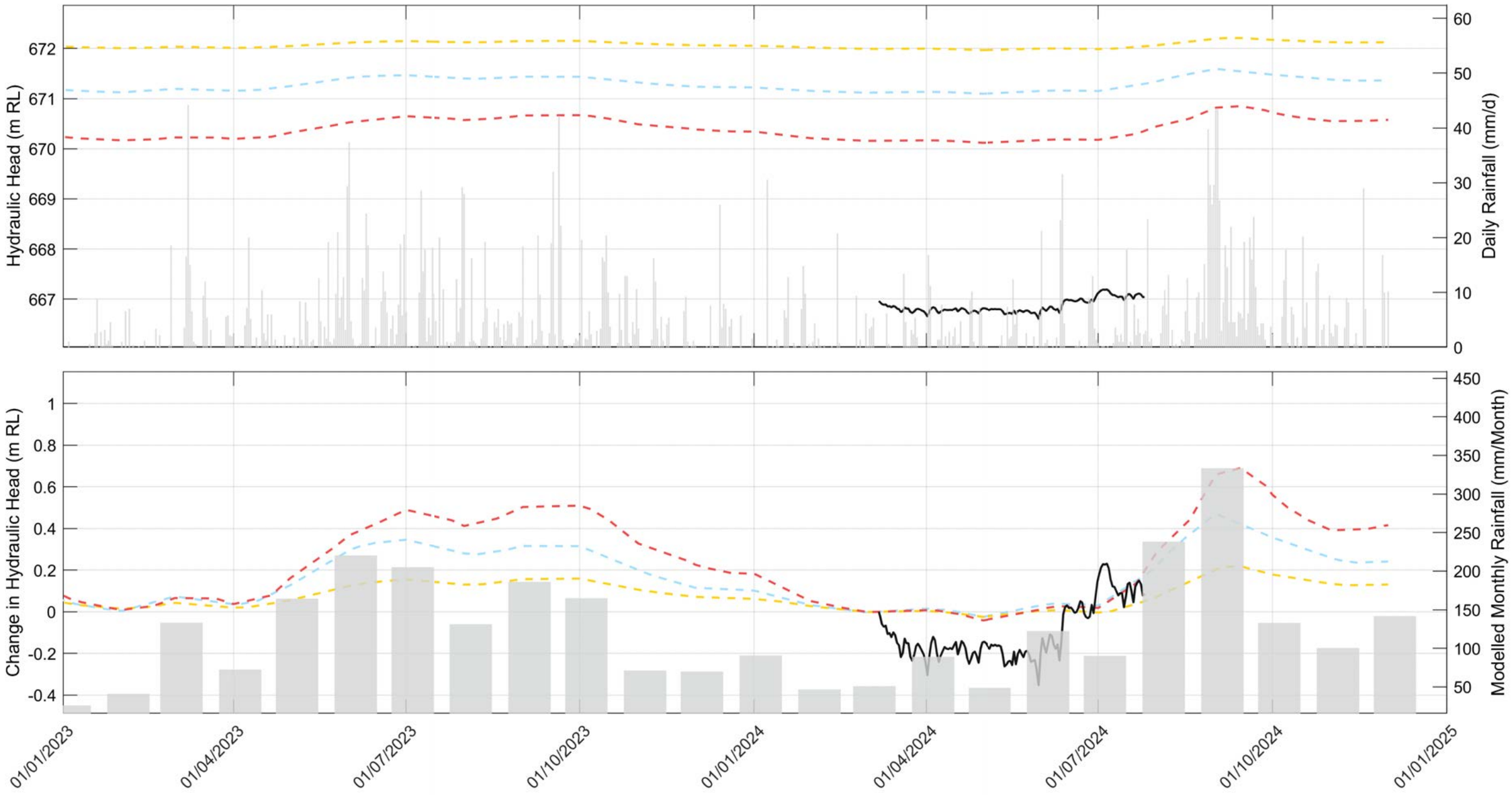
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Daily Average (Logger)

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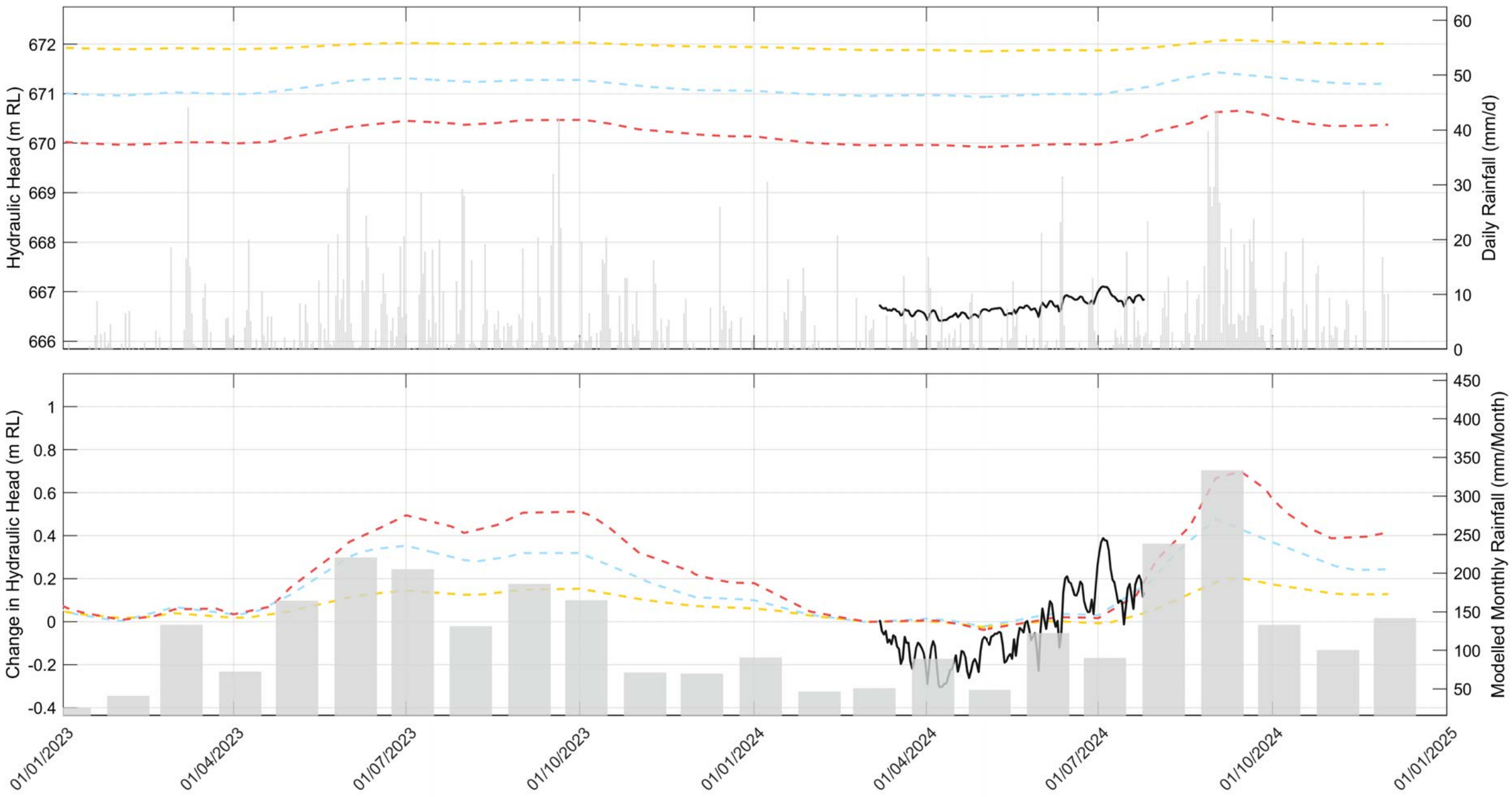
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Daily Average (Logger)

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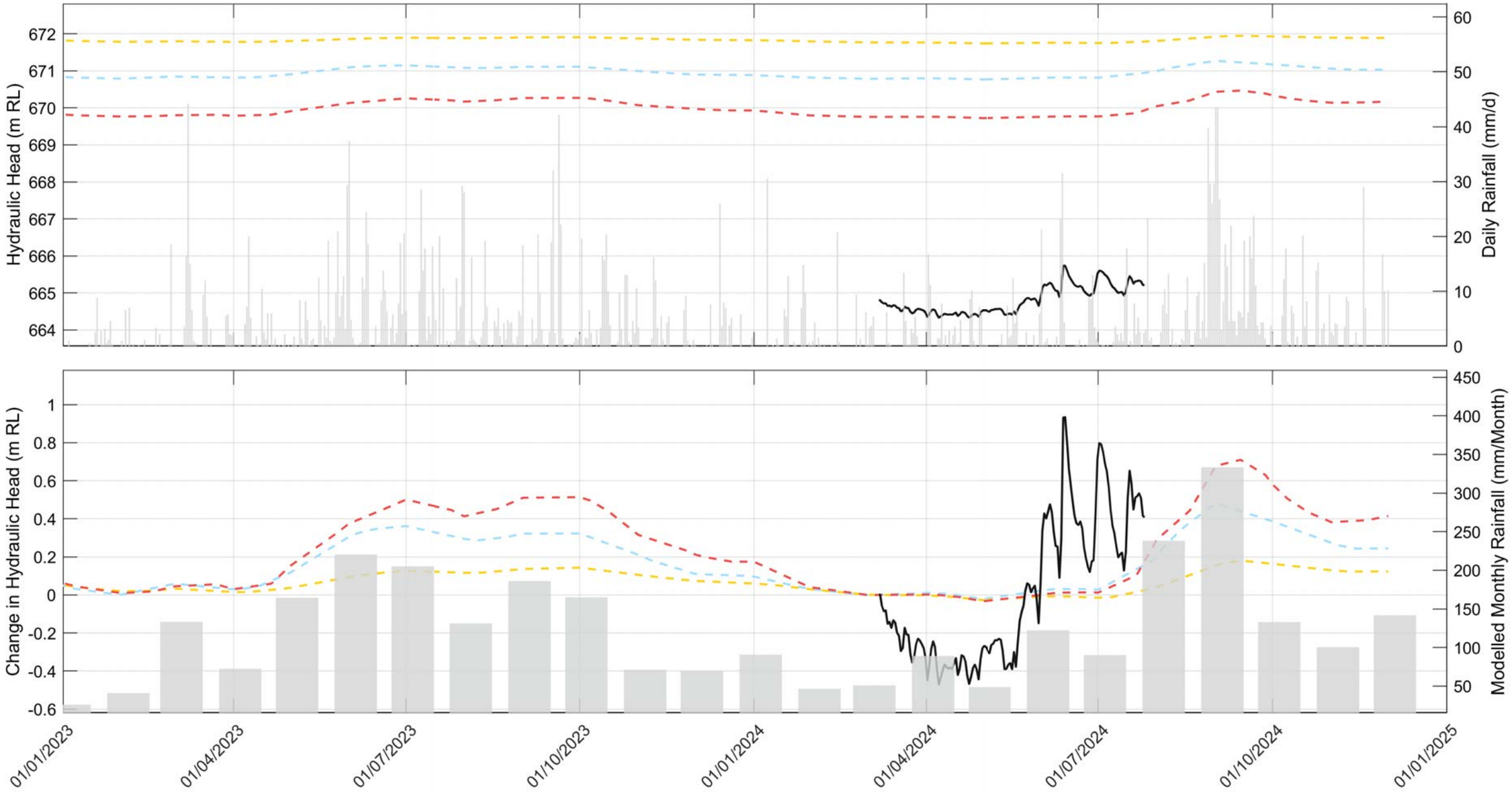
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Daily Average (Logger)

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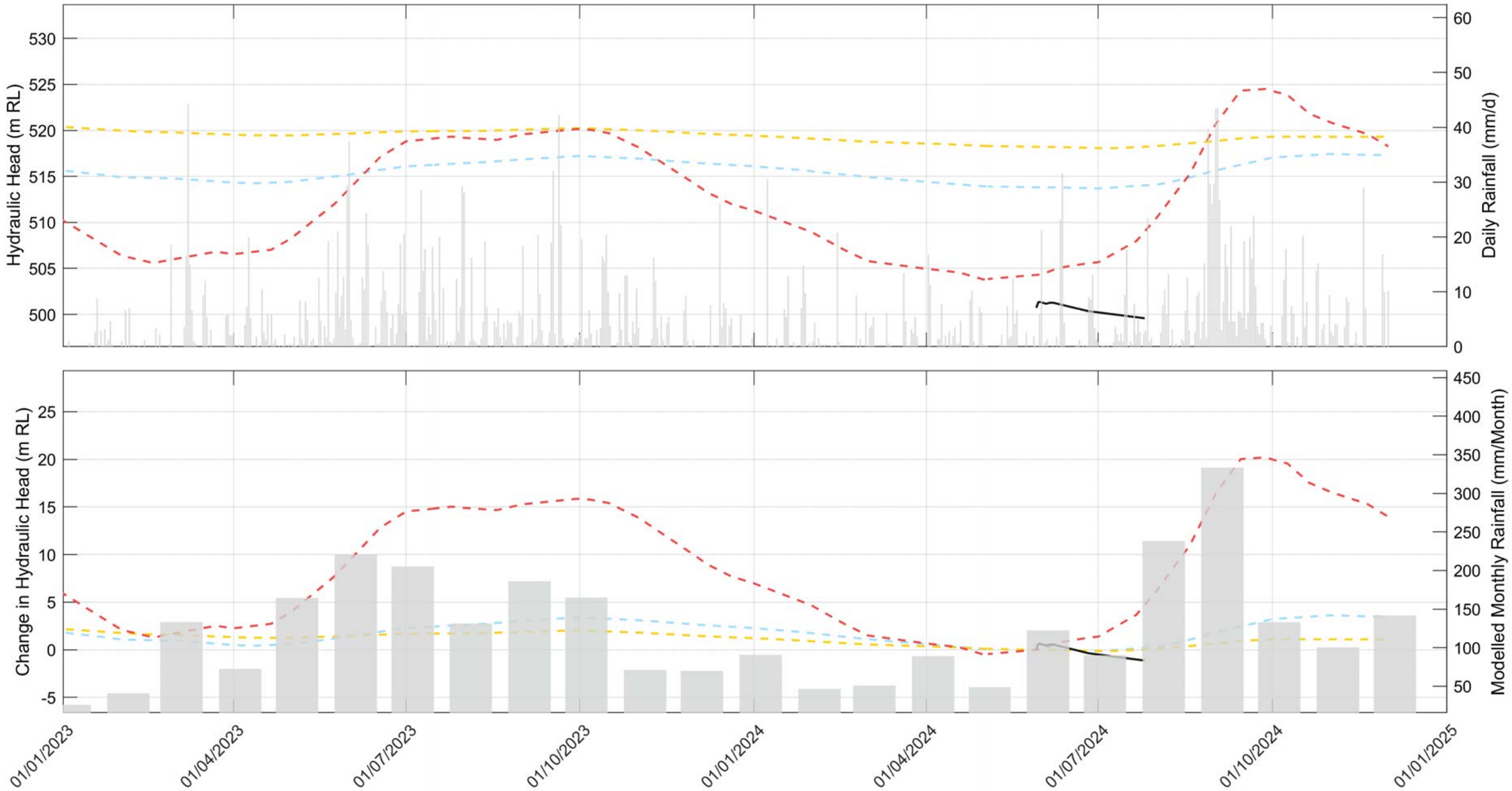
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
Transient History Matching
Hydraulic Head
TA-MB301-VWP4

PSM4346-115R | Figure F4-13 (d)

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	Date: 28-Jan-2025	Paper Size: A4	PSM4346-115R | Figure F4-14 (a)

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Hydraulic Head (m RL)

Daily Rainfall (mm/d)

Change in Hydraulic Head (m RL)

Modelled Monthly Rainfall (mm/Month)

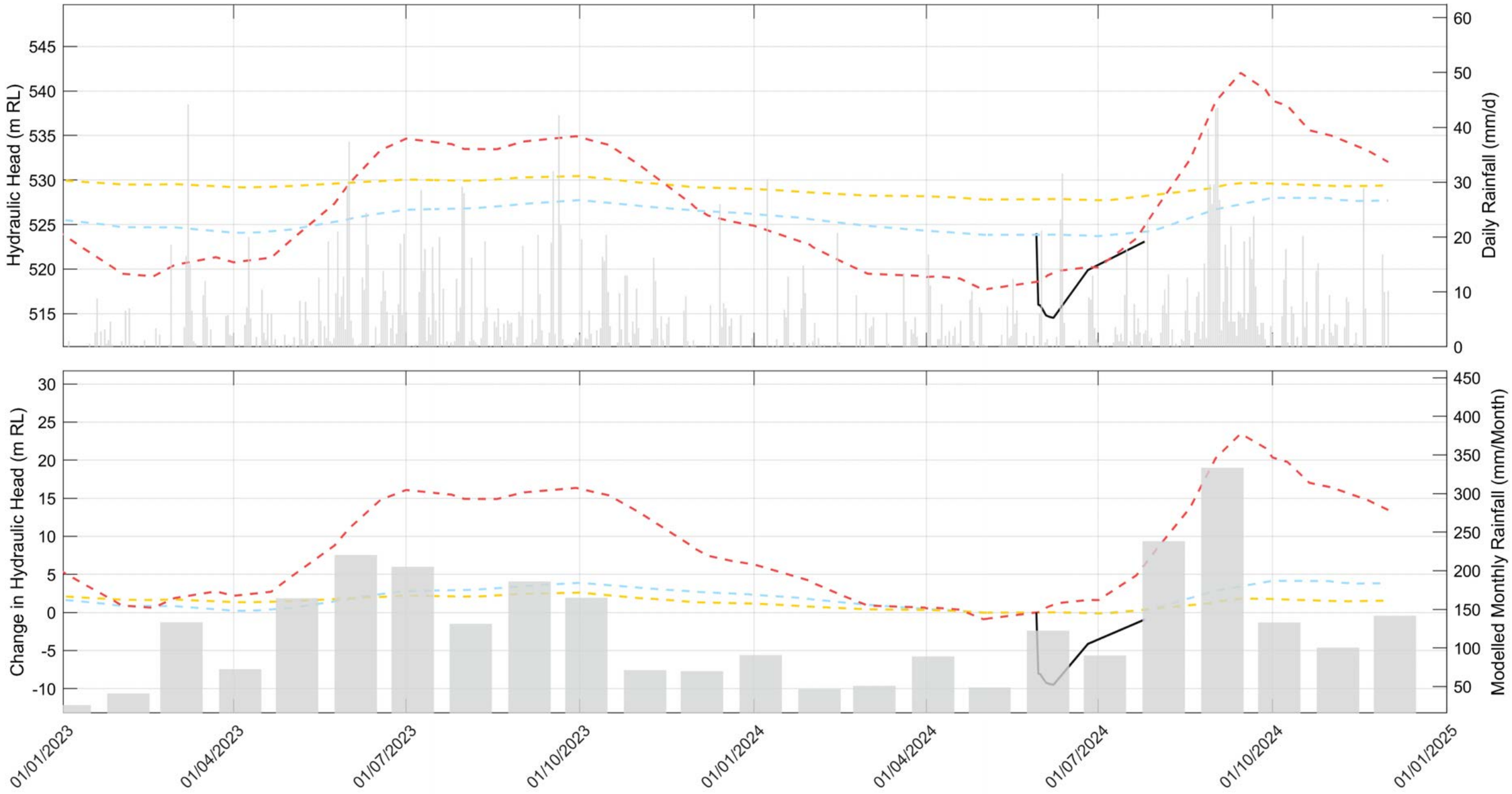
01/01/2023
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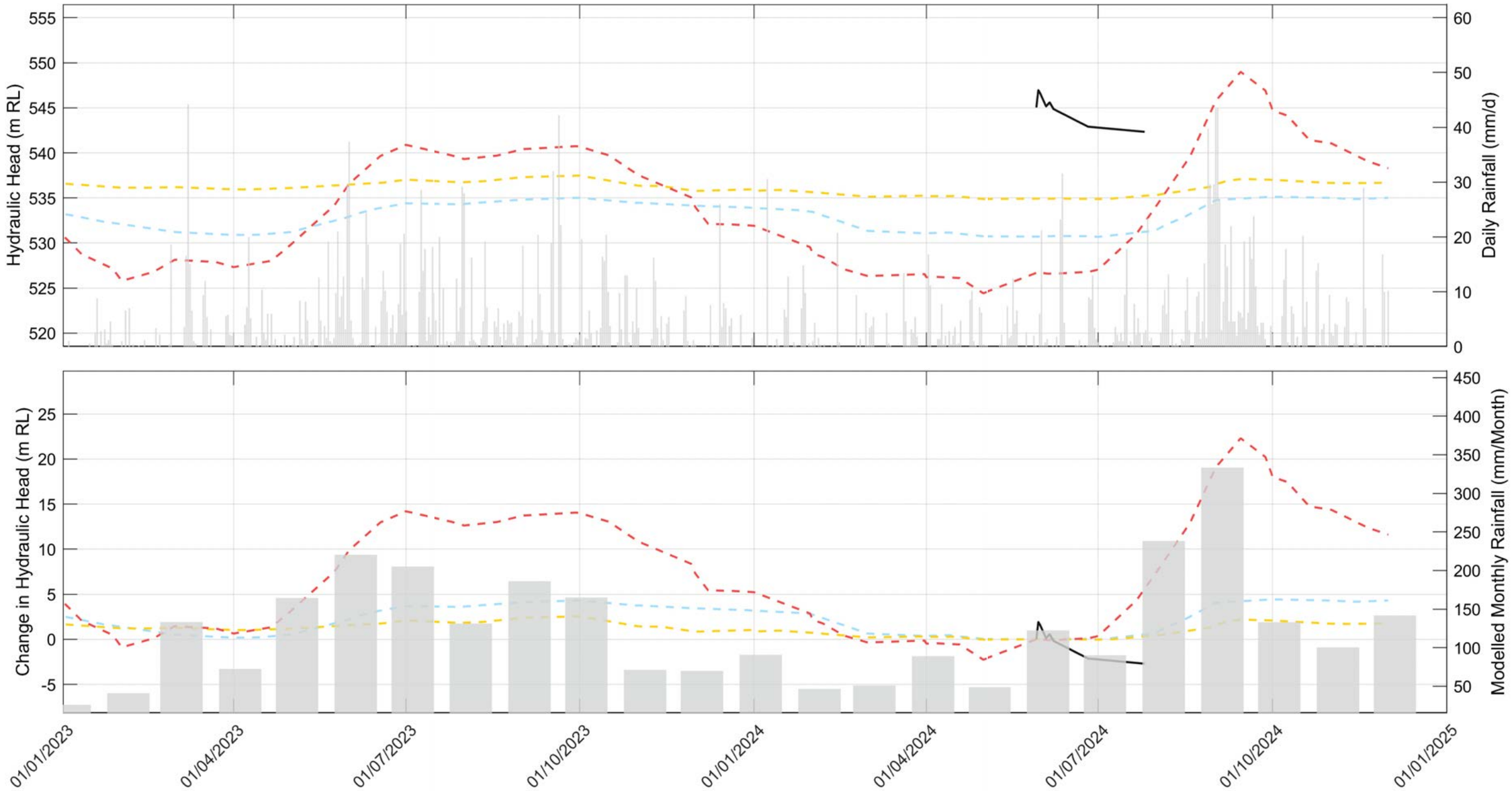
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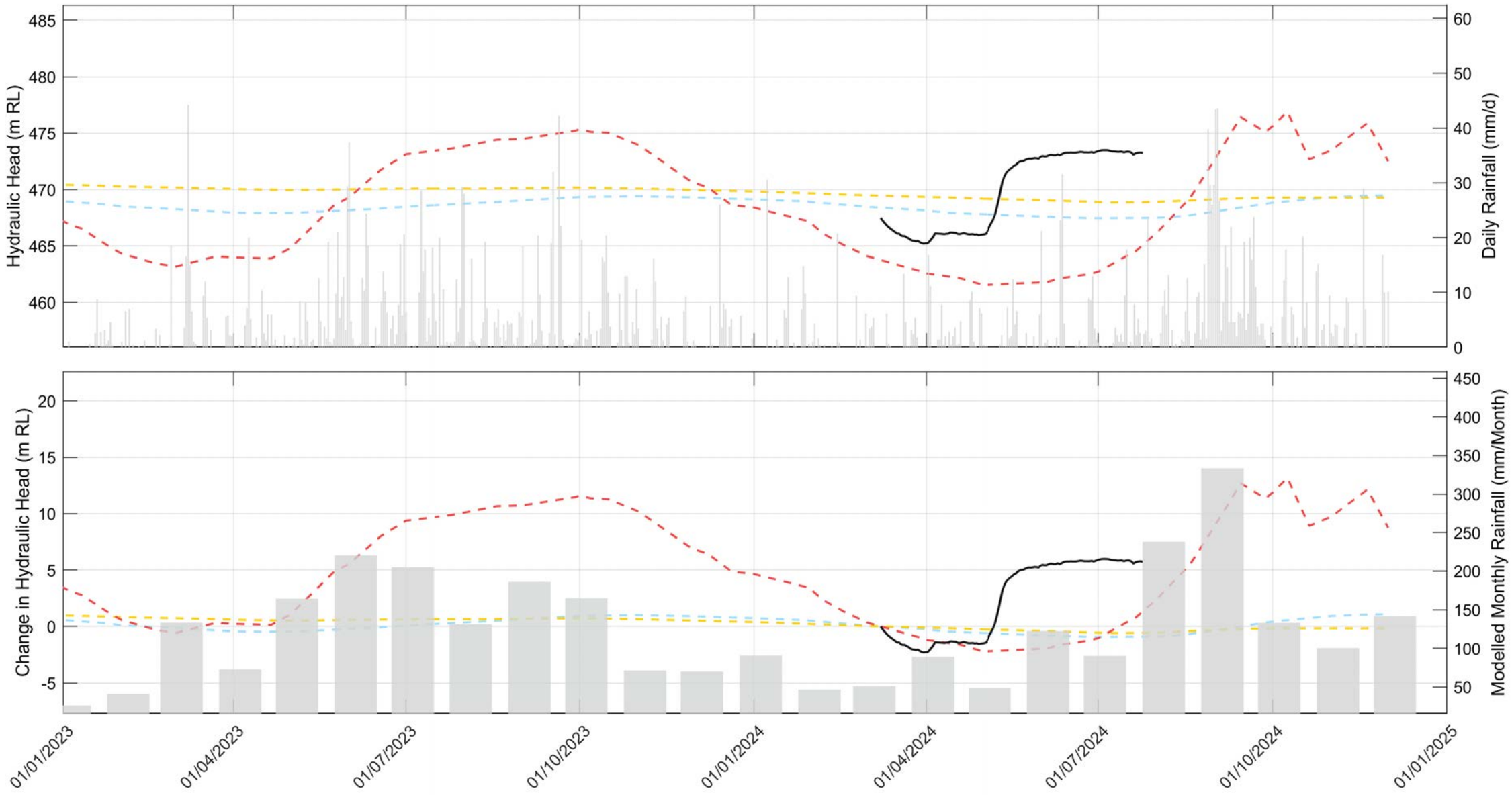
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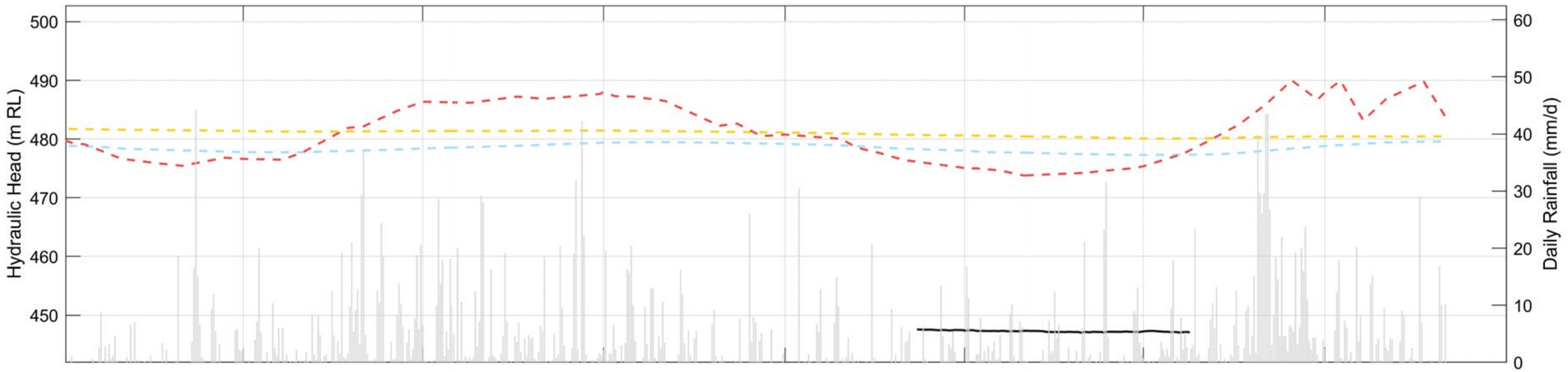
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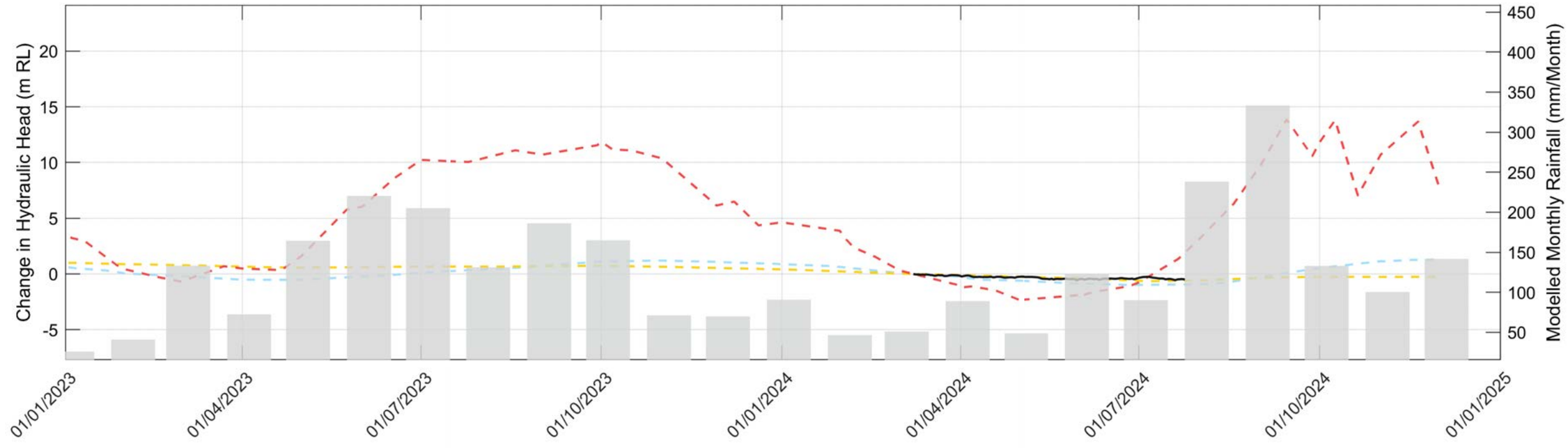
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Daily Average (Logger)

Base Case

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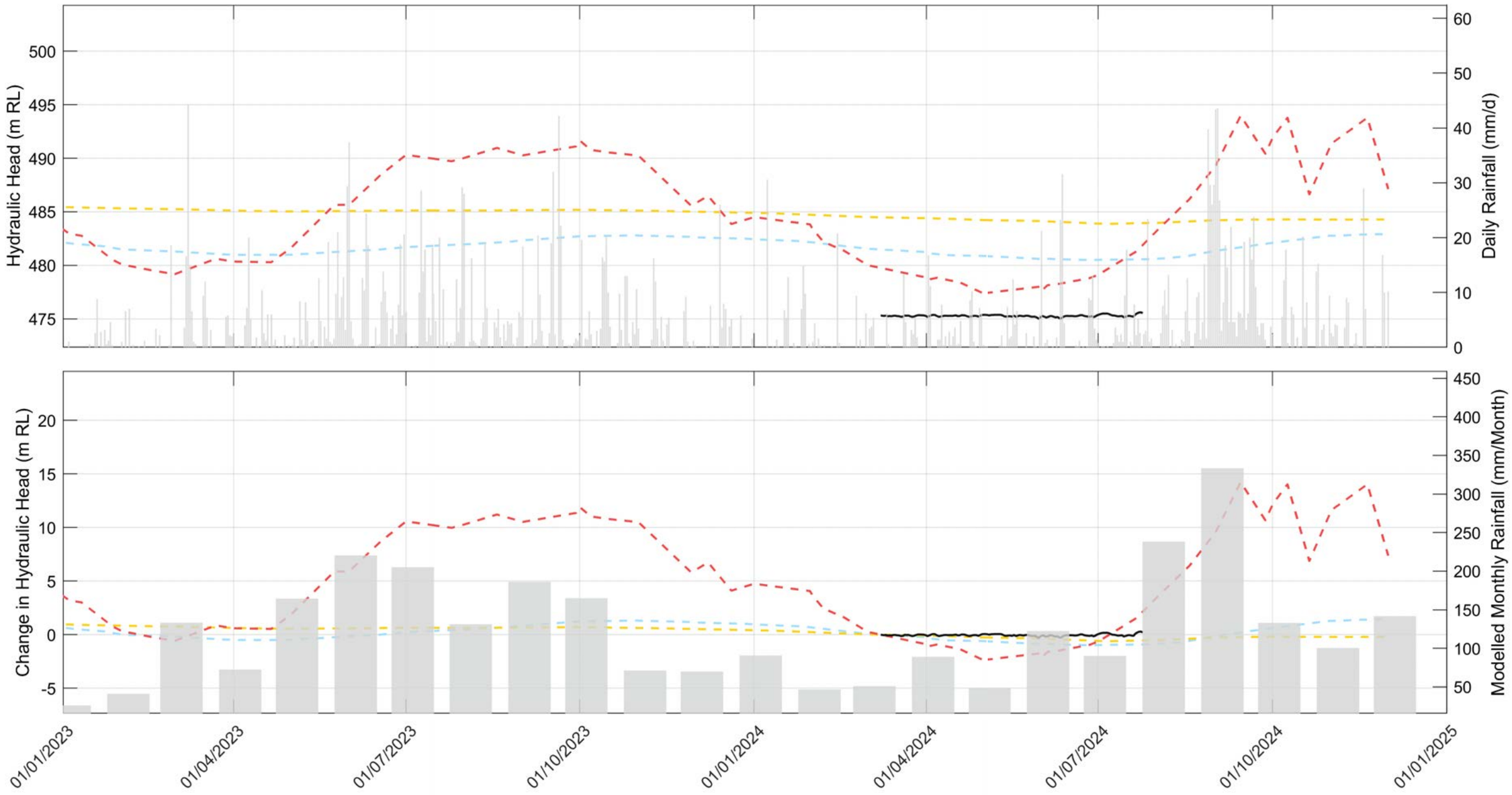
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Transient History Matching
Hydraulic Head
TA-MB309-VWP2

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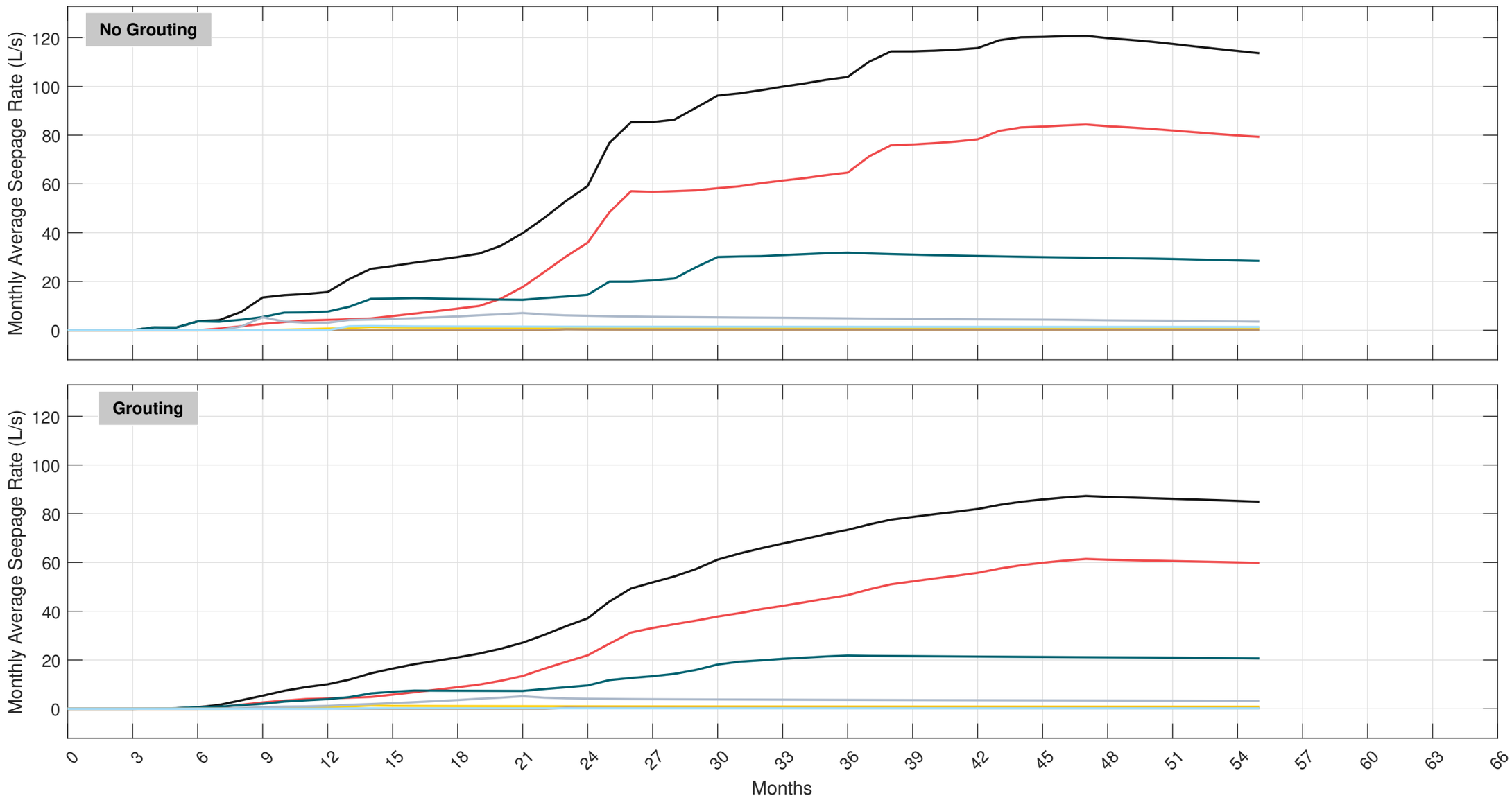
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Appendix G
Construction Stage – Seepage Assessment

- Figure G1 – Simulated Groundwater Seepage (Base Schedule)
- Figure G2 – Simulated Groundwater Seepage (P90 Schedule)
- Figure G3 – Simulated Annual Groundwater Take (Base Schedule)
- Figure G4 – Simulated Annual Groundwater Take (P90 Schedule)



Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

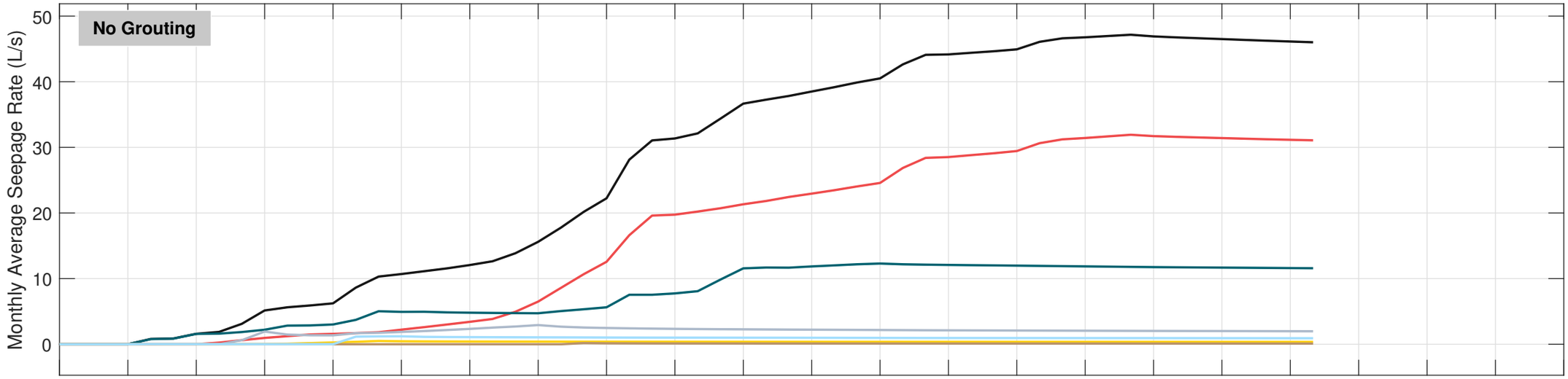
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SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE (BASE CASE)

PSM4346-115R | Figure G1-1 (a)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

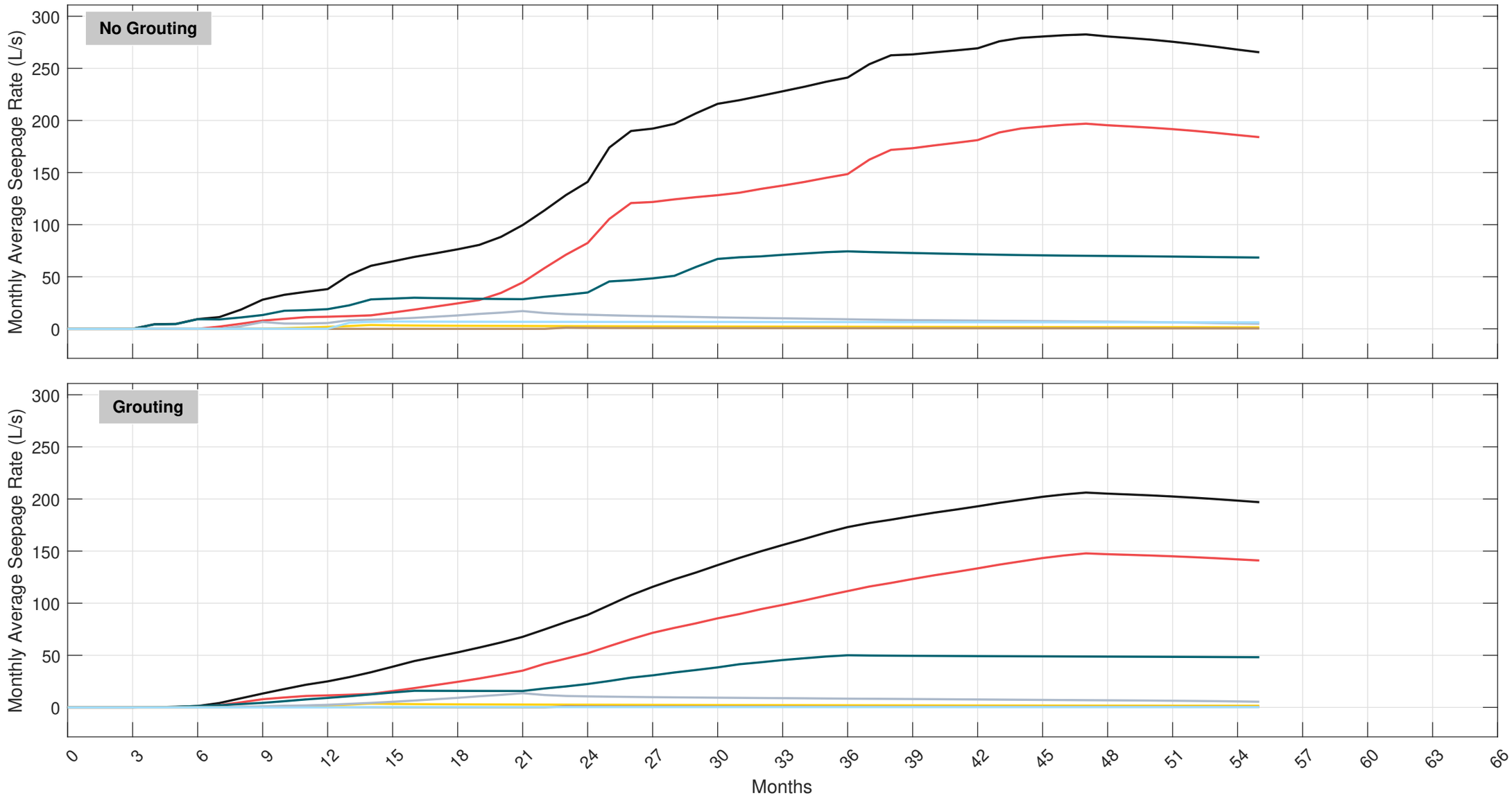
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SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure G1-1 (b)

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Combined
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Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

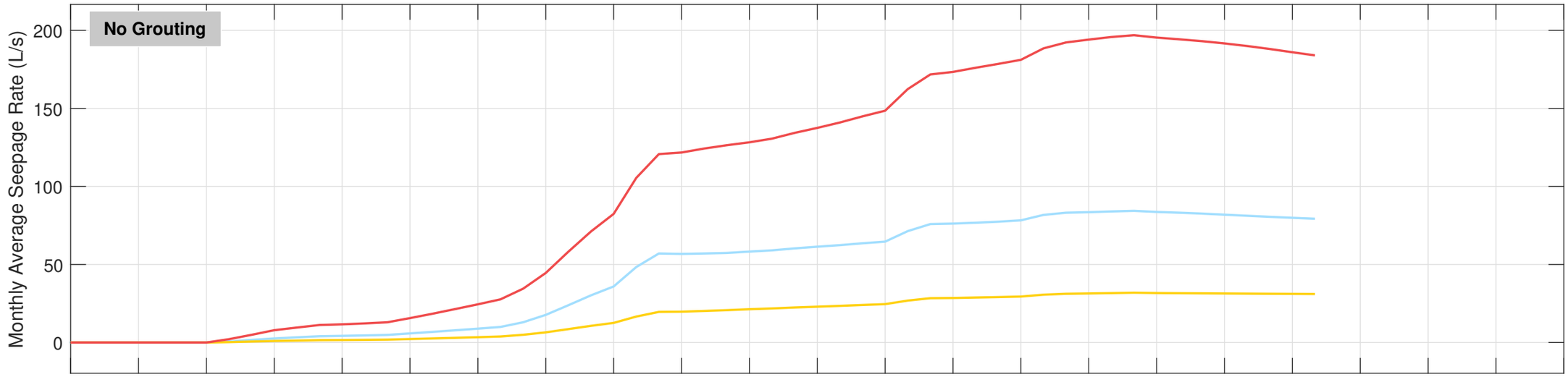
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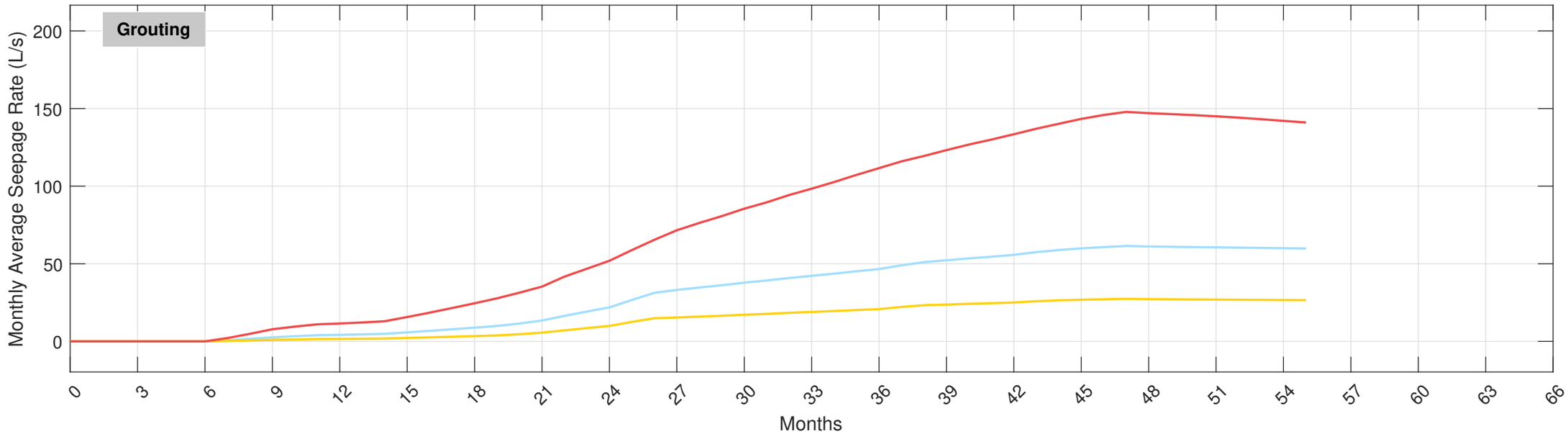
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TARRALEAH TUNNELS
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure G1-1 (c)

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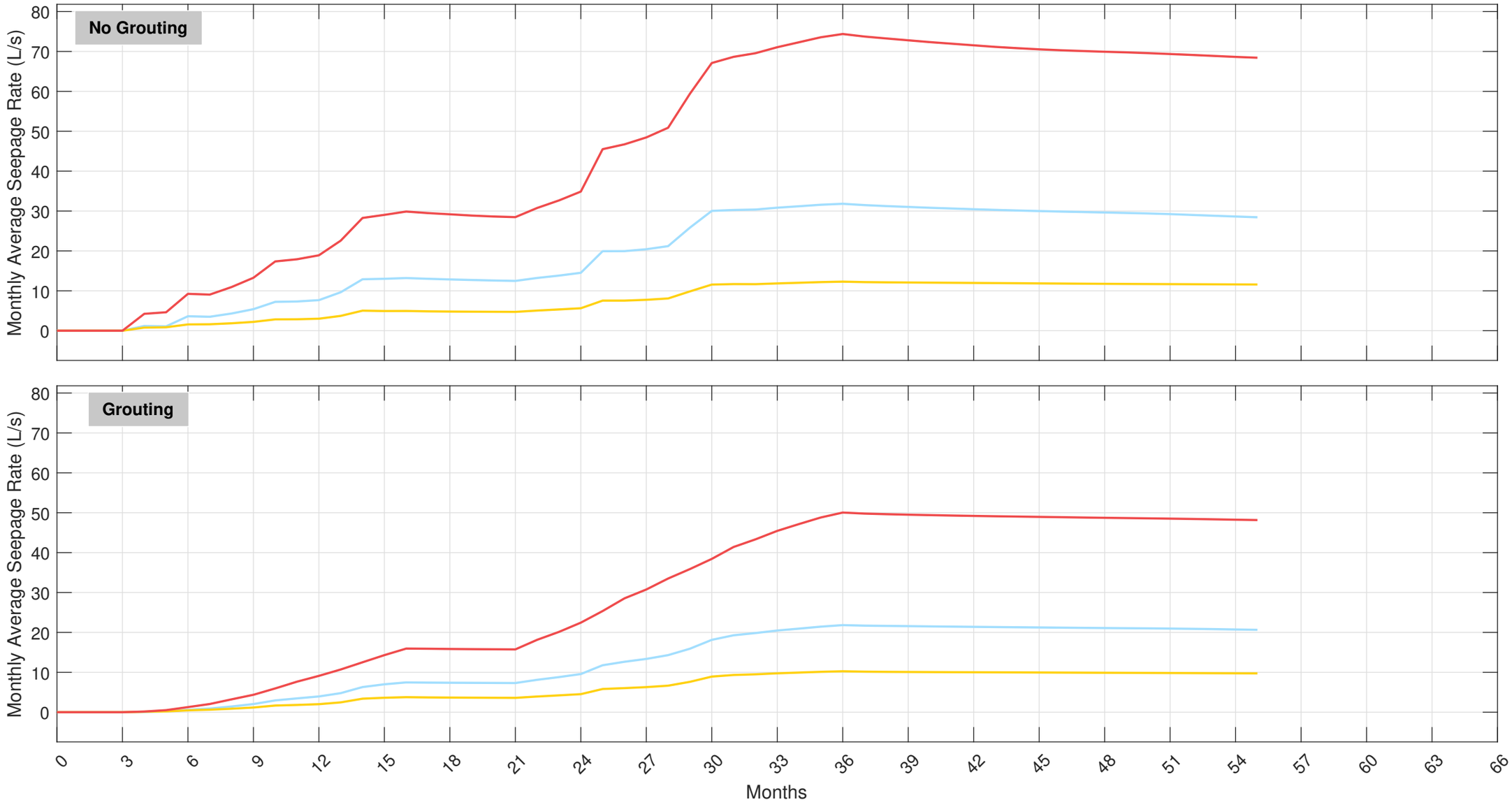
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HEADRACE TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-2

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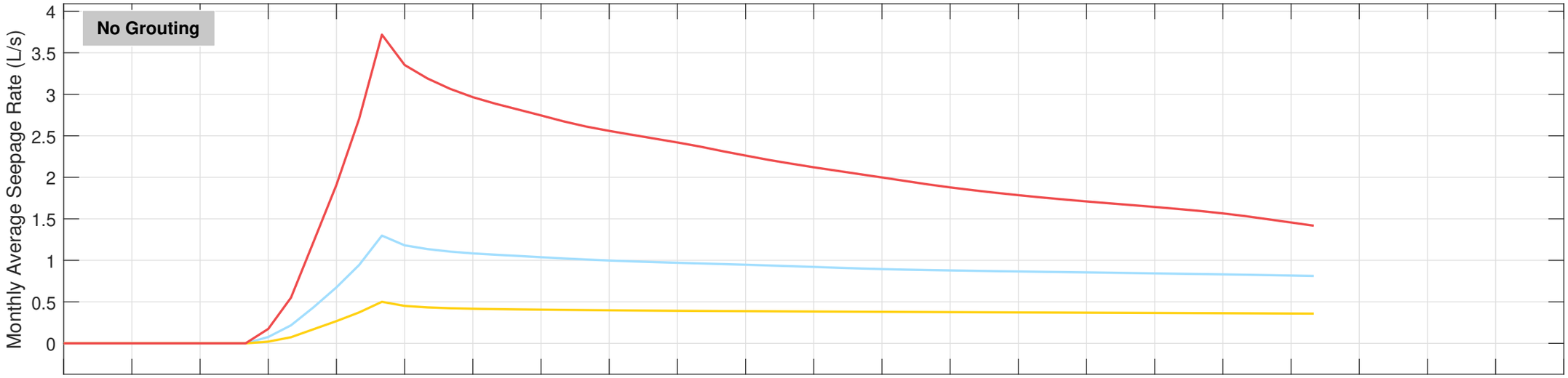
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POWER TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-3

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Base Case

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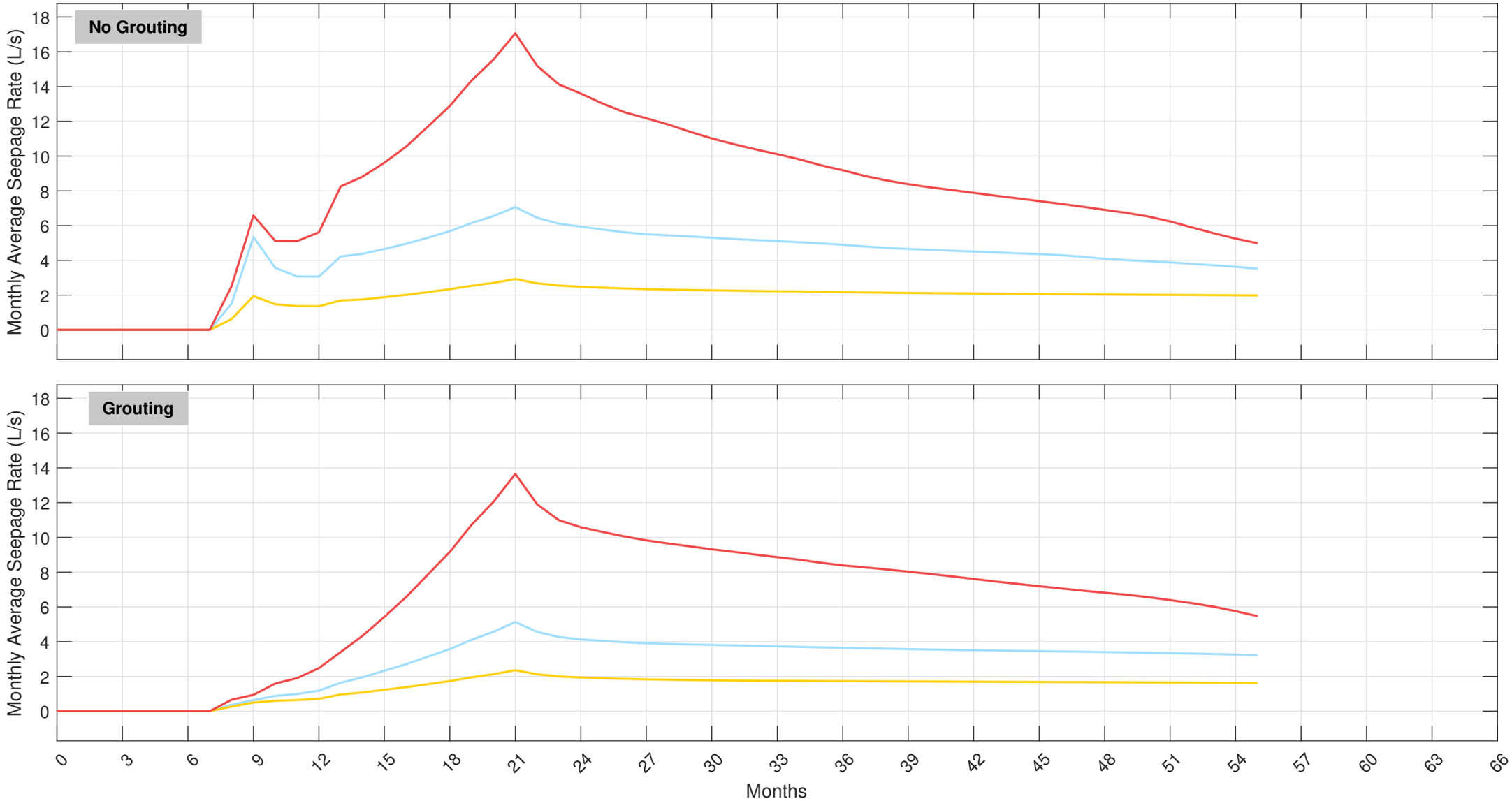
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MID ACCESS TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-4

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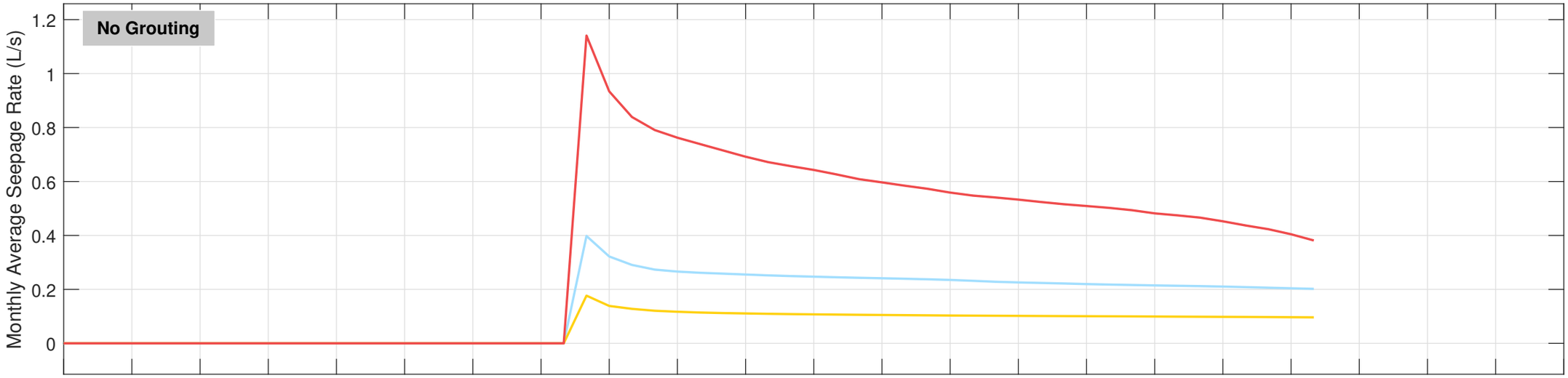
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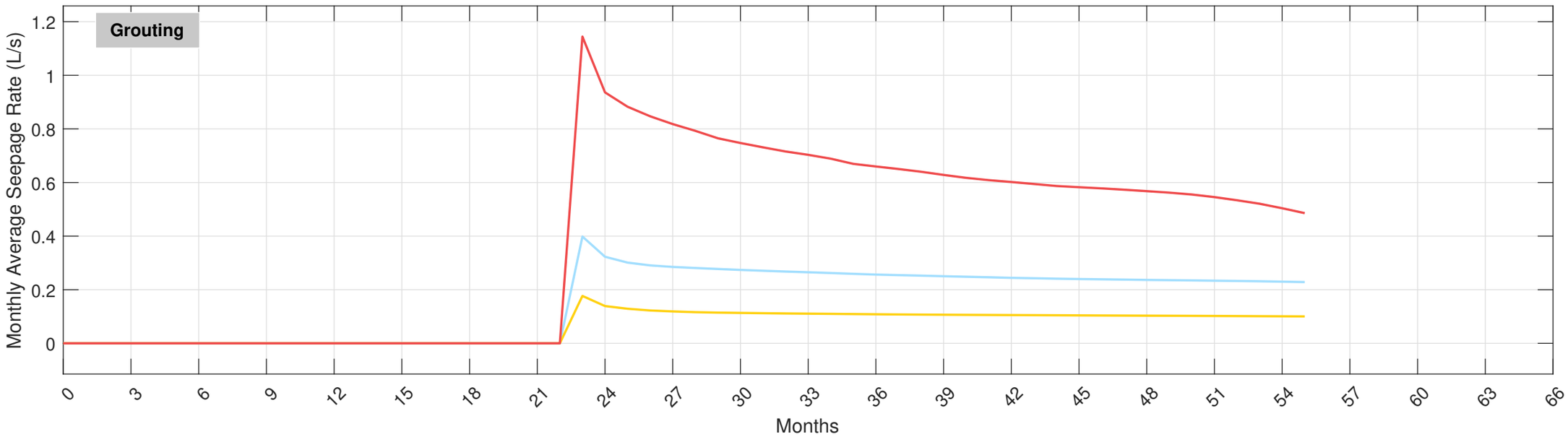
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SURGE ACCESS TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-5

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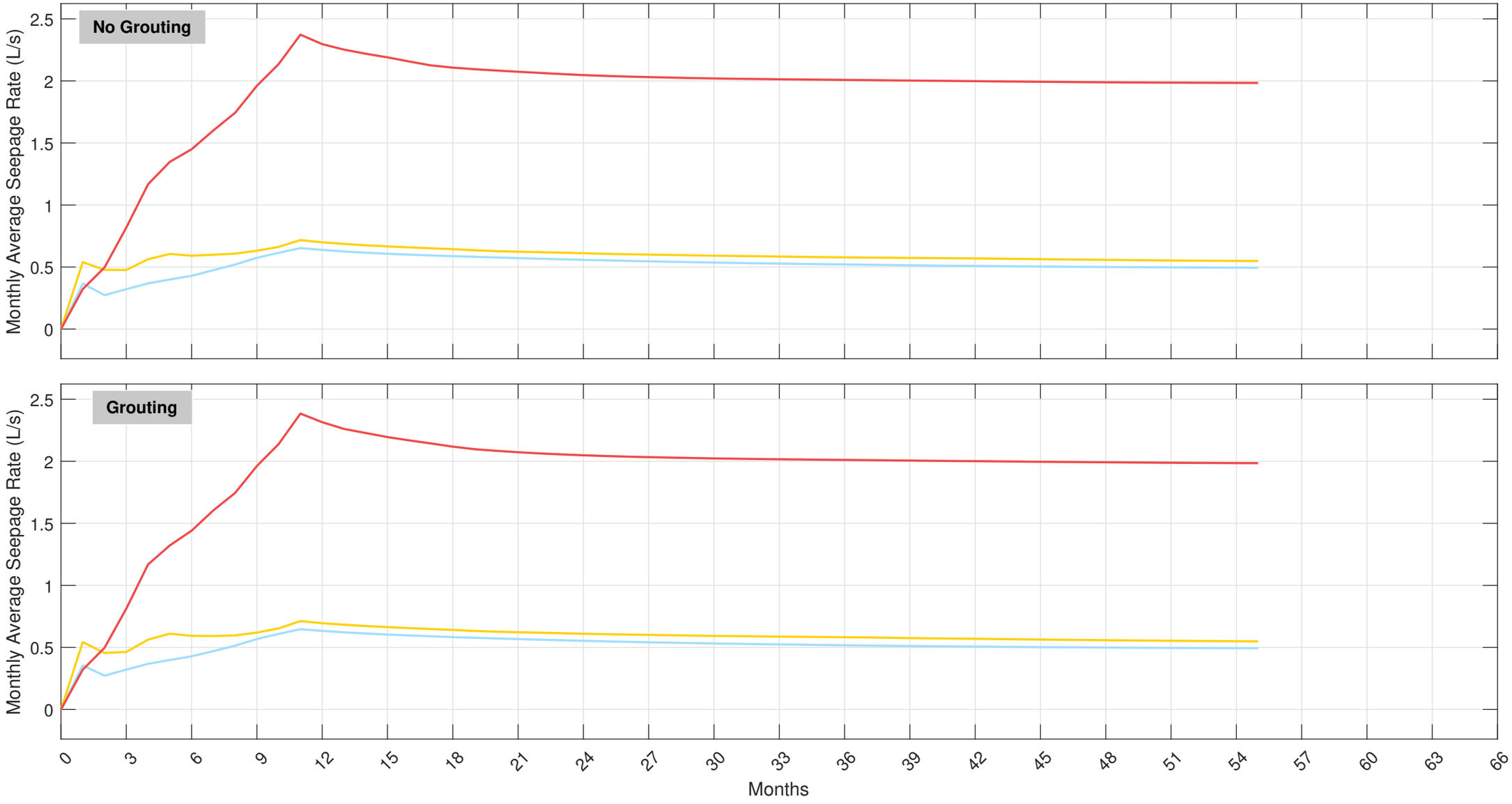
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SURGE SHAFT AND CHAMBER
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-6

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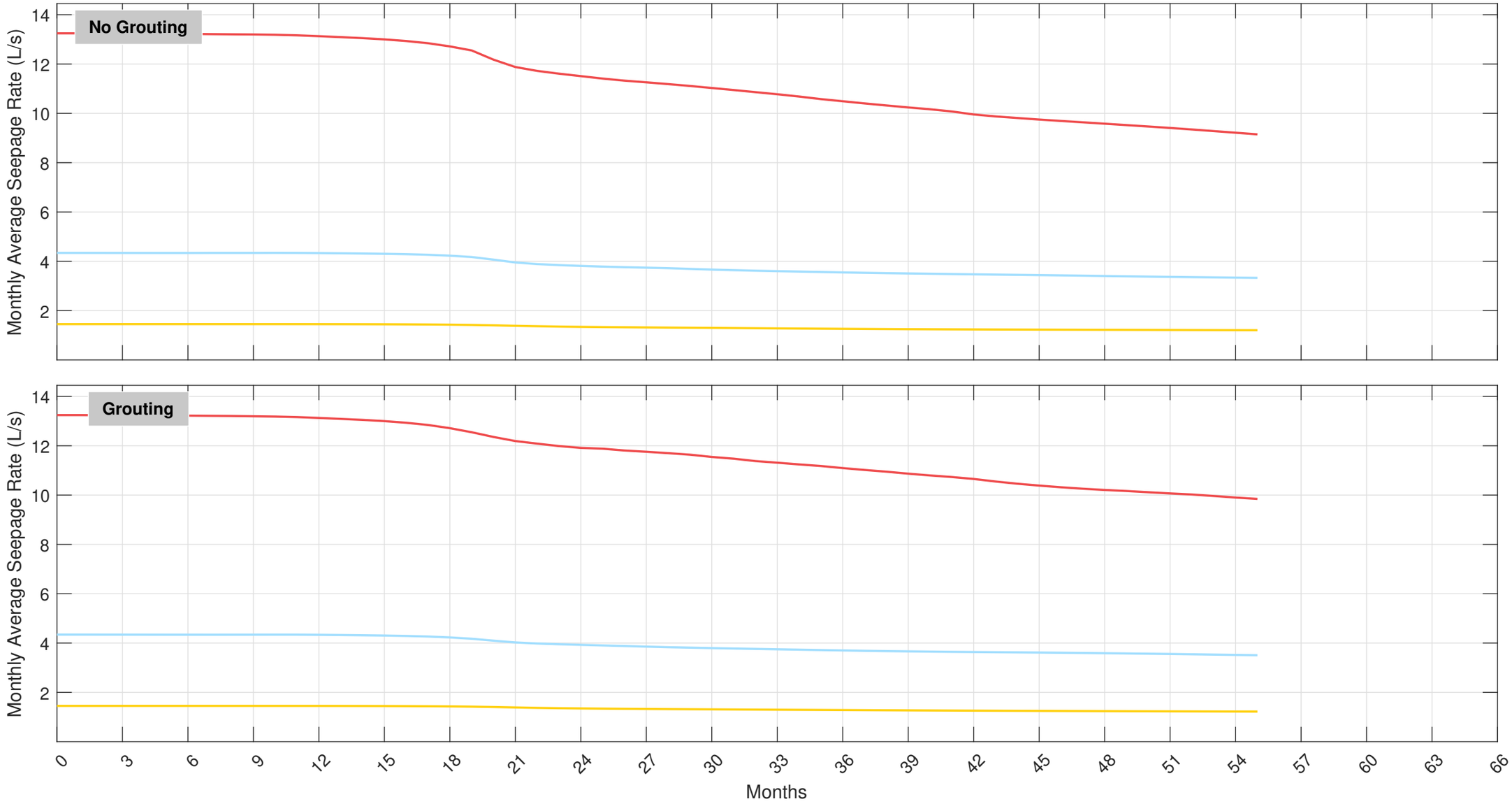
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LAKE KING WILLIAM TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-7

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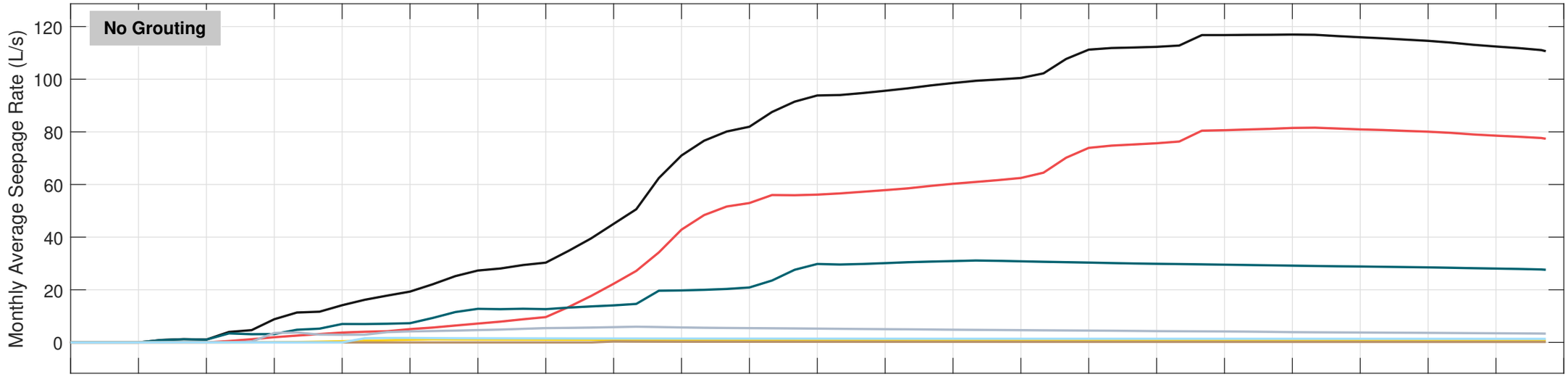
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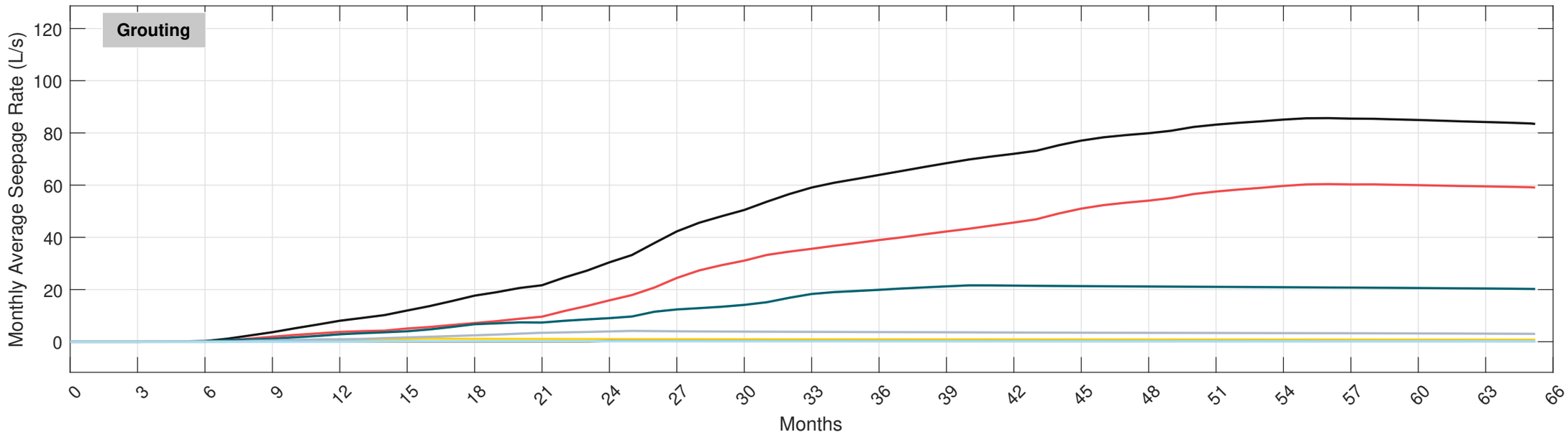
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MOSSY MARSH TUNNEL
SIMULATED GROUNDWATER SEEPAGE
BASE SCHEDULE

PSM4346-115R | Figure G1-8

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Combined
Surge Access Tunnel
Headrace Tunnel
Surge Shaft and Connection Chamber
Power Tunnel
Penstock Tunnels
Mid Access Tunnel

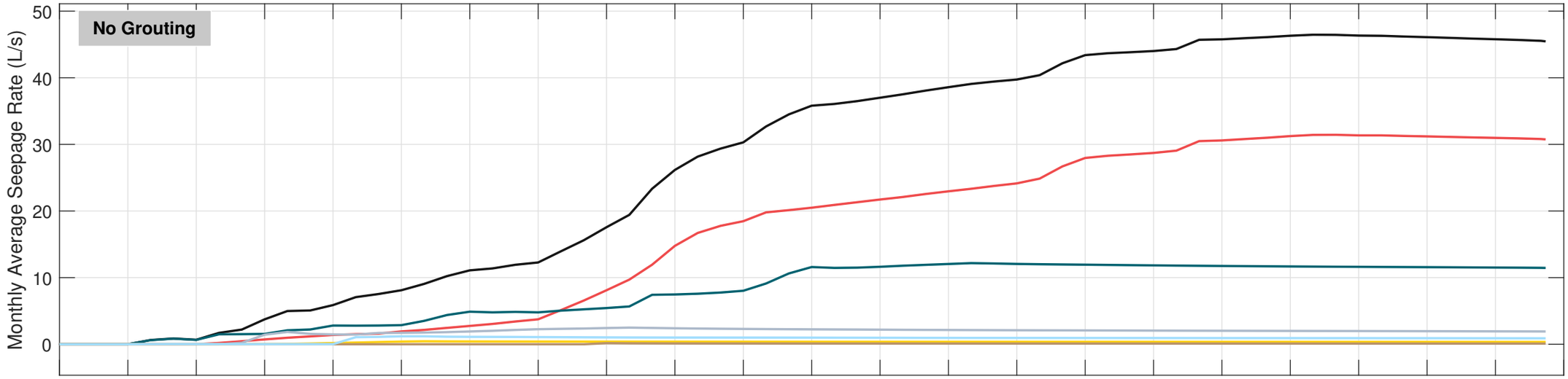
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TARRALEAH TUNNELS
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE (BASE CASE)

PSM4346-115R | Figure G2-1 (a)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

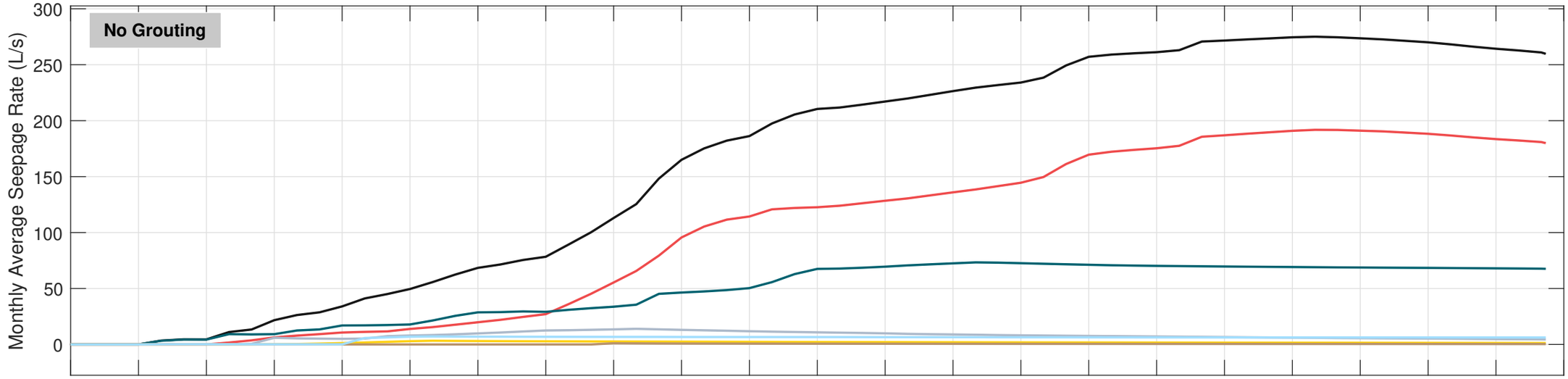
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TARRALEAH TUNNELS
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure G2-1 (b)

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Combined
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Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

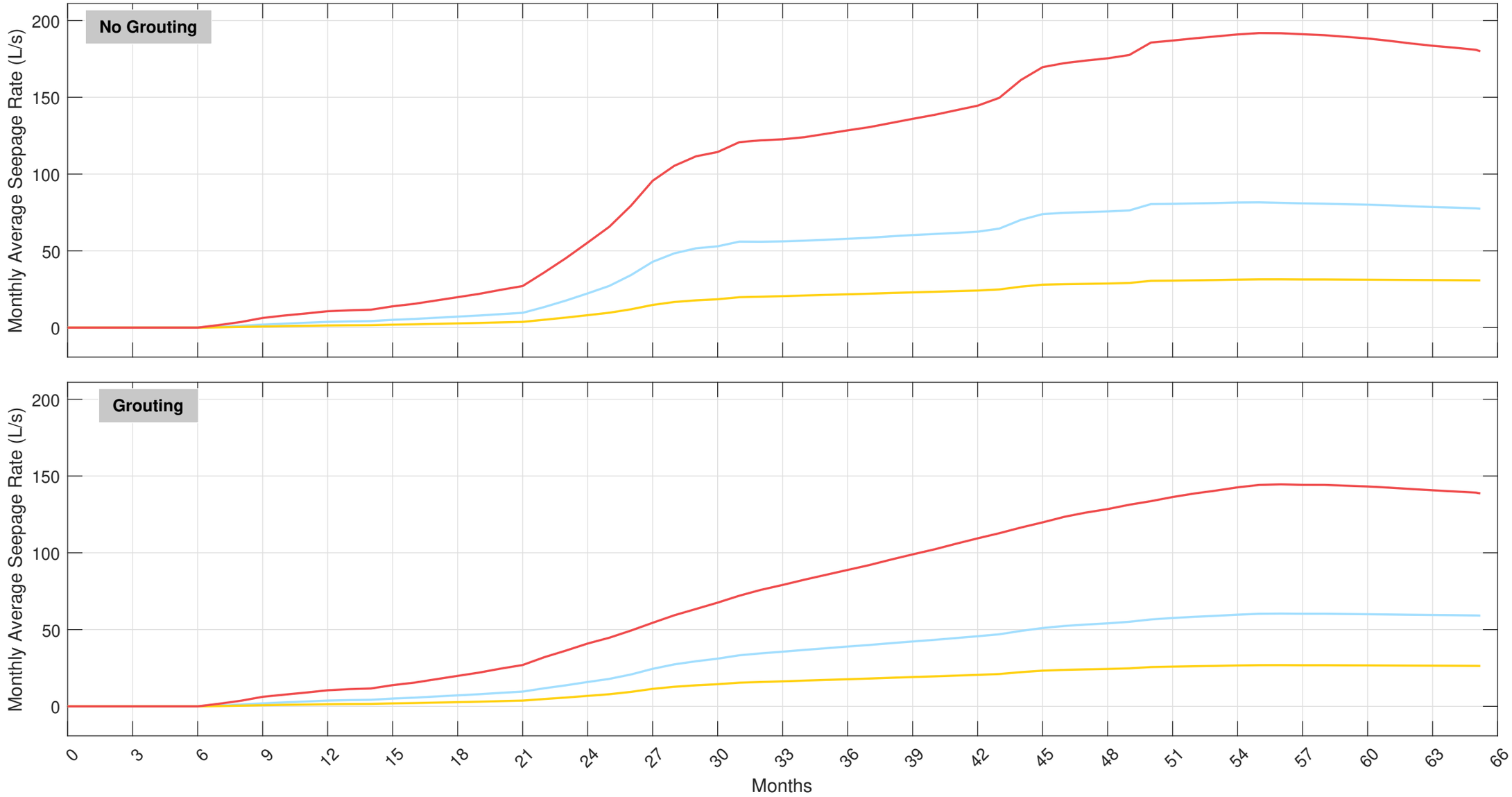
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Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure G2-1 (c)

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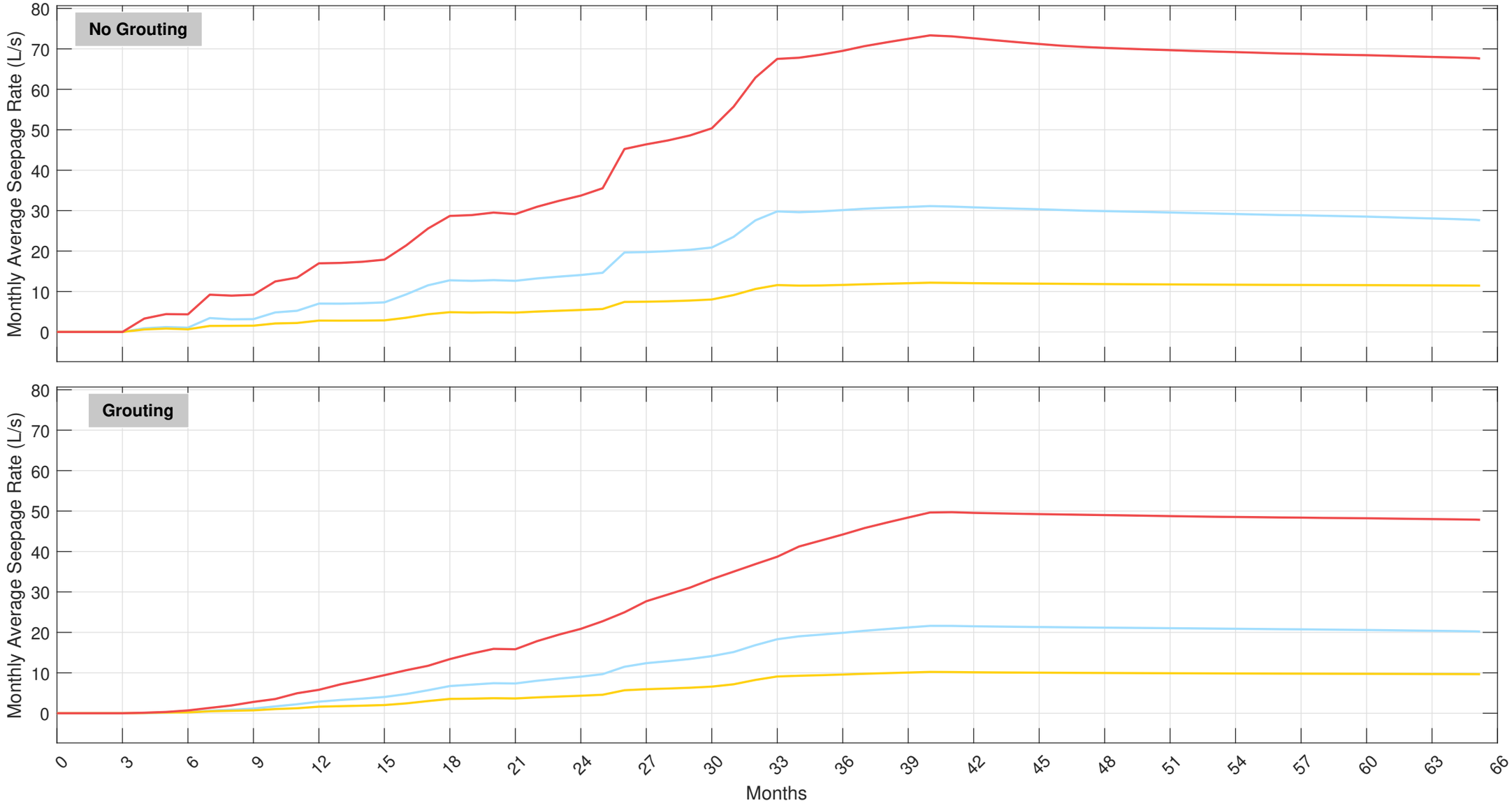
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HEADRACE TUNNEL
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-2

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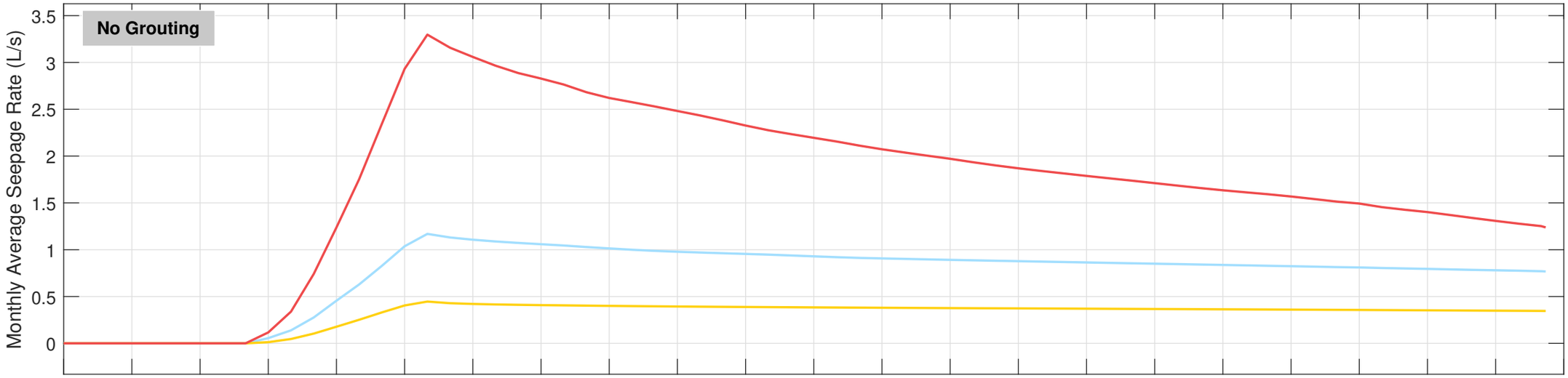
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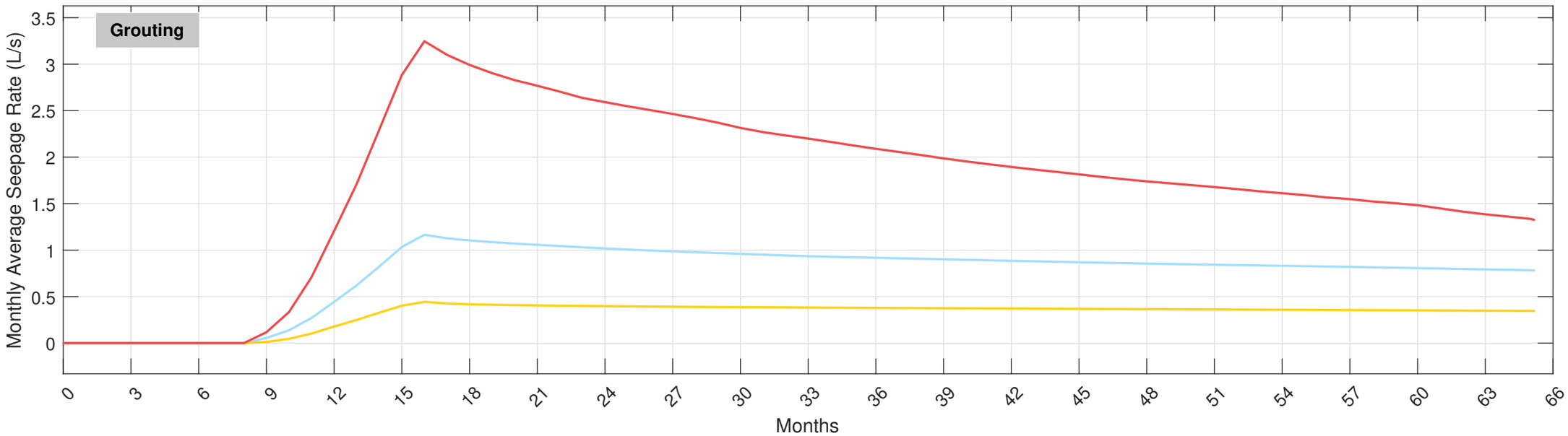
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POWER TUNNEL
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-3

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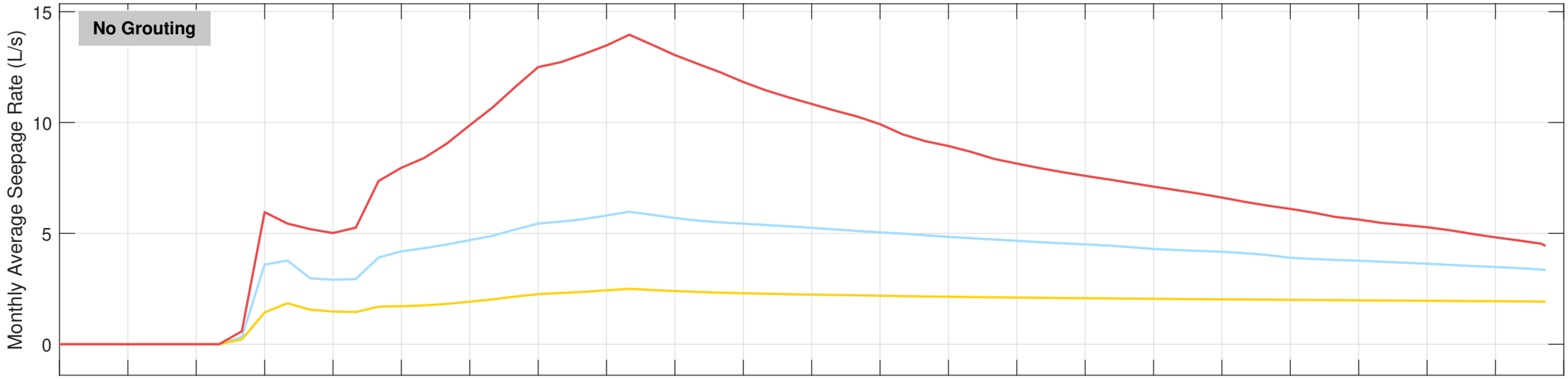
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MID ACCESS TUNNEL
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-4

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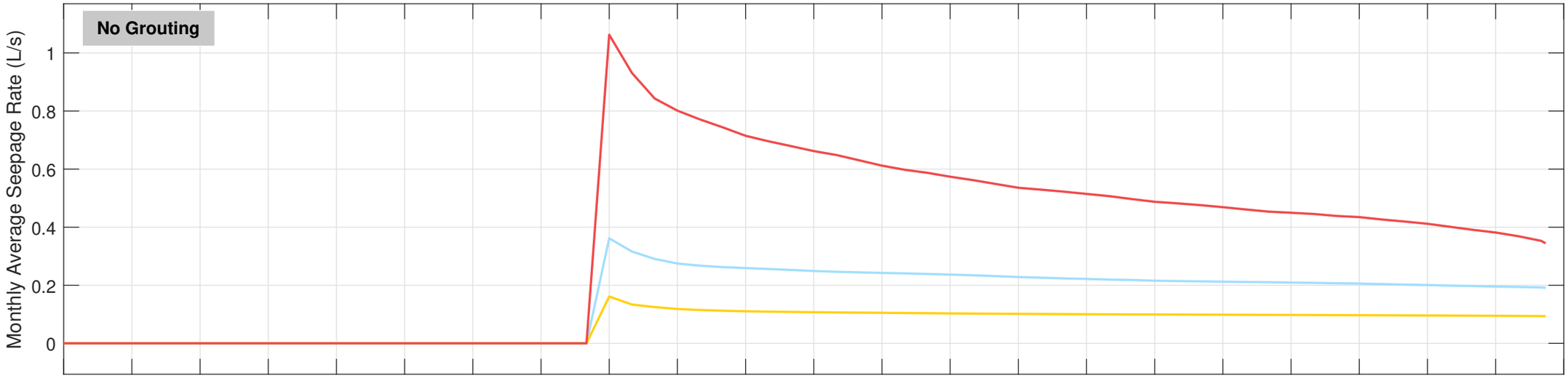
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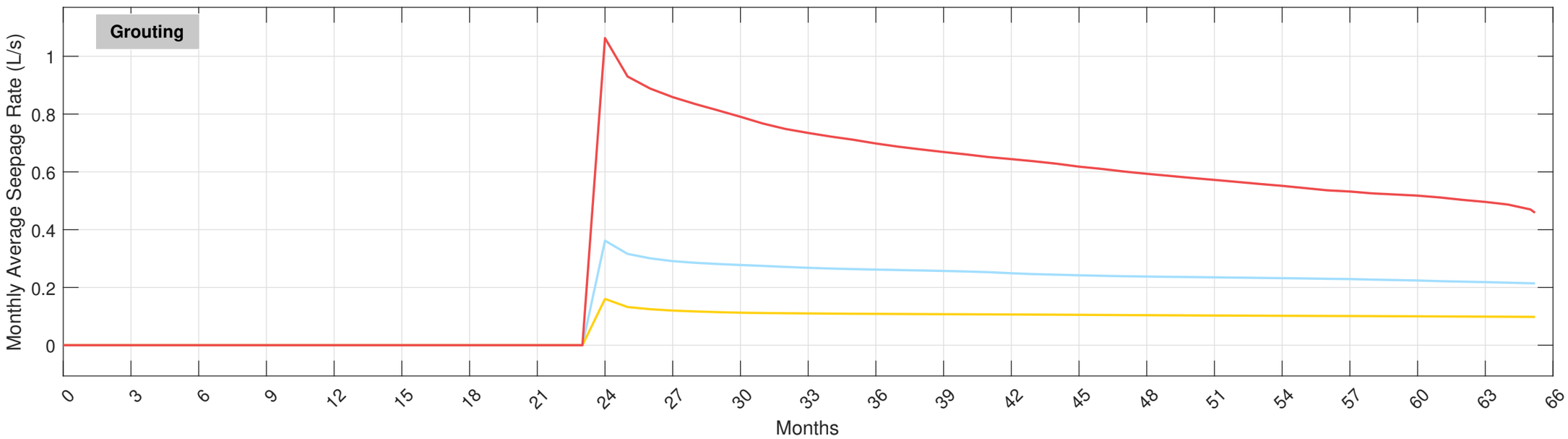
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SURGE ACCESS TUNNEL
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-5

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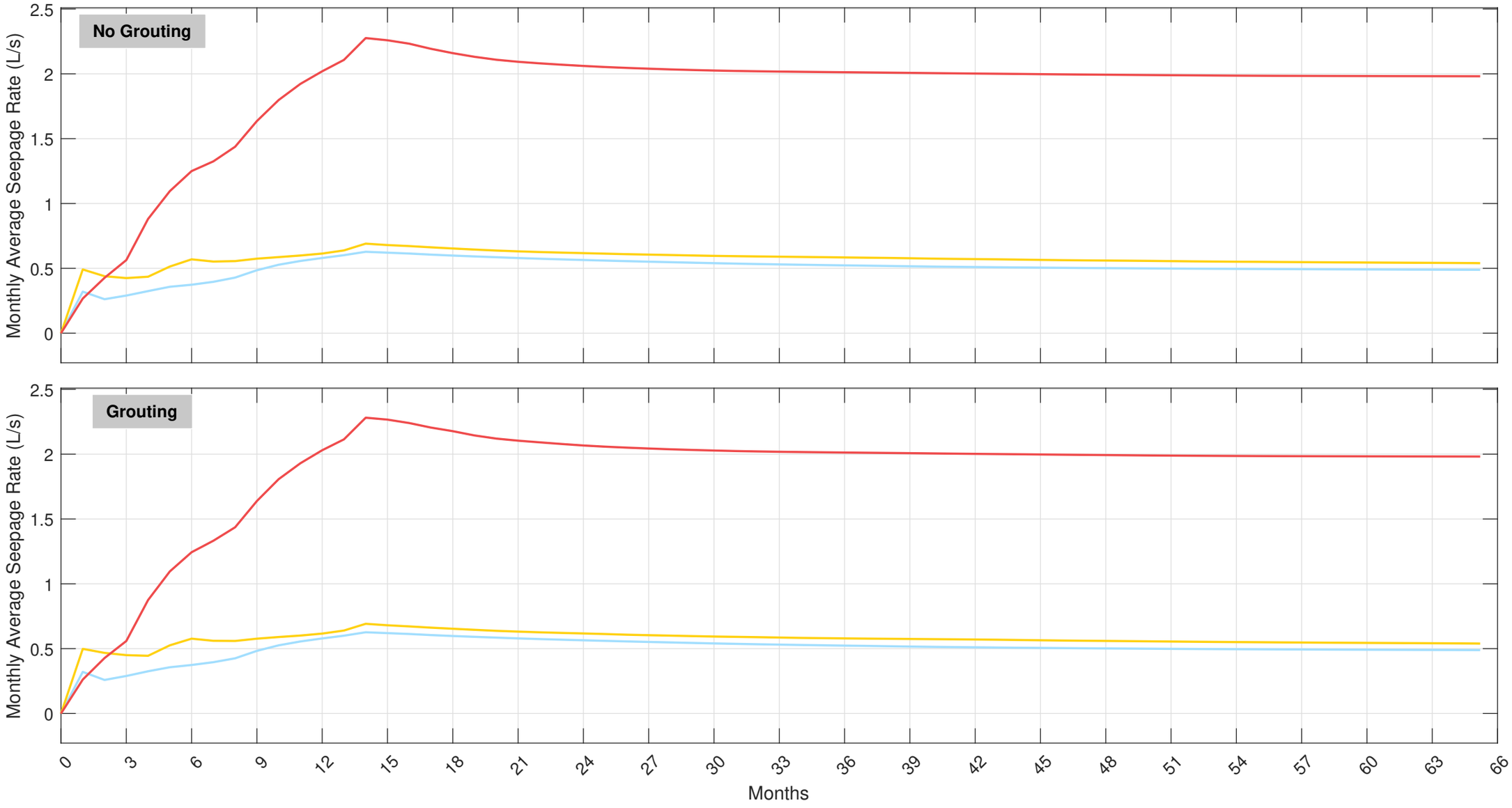
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SURGE SHAFT AND CHAMBER
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-6

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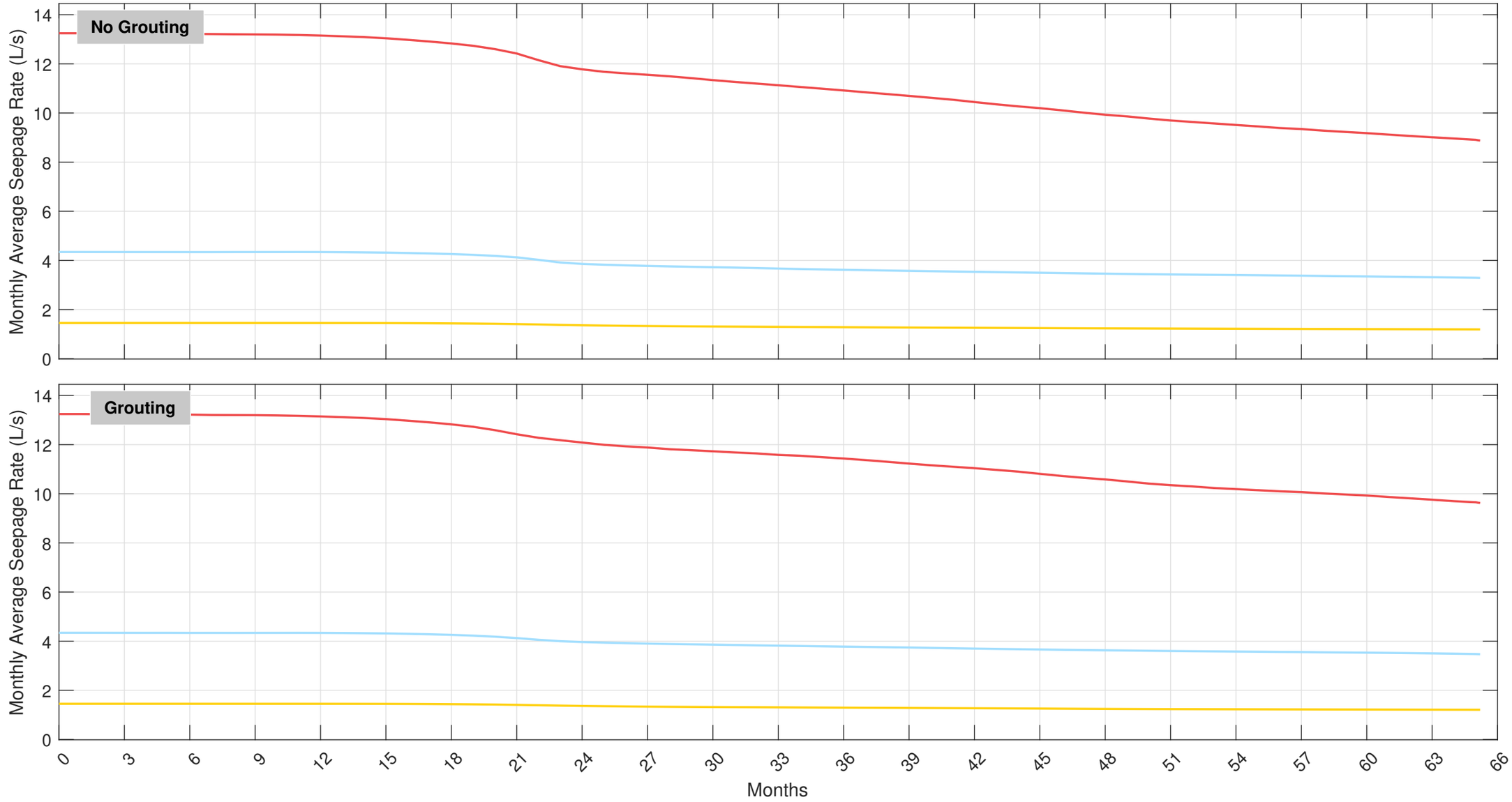
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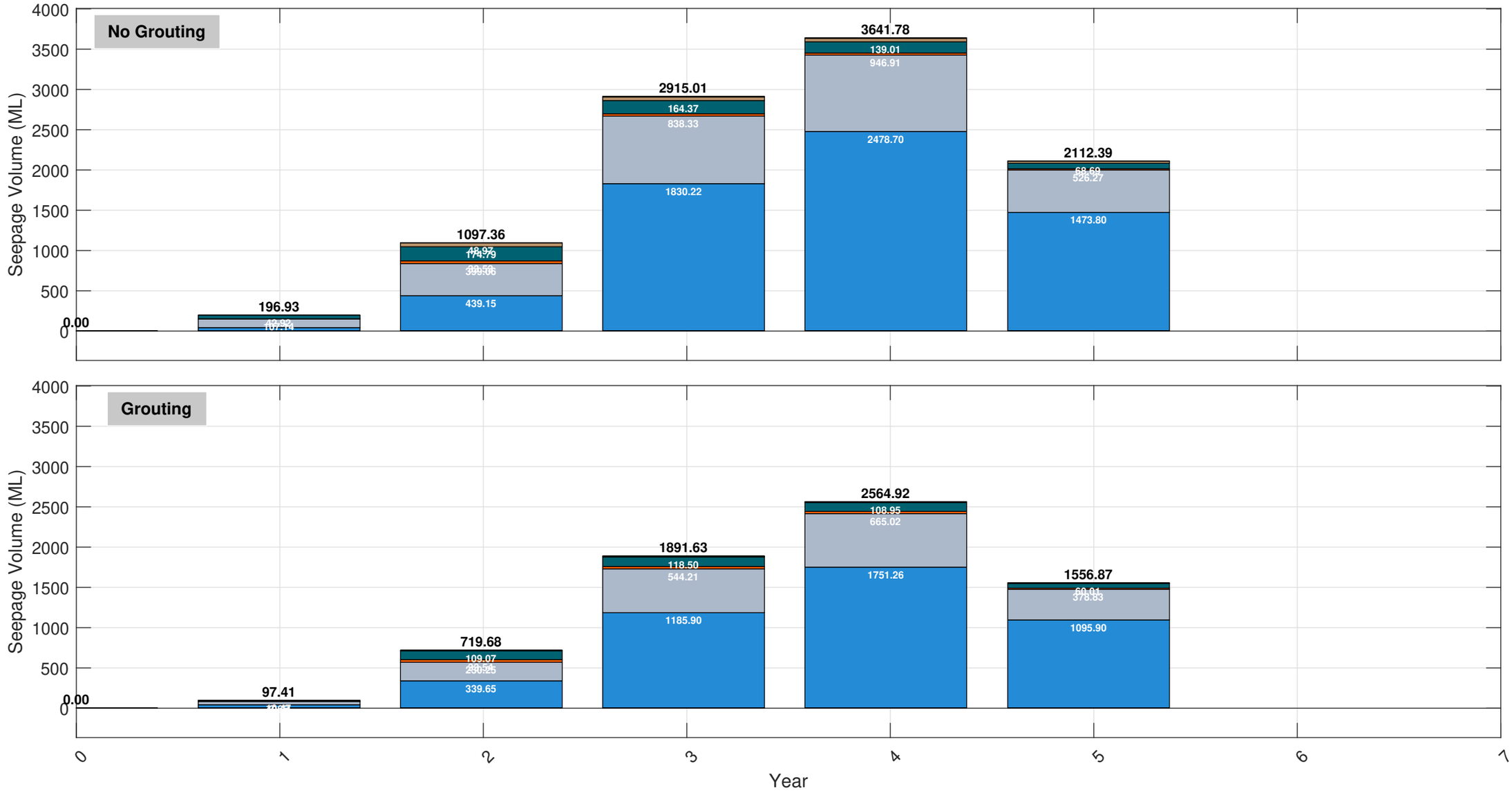
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MOSSY MARSH TUNNEL
SIMULATED GROUNDWATER SEEPAGE
P90 SCHEDULE

PSM4346-115R | Figure G2-8

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Headrace Tunnel
Power Tunnel
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Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

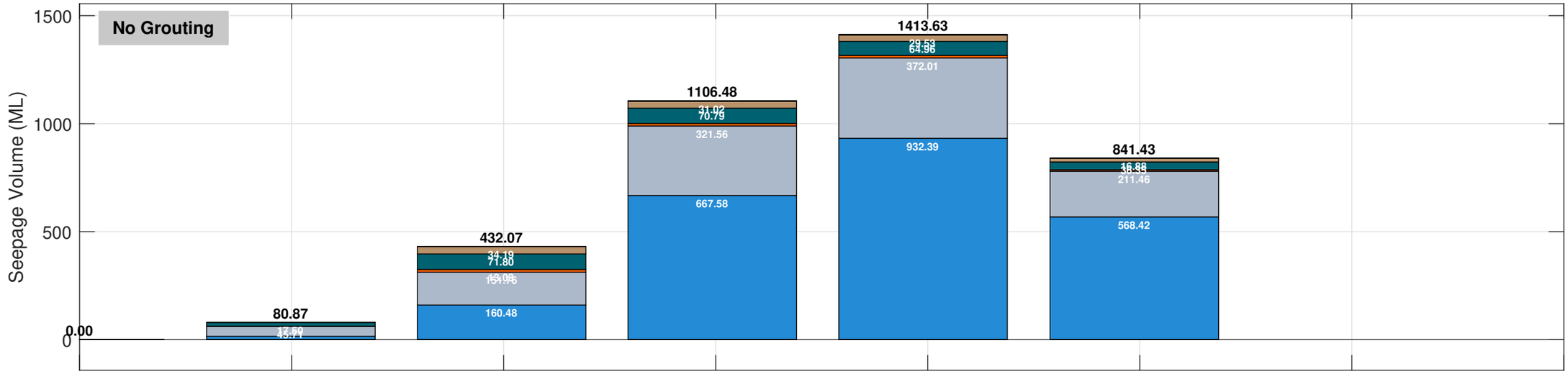
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TARRALEAH TUNNELS
SIMULATED ANNUAL GROUNDWATER TAKE
BASE SCHEDULE - BASE CASE

PSM4346-115R | Figure G3-1 (a)

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Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

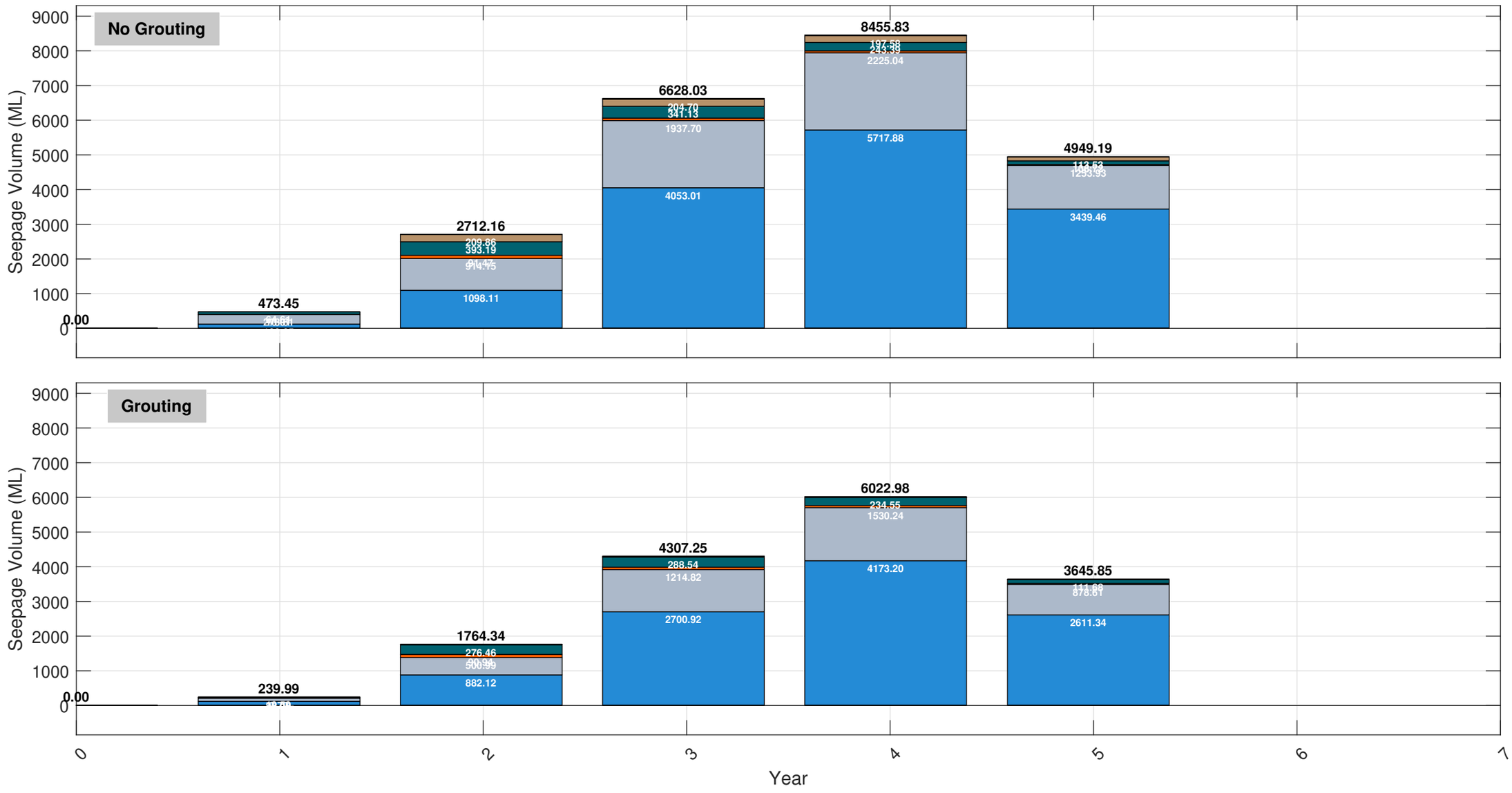
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED ANNUAL GROUNDWATER TAKE
BASE SCHEDULE - LOWER BOUND

PSM4346-115R | Figure G3-1 (b)

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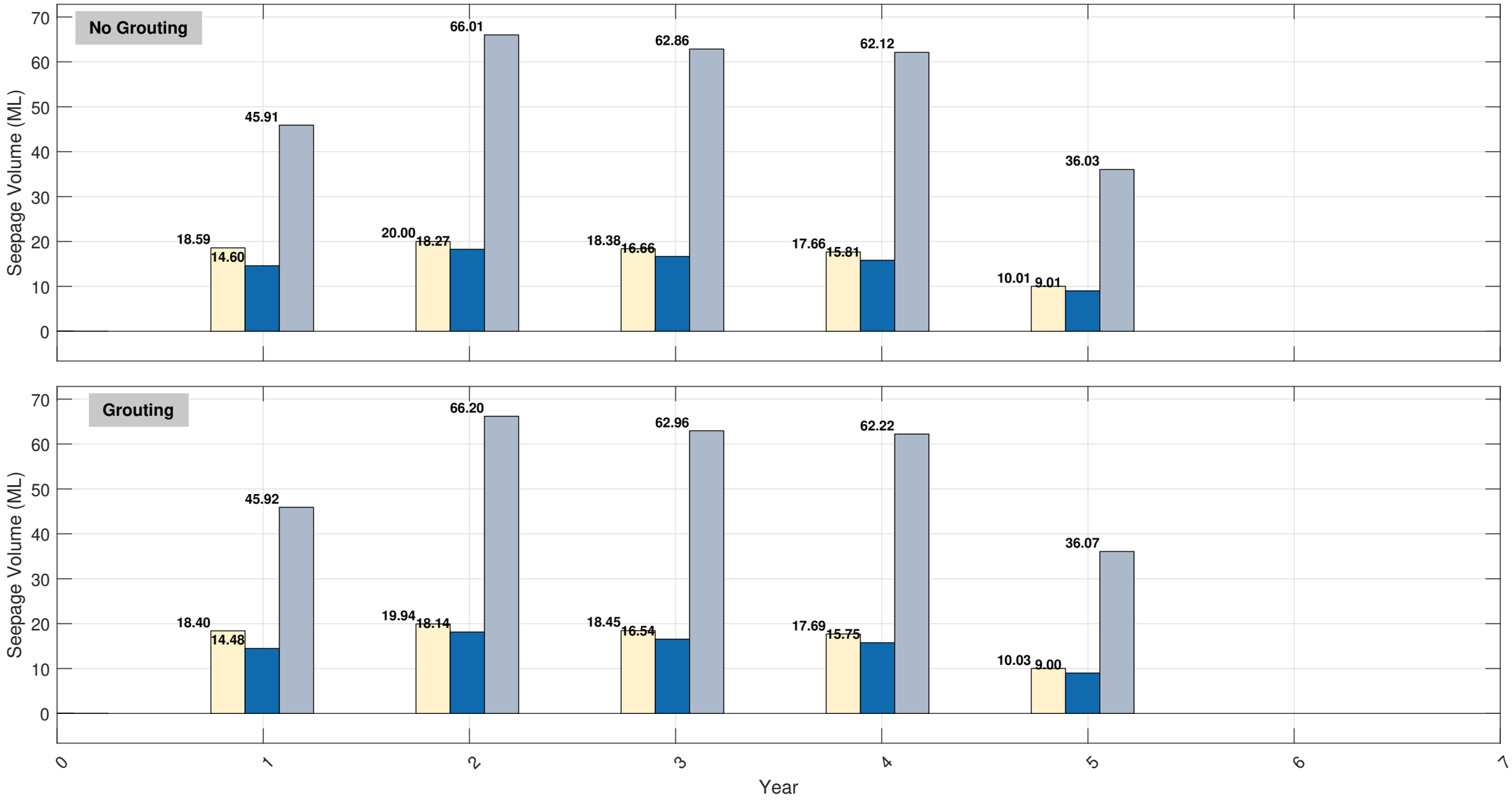


Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

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	Date: 23-Jan-2025	Paper Size: A4	PSM4346-115R | Figure G3-1 (c)

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Lower Bound

Base Case

Upper Bound

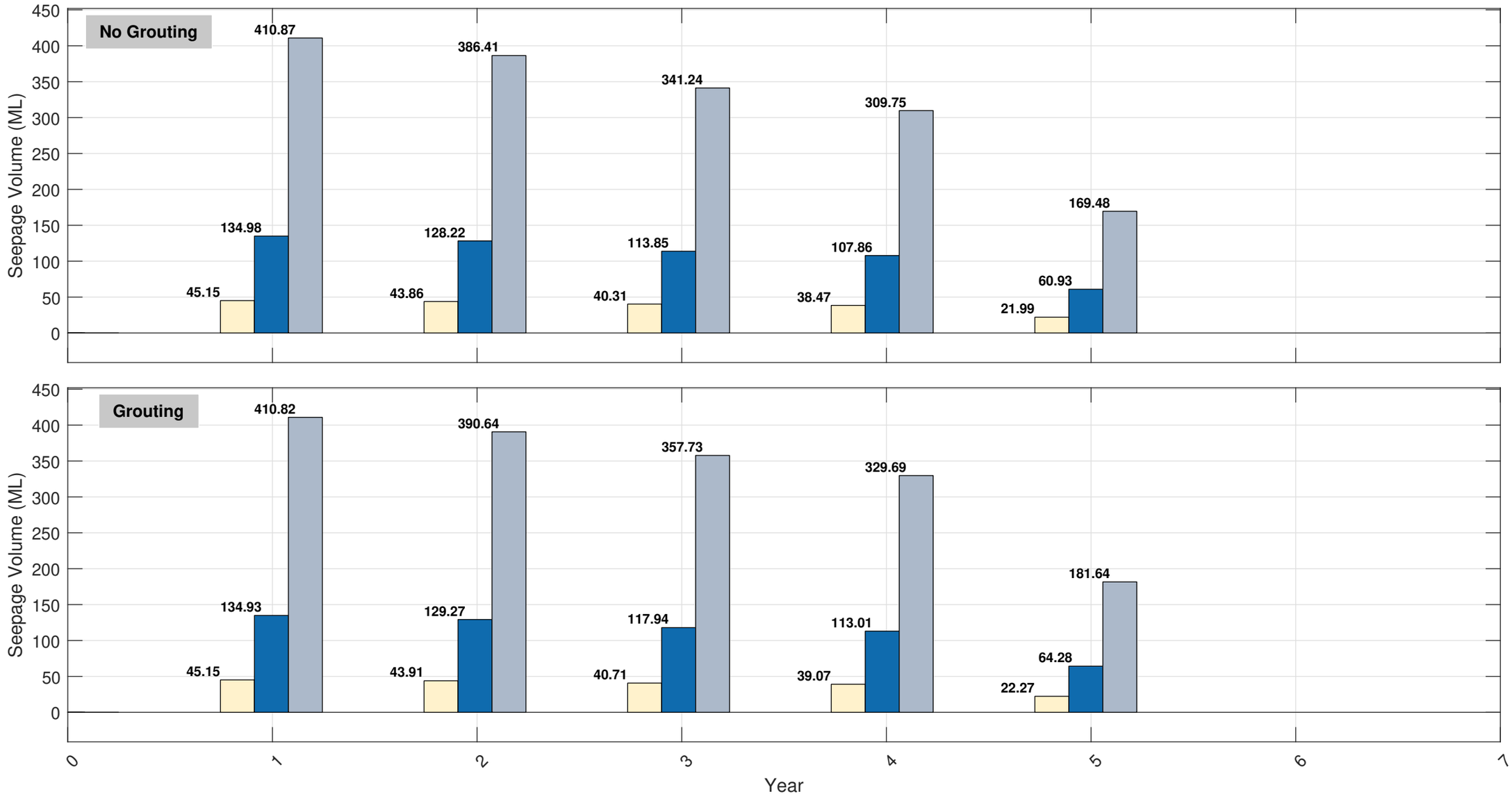
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Hydrogeological Interpretive Report
LAKE KING WILLIAM TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
BASE SCHEDULE

PSM4346-115R | Figure G3-2

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Lower Bound

Base Case

Upper Bound

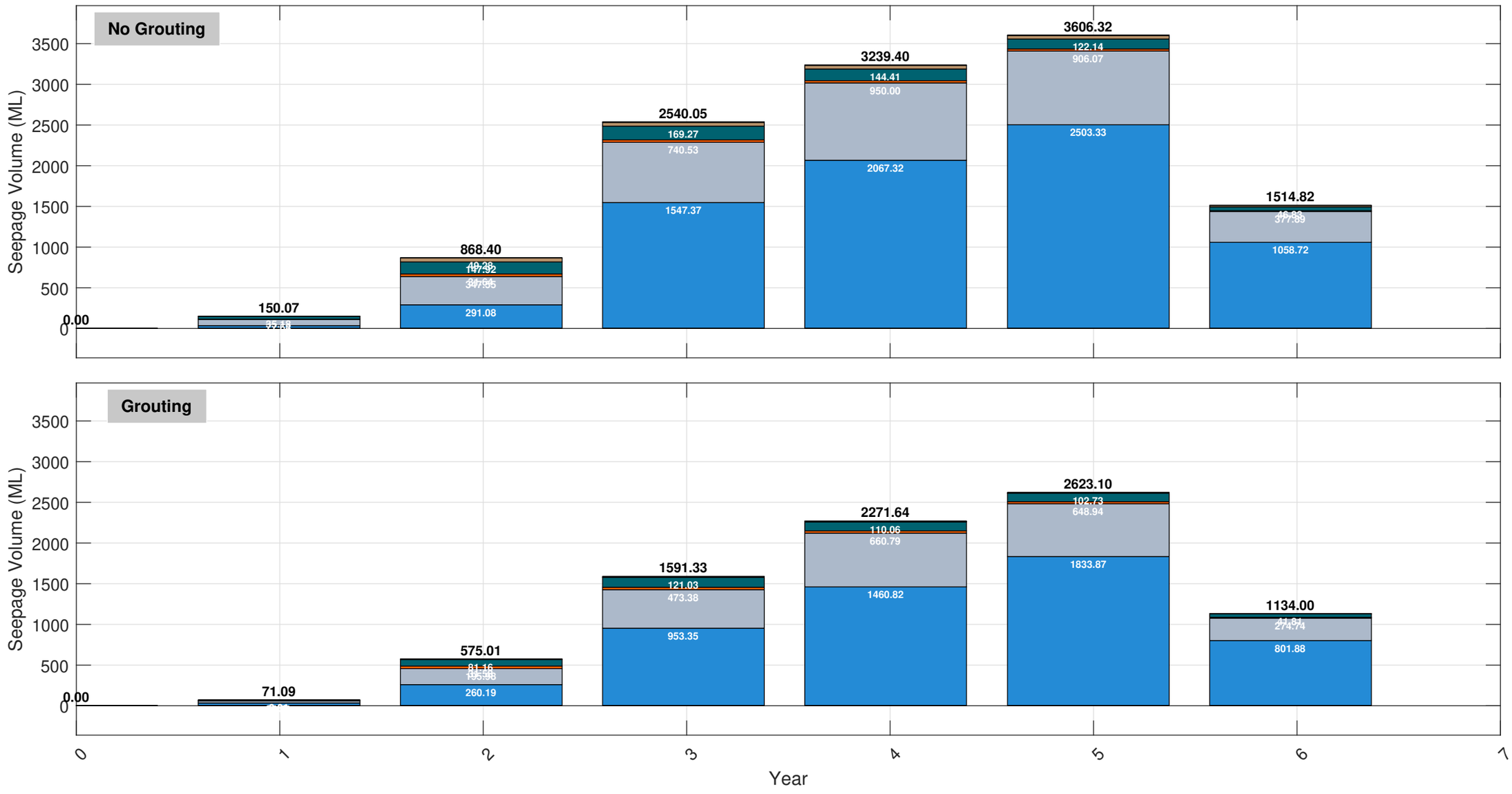
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
MOSSY MARSH TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
BASE SCHEDULE

PSM4346-115R | Figure G3-3

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Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

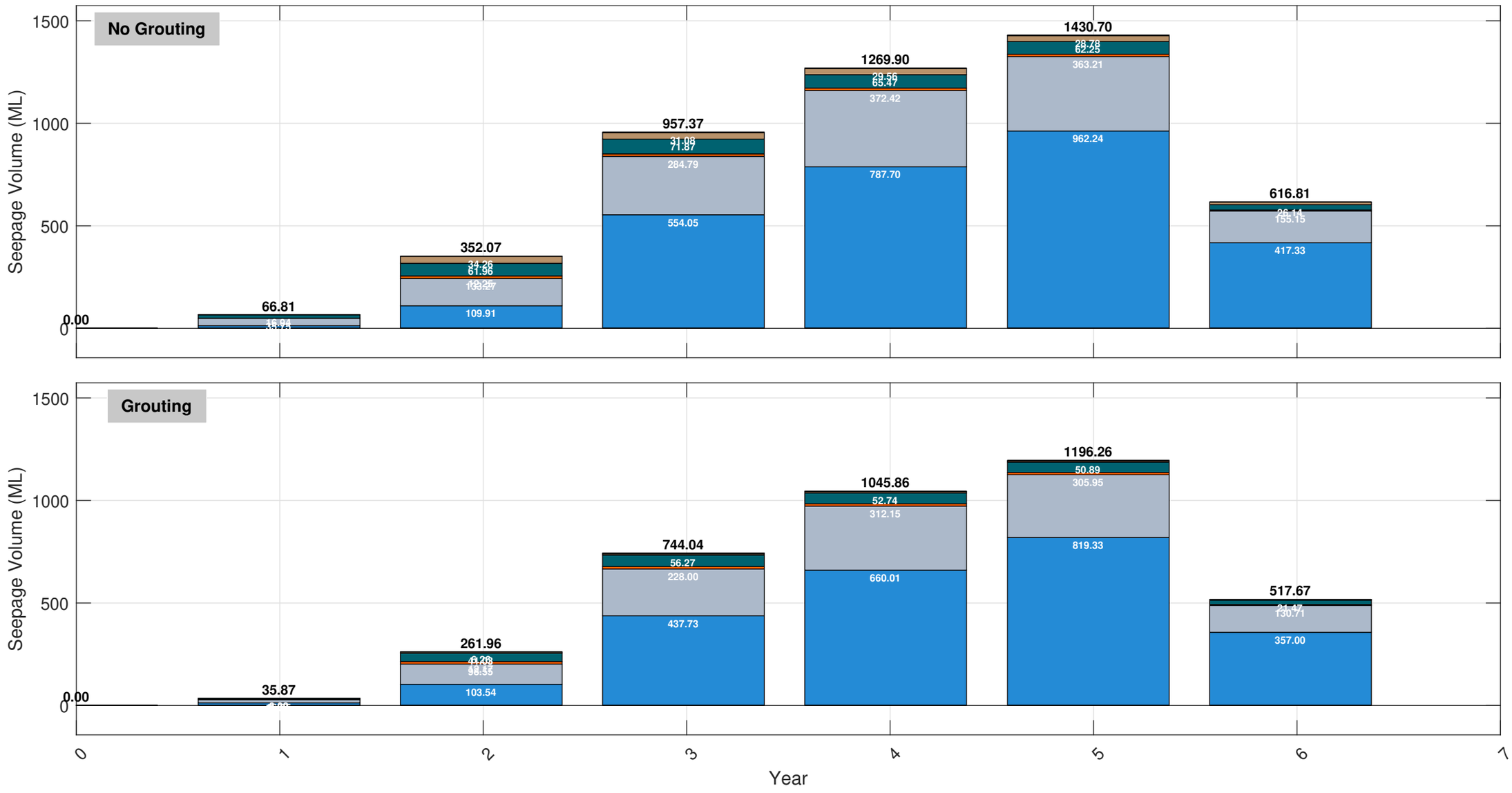
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TARRALEAH TUNNELS
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE - BASE CASE

PSM4346-115R | Figure G4-1 (a)

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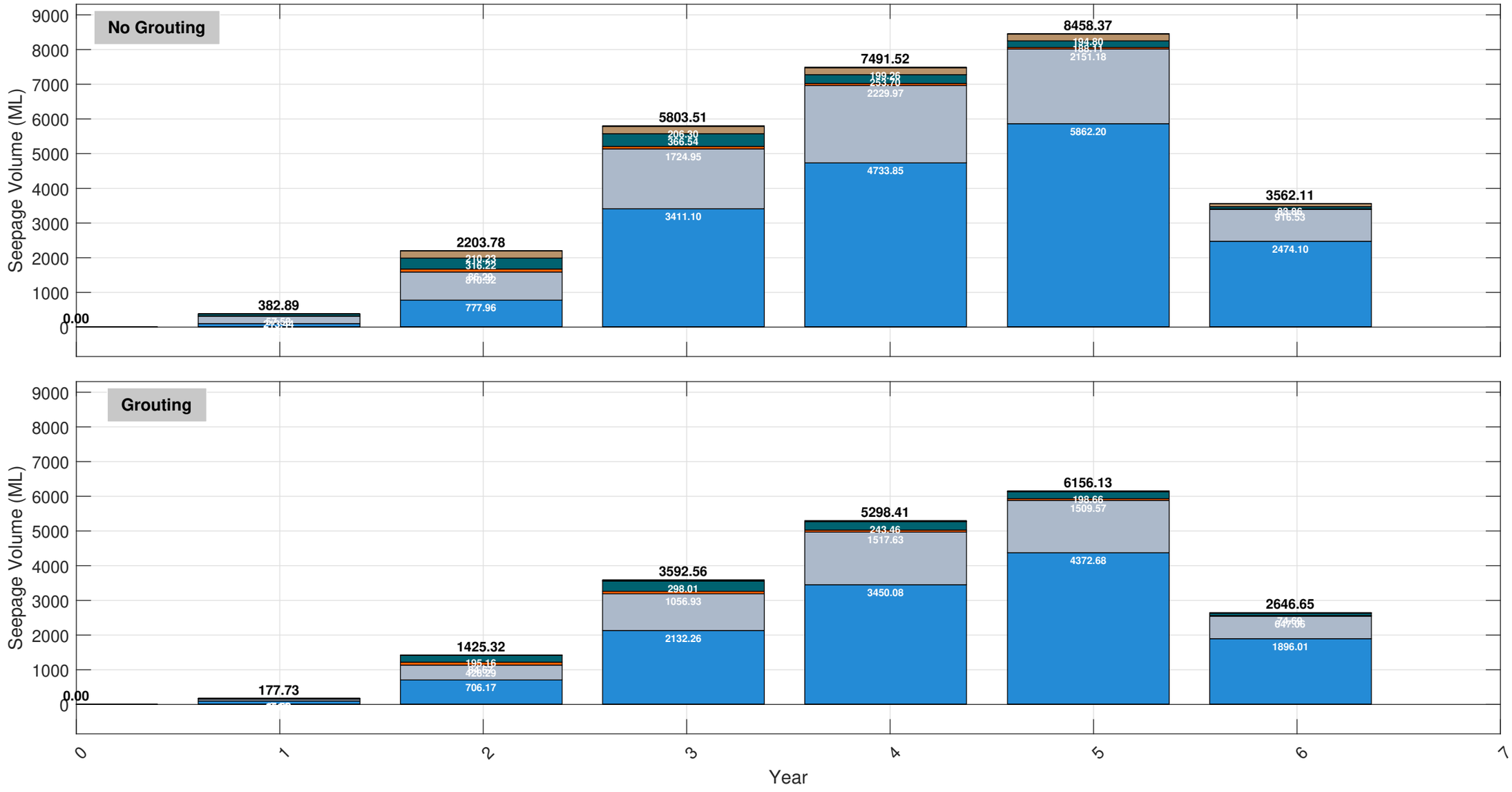
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TARRALEAH TUNNELS
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE - LOWER BOUND

PSM4346-115R | Figure G4-1 (b)

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Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

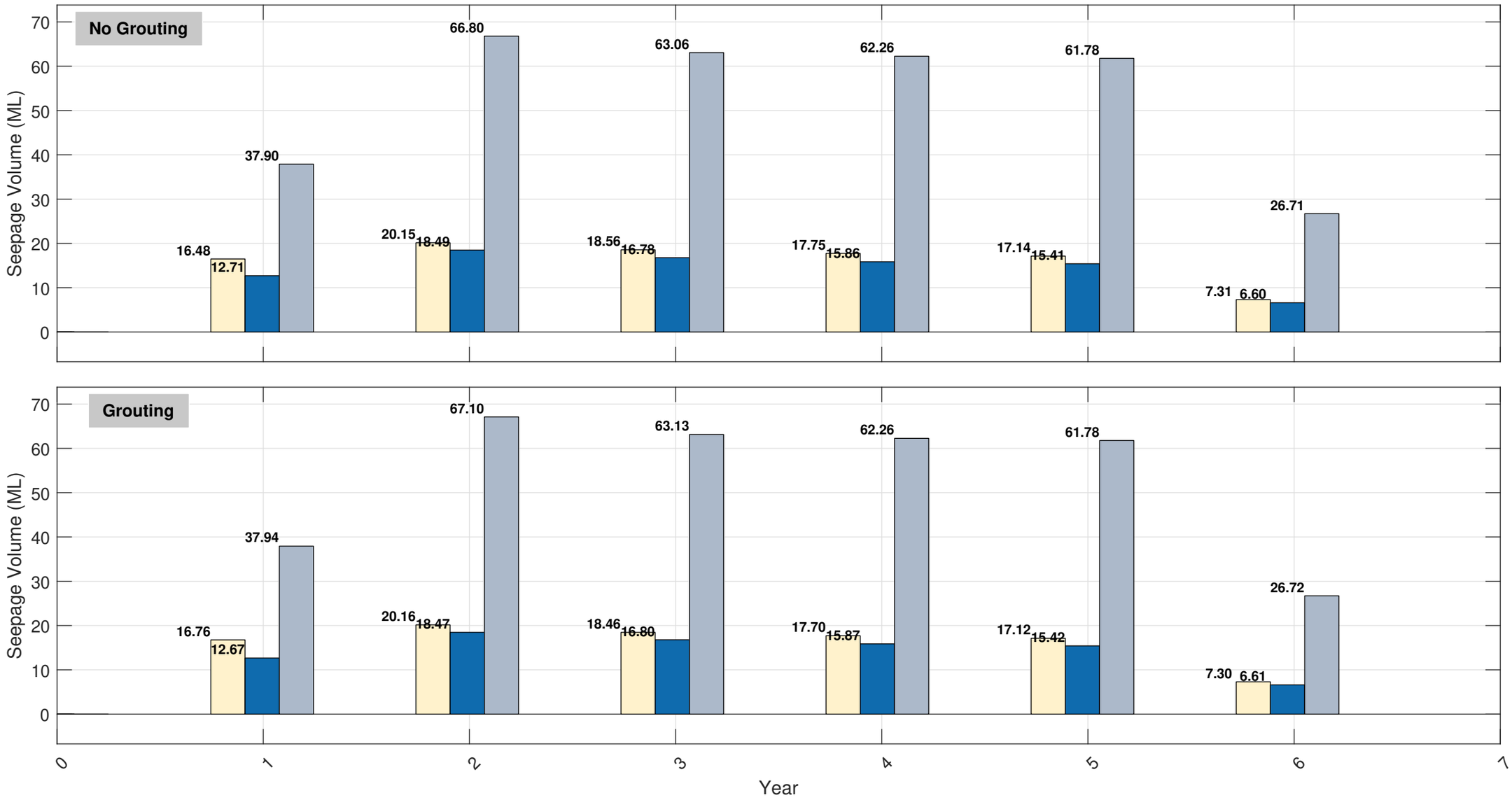
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TARRALEAH TUNNELS
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE - UPPER BOUND

PSM4346-115R | Figure G4-1 (c)

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Lower Bound

Base Case

Upper Bound

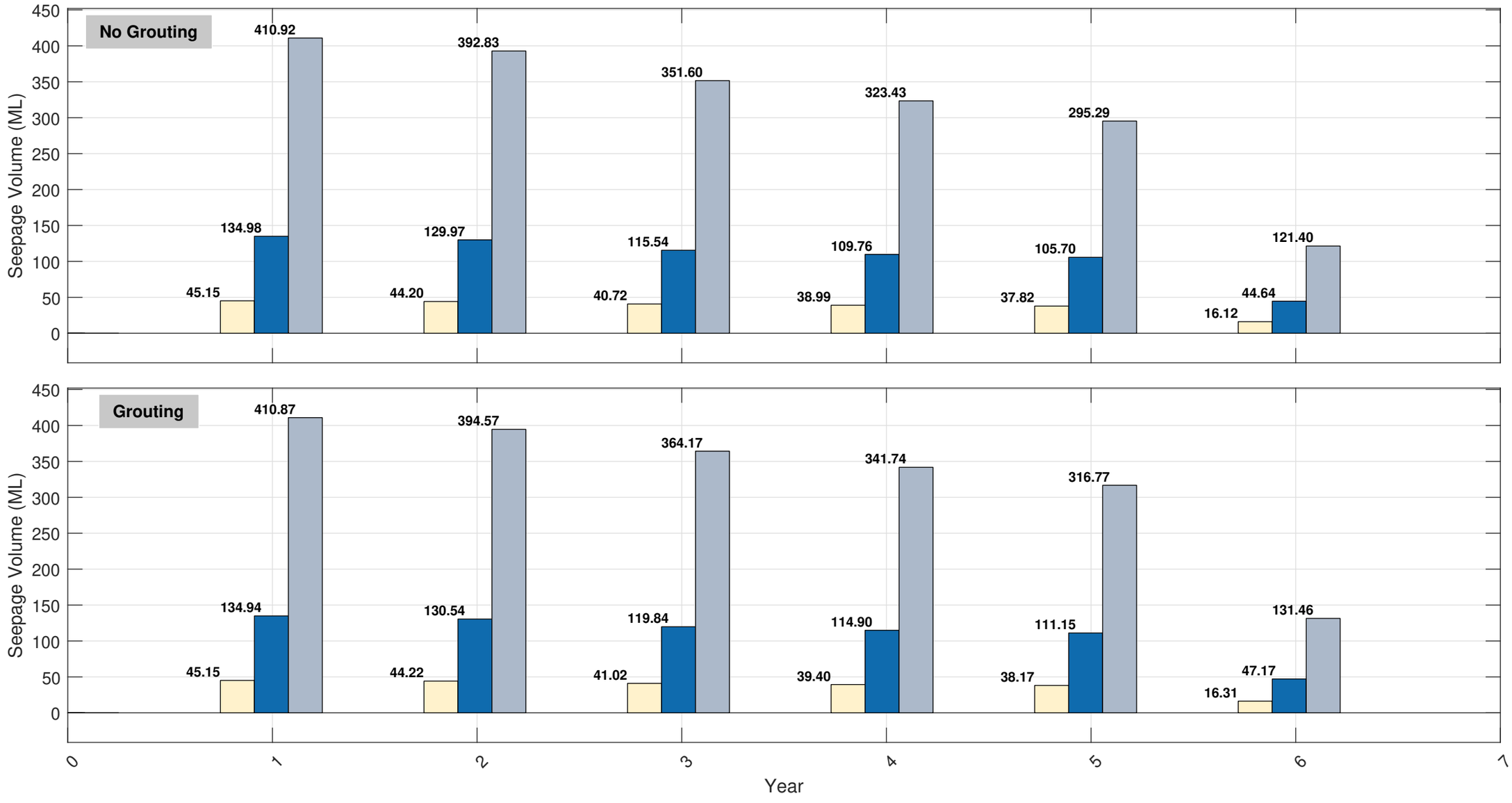
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
LAKE KING WILLIAM TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE

PSM4346-115R | Figure G4-2

N:\PSM4346\Eng\12. Groundwater\9. Numerical Modelling\04_PostProcessing\Model 2024\Results Charts\Construction Stage - Seepage Assessment\Figure G4-2_B.pdf



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Tarraleah Redevelopment Project
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MOSSY MARSH TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE

PSM4346-115R | Figure G4-3

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Appendix H
Construction Stage – Drawdown Assessment

- Figure H1 – Tarraleah Tunnels Transient Drawdown Snapshots
- Figure H2 – Tarraleah Power Tunnel Transient Drawdown Snapshots
- Figure H3 – Lake King William Tunnel Transient Drawdown Snapshots

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (BASE CASE)

PSM4346-115R | Figure H1-1(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-1(a) Tarraleah Tunnels Transient Drawdown Snapshots Base Schedule (Base Case).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure H1-1(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-1(b) Tarraleah Tunnels Transient Drawdown Snapshots Base Schedule (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure H1-1(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-1(c) Tarraleah Tunnels Transient Drawdown Snapshots Base Schedule (Upper Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(BASE CASE)

PSM4346-115R | Figure H1-2(a)

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1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure H1-2(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-2(b) Tarraleah Tunnels Transient Drawdown Snapshots Base Schedule - Grouting (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure H1-2(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-2(c) Tarraleah Tunnels Transient Drawdown Snapshots Base Schedule - Grouting (Upper Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (BASE CASE)

PSM4346-115R | Figure H1-3(a)

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1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure H1-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-3(b) Tarraleah Tunnels Transient Drawdown Snapshots P90 Schedule (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure H1-3(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-3(c) Tarraleah Tunnels Transient Drawdown Snapshots P90 Schedule (Upper Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

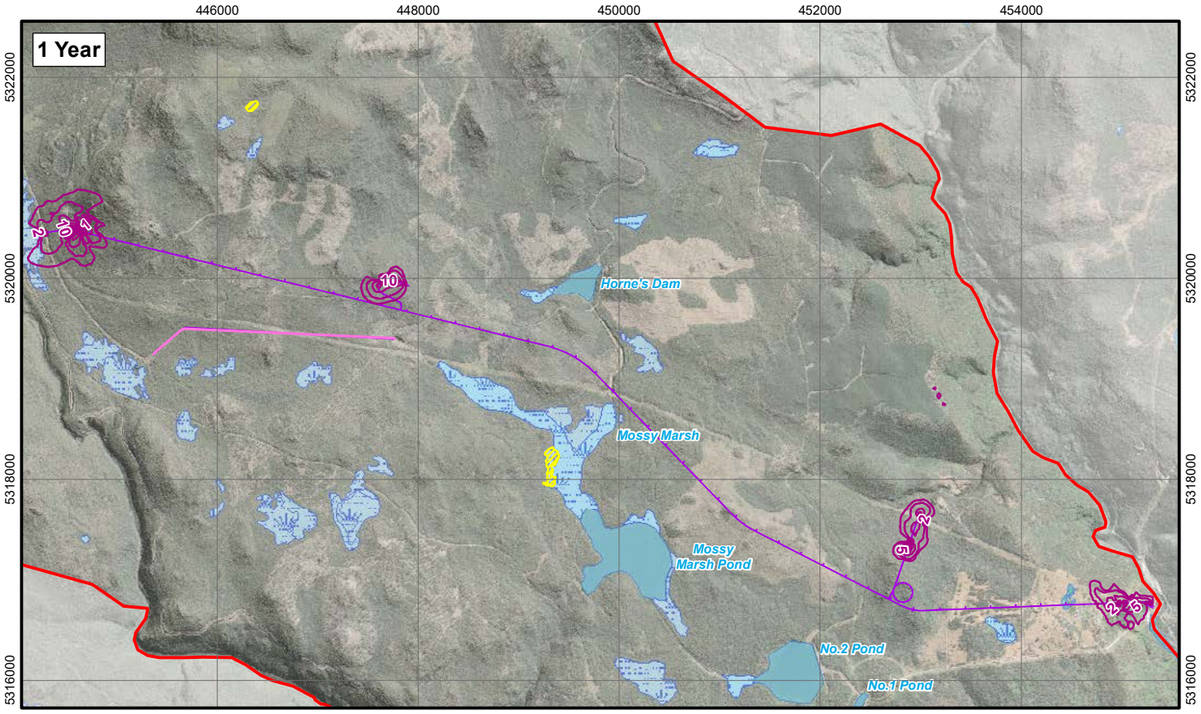
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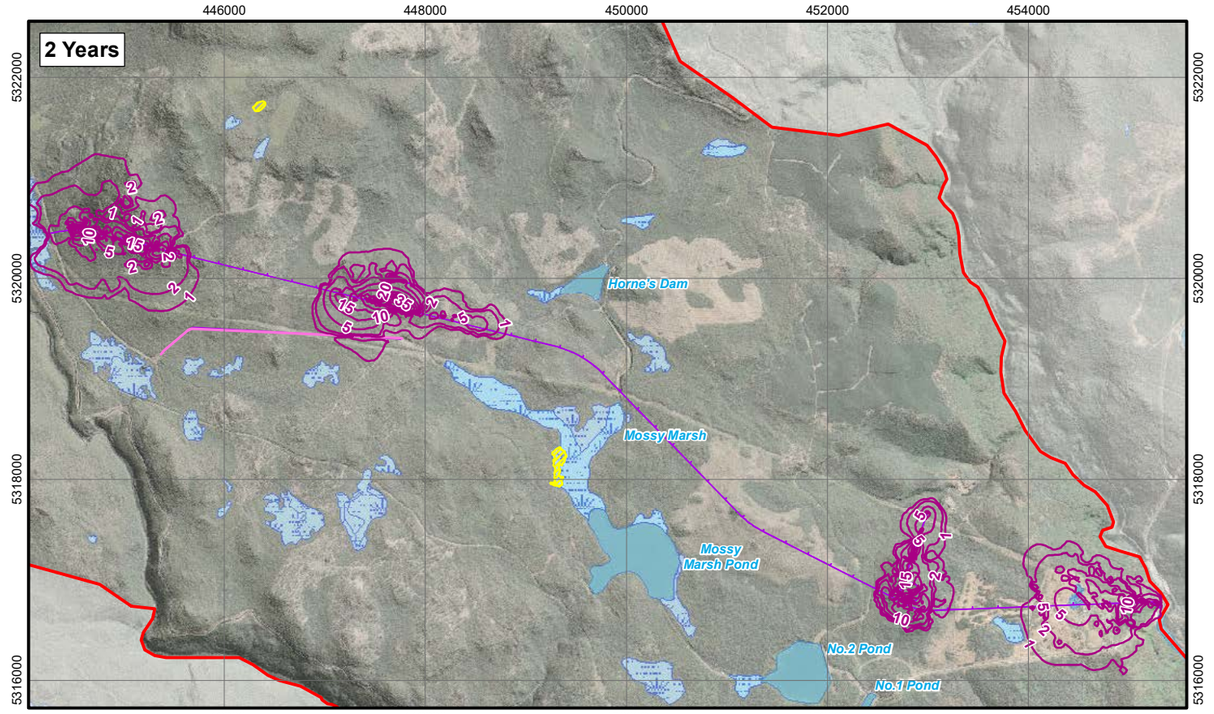
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

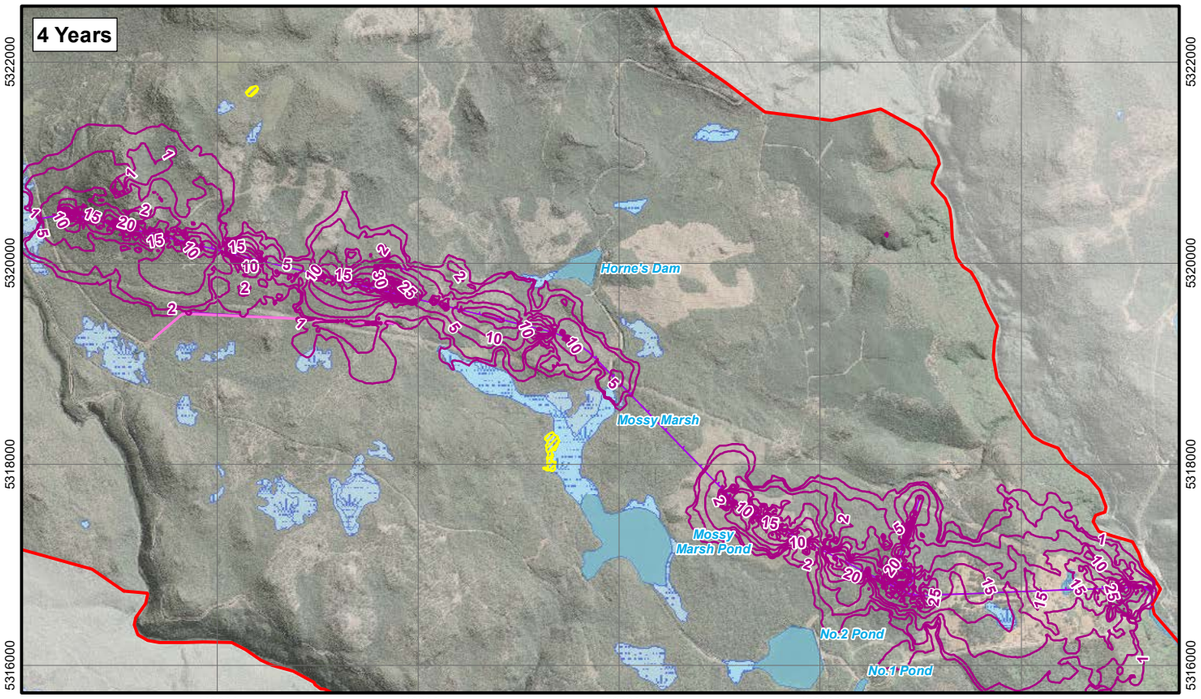
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TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING (BASE CASE)

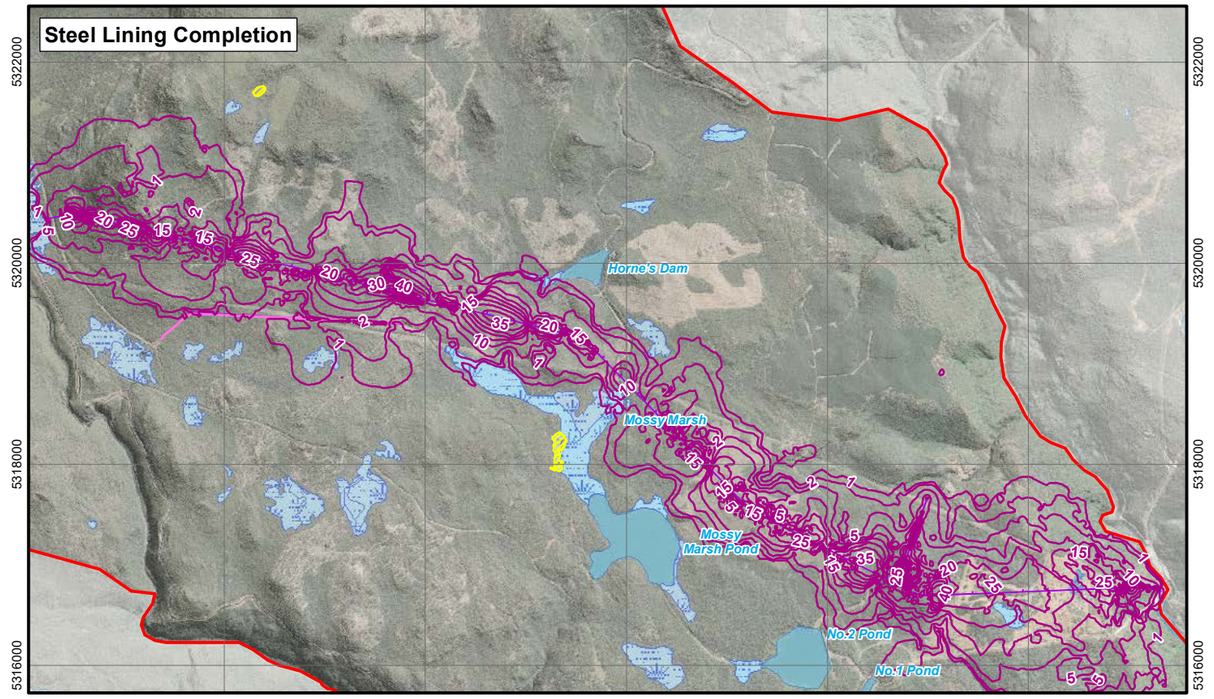
PSM4346-115R | Figure H1-4(a)

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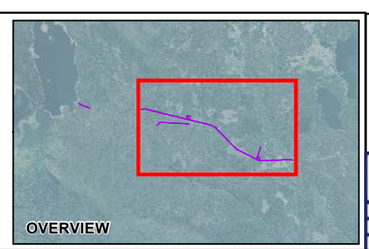


446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure H1-4(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-4(b) Tarraleah Tunnels Transient Drawdown Snapshots P90 Schedule - Grouting (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure H1-4(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H1-4(c) Tarraleah Tunnels Transient Drawdown Snapshots P90 Schedule - Grouting (Upper Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

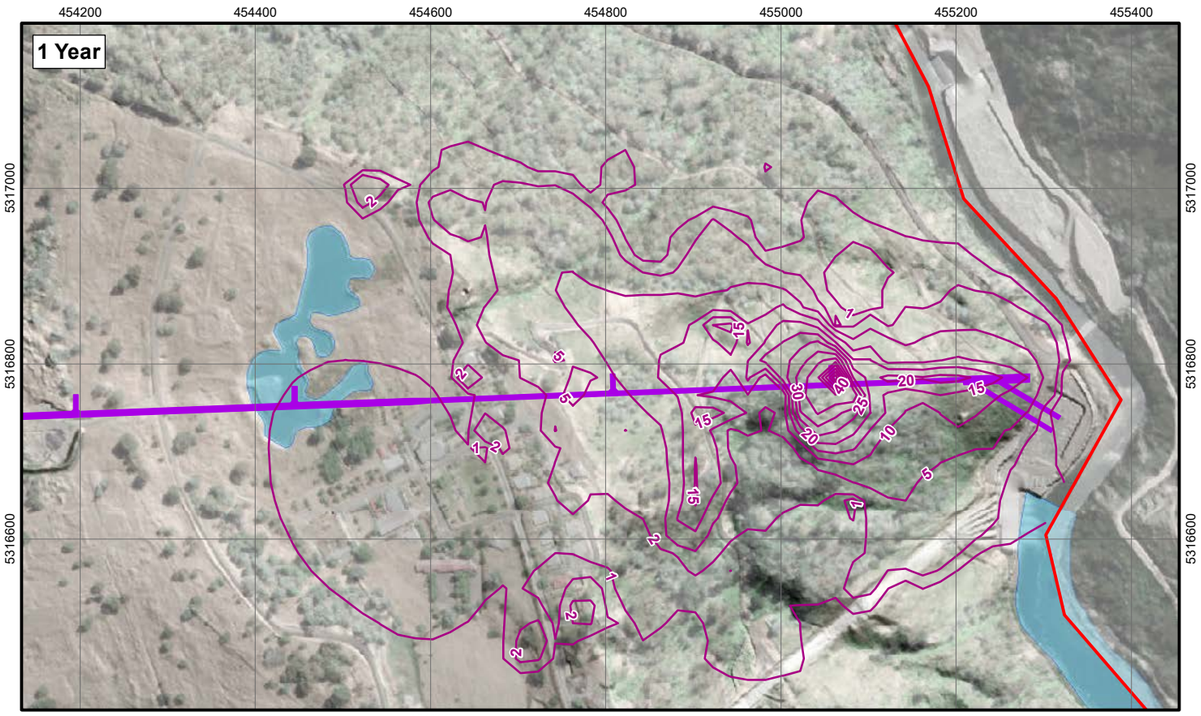
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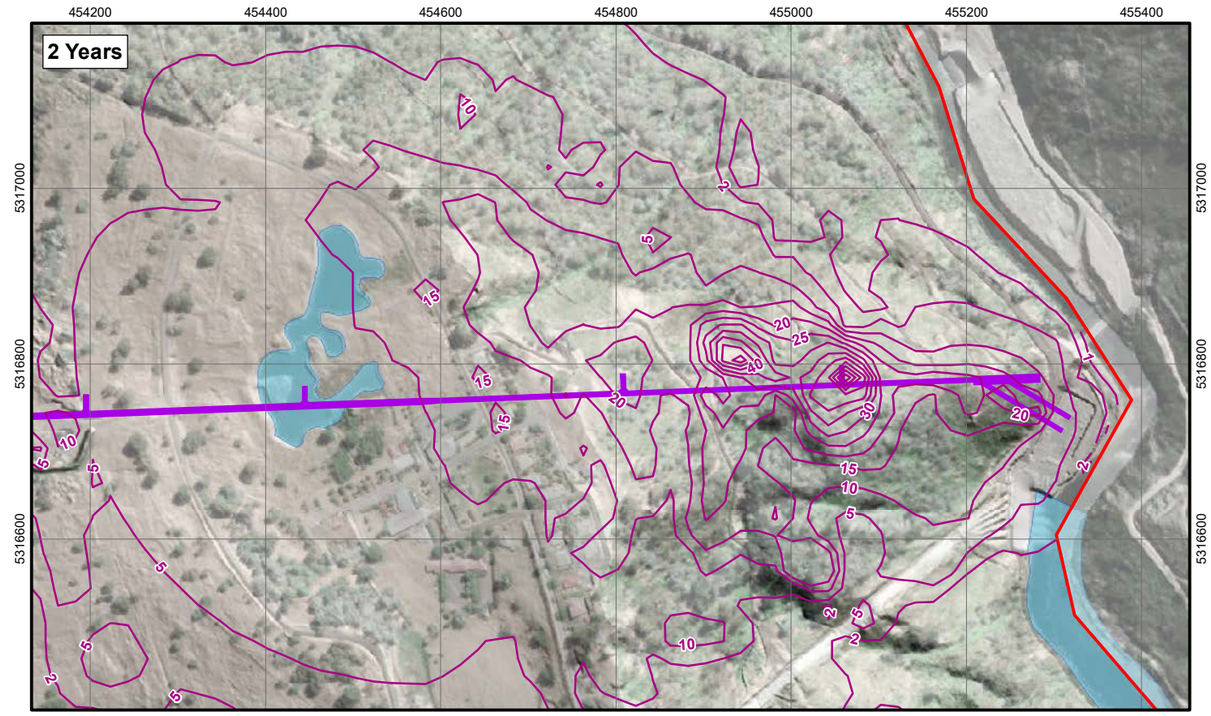
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

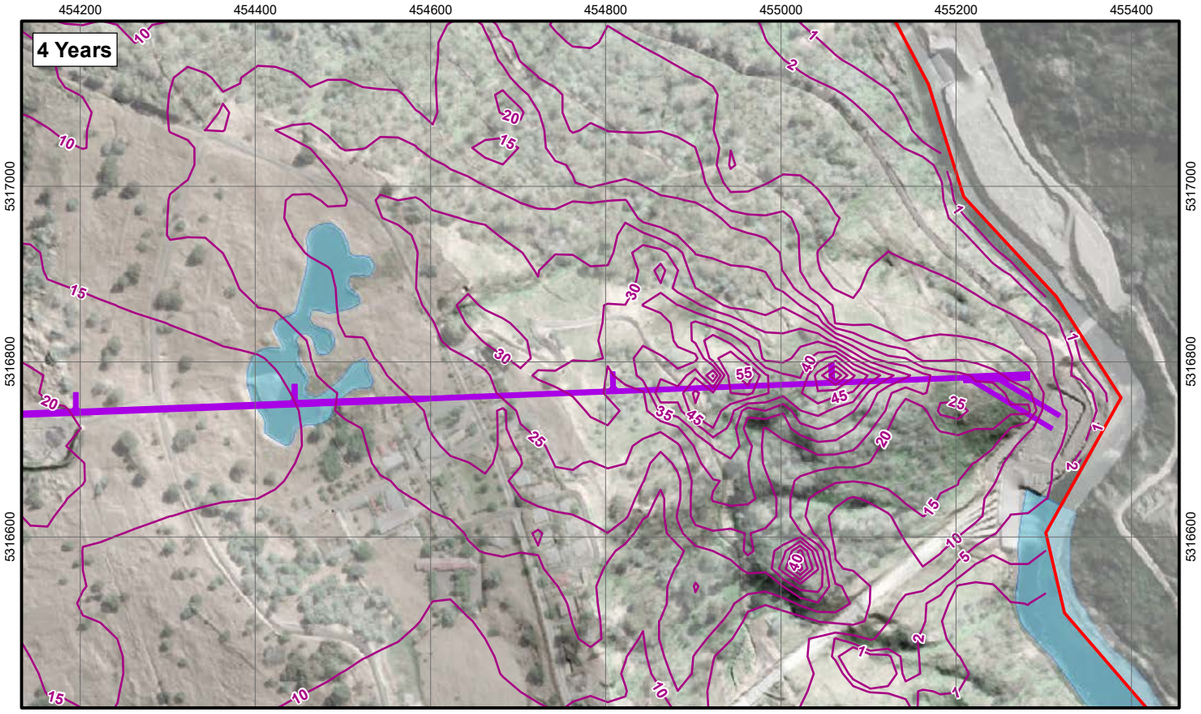
TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (BASE CASE)

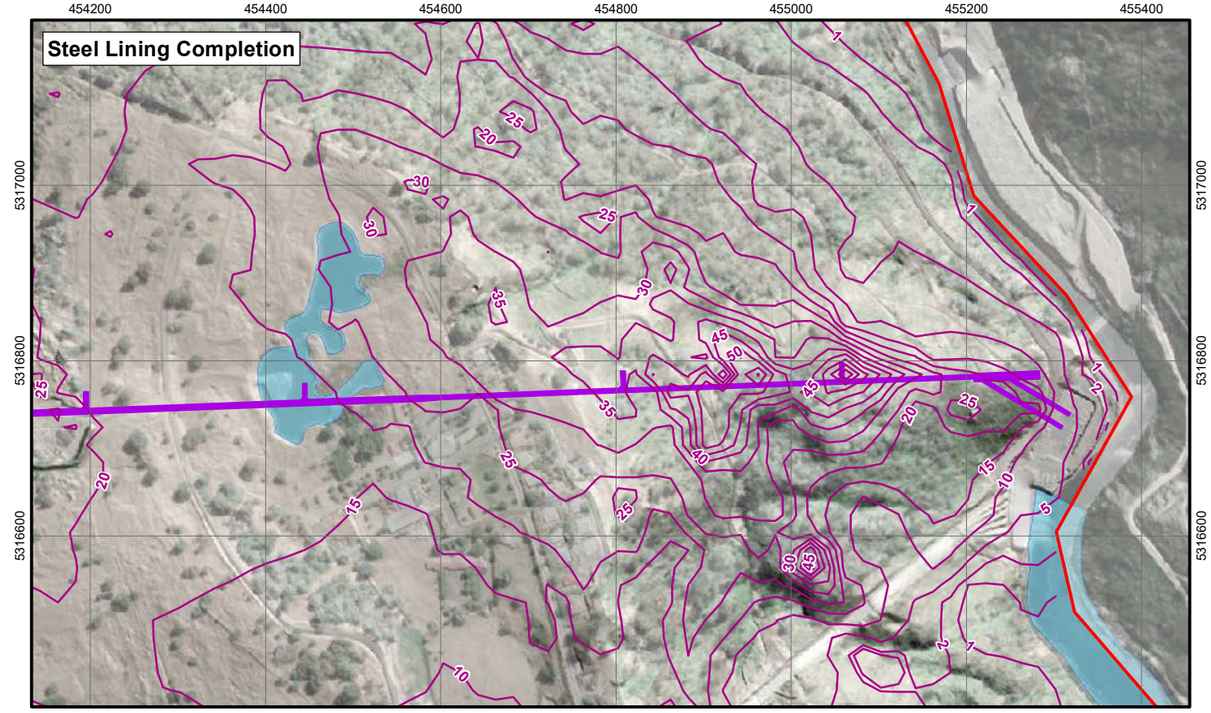
PSM4346-115R | Figure H2-1(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-1(a) Tarraleah Power Station Transient Drawdown Snapshots Base Schedule (Base Case).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: B	
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Hydrogeological Interpretative Report

TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure H2-1(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-1(b) Tarraleah Power Station Transient Drawdown Snapshots Base Schedule (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

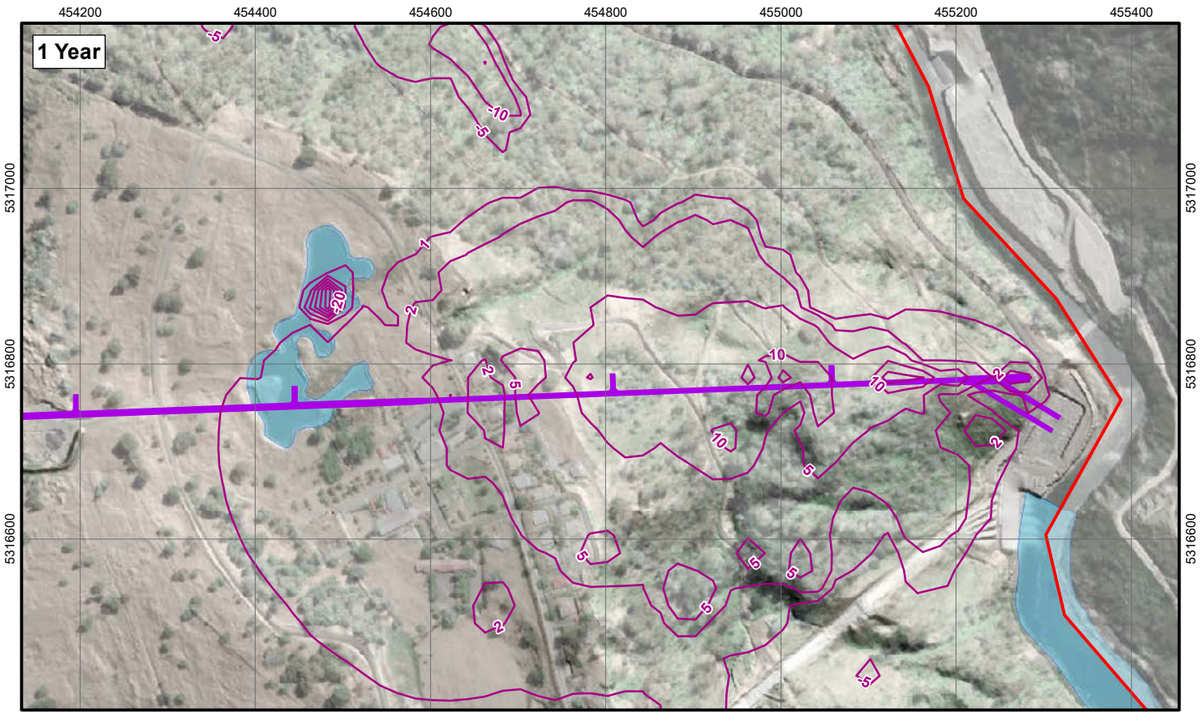
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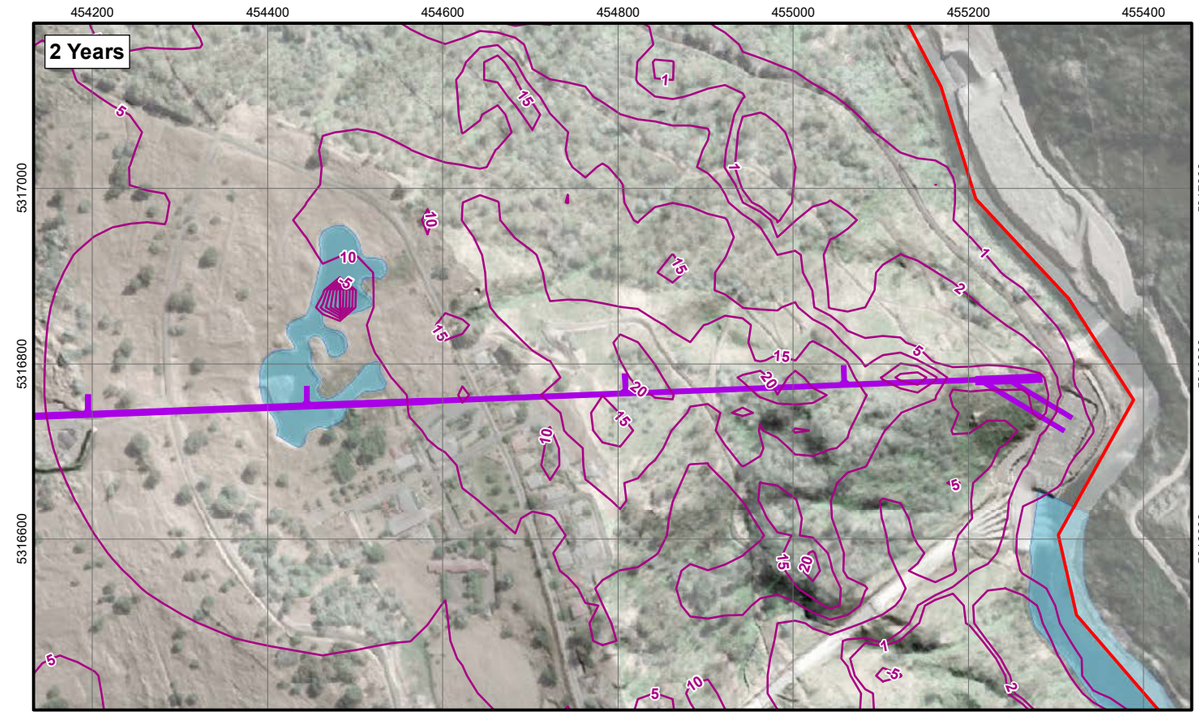
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

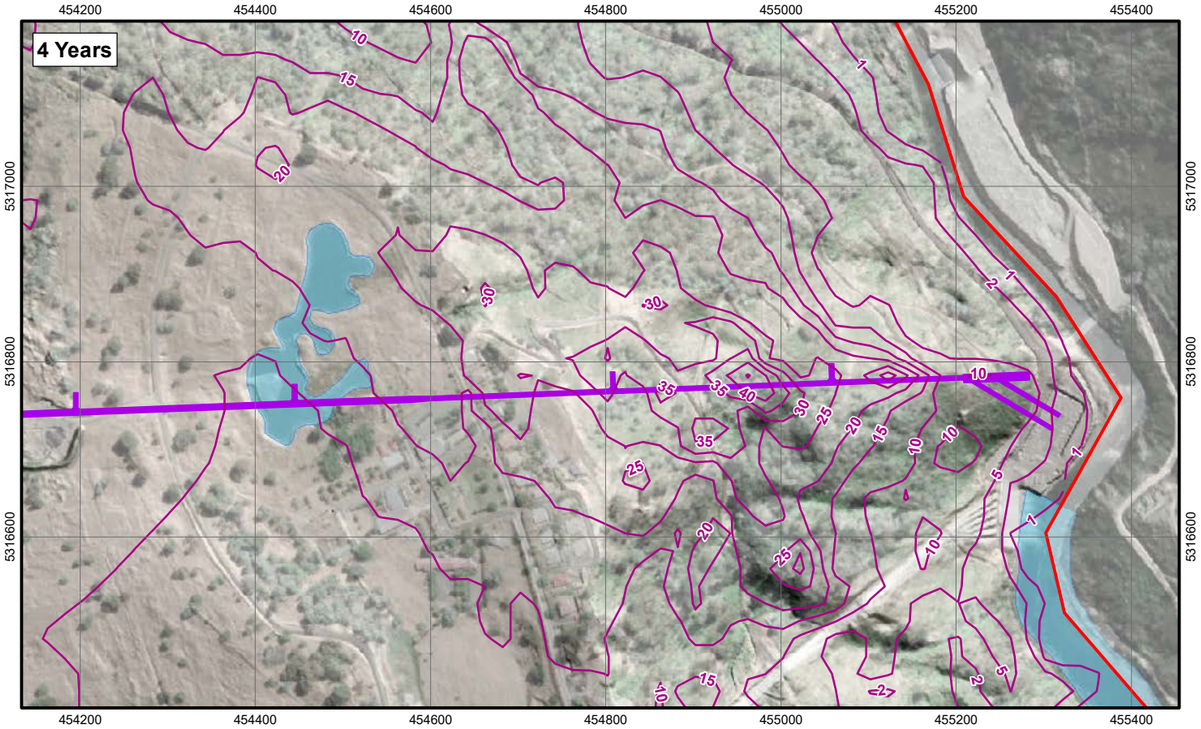
TARRALEAH POWER STATION TRANSIENT DRAWDOWN SNAPSHOTS BASE SCHEDULE (UPPER BOUND)

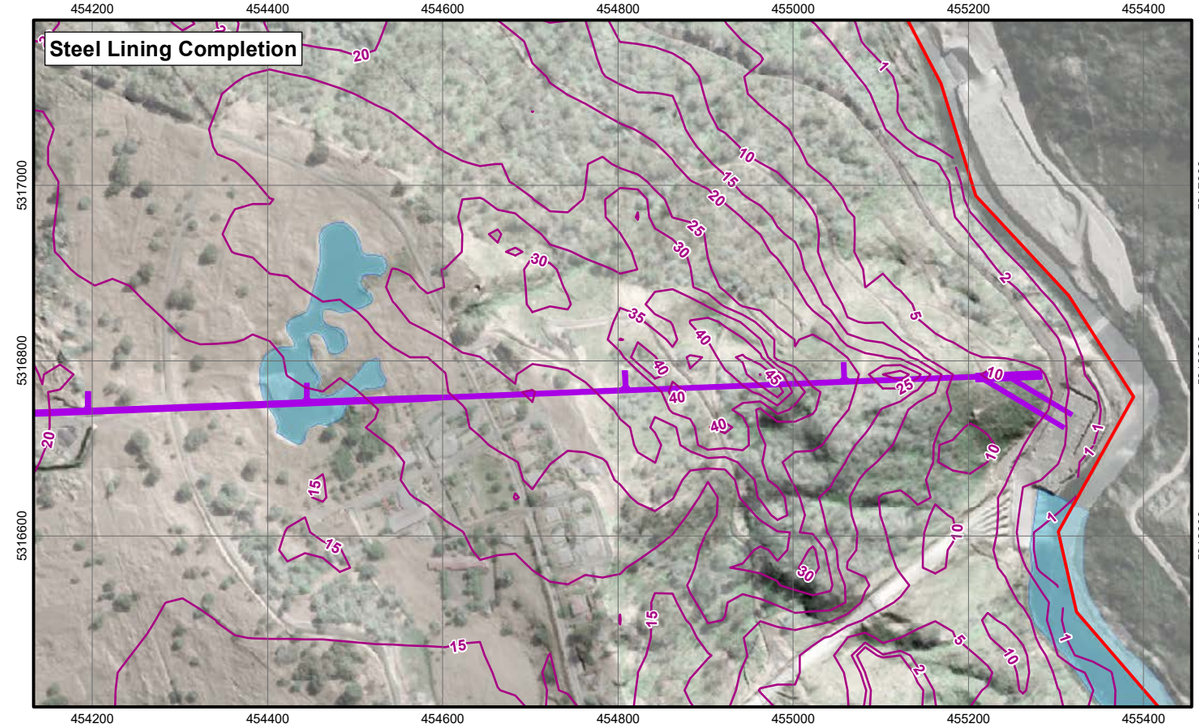
PSM4346-115R | Figure H2-1(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-1(c) Tarraleah Power Station Transient Drawdown Snapshots Base Schedule (Upper Bound).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

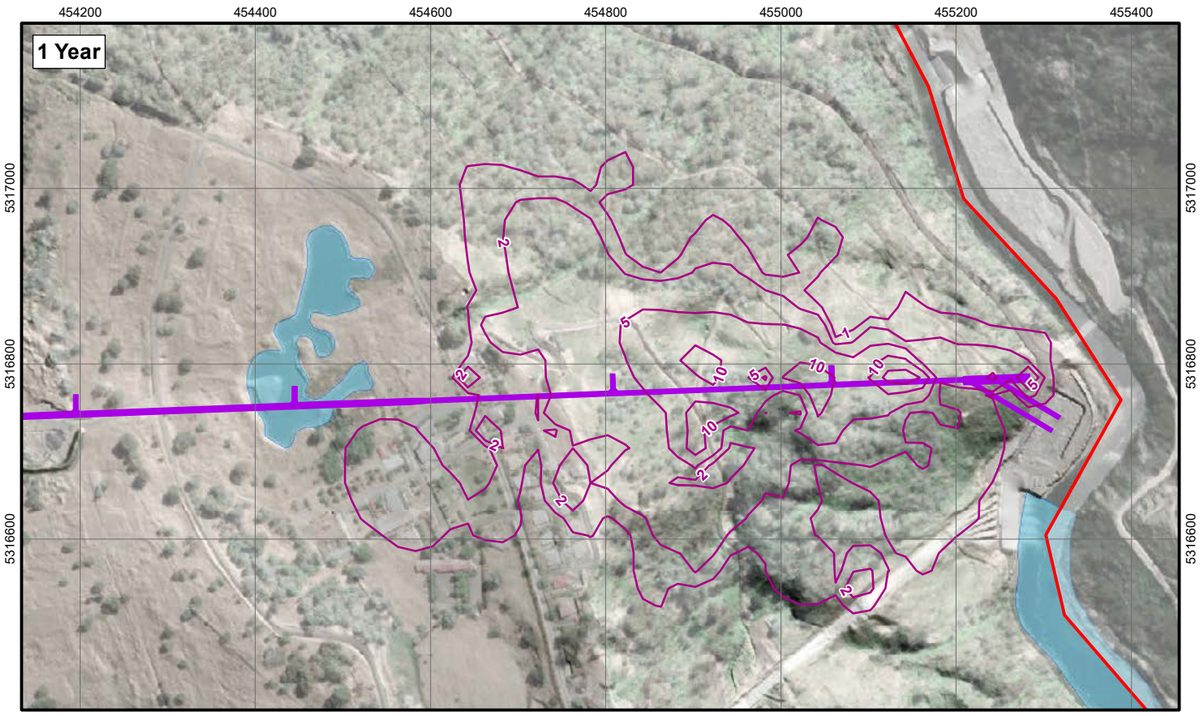
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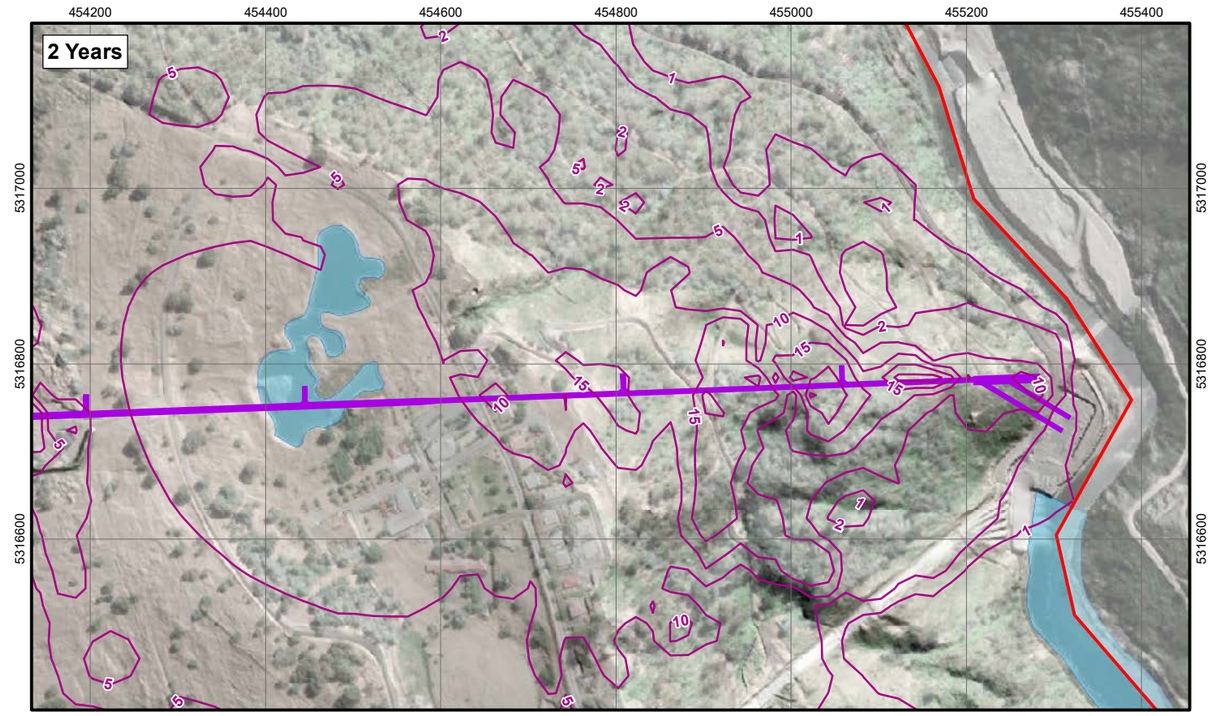
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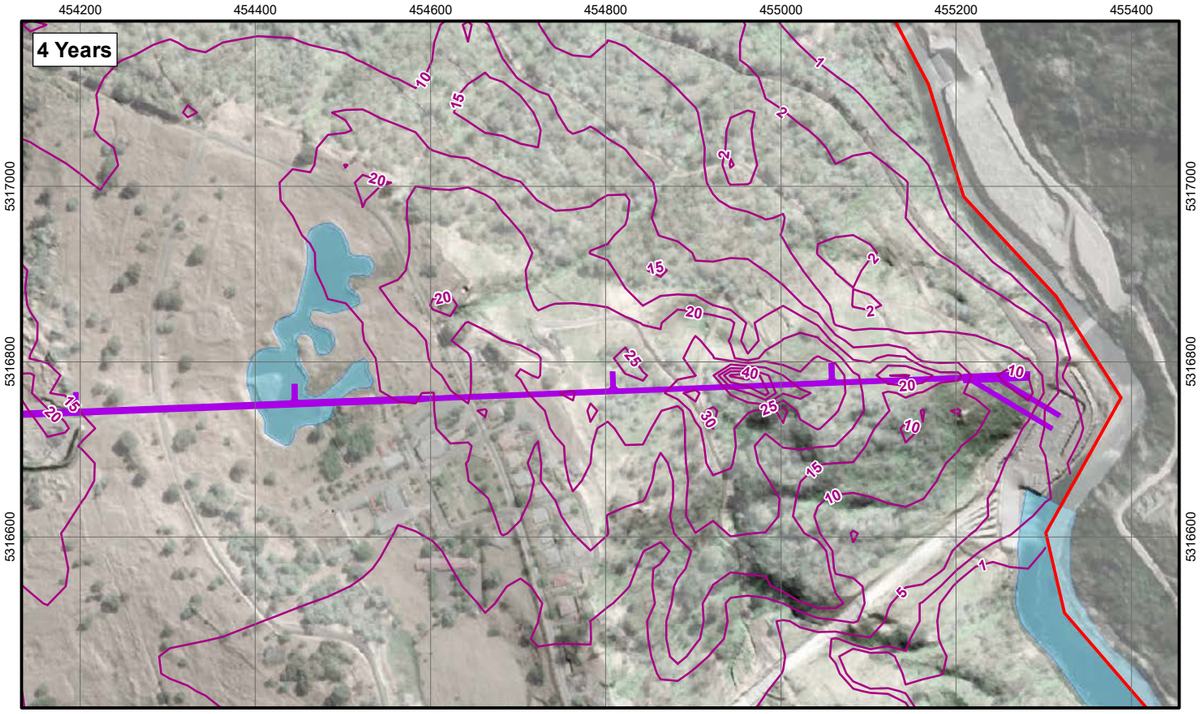
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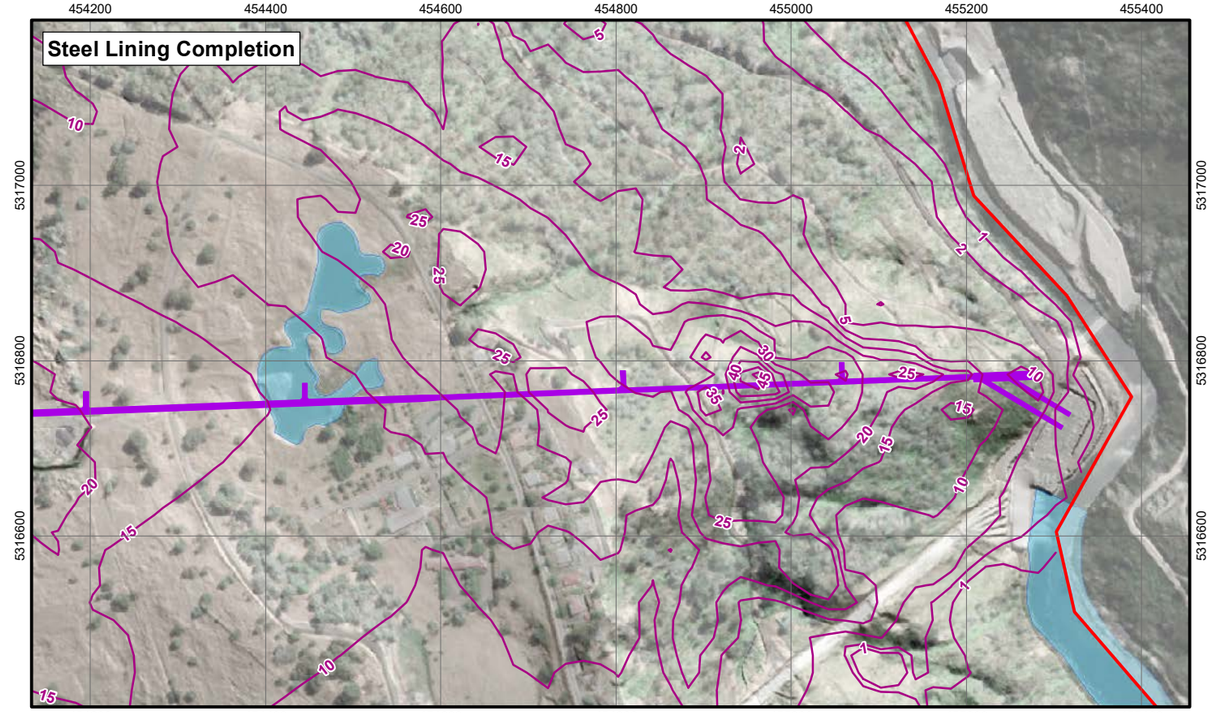
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	Date: 23 Jan 2025	Paper Size: A3	PSM4346-115R | Figure H2-2(a)

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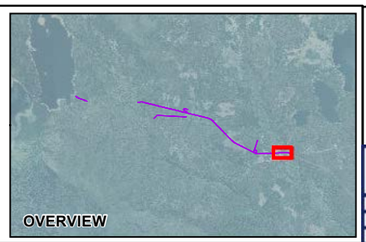






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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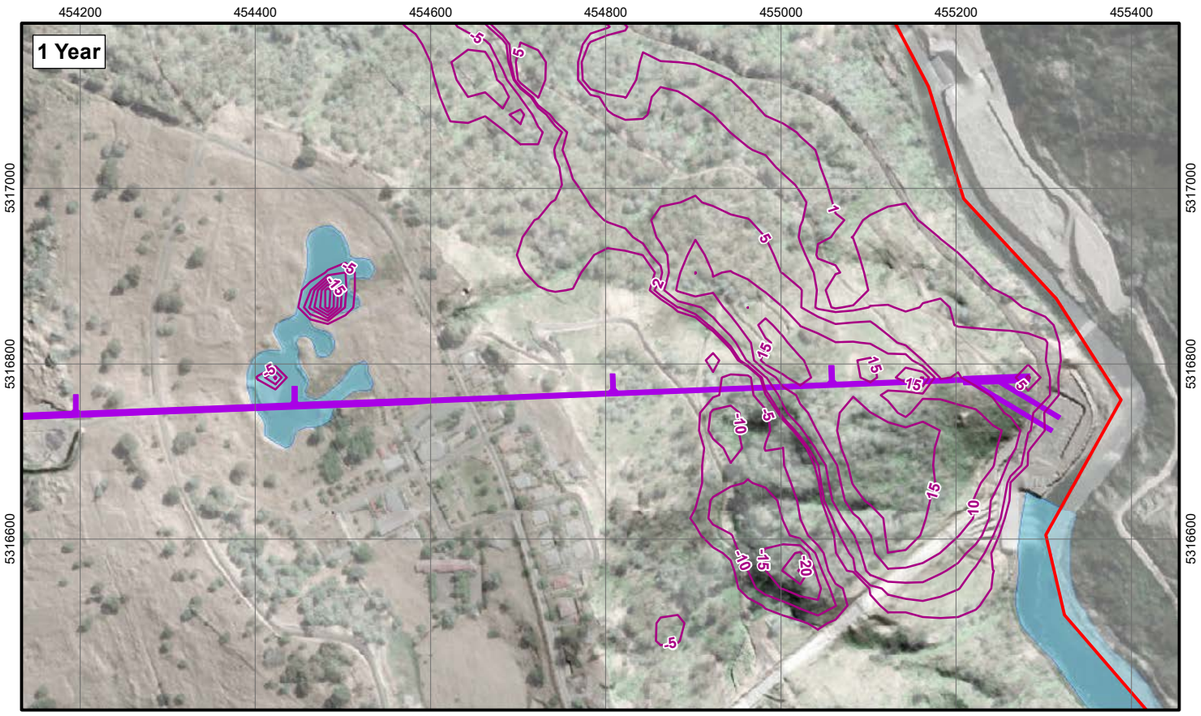
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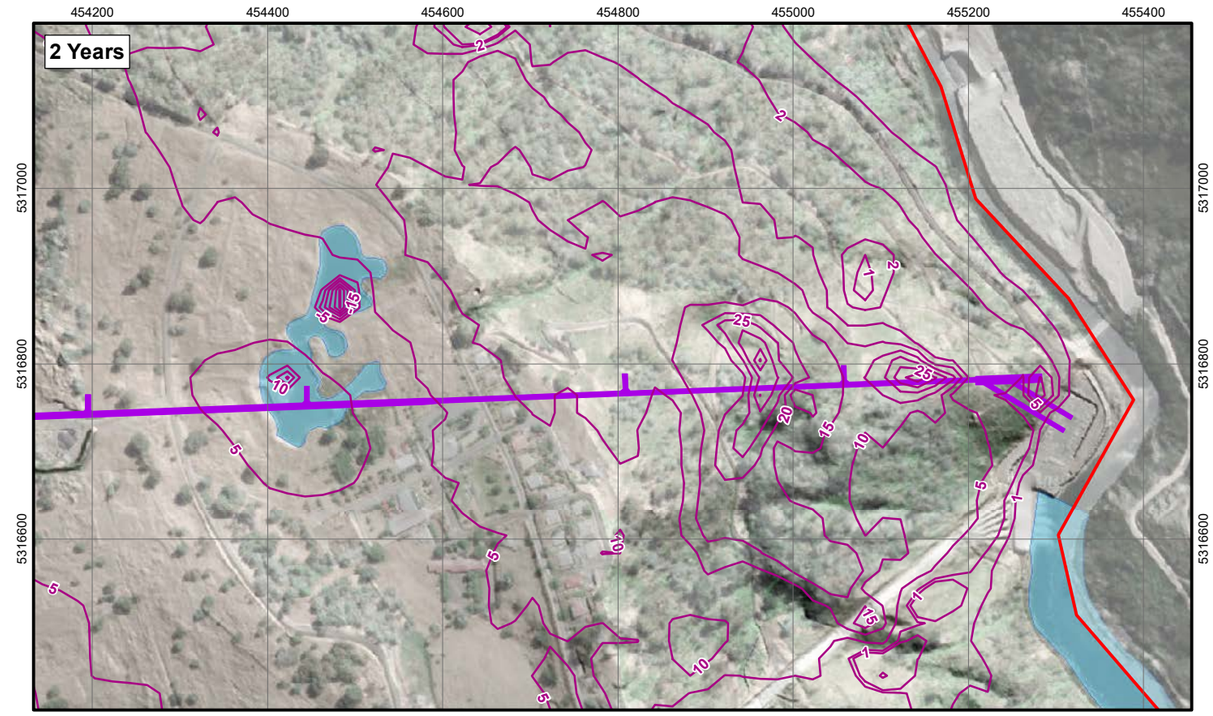
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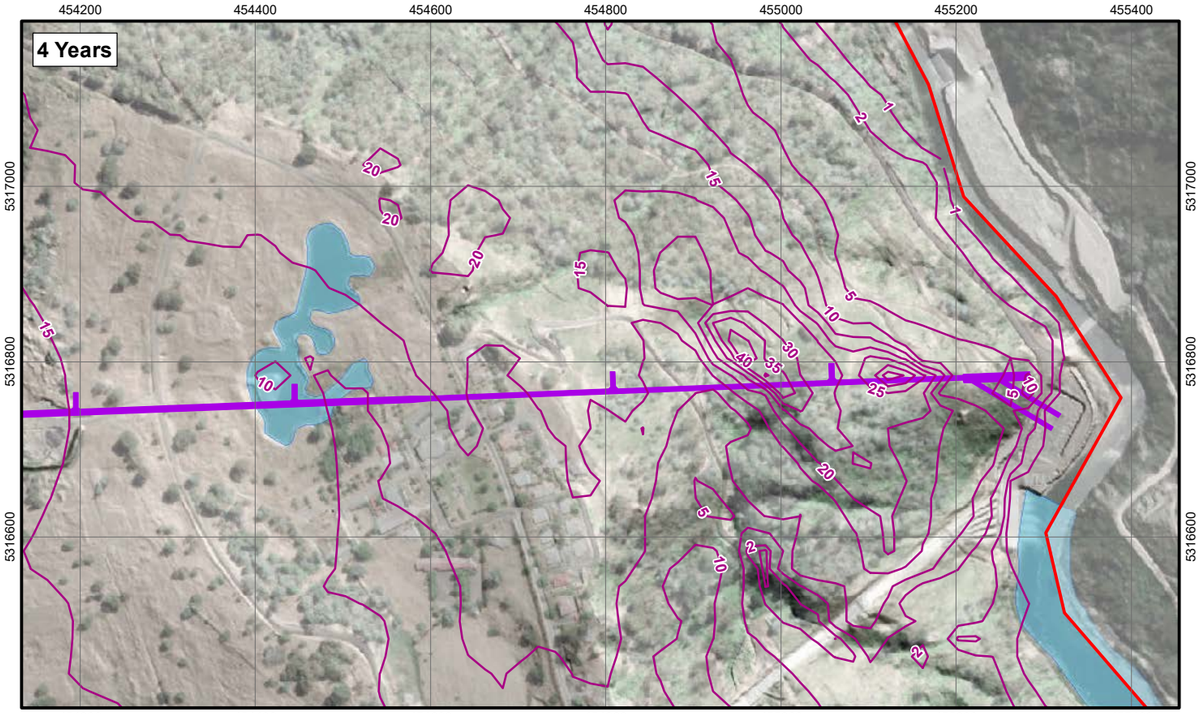
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(LOWER BOUND)

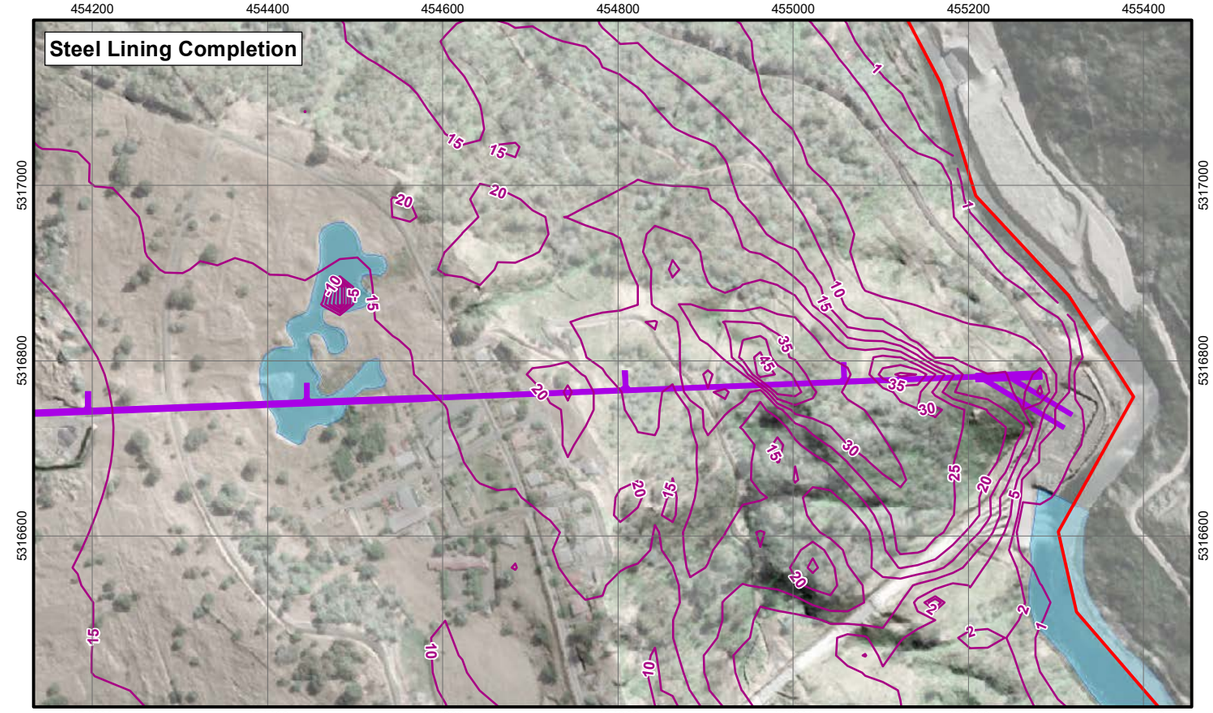
PSM4346-115R | Figure H2-2(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-2(b) Tarraleah Power Station Transient Drawdown Snapshots Base Schedule - Grouting (Lower Bound).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-2(c) Tarraleah Power Station Transient Drawdown Snapshots Base Schedule - Grouting (Upper Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (BASE CASE)

PSM4346-115R | Figure H2-3(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-3(a) Tarraleah Power Station Transient Drawdown Snapshots P90 Schedule (Base Case).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure H2-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-3(b) Tarraleah Power Station Transient Drawdown Snapshots P90 Schedule (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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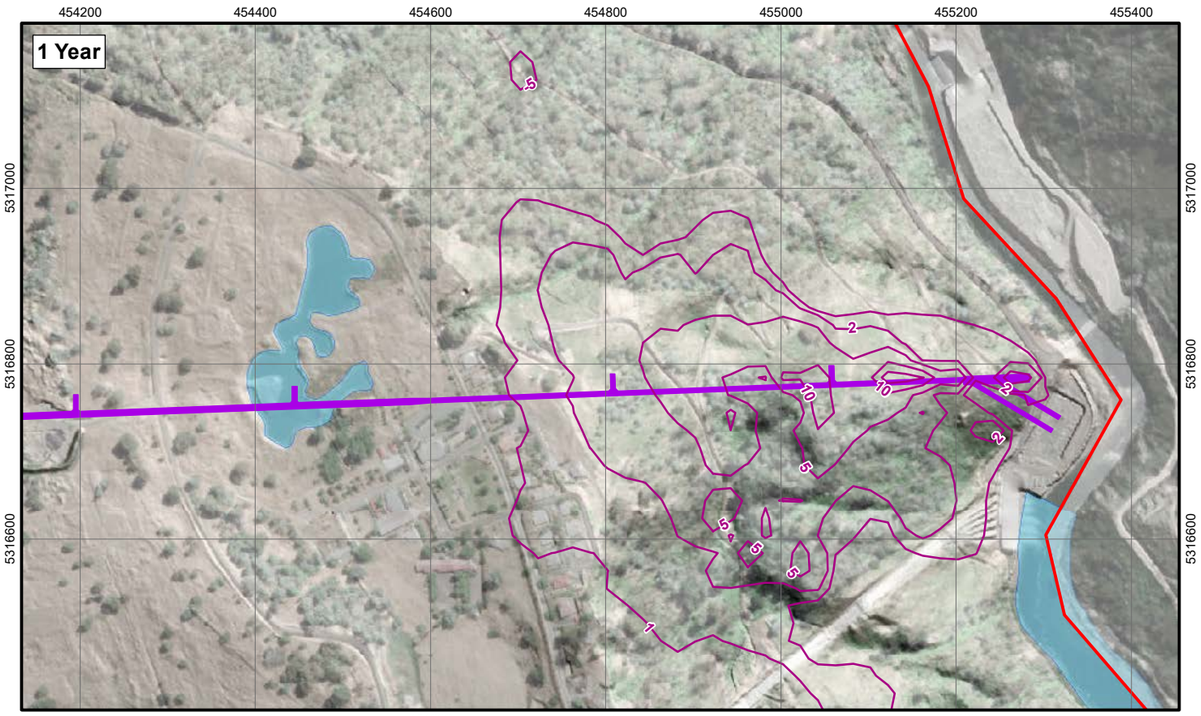
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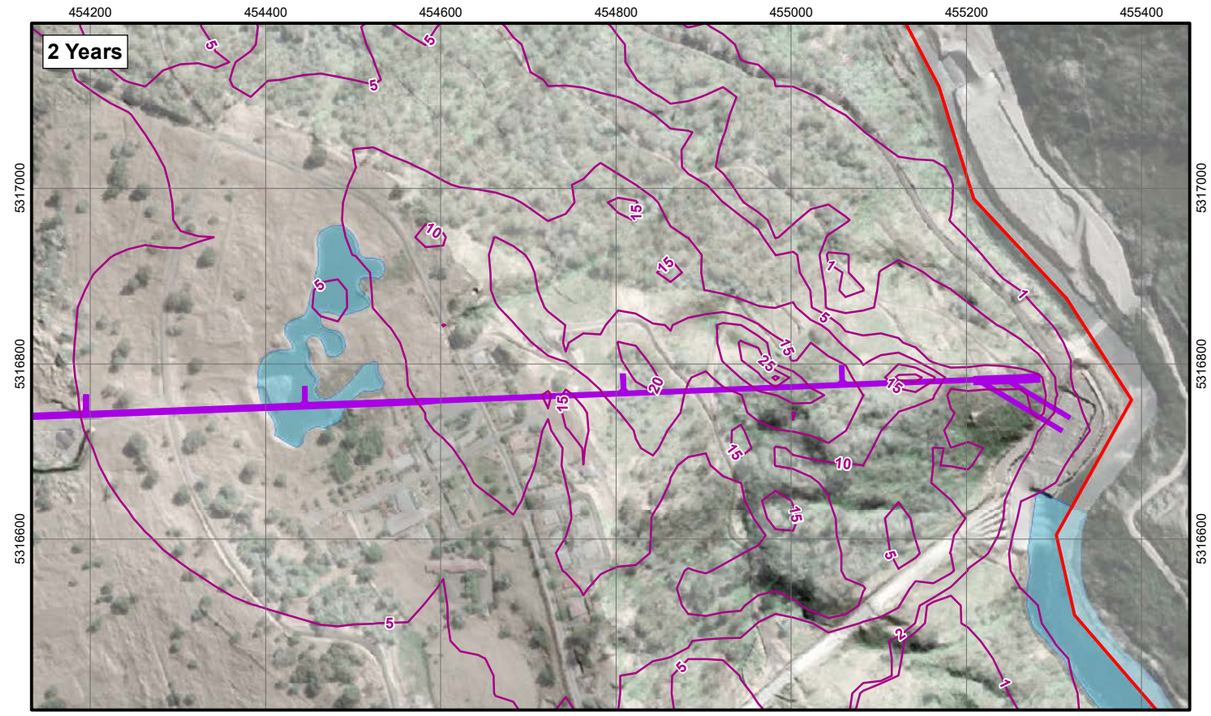
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Hydrogeological Interpretative Report

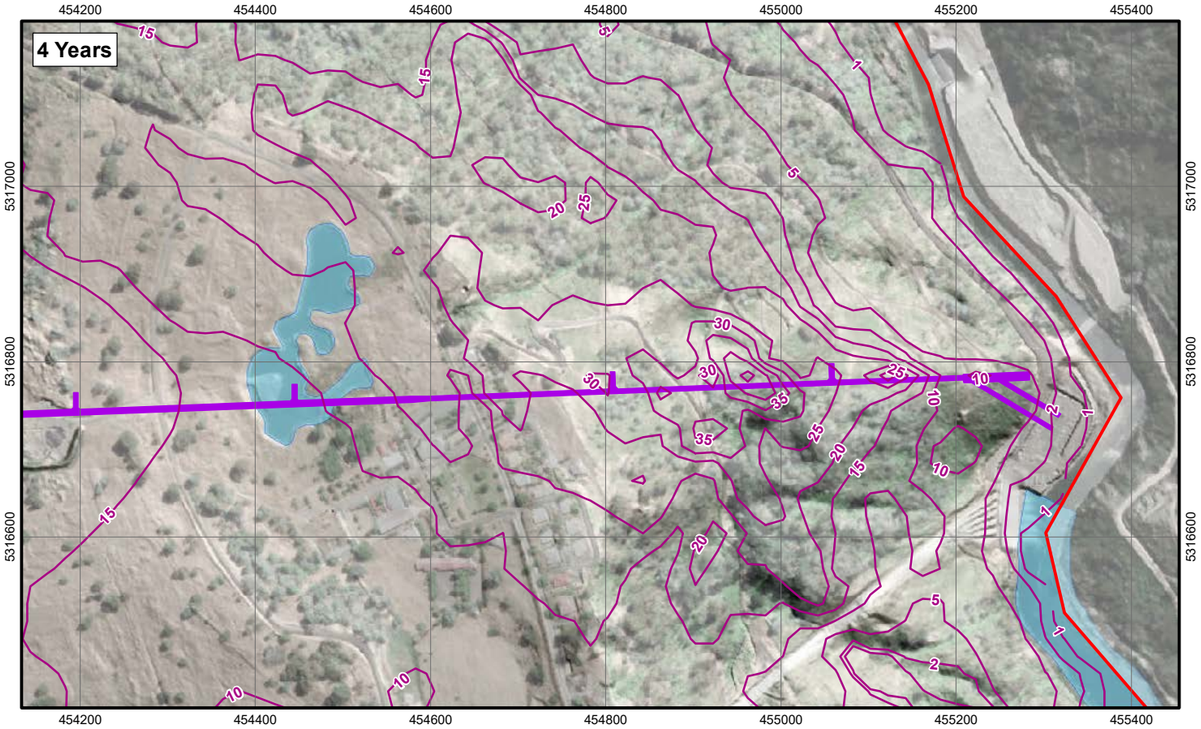
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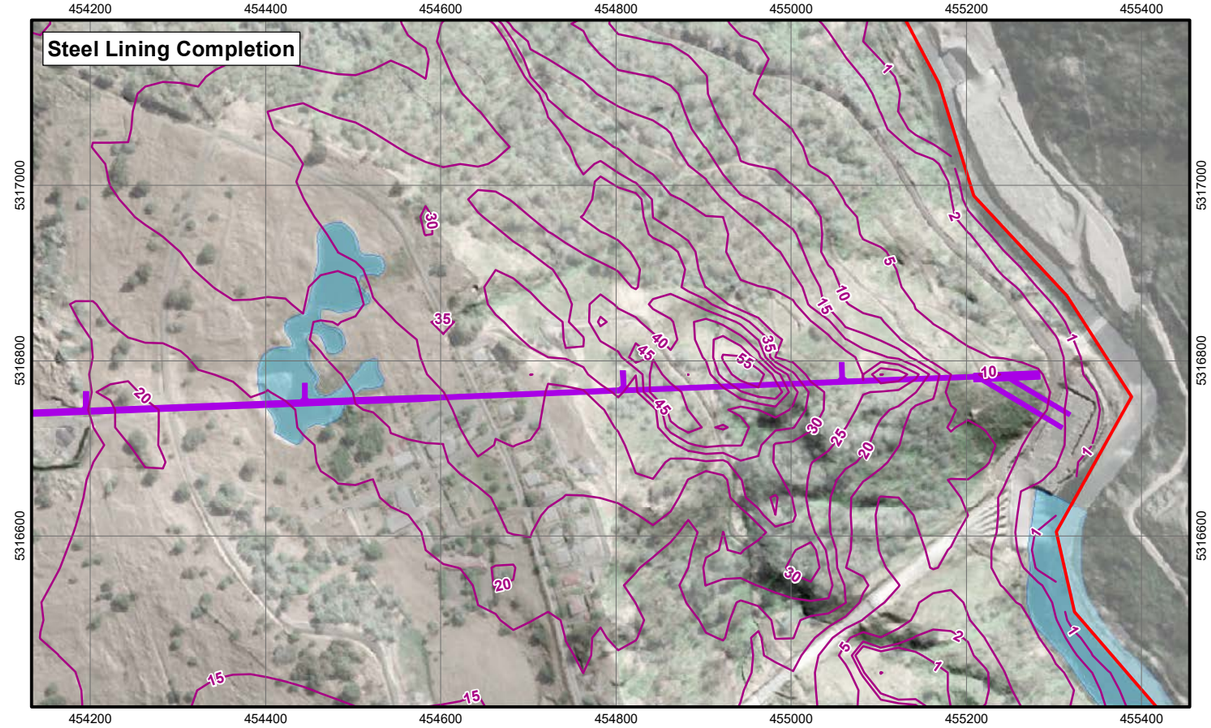
PSM4346-115R | Figure H2-3(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-3(c) Tarraleah Power Station Transient Drawdown Snapshots P90 Schedule (Upper Bound).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

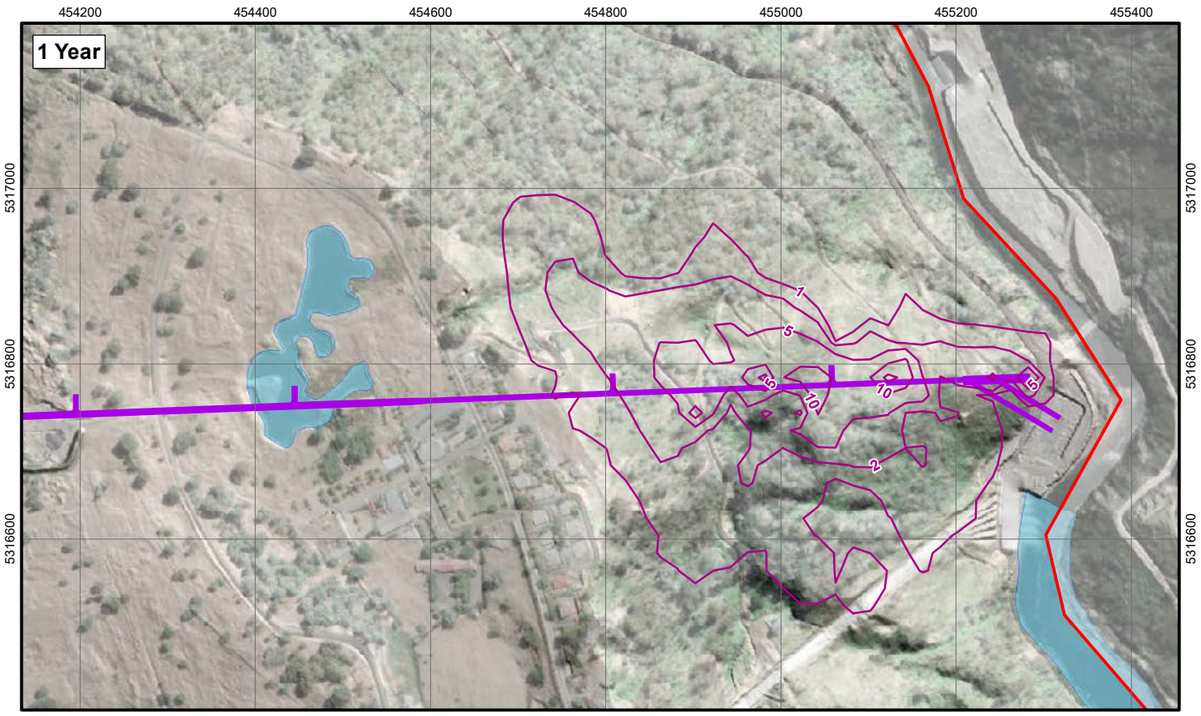
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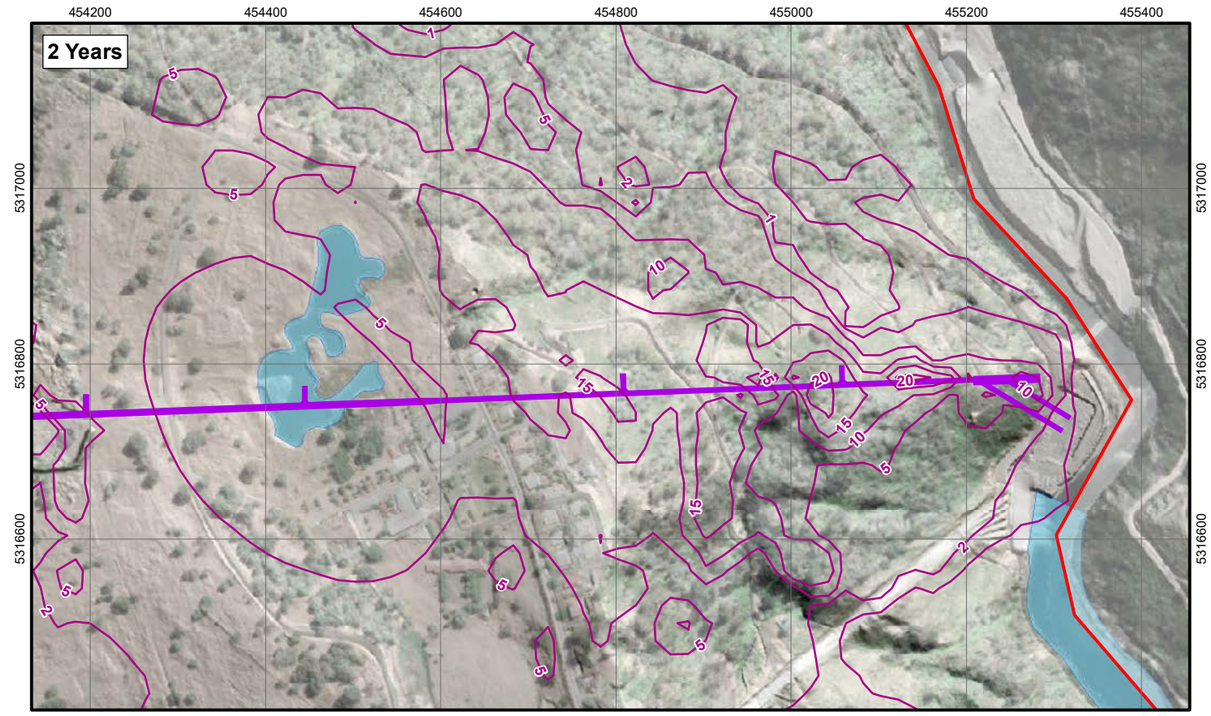
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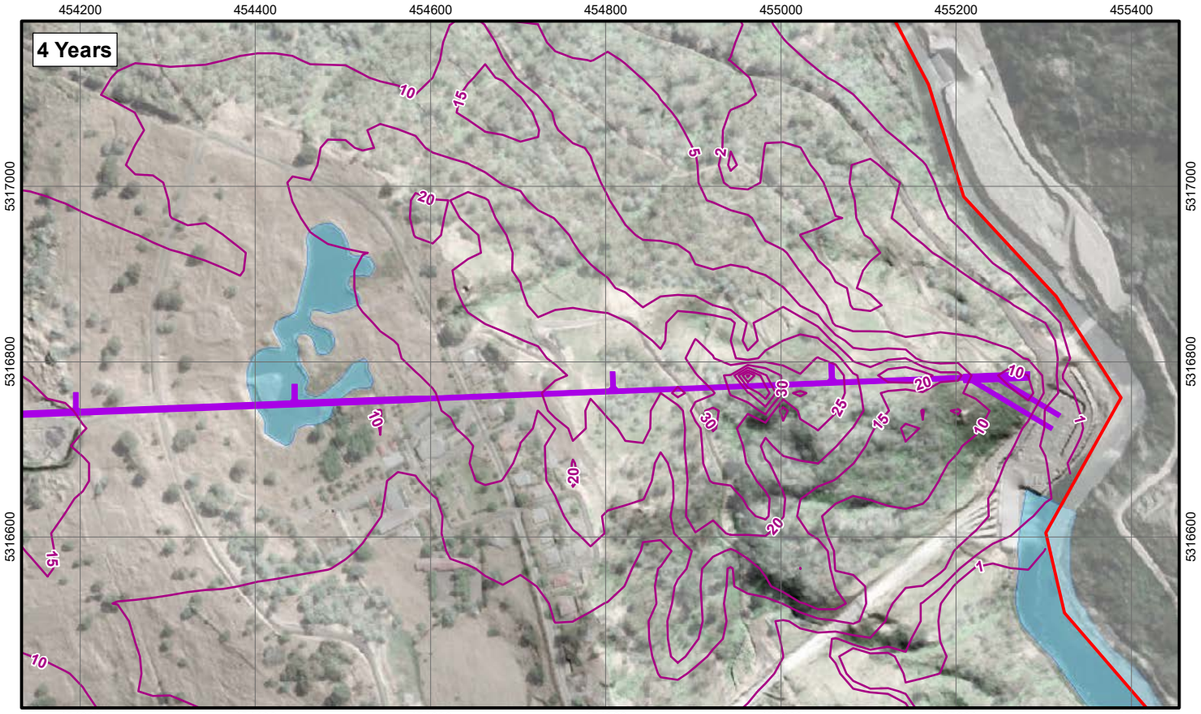
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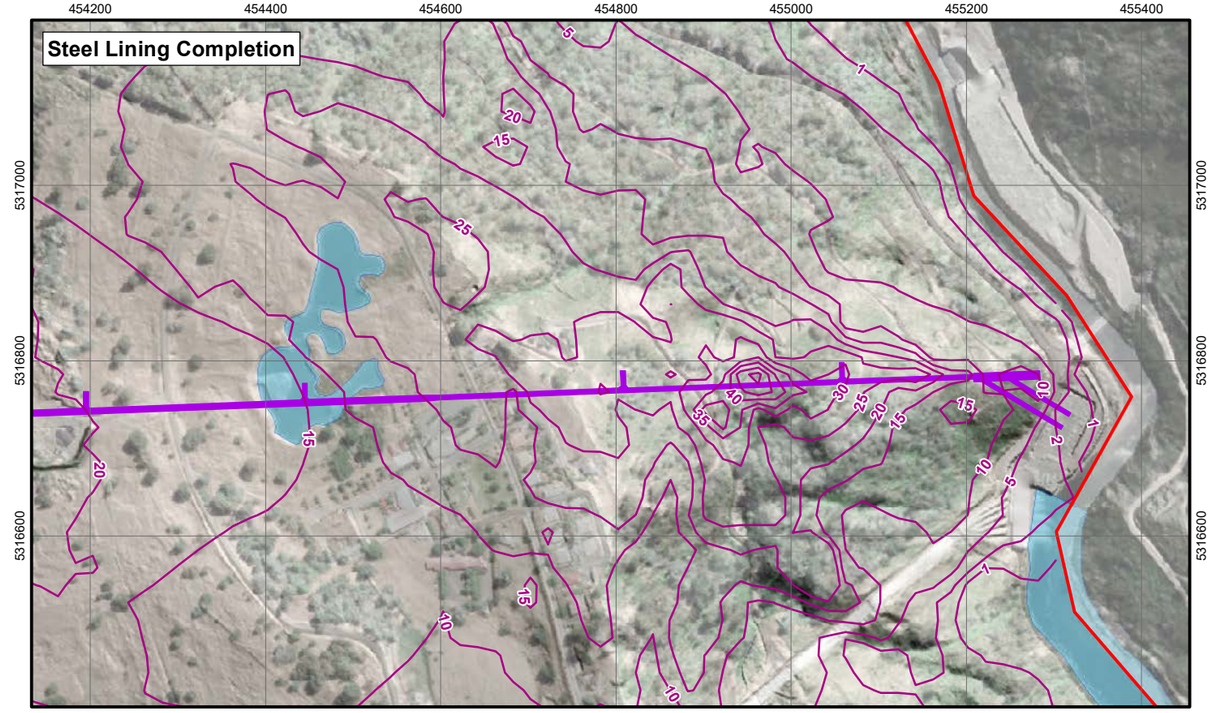
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C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-4(a) Tarraleah Power Station Transient Drawdown Snapshots P90 Schedule - Grouting (Base Case).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: B	
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TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure H2-4(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H2-4(b) Tarraleah Power Station Transient Drawdown Snapshots P90 Schedule - Grouting (Lower Bound).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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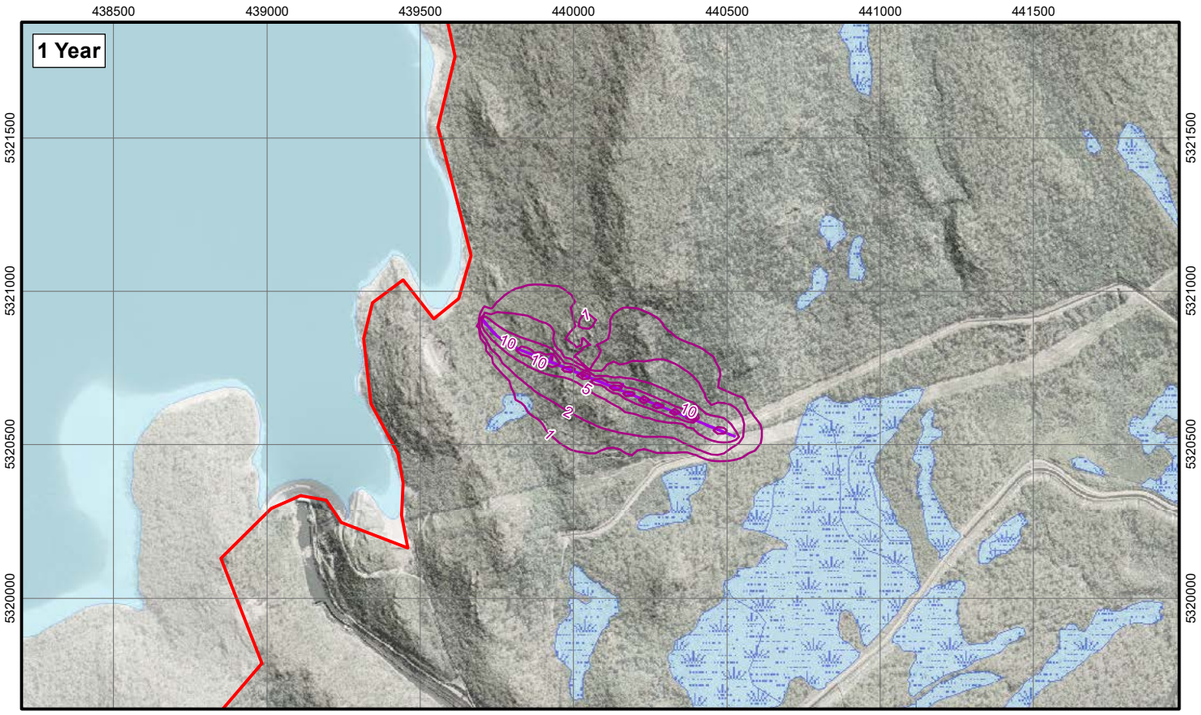
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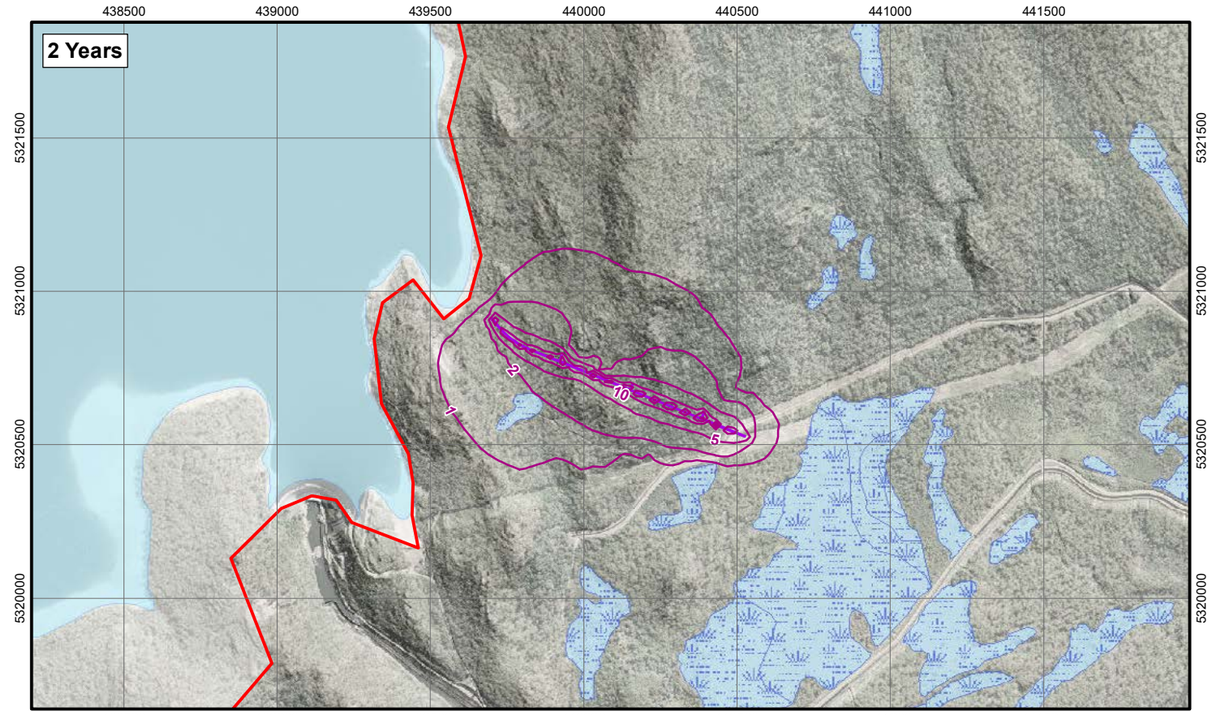
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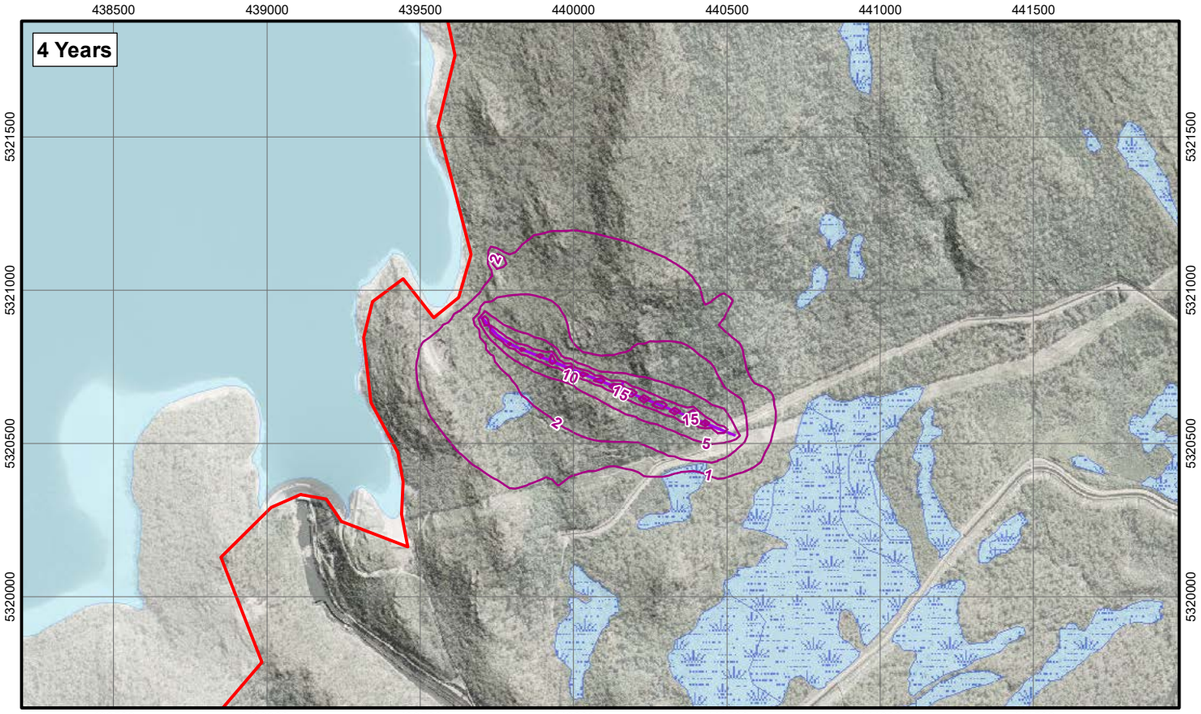
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH POWER STATION
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

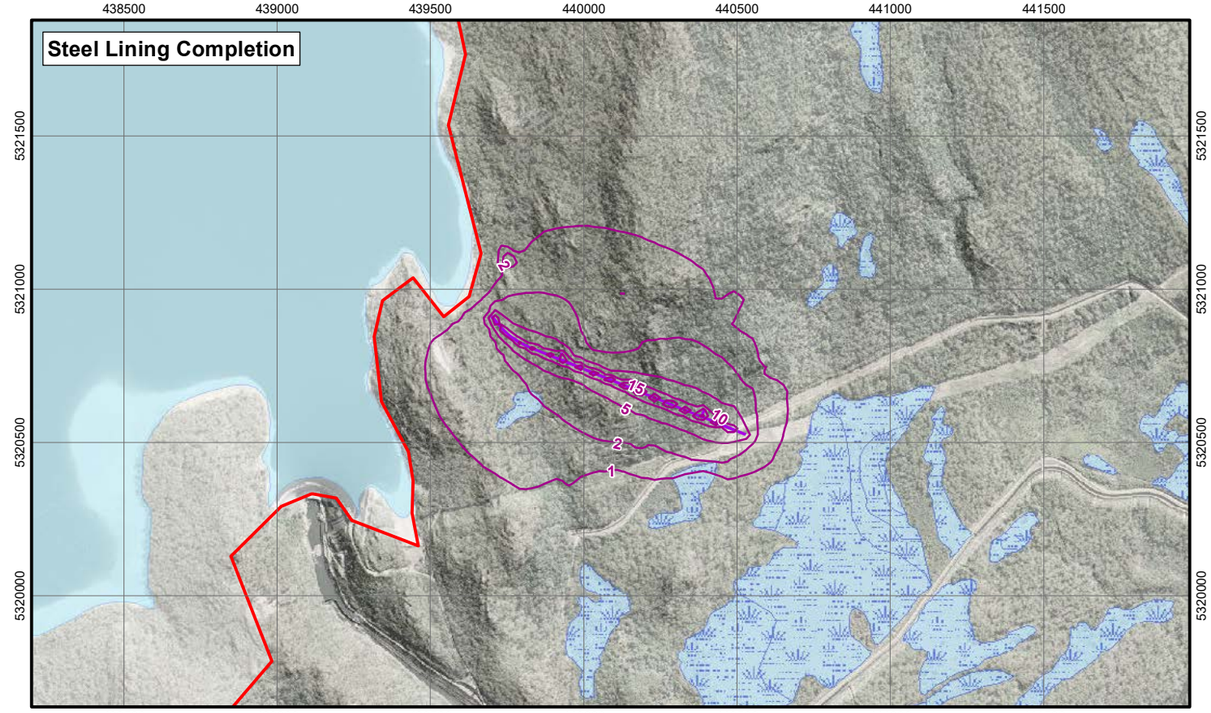
PSM4346-115R | Figure H2-4(c)

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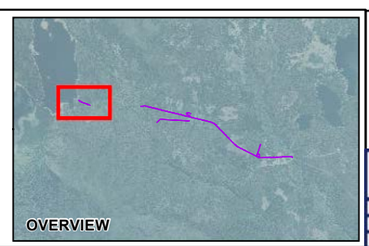






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE (BASE CASE)

PSM4346-115R | Figure H3-1(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H3-1(a) Lake King William Tunnel Transient Drawdown Snapshots Base Schedule (Base Case).mxd

1 Year

2 Years

4 Years

Steel Lining Completion

438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland

OVERVIEW

N

Scale 1:20,000

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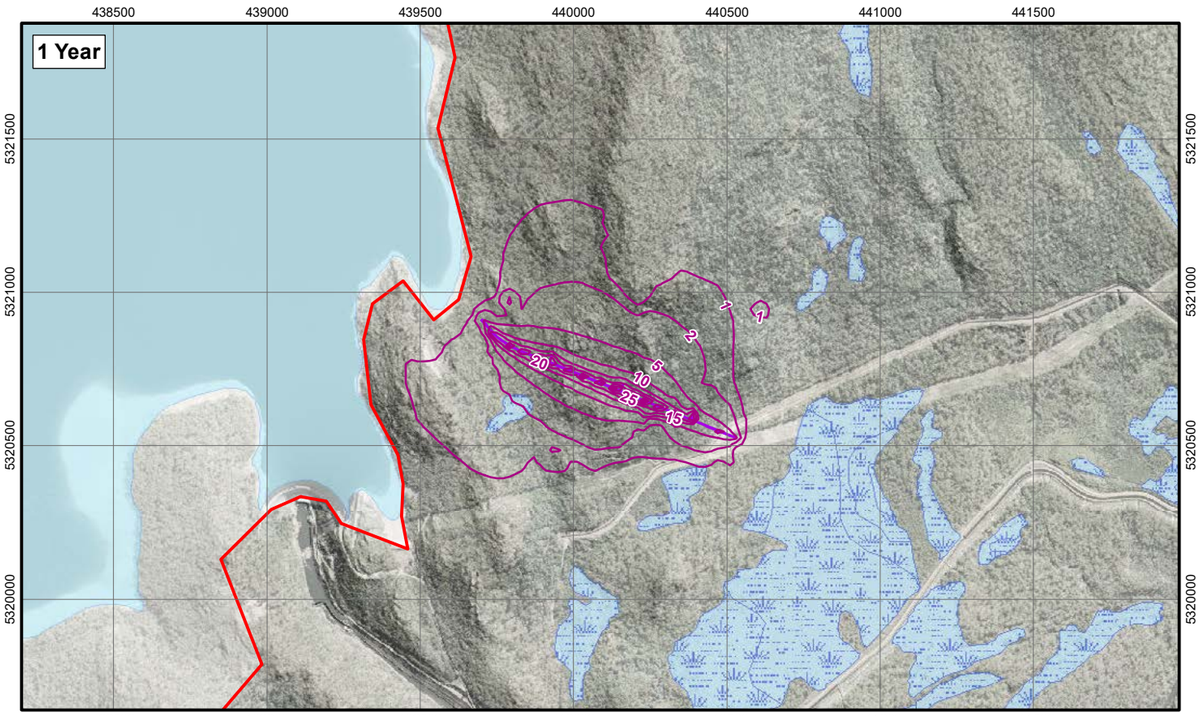
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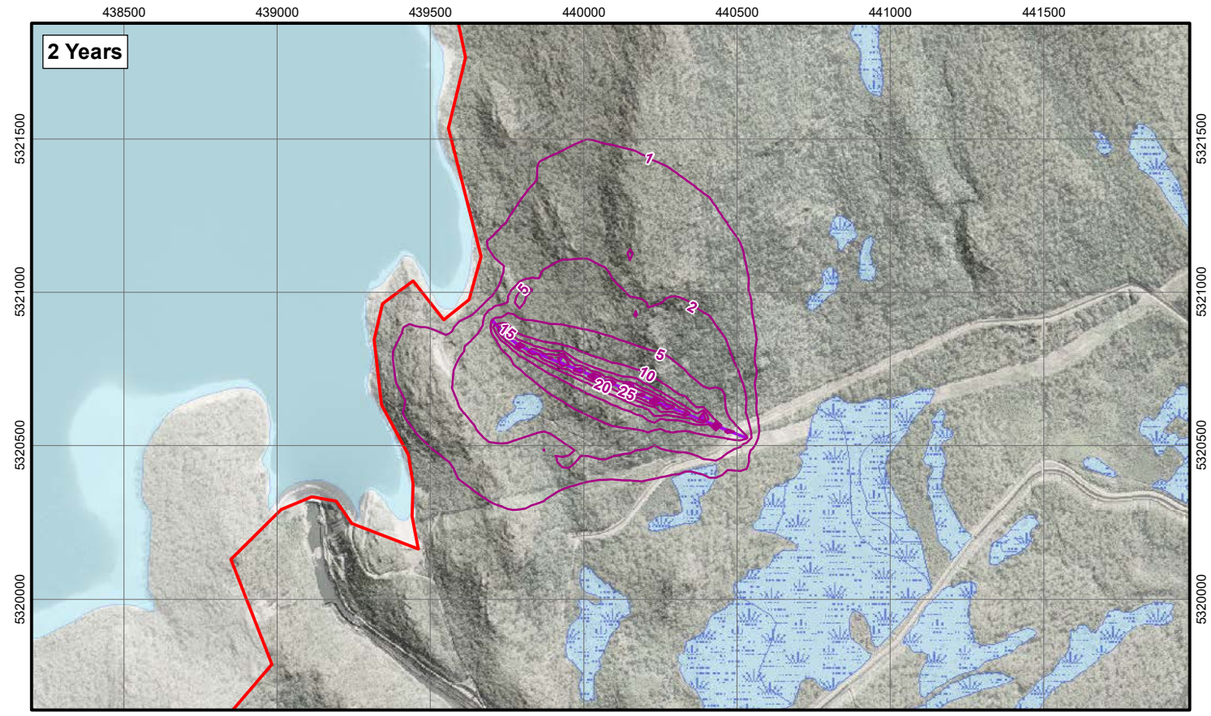
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

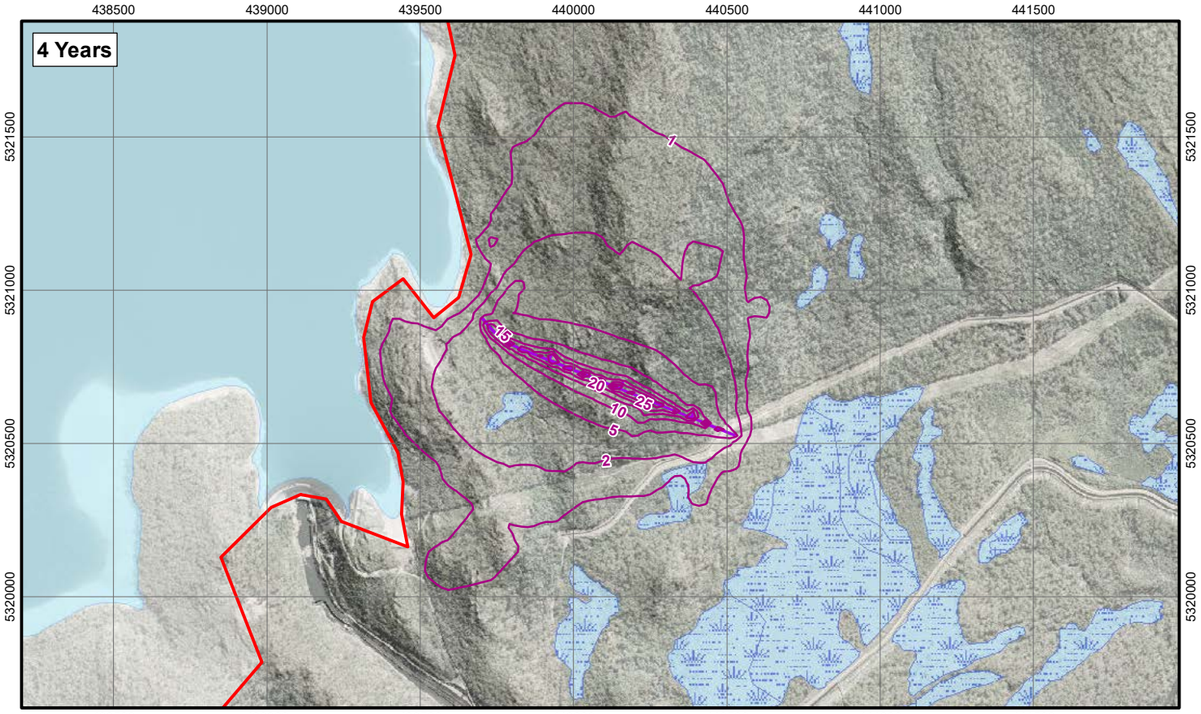
LAKE KING WILLIAM TUNNEL TRANSIENT DRAWDOWN SNAPSHOTS BASE SCHEDULE (LOWER BOUND)

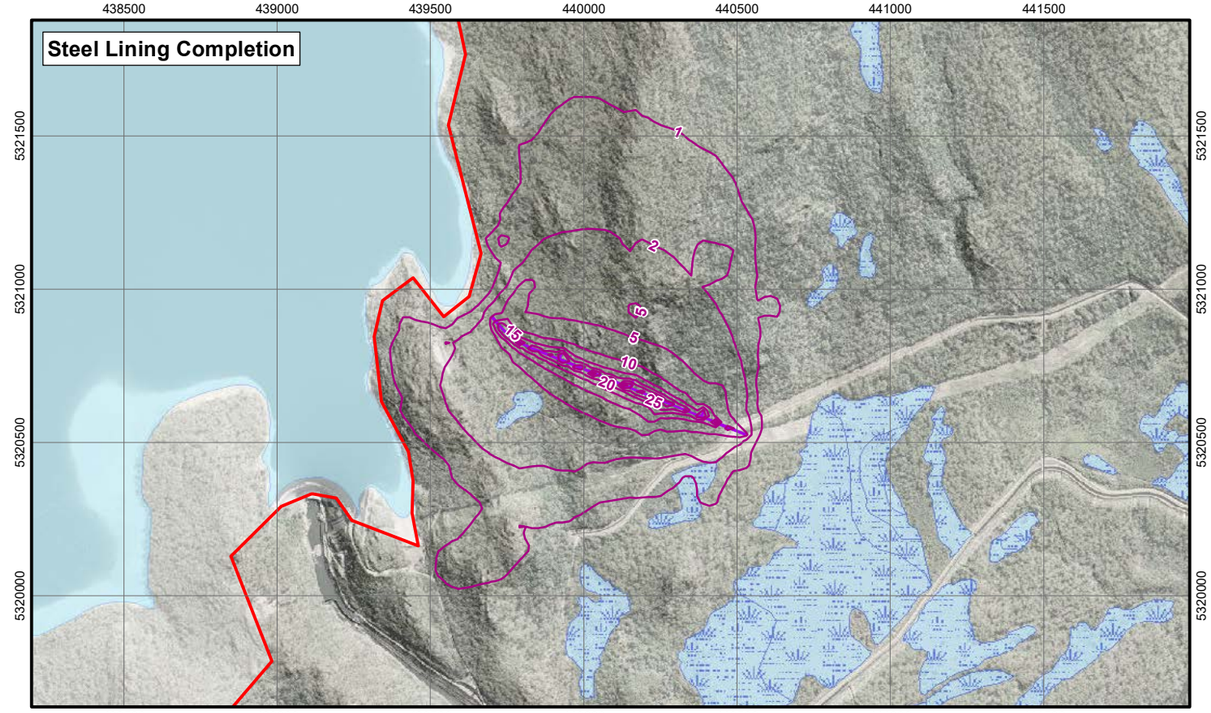
PSM4346-115R | Figure H3-1(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H3-1(b) Lake King William Tunnel Transient Drawdown Snapshots Base Schedule (Lower Bound).mxd



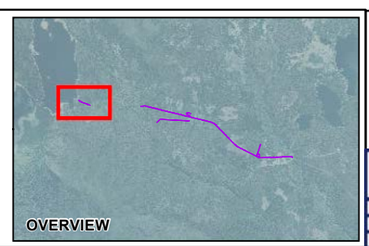






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

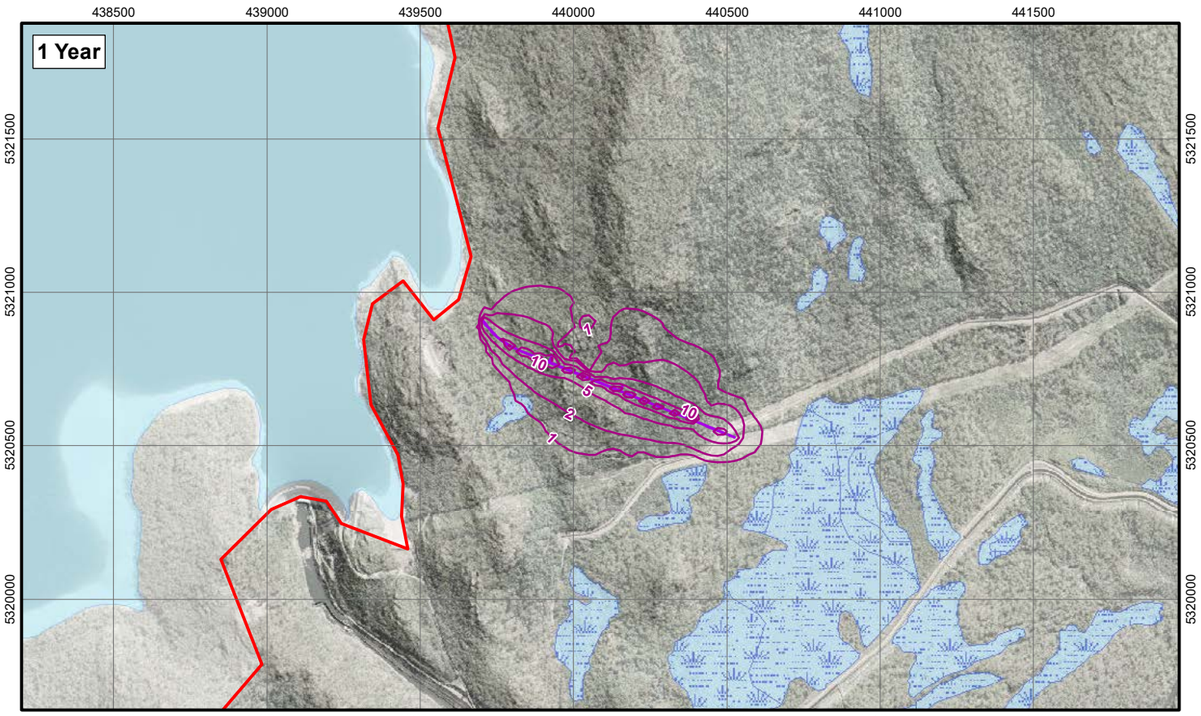
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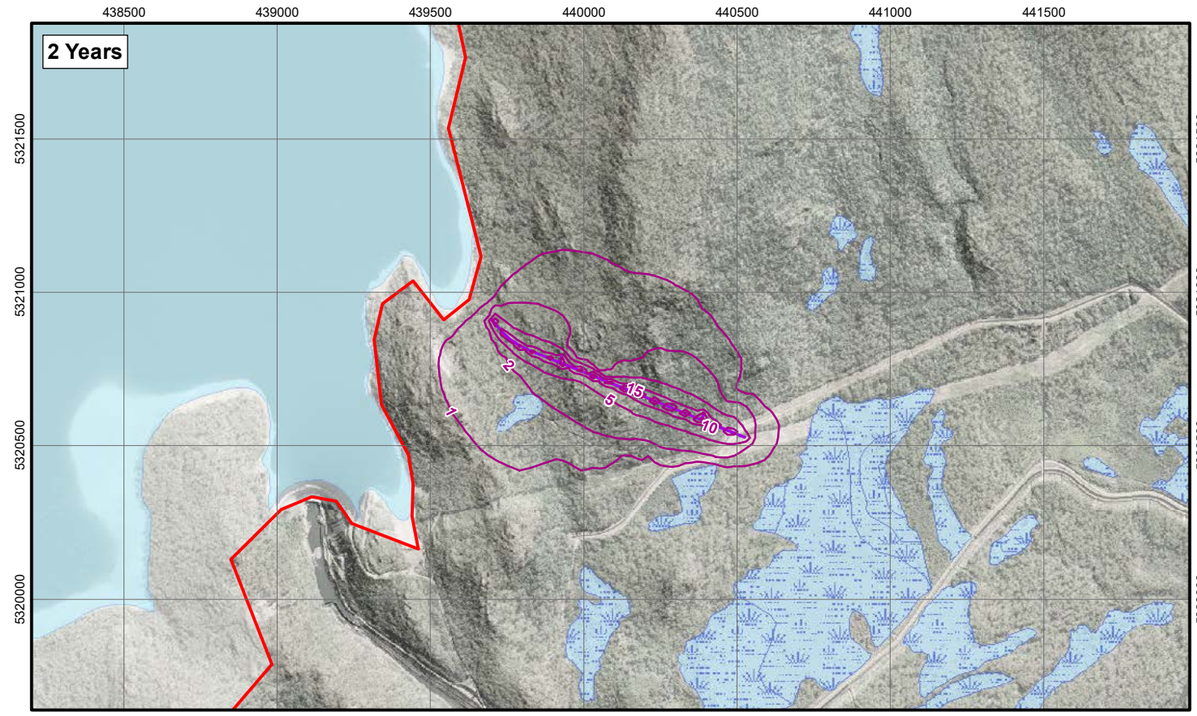
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

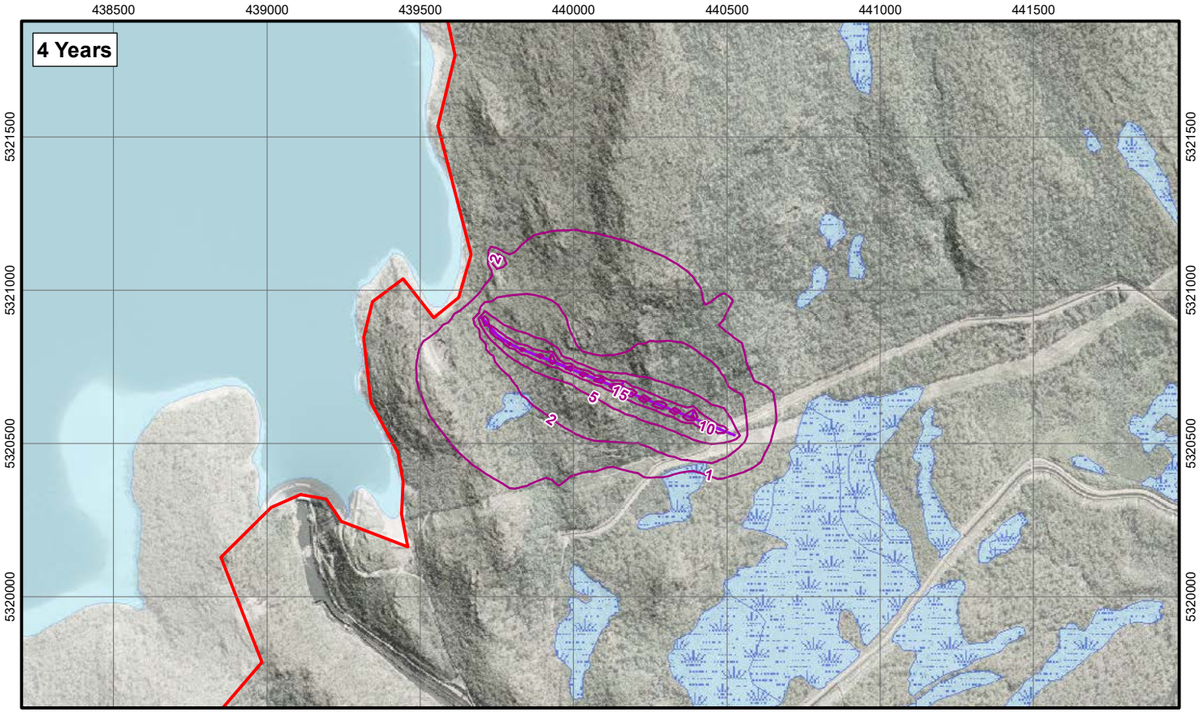
LAKE KING WILLIAM TUNNEL TRANSIENT DRAWDOWN SNAPSHOTS BASE SCHEDULE (UPPER BOUND)

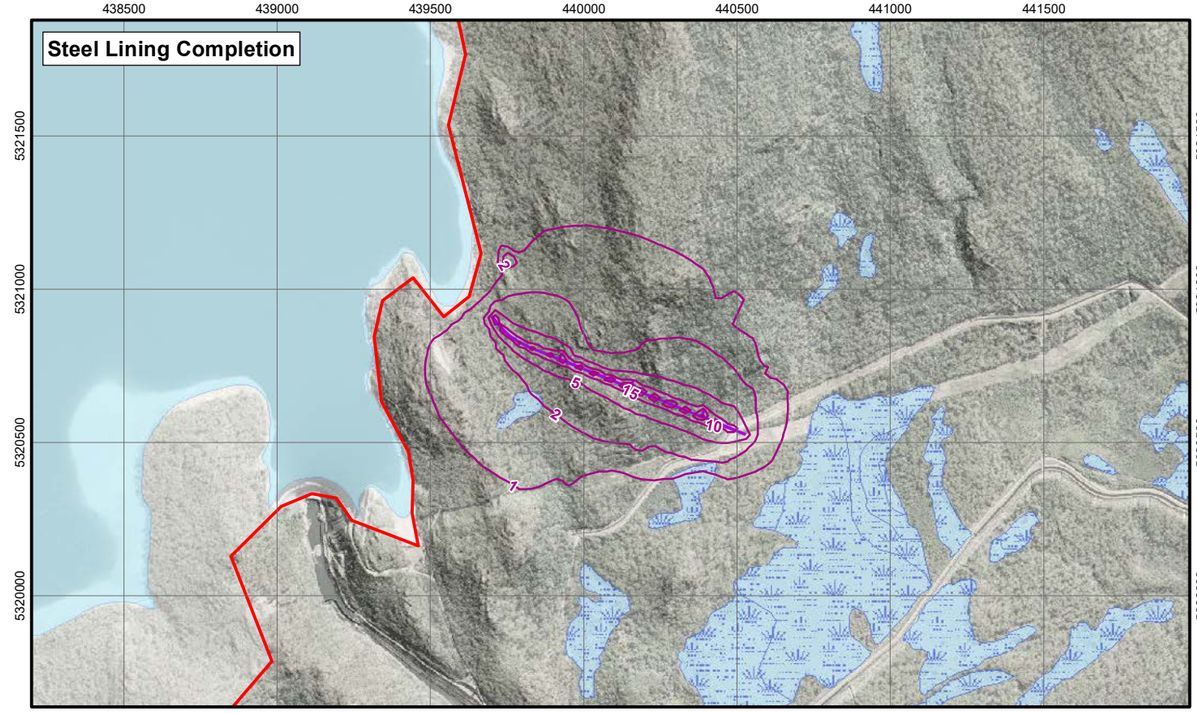
PSM4346-115R | Figure H3-1(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H3-1(c) Lake King William Tunnel Transient Drawdown Snapshots Base Schedule (Upper Bound).mxd



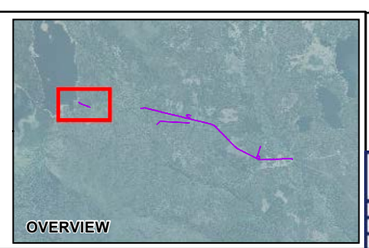






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

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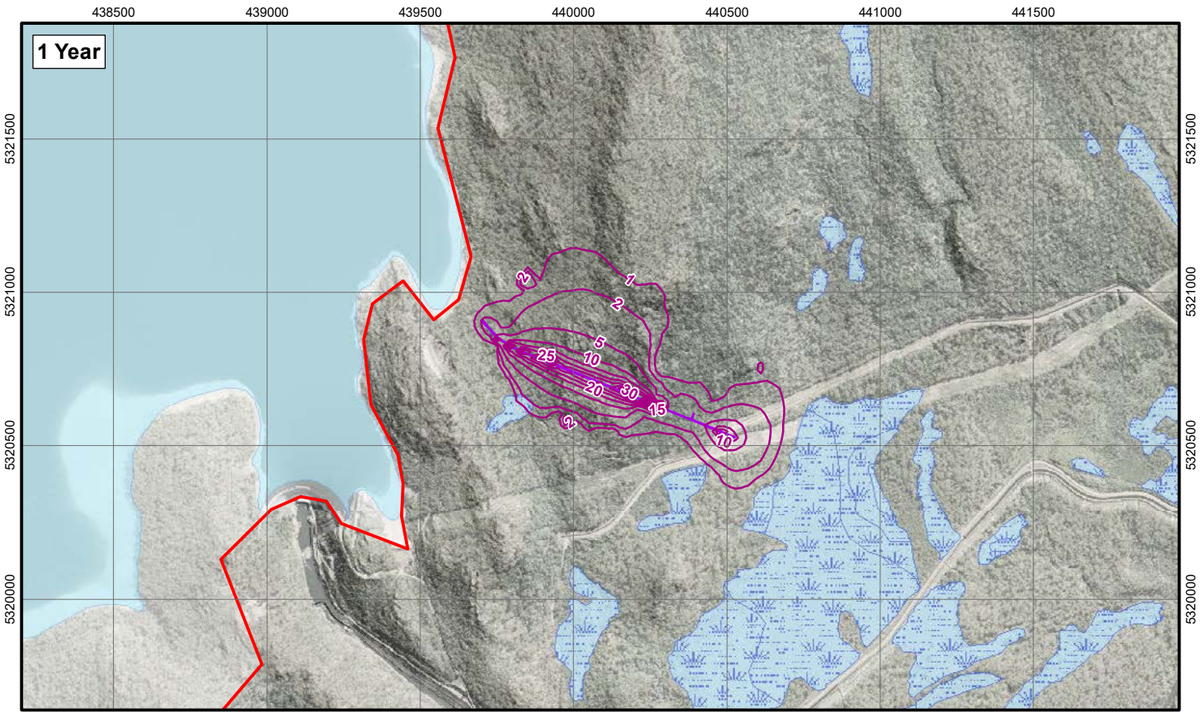
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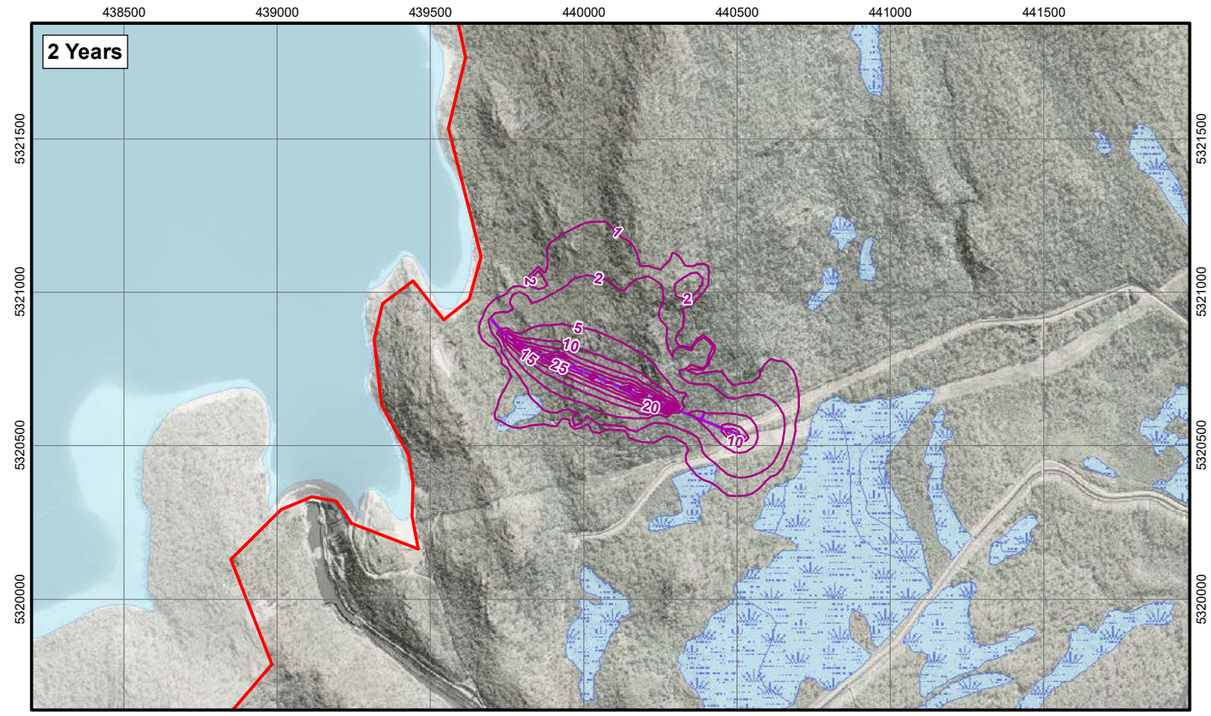
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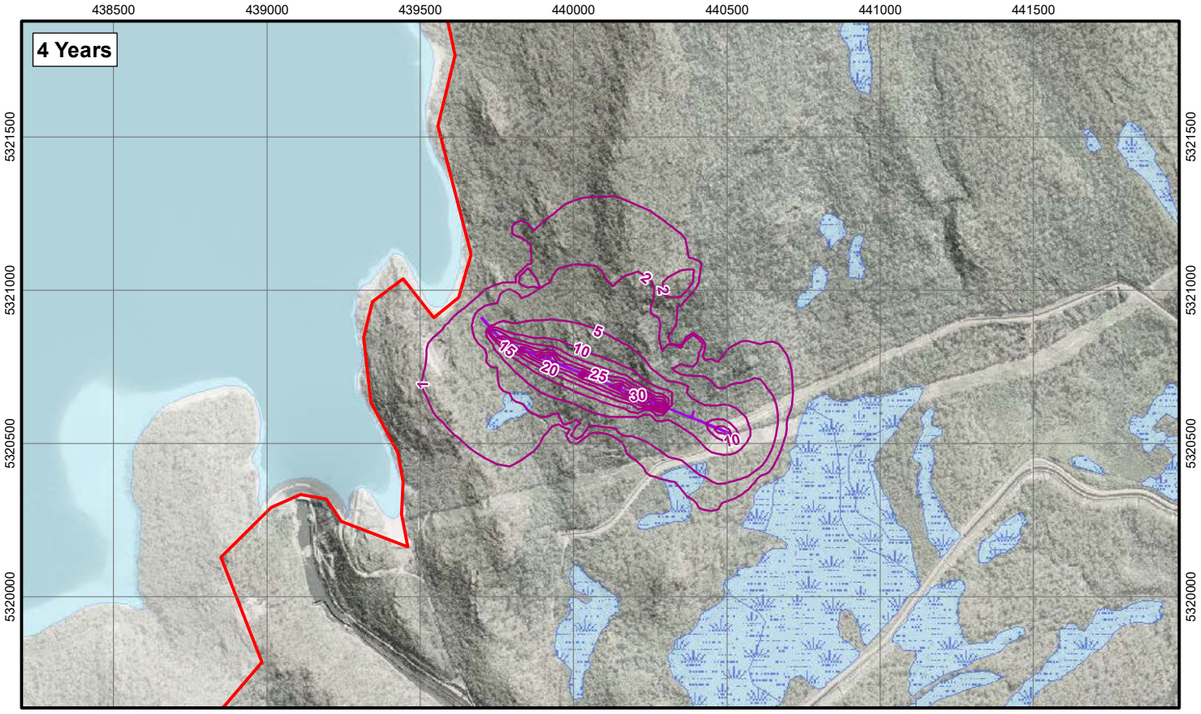
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(BASE CASE)

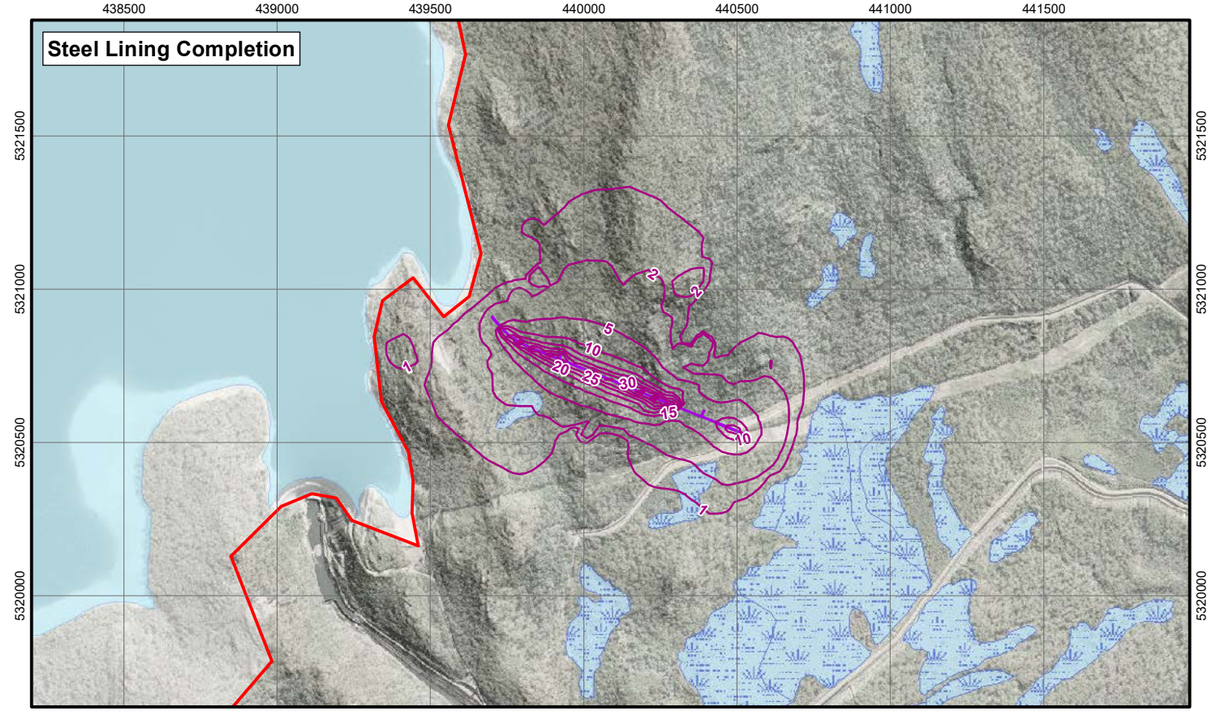
PSM4346-115R | Figure H3-2(a)

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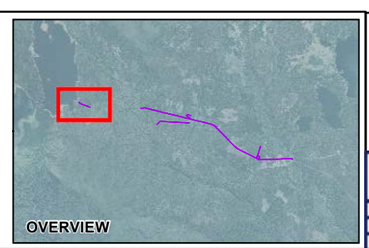






Legend

- Tarraleah Redevelopment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:20,000

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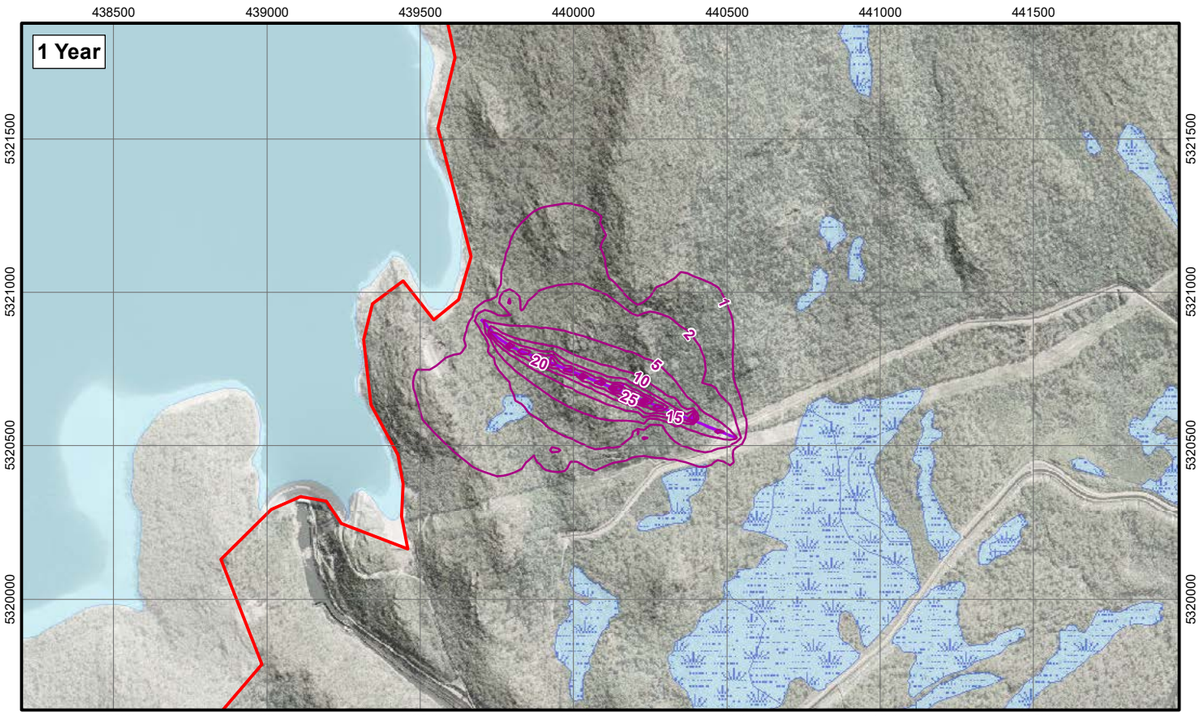
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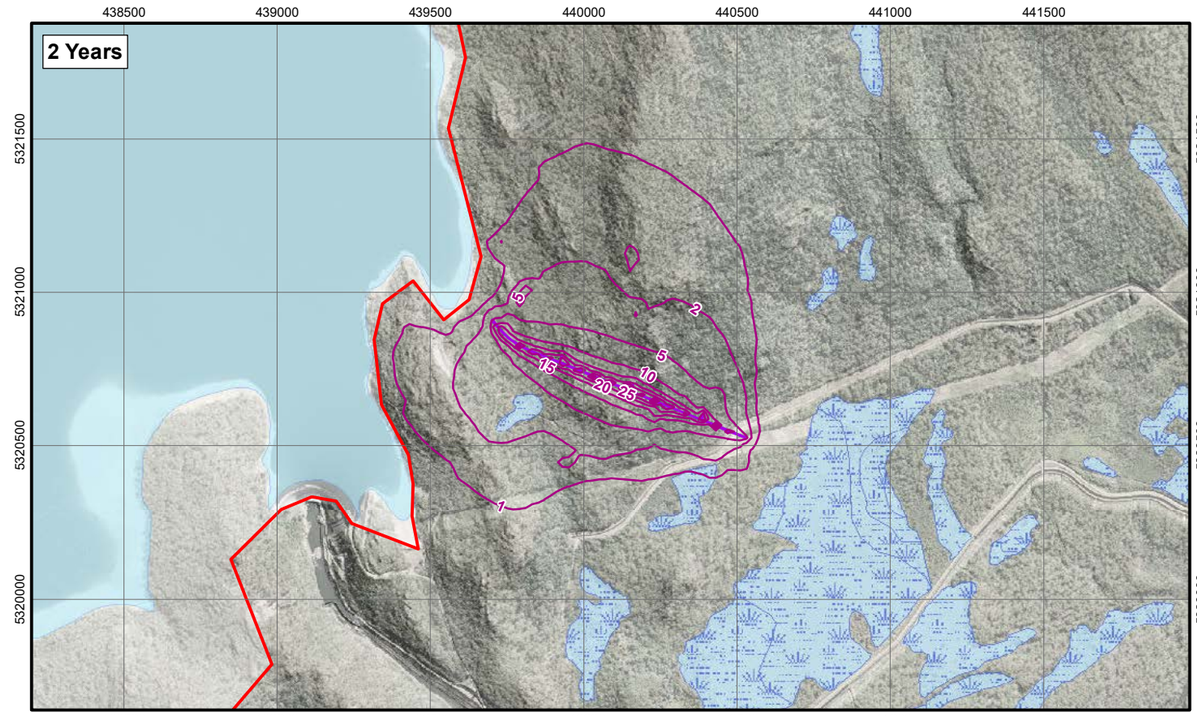
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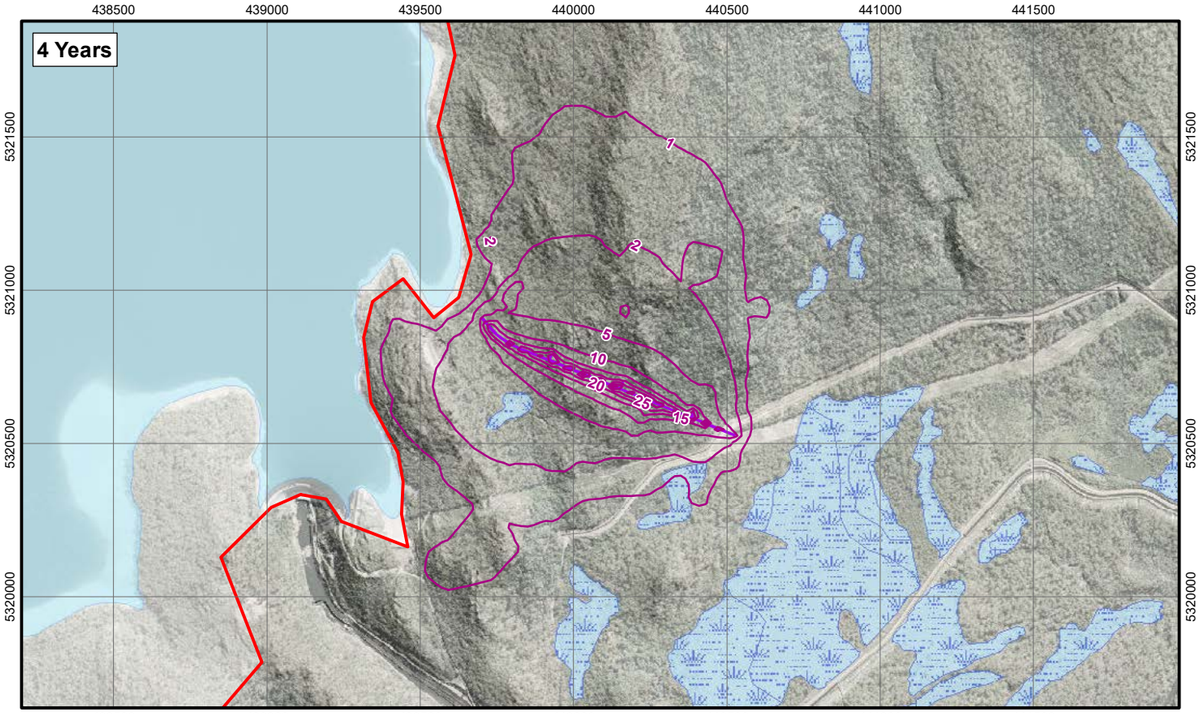
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(LOWER BOUND)

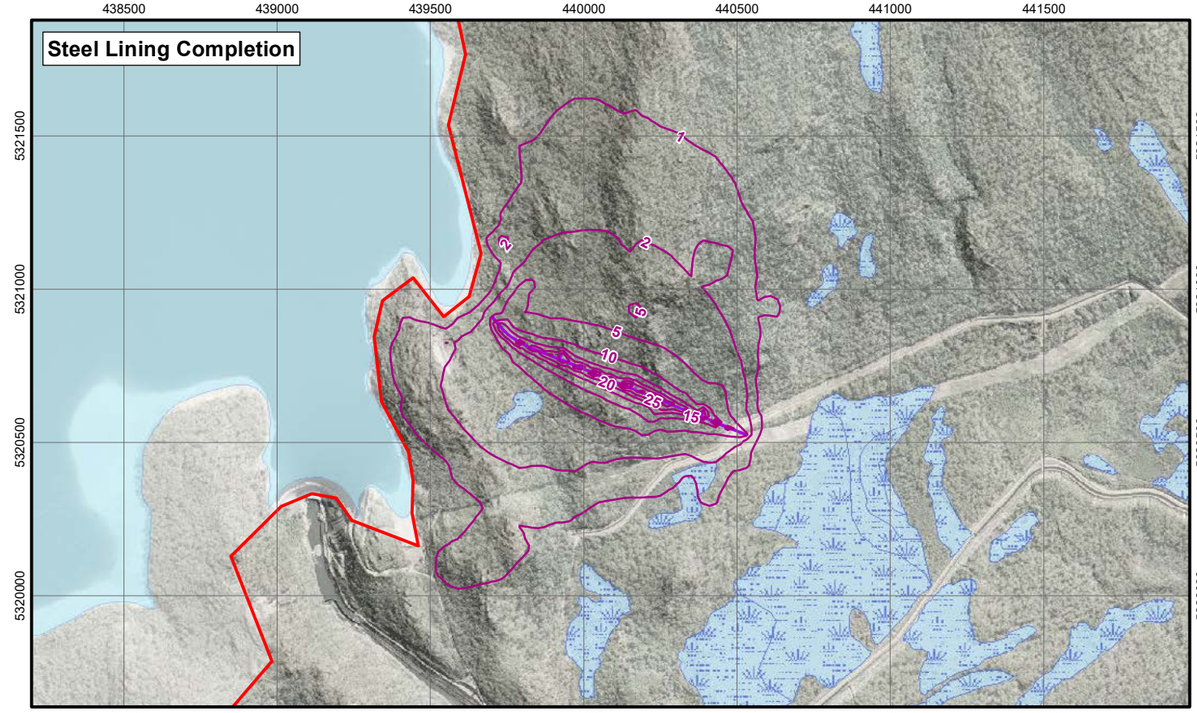
PSM4346-115R | Figure H3-2(b)

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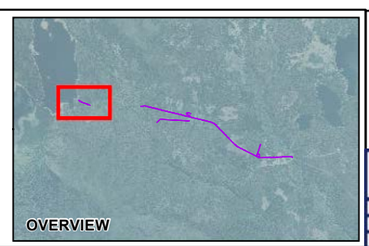






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

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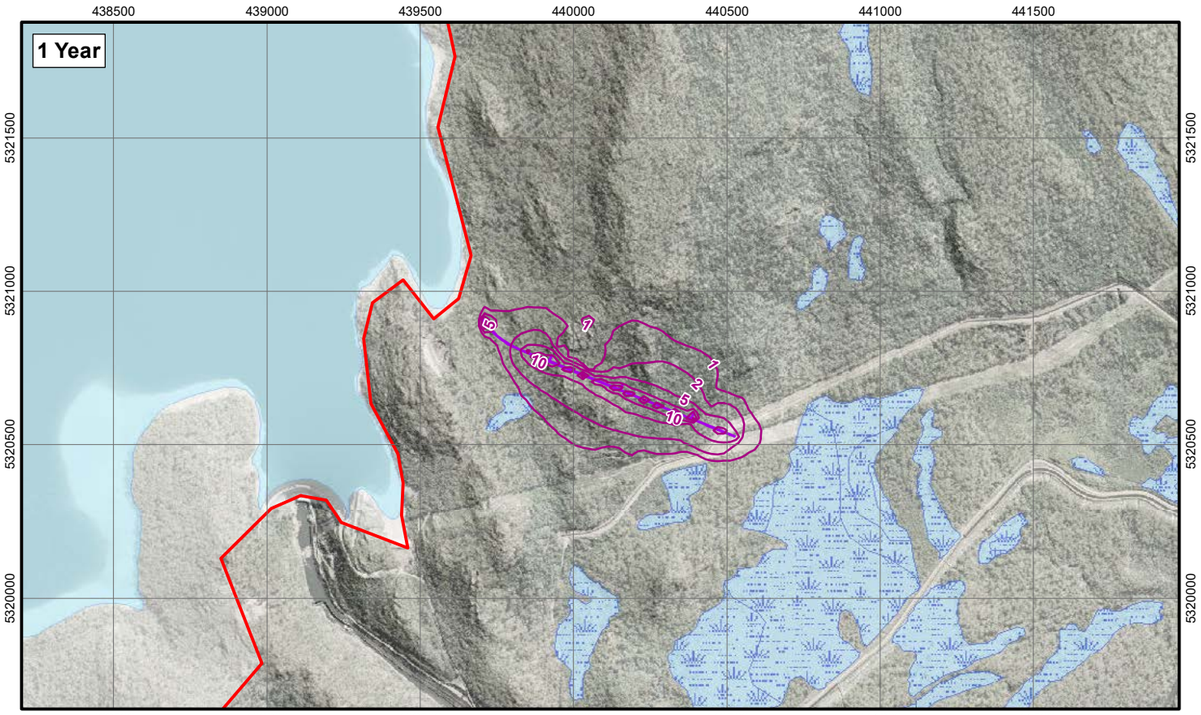
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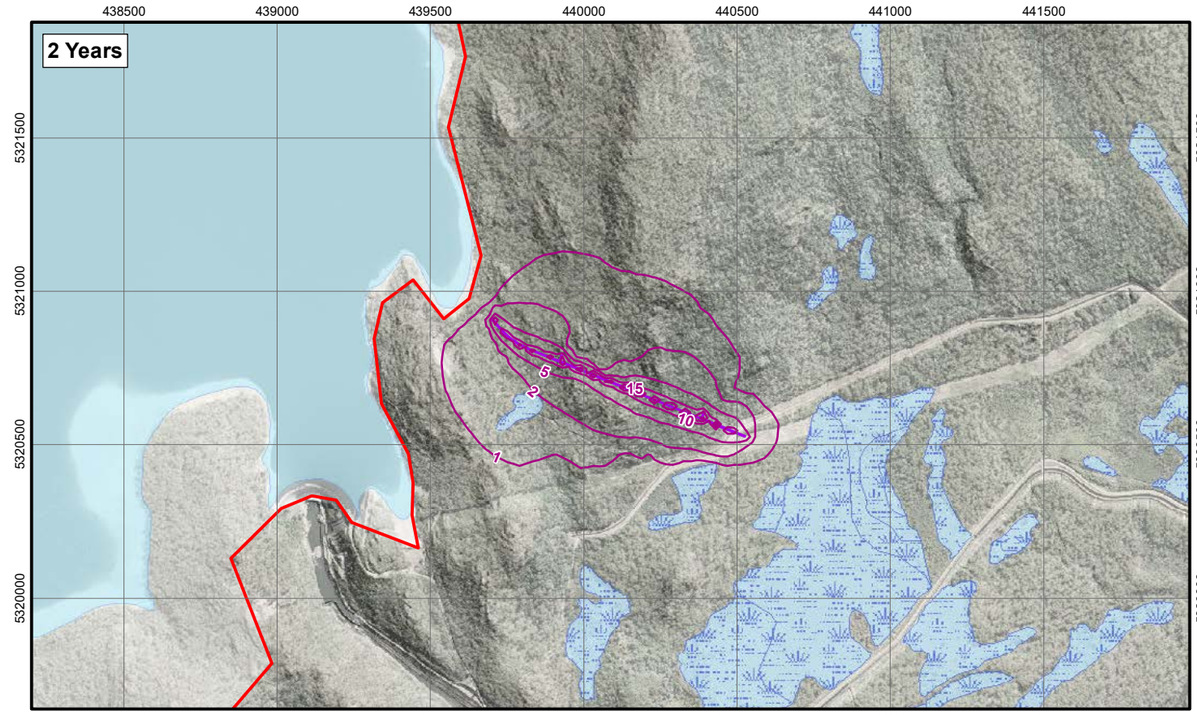
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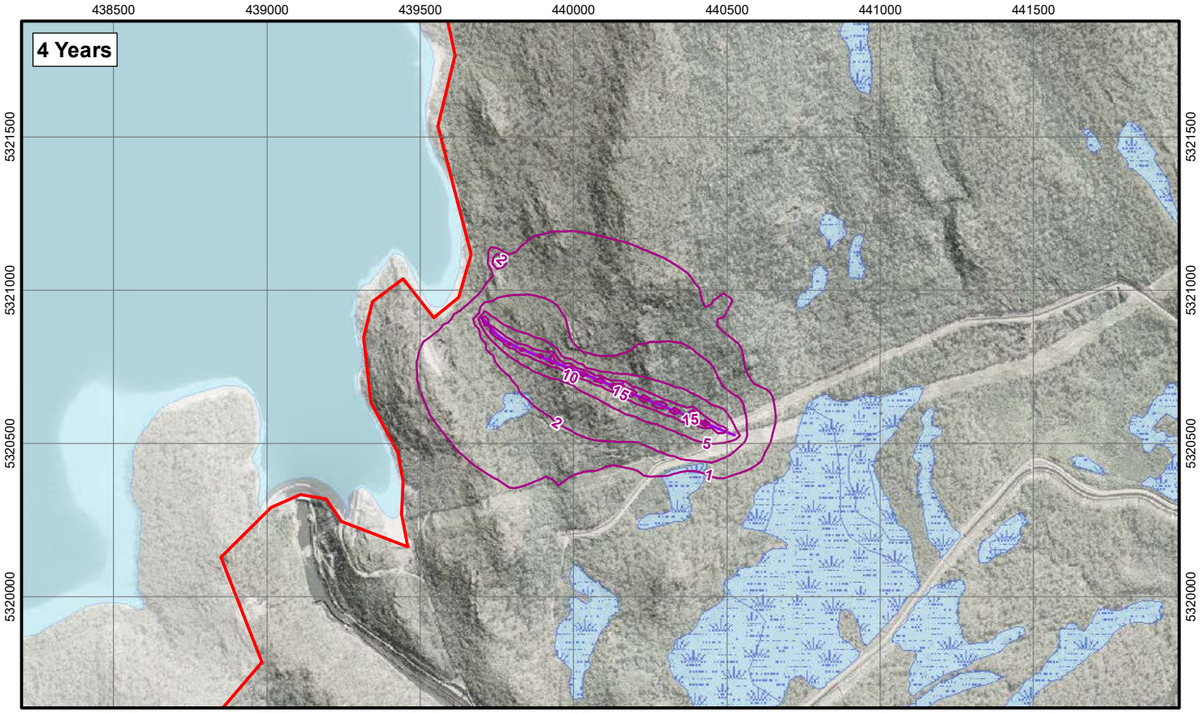
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
BASE SCHEDULE - GROUTING
(UPPER BOUND)

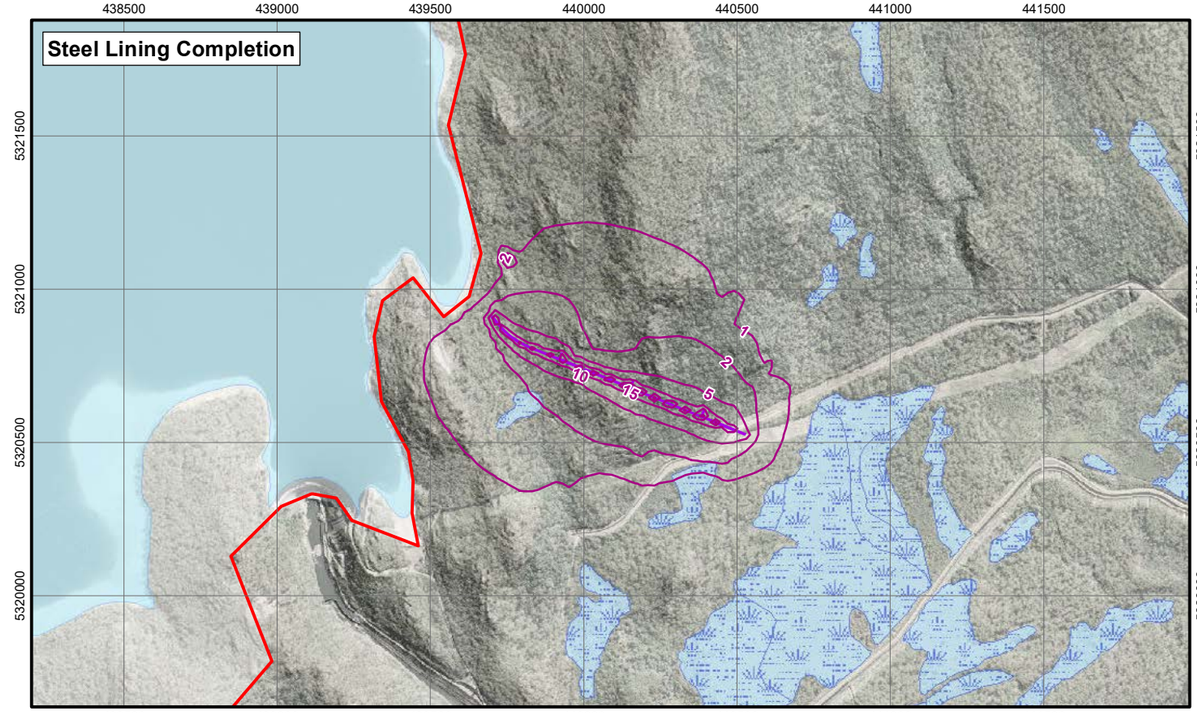
PSM4346-115R | Figure H3-2(c)

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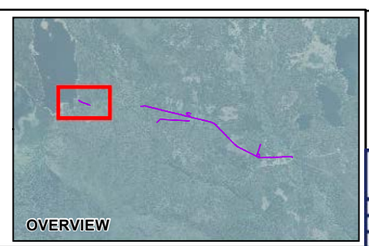






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

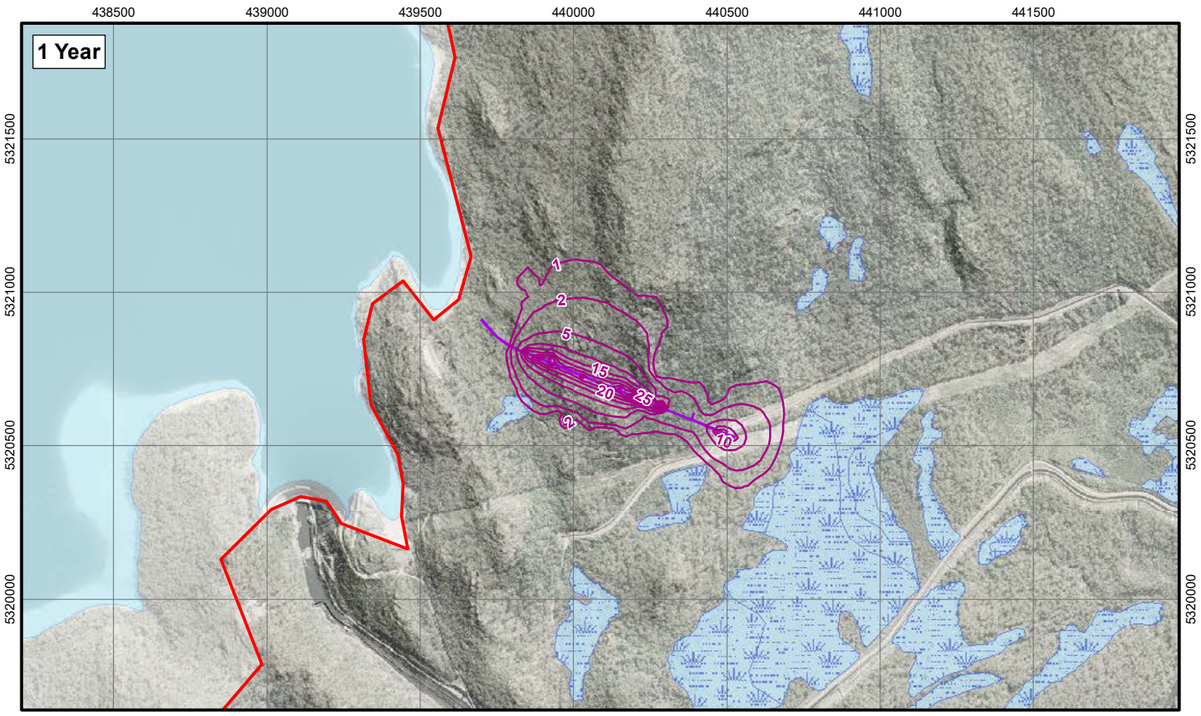
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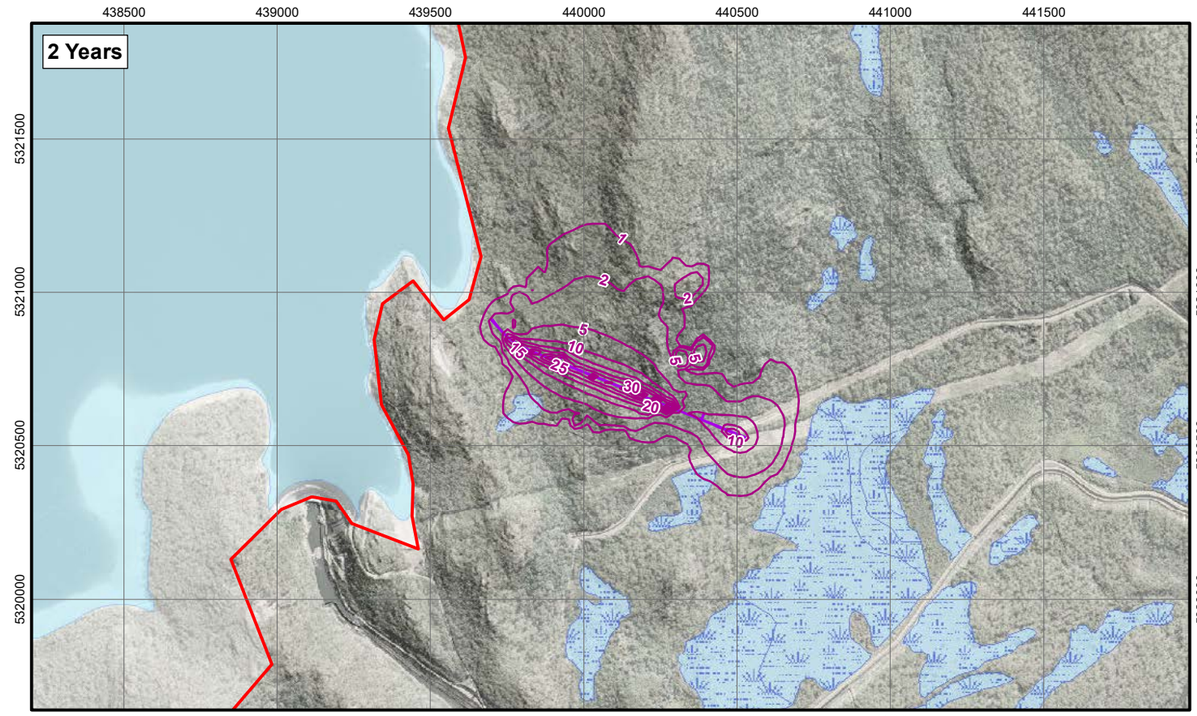
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

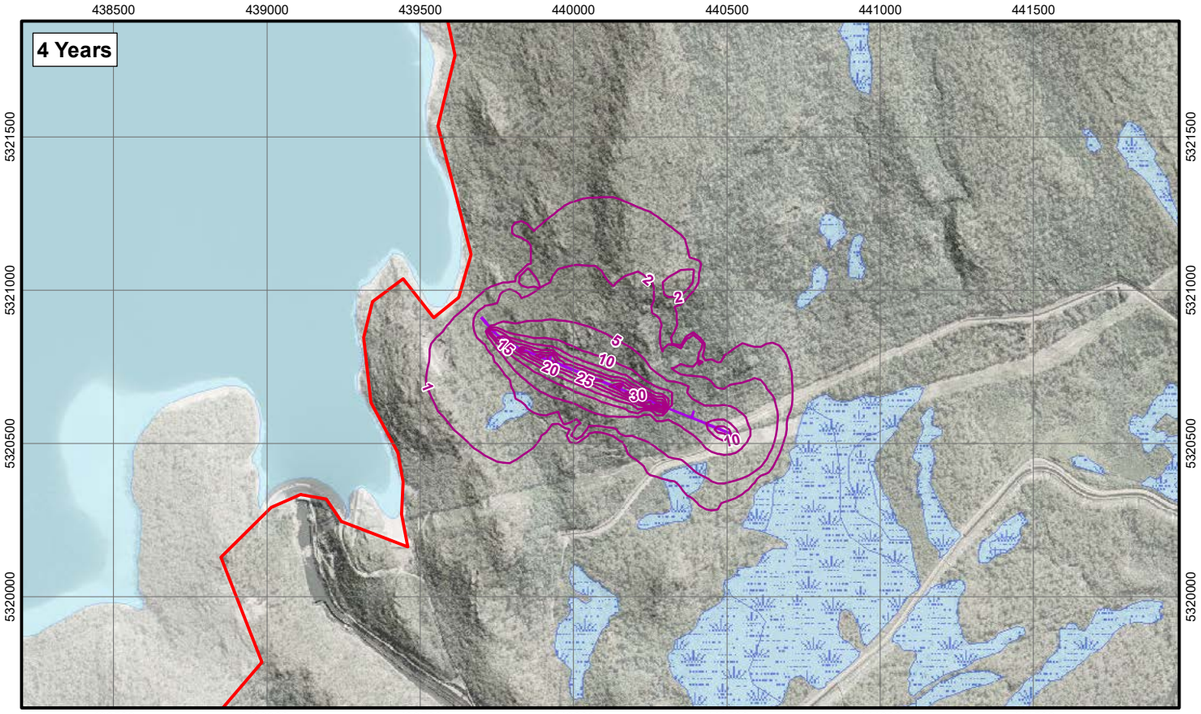
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (BASE CASE)

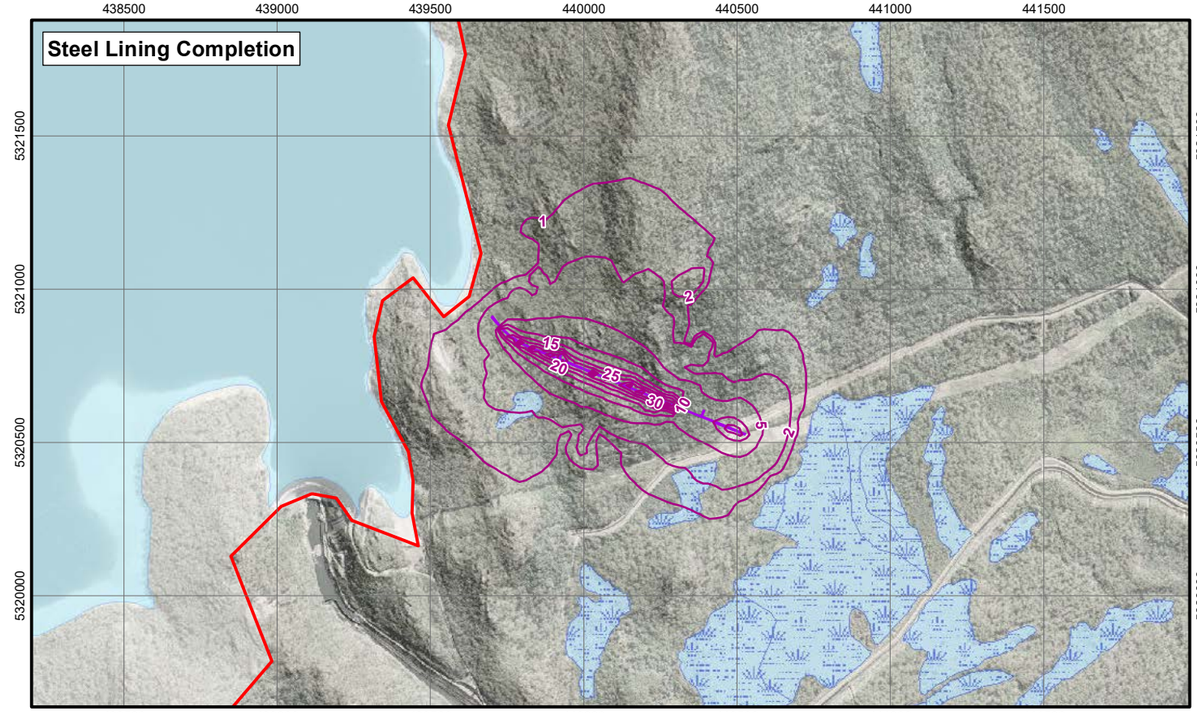
PSM4346-115R | Figure H3-3(a)

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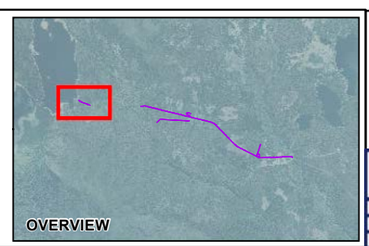






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

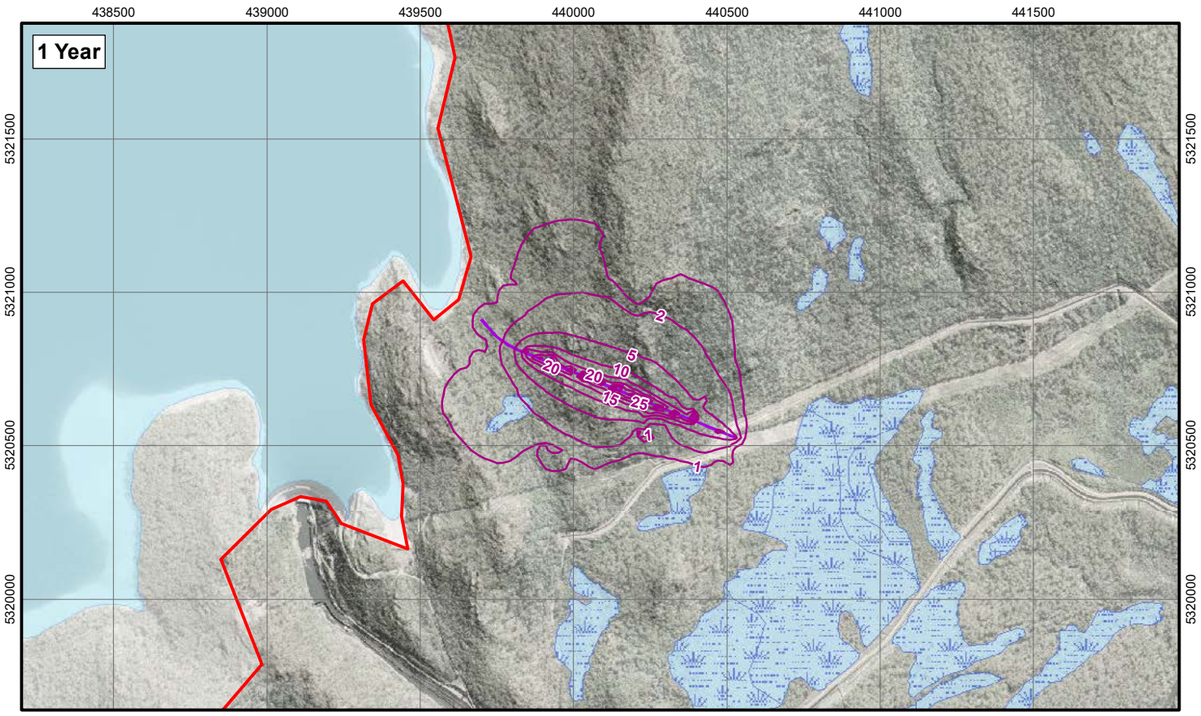
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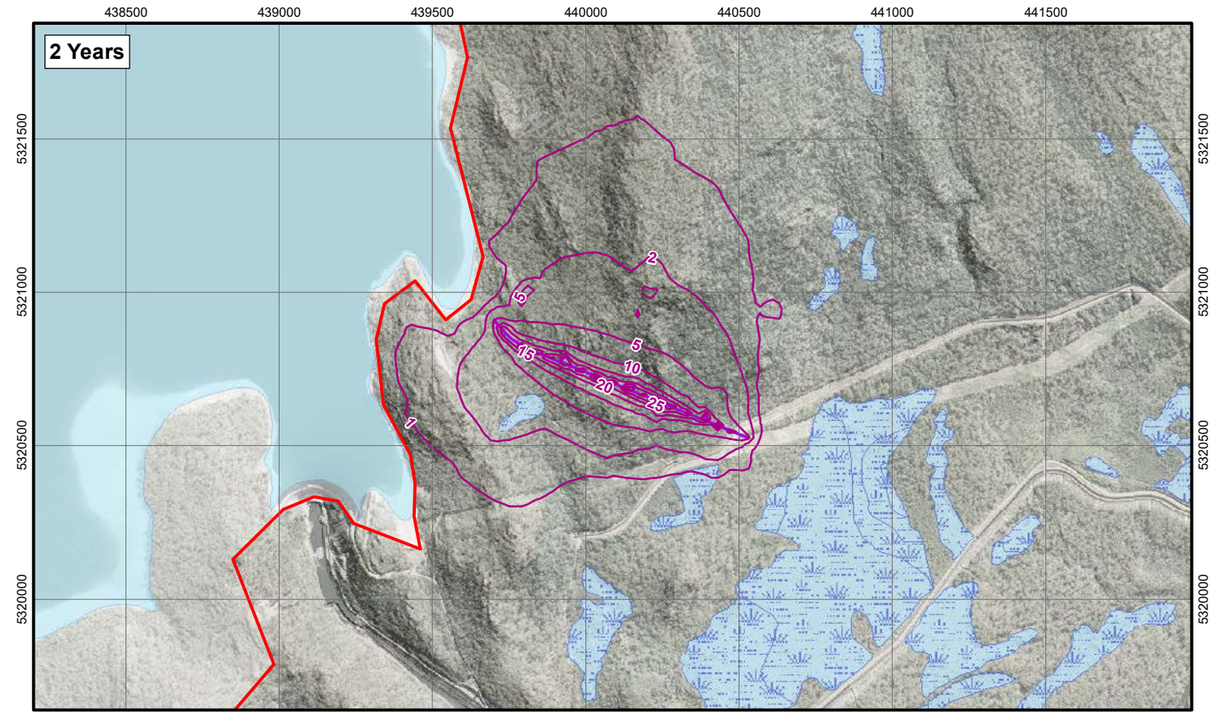
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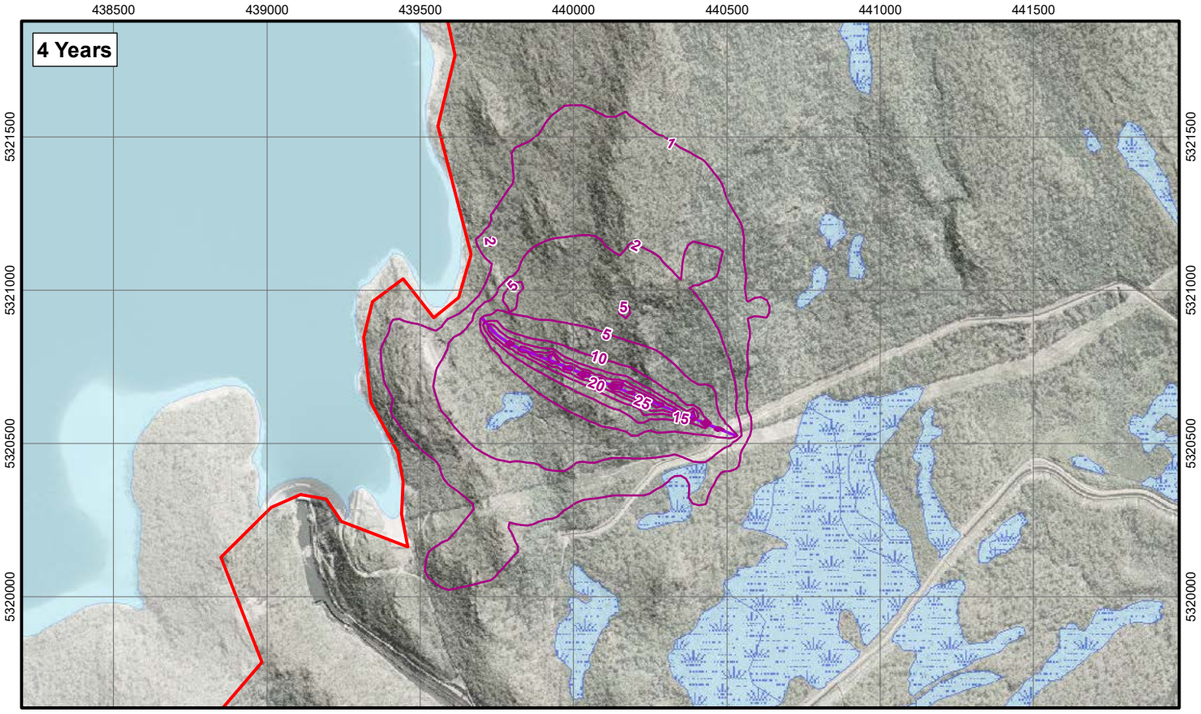
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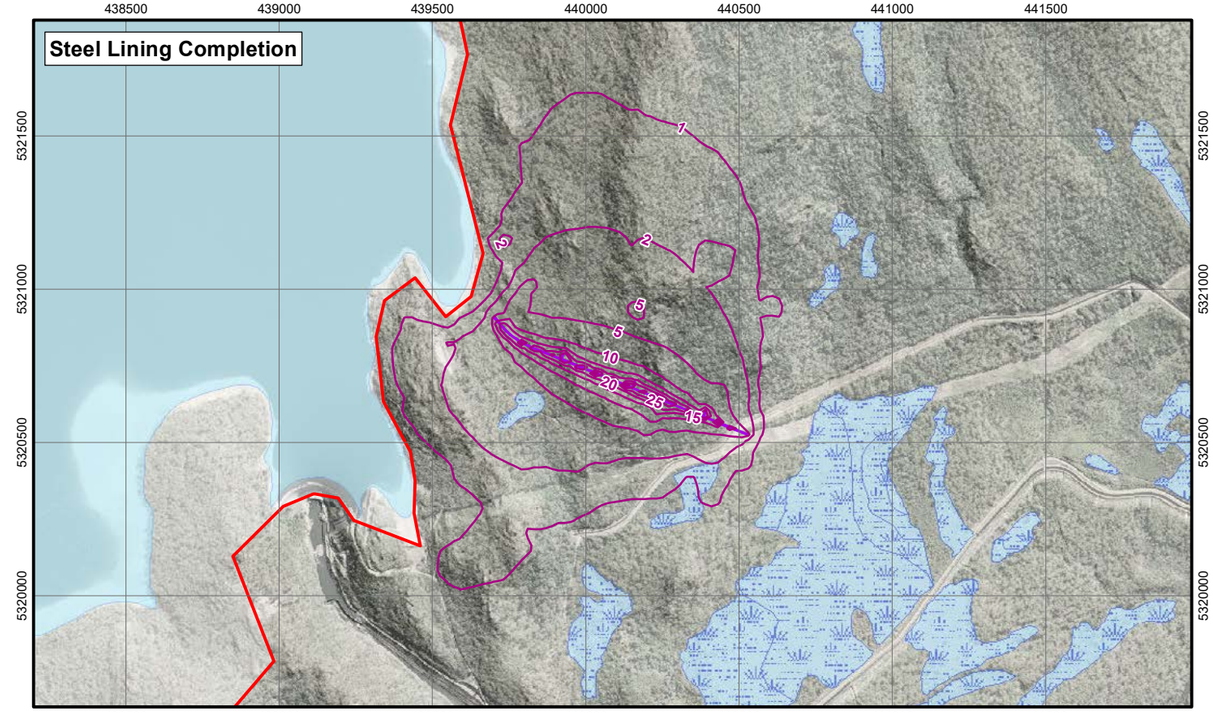
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	Date: 23 Jan 2025	Paper Size: A3	LAKE KING WILLIAM TUNNEL TRANSIENT DRAWDOWN SNAPSHOTS P90 SCHEDULE (LOWER BOUND)
			PSM4346-115R | Figure H3-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H3-3(b) Lake King William Tunnel Transient Drawdown Snapshots P90 Schedule (Lower Bound).mxd



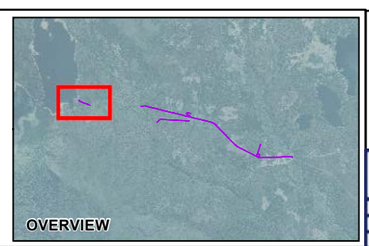






Legend

- Tarraleah Redevelopment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

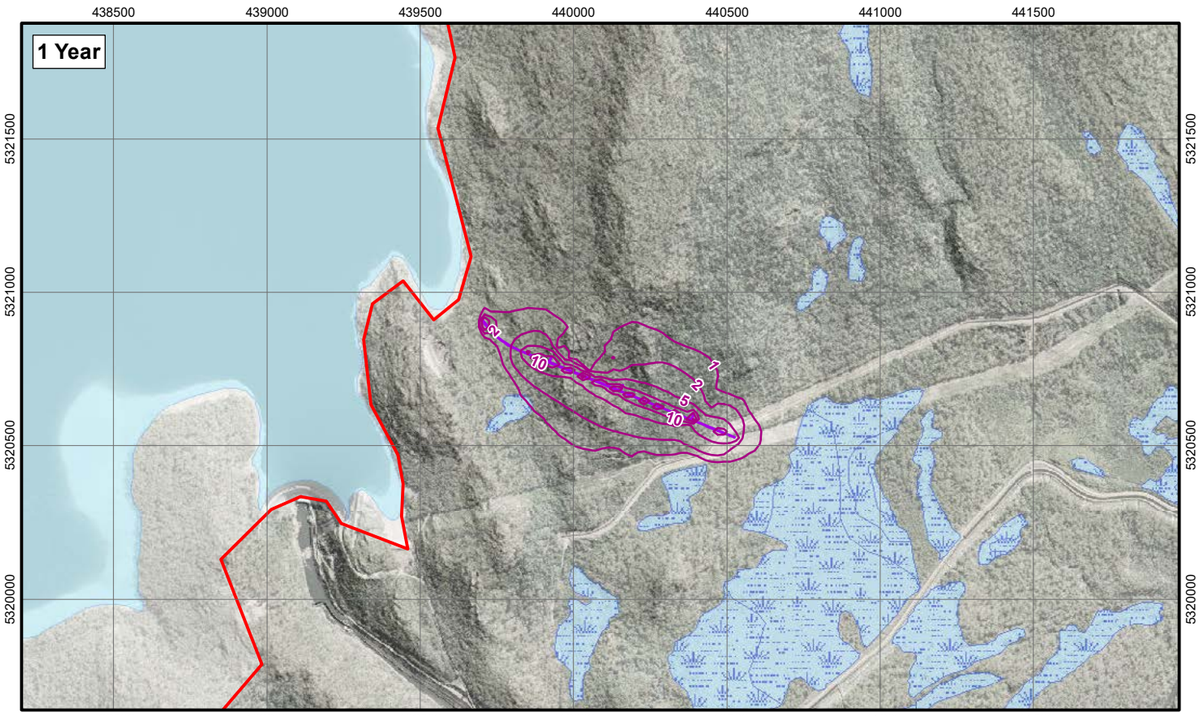
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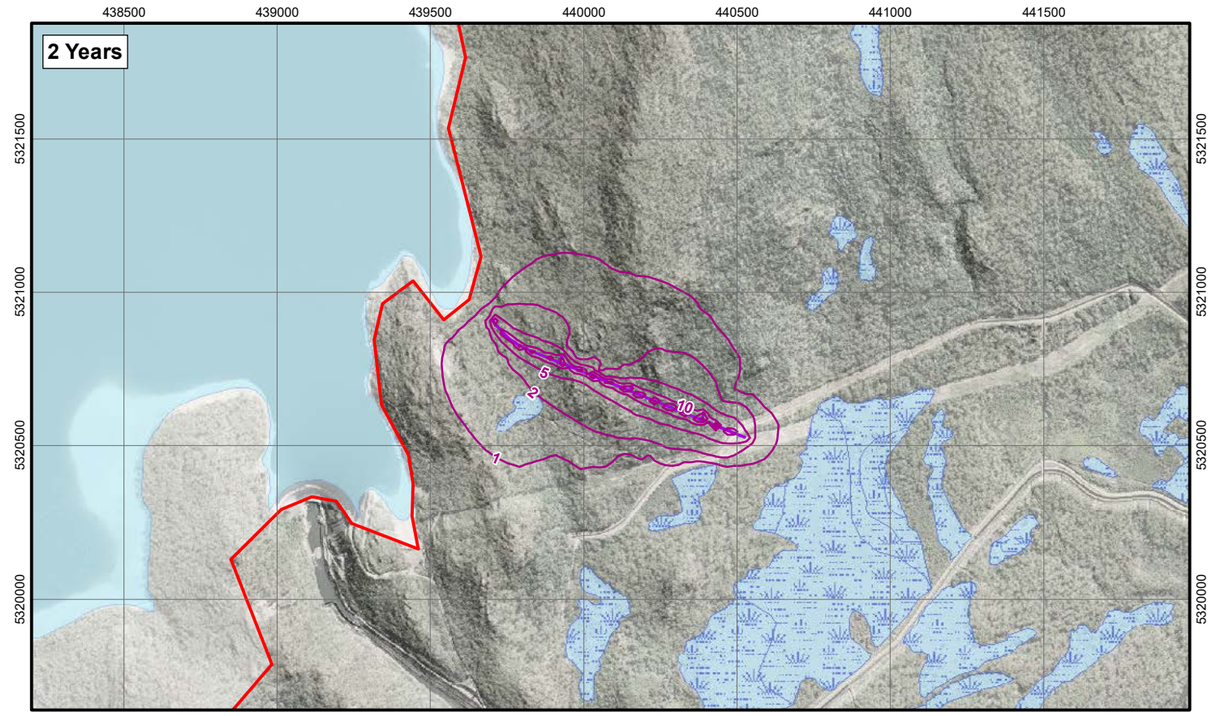
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

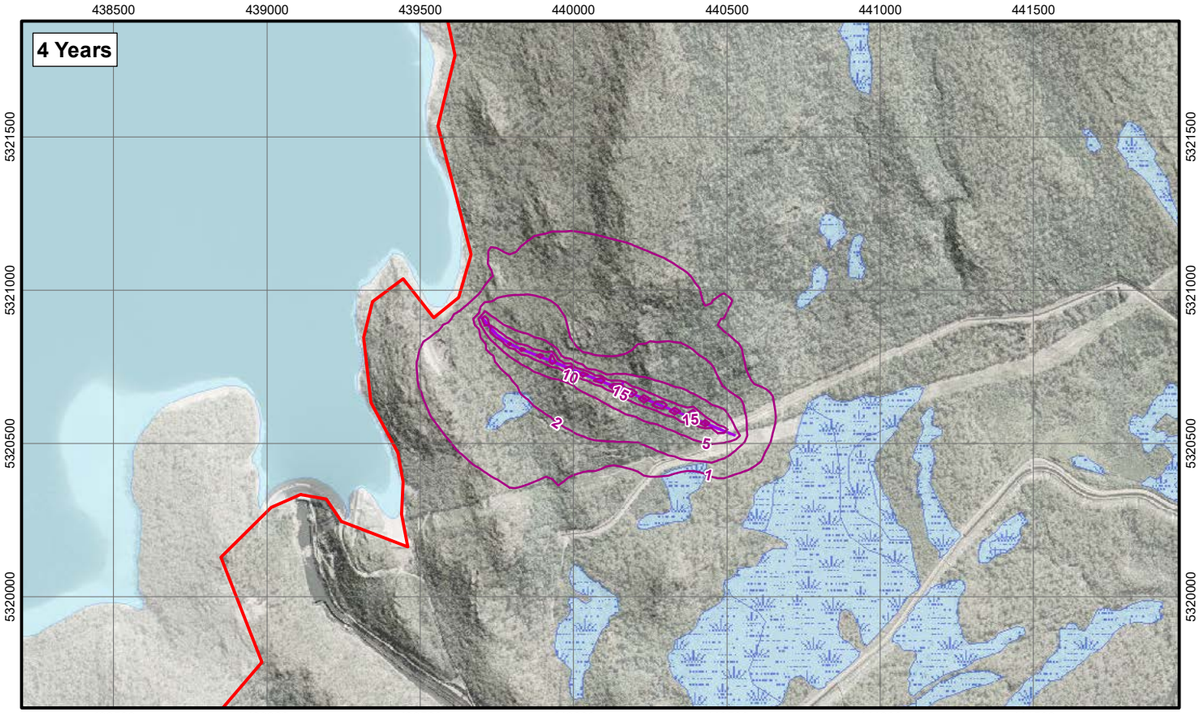
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TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE (UPPER BOUND)

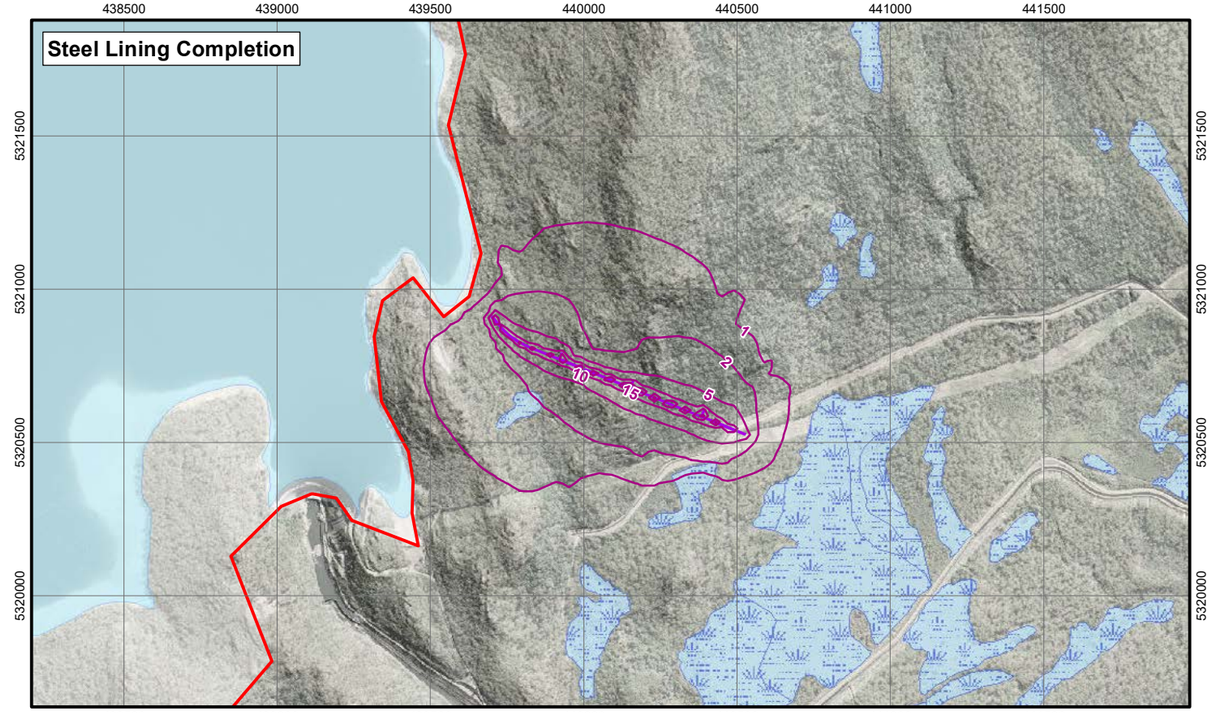
PSM4346-115R | Figure H3-3(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix H\Figure H3-3(c) Lake King William Tunnel Transient Drawdown Snapshots P90 Schedule (Upper Bound).mxd



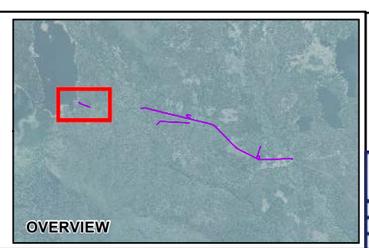






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

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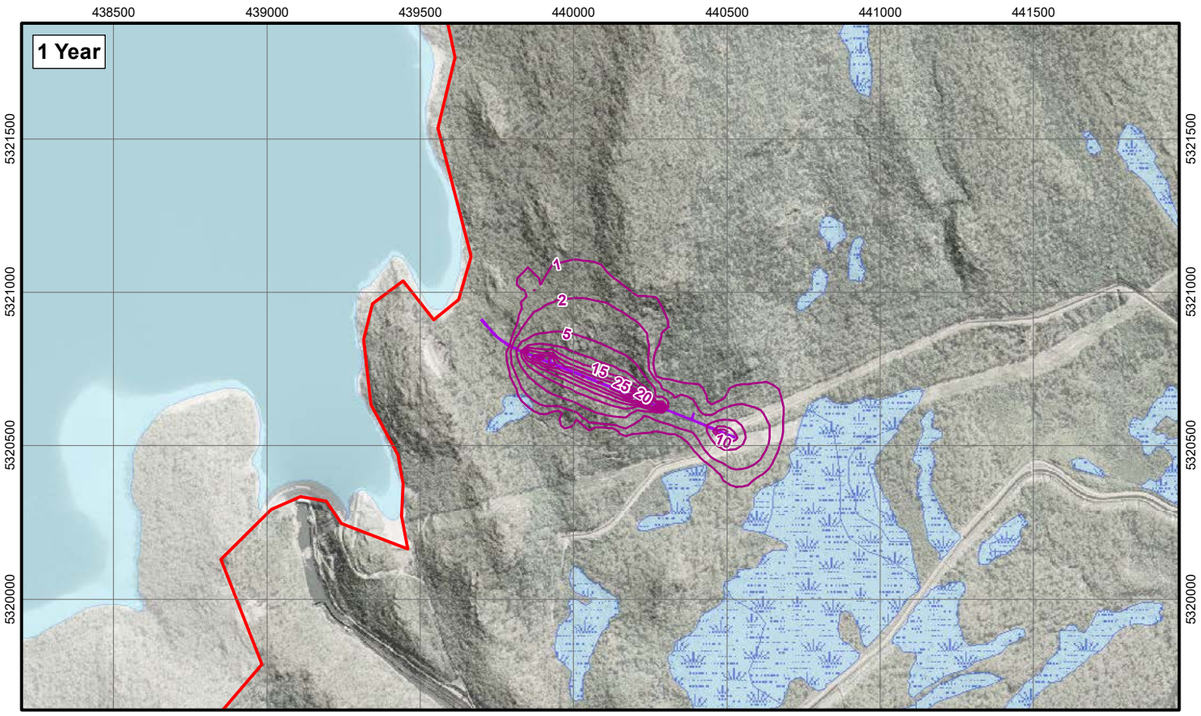
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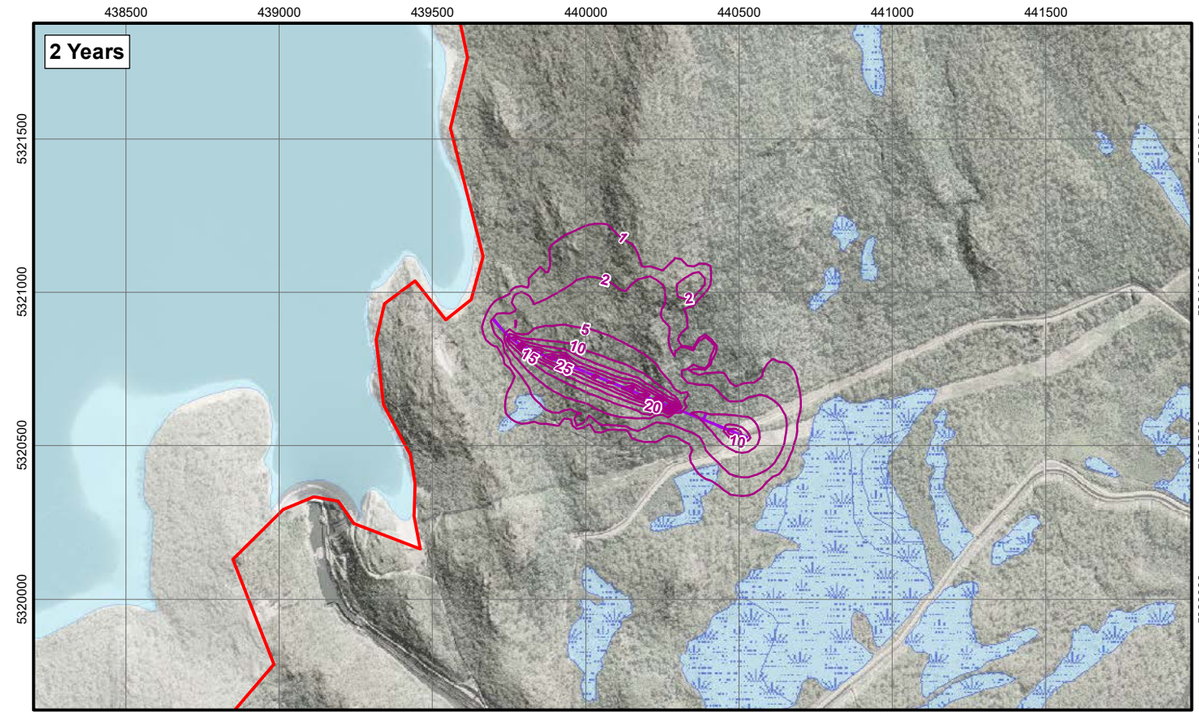
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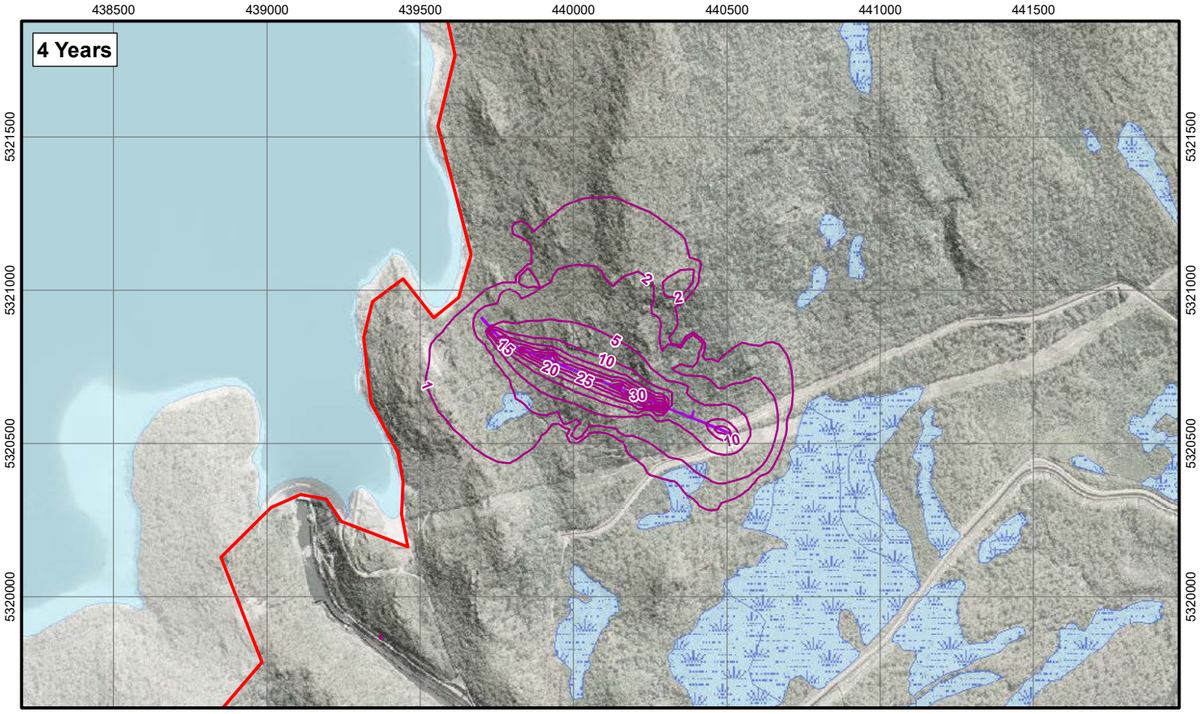
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(BASE CASE)

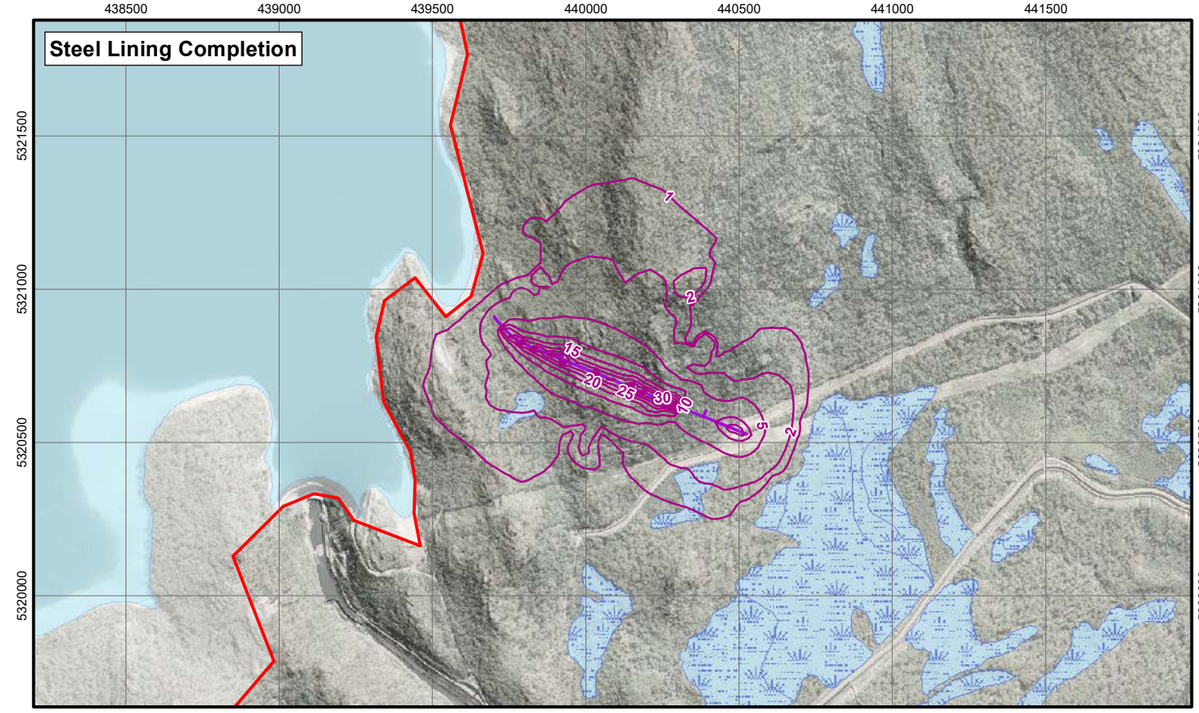
PSM4346-115R | Figure H3-4(a)

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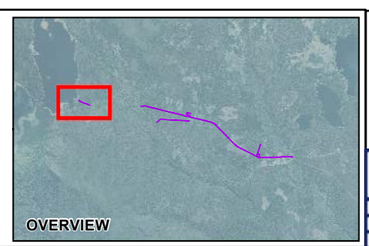






Legend

- Tarraleah Redevelopment Alignment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

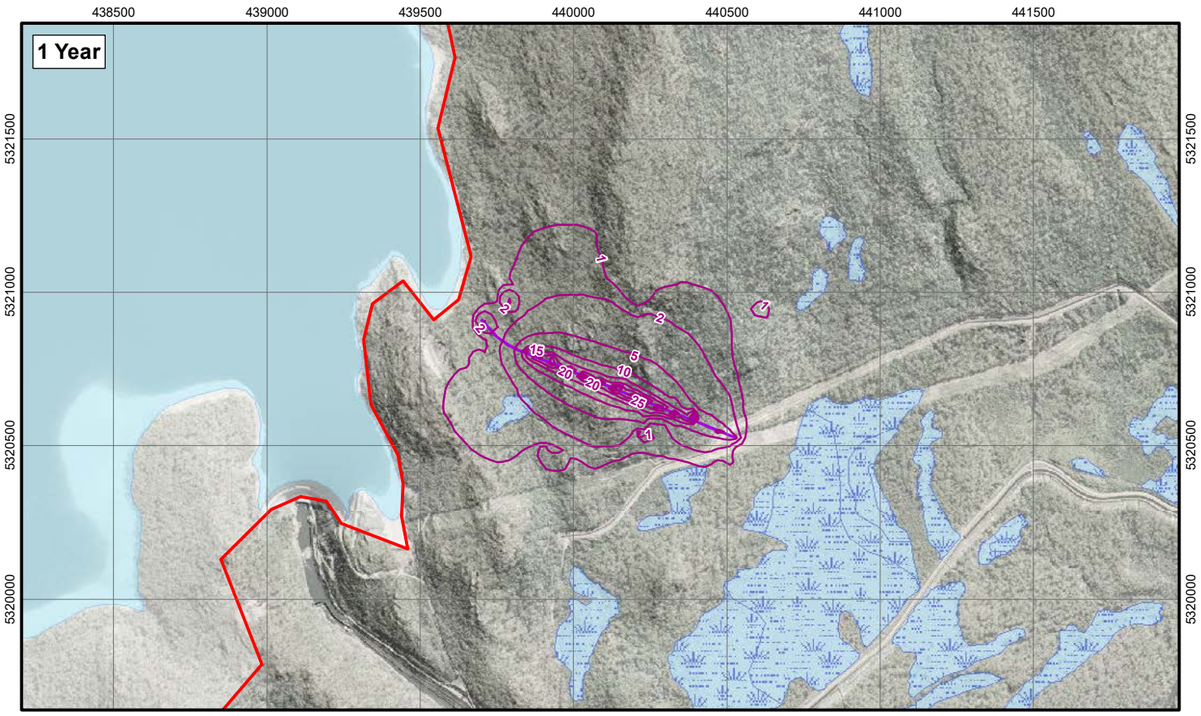
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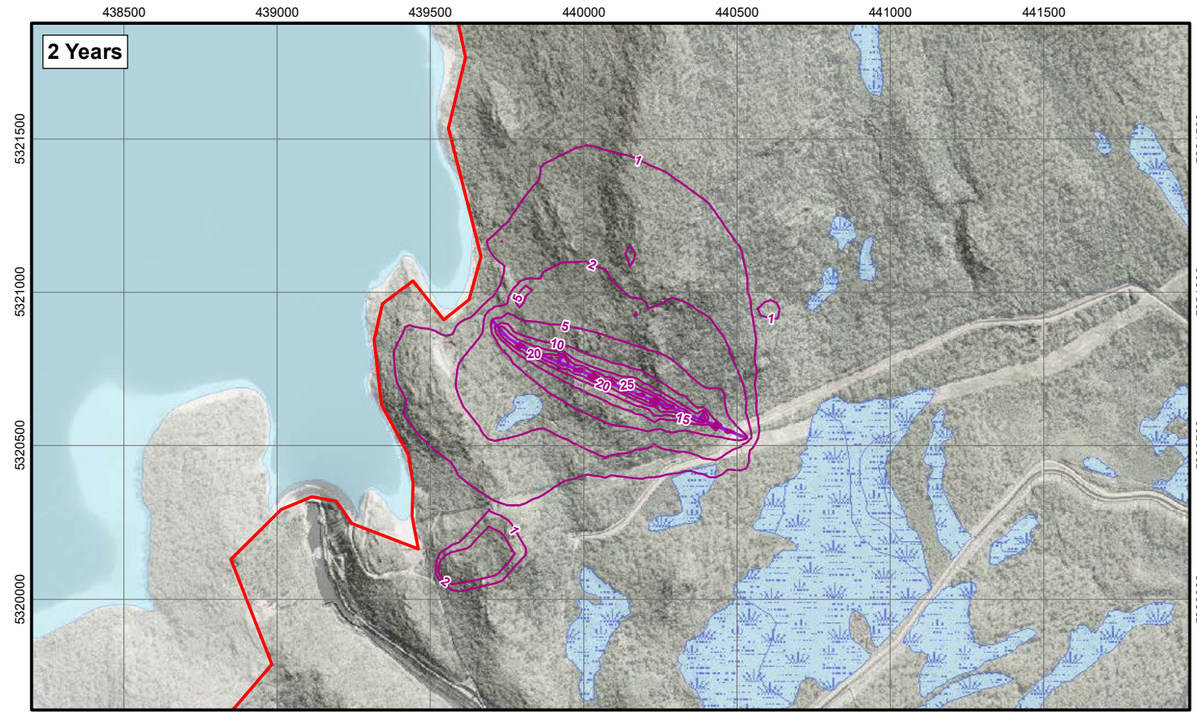
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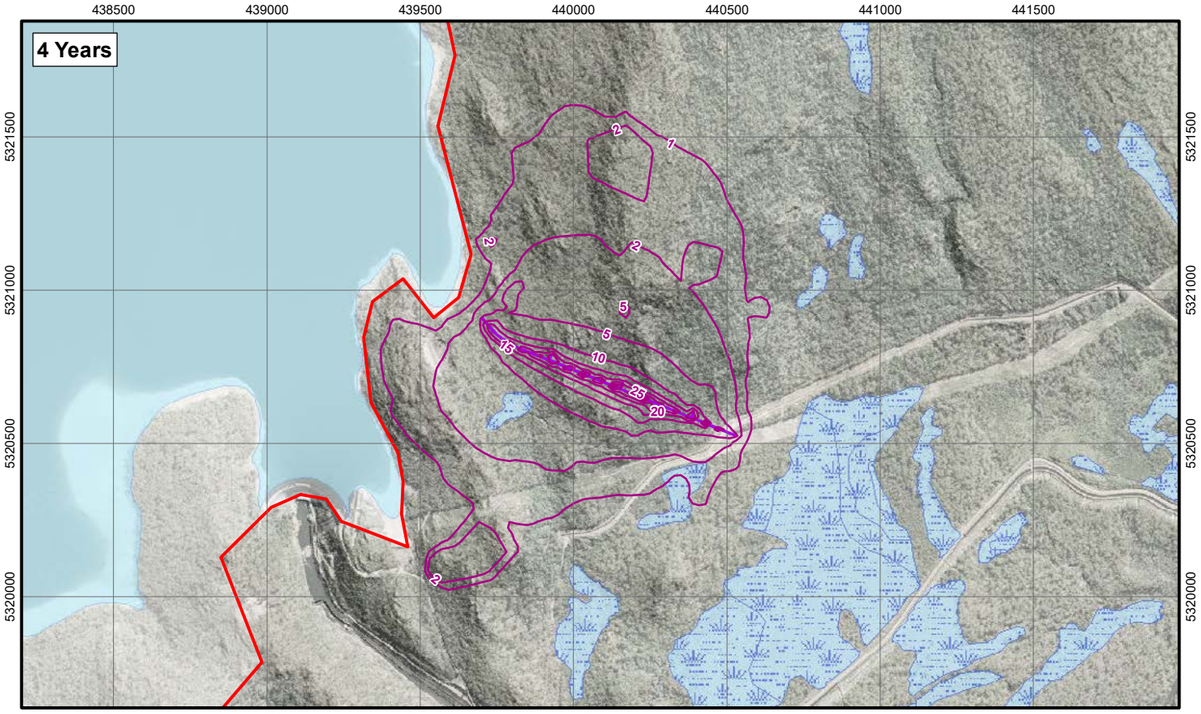
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(LOWER BOUND)

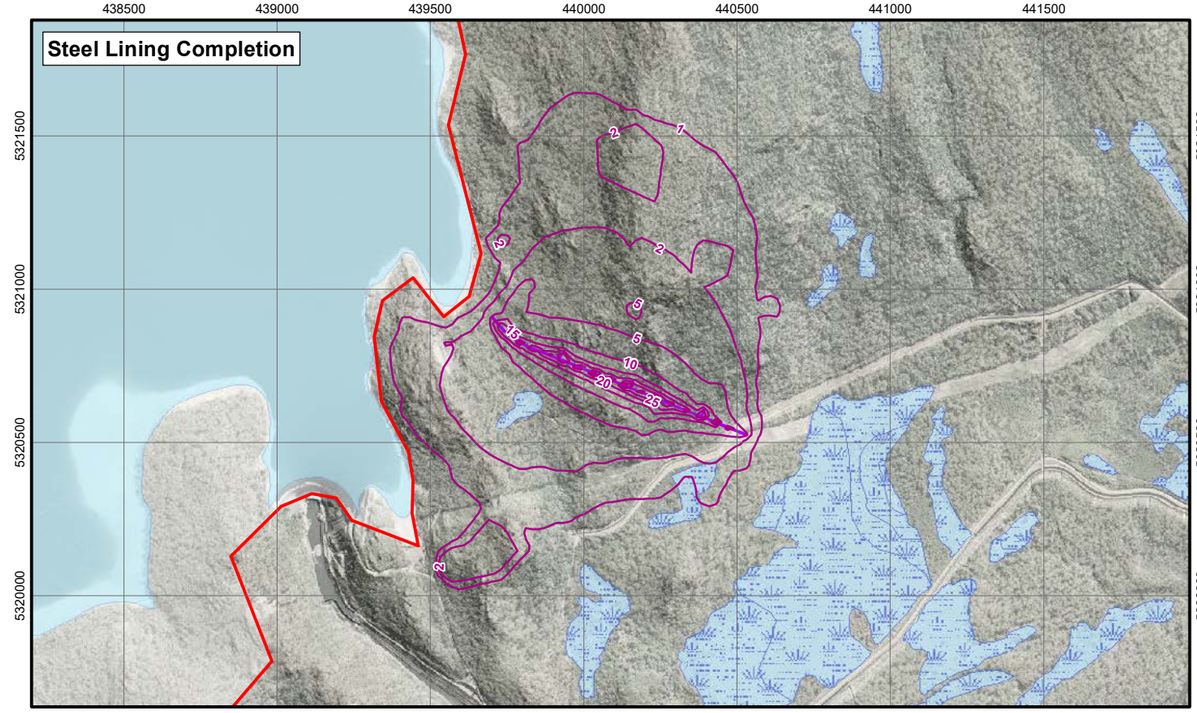
PSM4346-115R | Figure H3-4(b)

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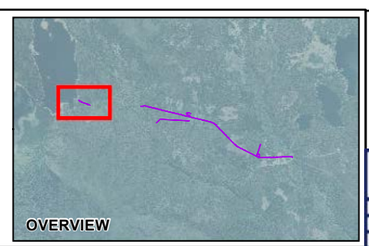






Legend

- Tarraleah Redevelopment
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

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LAKE KING WILLIAM TUNNEL
TRANSIENT DRAWDOWN SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure H3-4(c)

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Appendix I
Construction Stage – Backwards Particle Tracking

- Figure I1 – Simulated Pathlines - Base Schedule
- Figure I2 – Simulated Pathlines - Base Schedule and Grouting
- Figure I3 – Simulated Pathlines - P90 Schedule
- Figure I4 – Simulated Pathlines - P90 Schedule and Grouting

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Particle Pathlines (Years)

- 0 - 1
- 1 - 2

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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			PSM4346-115R | Figure I1(a)

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444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- > 6

- Model Domain
- Mossy Marsh Tunnel

- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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SIMULATED PATHLINES
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure I1(b)

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5322000 5320000 5318000 5316000

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- > 6

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED PATHLINES
BASE SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure I2(a)

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- > 6

- Model Domain
- Mossy Marsh Tunnel

- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Date: 23 Jan 2025	Paper Size: A3	SIMULATED PATHLINES BASE SCHEDULE - GROUTING (UPPER BOUND)	PSM4346-115R | Figure I2(b)

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Particle Pathlines (Years)

- 0 - 1
- 1 - 2

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 23 Jan 2025	Paper Size: A3	SIMULATED PATHLINES P90 SCHEDULE (LOWER BOUND)
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5322000 5320000 5318000 5316000

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Particle Pathlines (Years)

- 0 - 1
- 1 - 2

OVERVIEW

Lake King William Outlet

Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED PATHLINES
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure I3(b)

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)
  - 2 - 3
  - 3 - 4
  - 4 - 5
  - 5 - 6
  - > 6
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Particle Pathlines (Years)

- 0 - 1
- 1 - 2

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N
Scale 1:30,000
0 0.25 0.5 1 1.5 Km
Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

SIMULATED PATHLINES
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure I4(a)

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5322000 5320000 5318000 5316000

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

Scale 1:7,500
0 50 100 200 300 m

INSET - Tarraleah Power Station

Scale 1:15,000
0 100 200 400 600 m

INSET - Lake King William Outlet

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Prior to Steel Lining Completion (m AHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- > 6

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

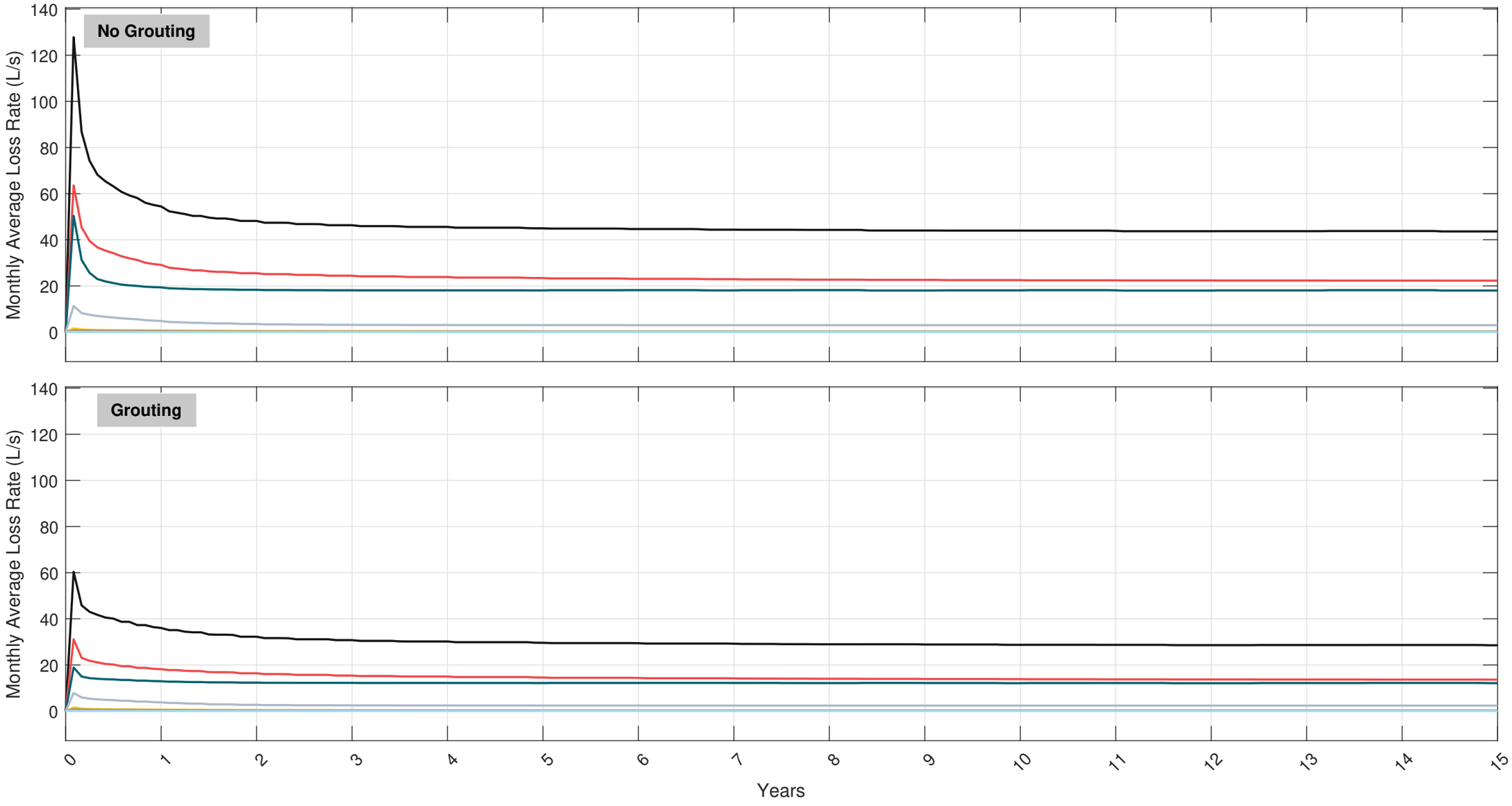
SIMULATED PATHLINES
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure I4(b)

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Appendix J
Operation Stage – Water Loss Assessment

- Figure J1 - Simulated Water Loss Rate - Base Schedule
- Figure J2 - Simulated Water Loss Rate - P90 Schedule
- Figure J3 - Simulated Water Loss Volume - Base Schedule
- Figure J4 - Simulated Water Loss Volume - P90 Schedule
- Figure J5 - Induced Discharge Locations - Base Schedule
- Figure J6 - Induced Discharge Locations - P90 Schedule
- Figure J7 - Simulated Net Surface Discharge Rate - Base Schedule
- Figure J8 - Simulated Net Surface Discharge Rate - P90 Schedule
- Figure J9 –Simulated Surface Discharge Volume Rate - Base Schedule
- Figure J10 –Simulated Surface Discharge Volume Rate - P90 Schedule



Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

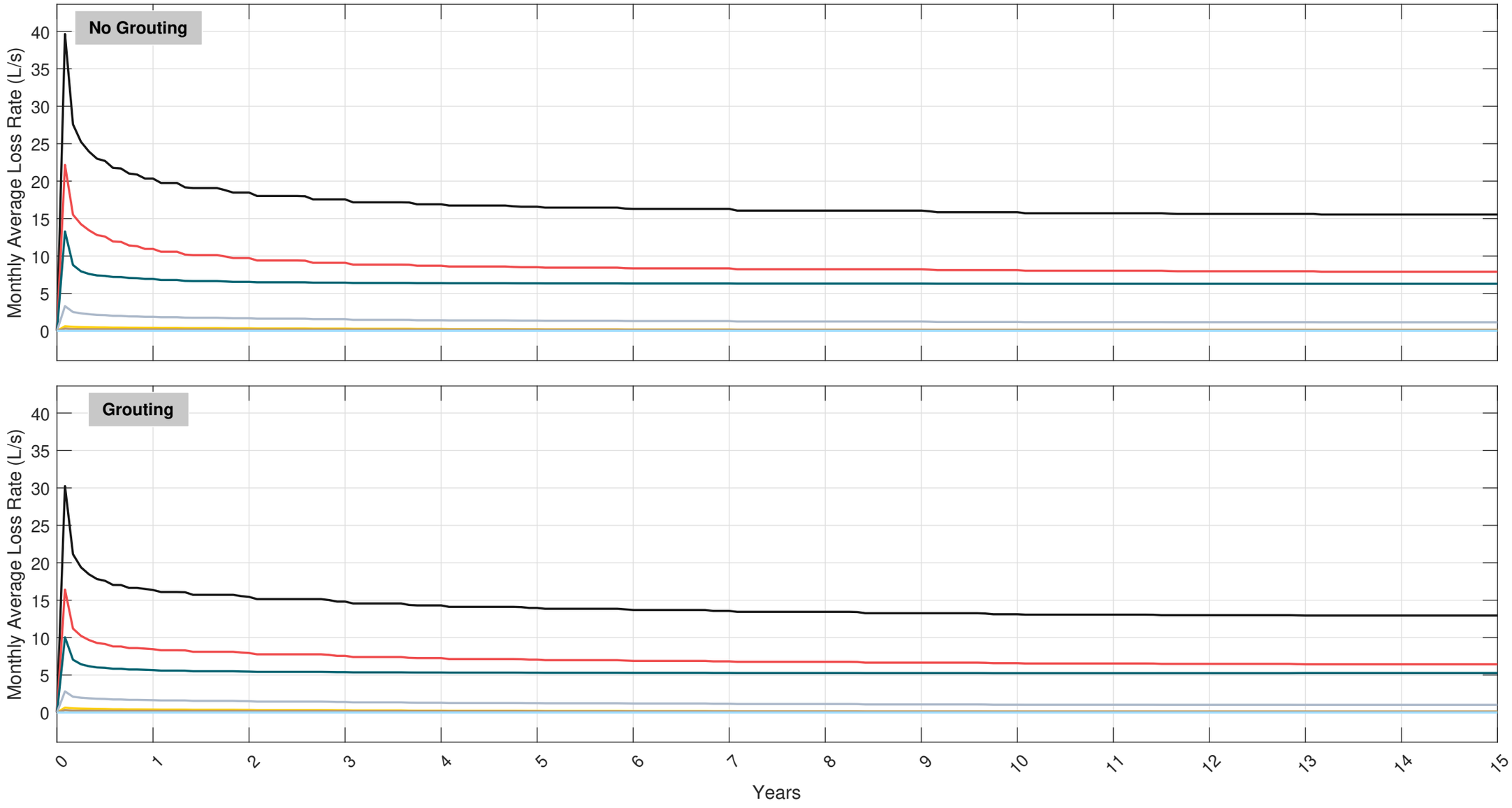
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TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
BASE SCHEDULE (BASE CASE)

PSM4346-115R | Figure J1-1 (a)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

Notes:

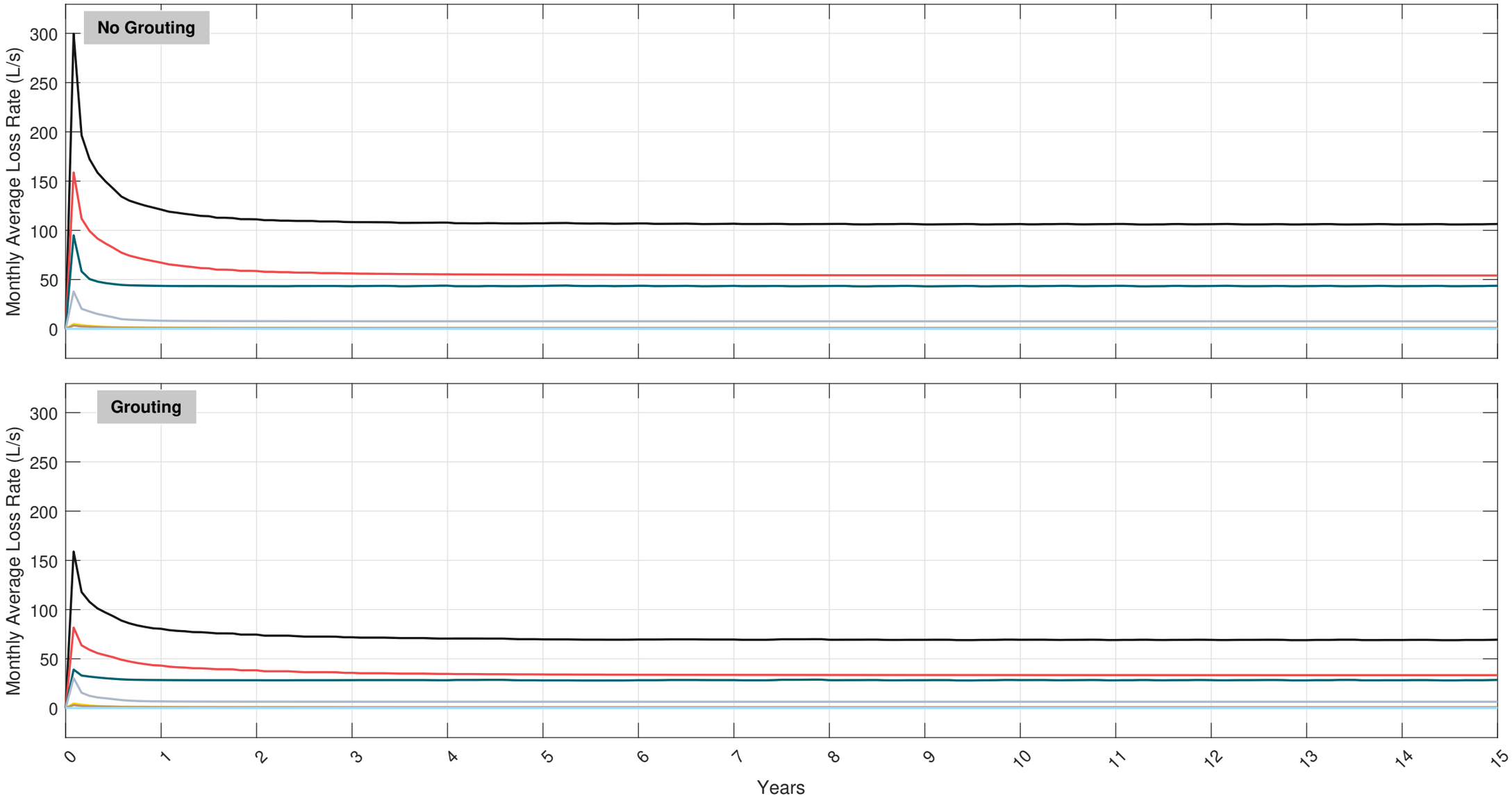
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Hydrogeological Interpretive Report

TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure J1-1 (b)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

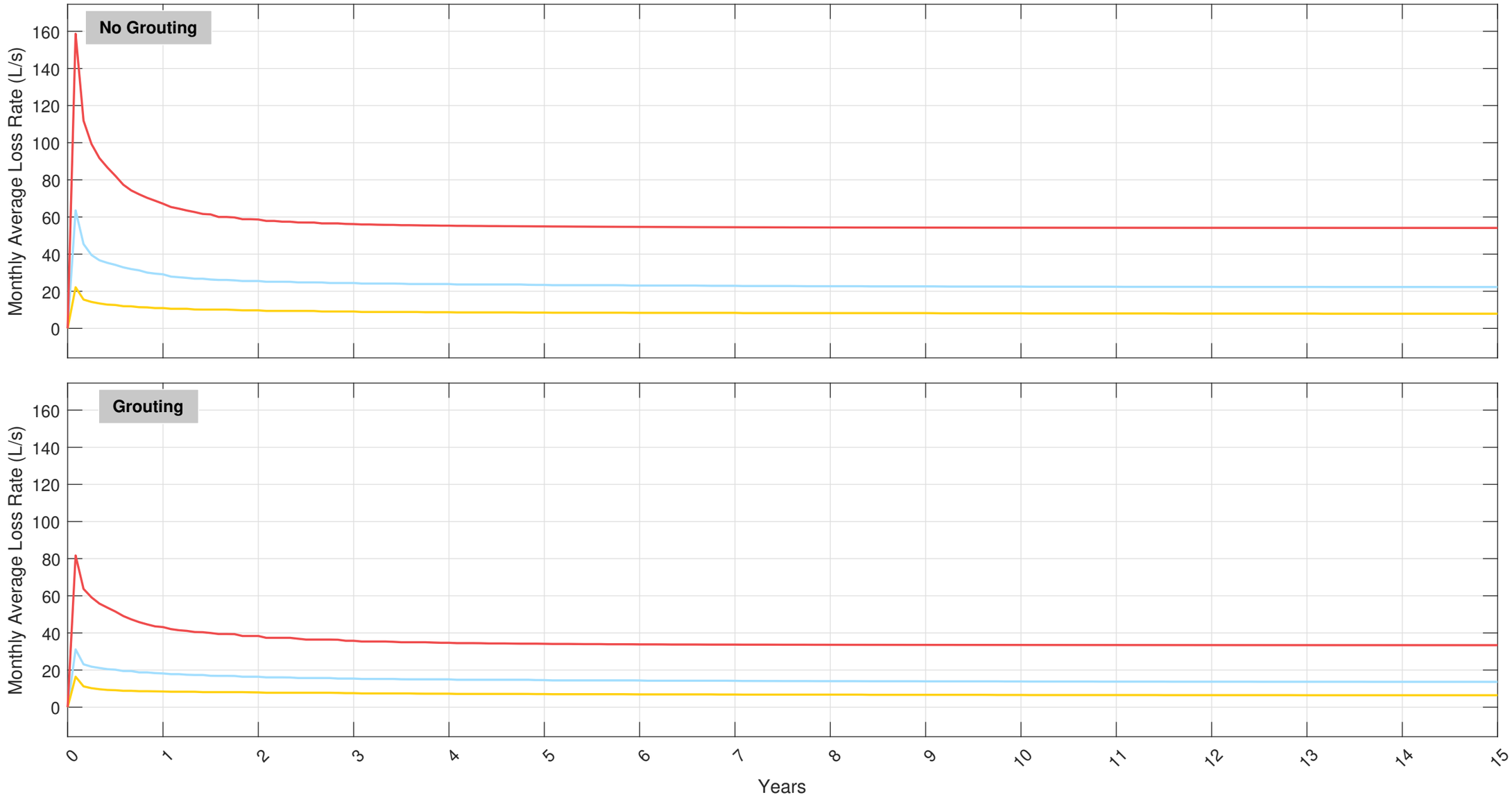
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TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure J1-1 (c)

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Base Case

Lower Bound

Upper Bound

Notes:

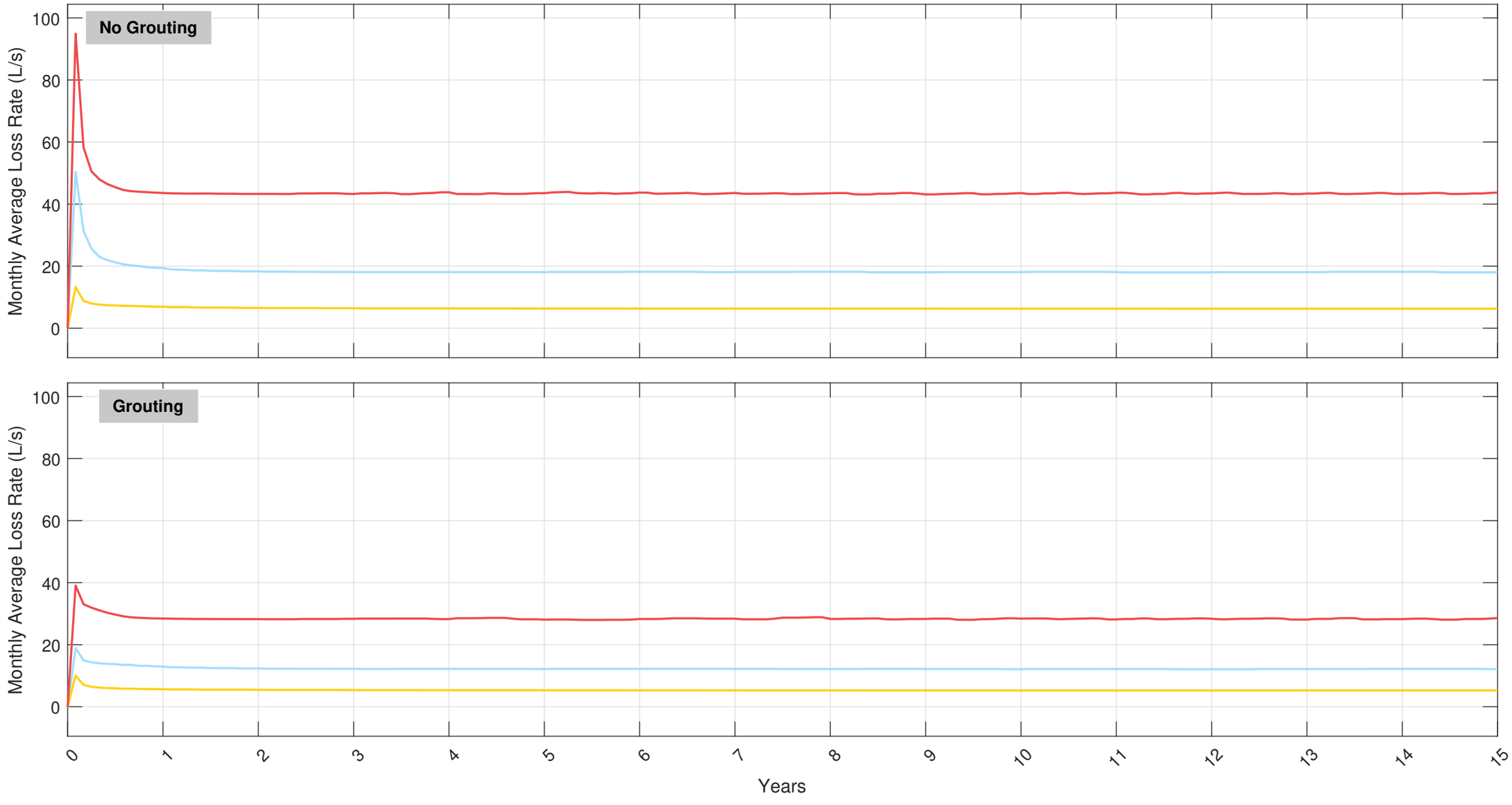
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

HEADRACE TUNNEL
SIMULATED WATER LOSS RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-2

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Base Case

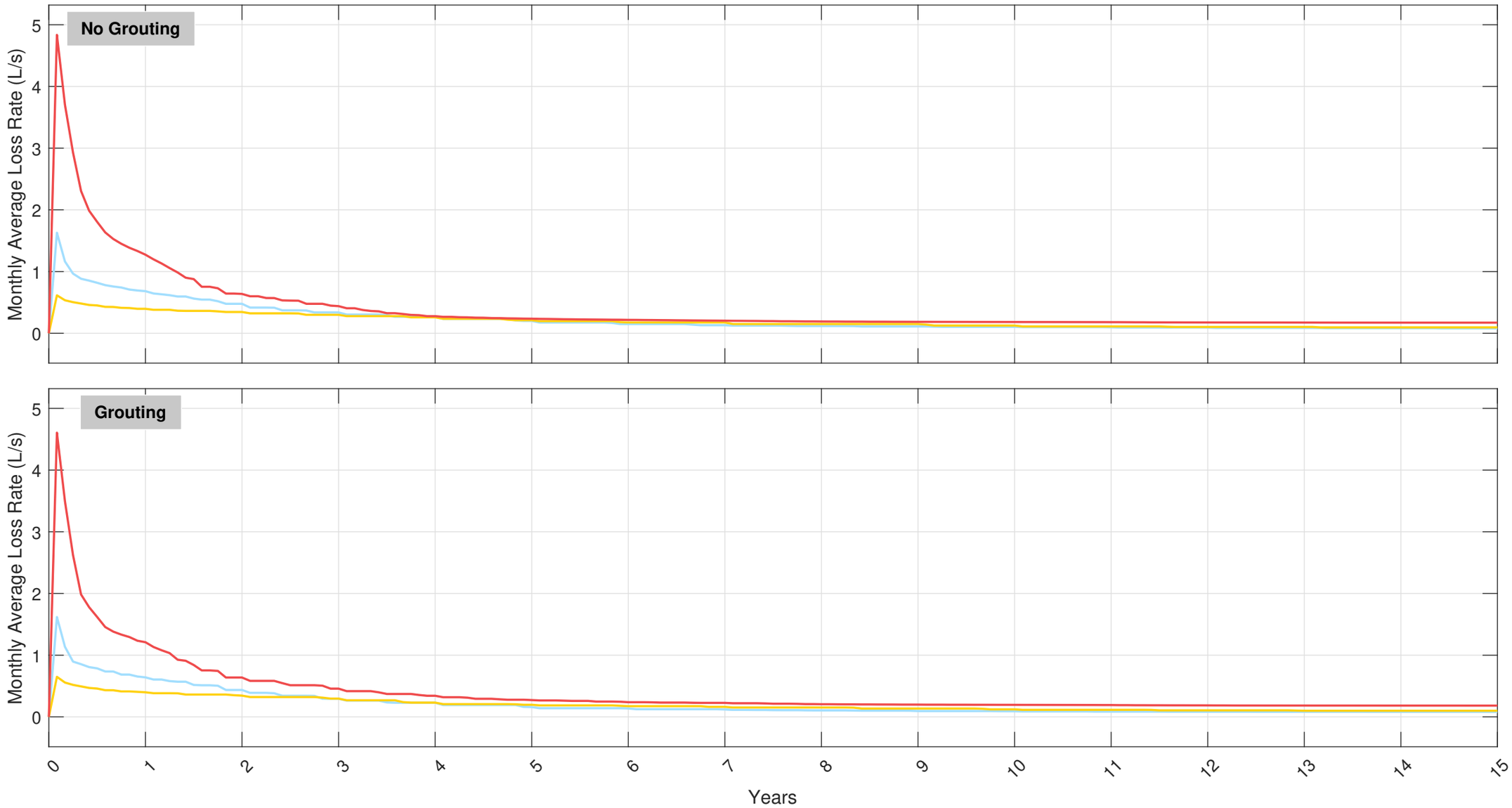
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Upper Bound

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Base Case

Lower Bound

Upper Bound

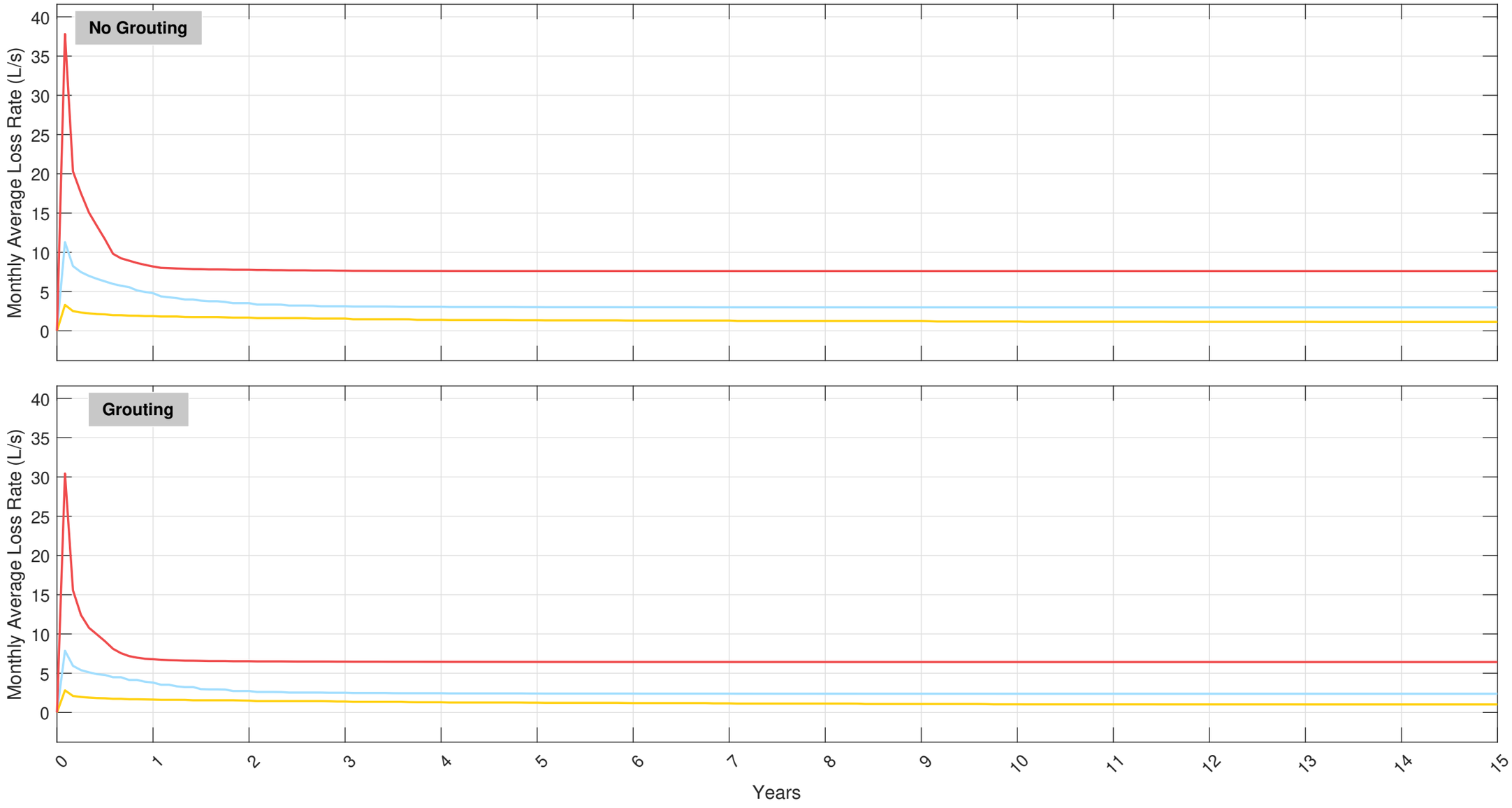
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
MID ACCESS TUNNEL
SIMULATED WATER LOSS RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-4

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Base Case

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Upper Bound

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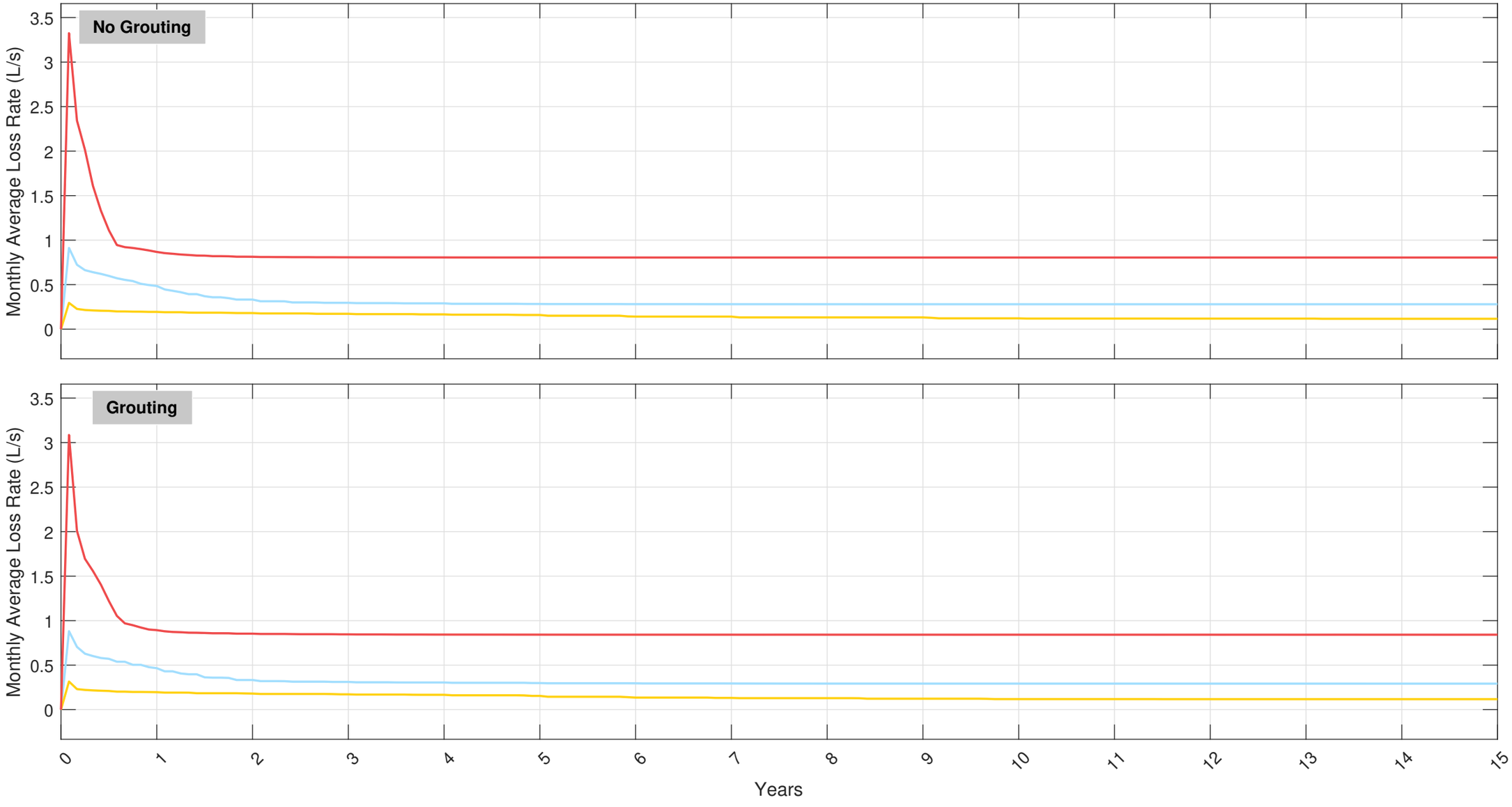
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Hydrogeological Interpretive Report

SURGE ACCESS TUNNEL
SIMULATED WATER LOSS RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-5

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Base Case

Lower Bound

Upper Bound

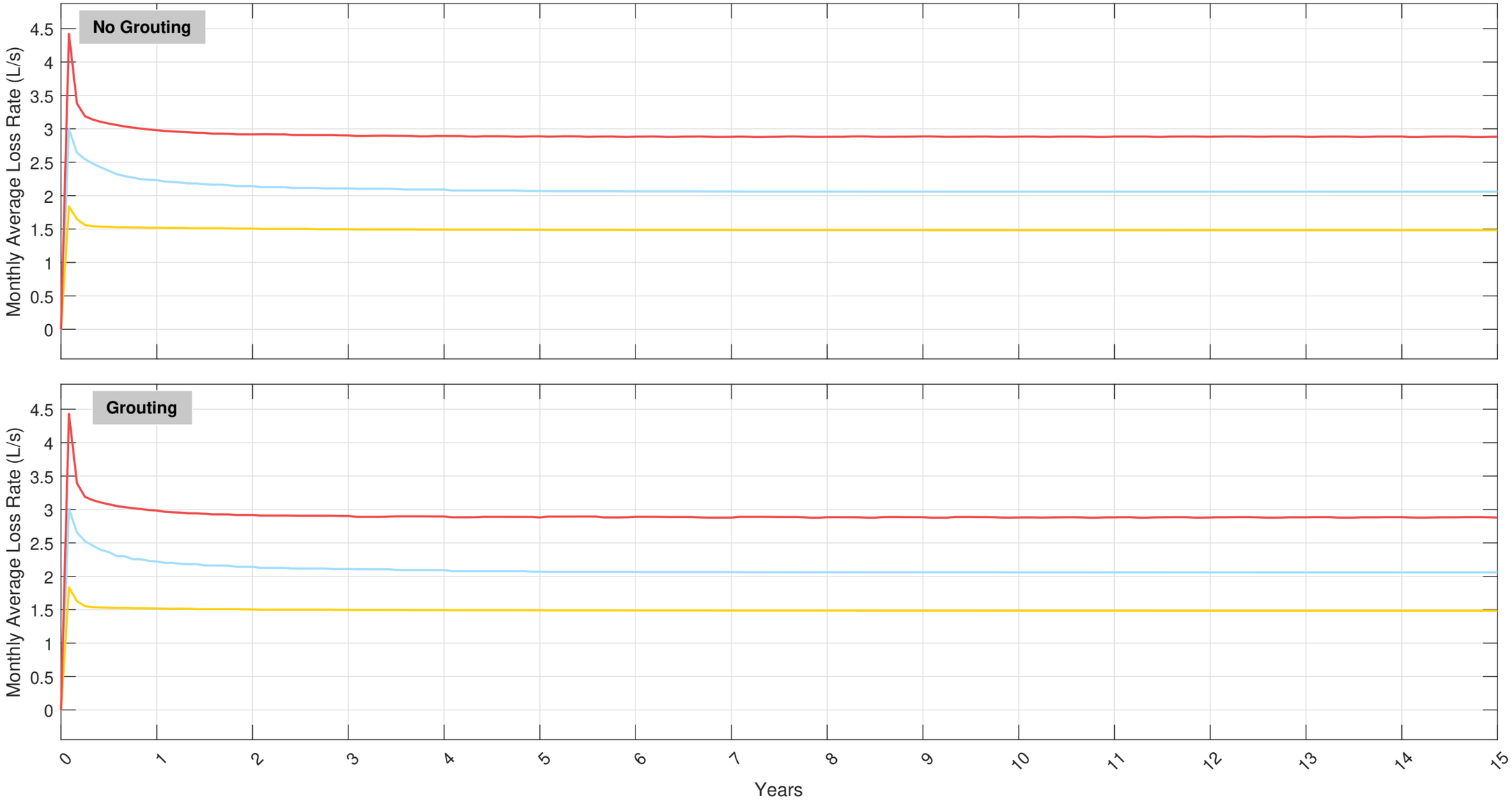
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Hydro Tasmania
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SURGE SHAFT AND CHAMBER
SIMULATED WATER LOSS RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-6

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Base Case

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Upper Bound

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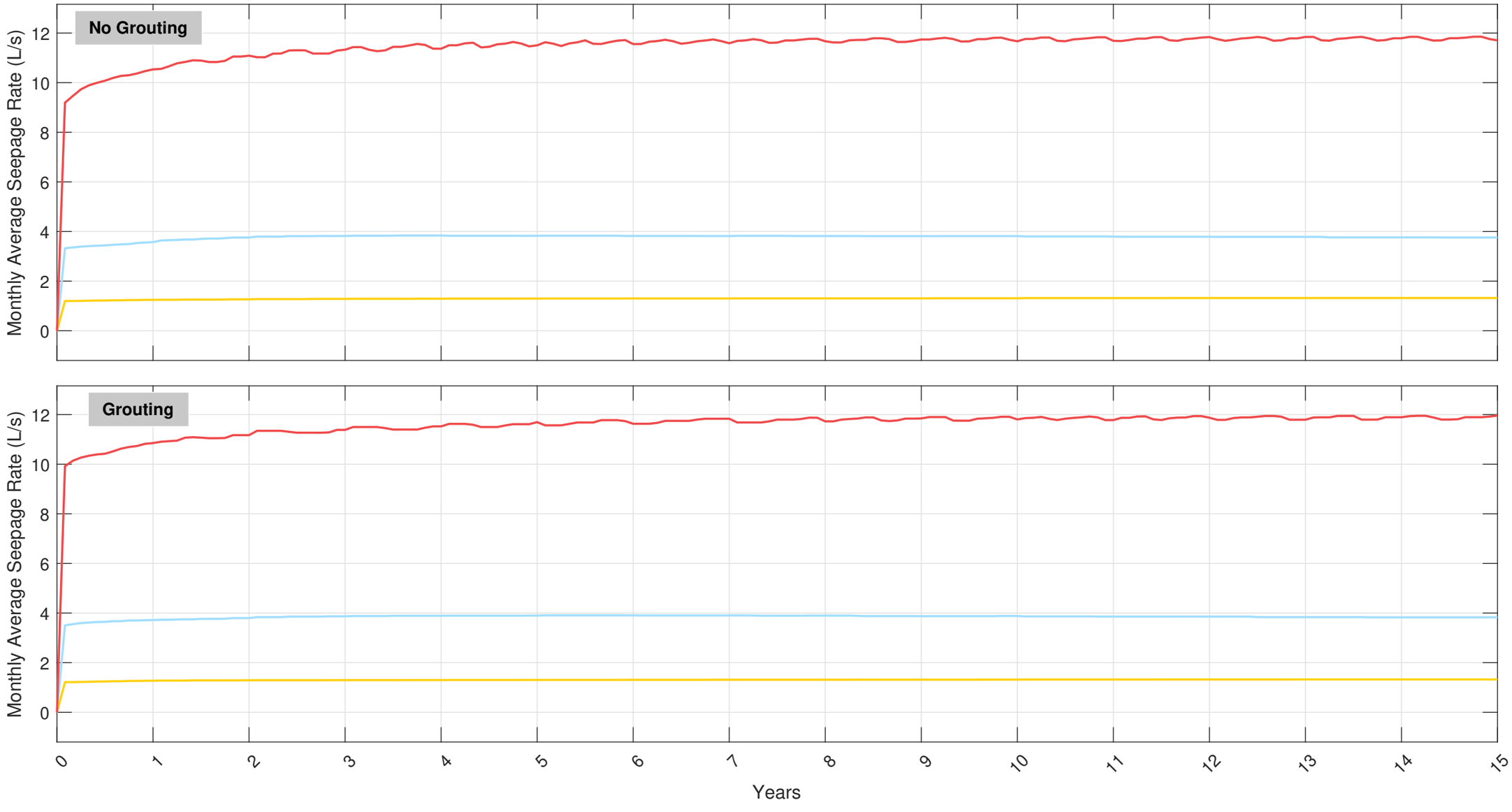
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LAKE KING WILLIAM TUNNEL
SIMULATED WATER LOSS RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-7

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Base Case

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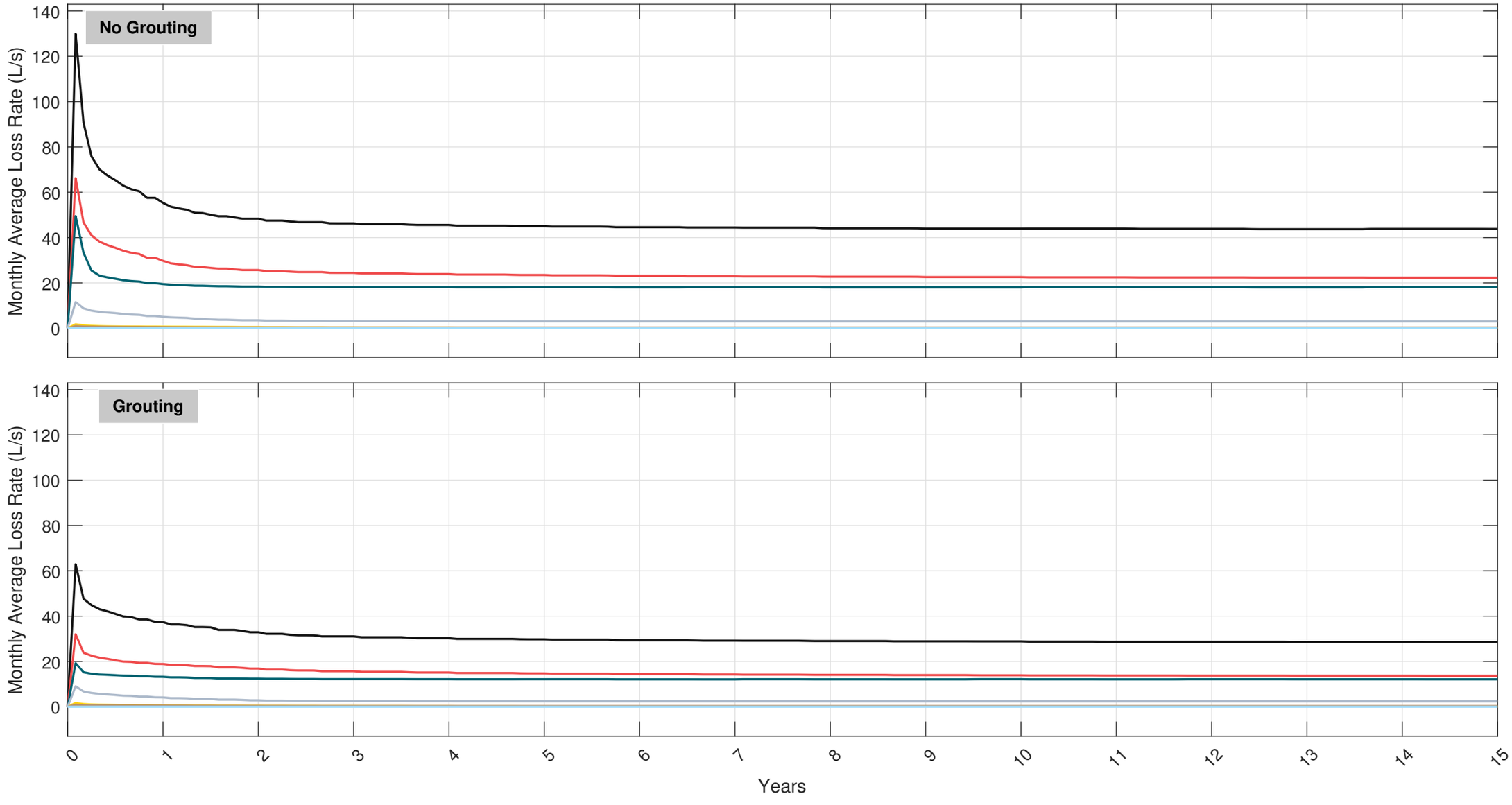
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MOSSY MARSH TUNNEL
SIMULATED WATER SEEPAGE RATE
BASE SCHEDULE

PSM4346-115R | Figure J1-8

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

Notes:

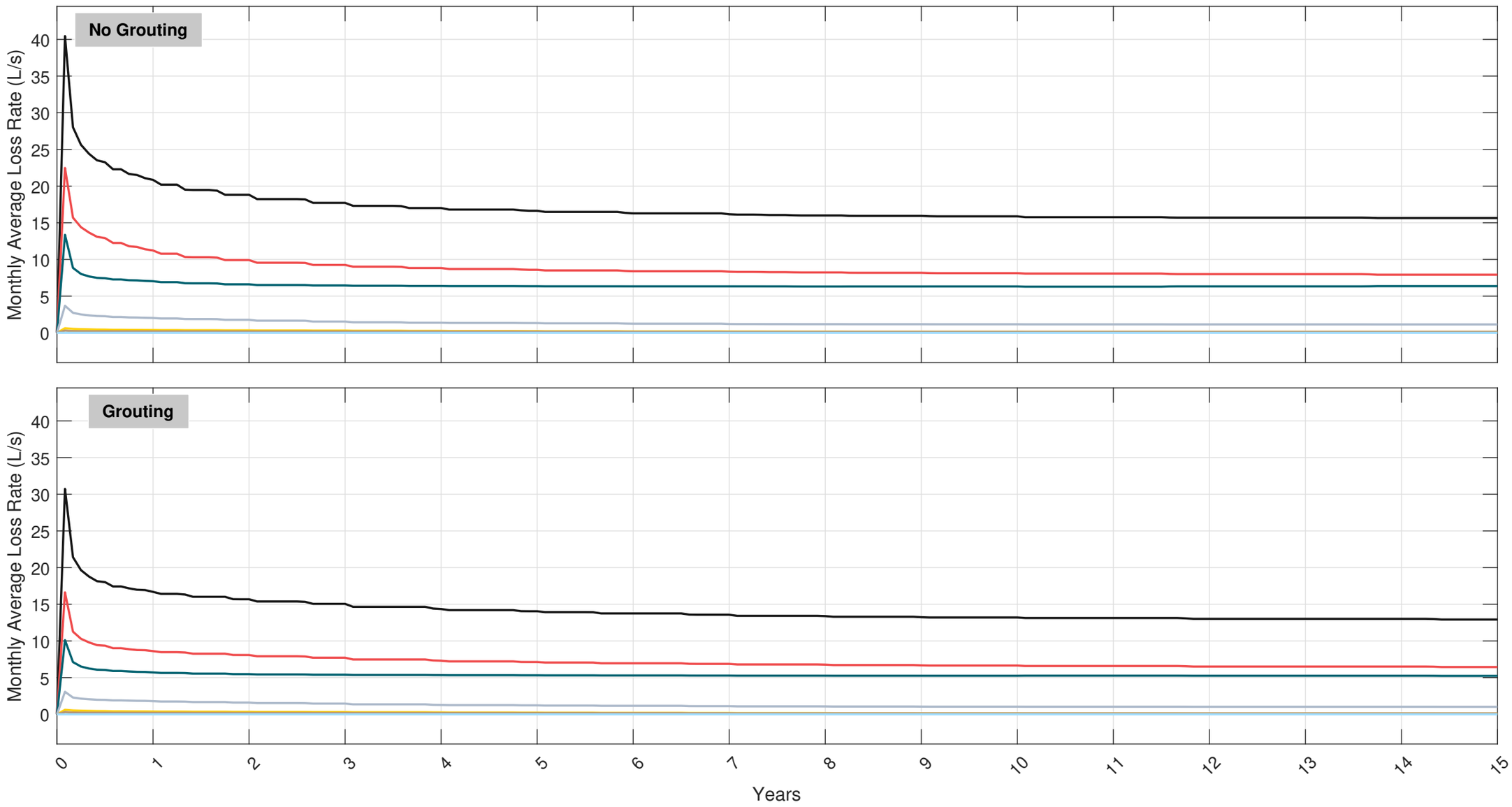
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TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
P90 SCHEDULE (BASE CASE)

PSM4346-115R | Figure J2-1 (a)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

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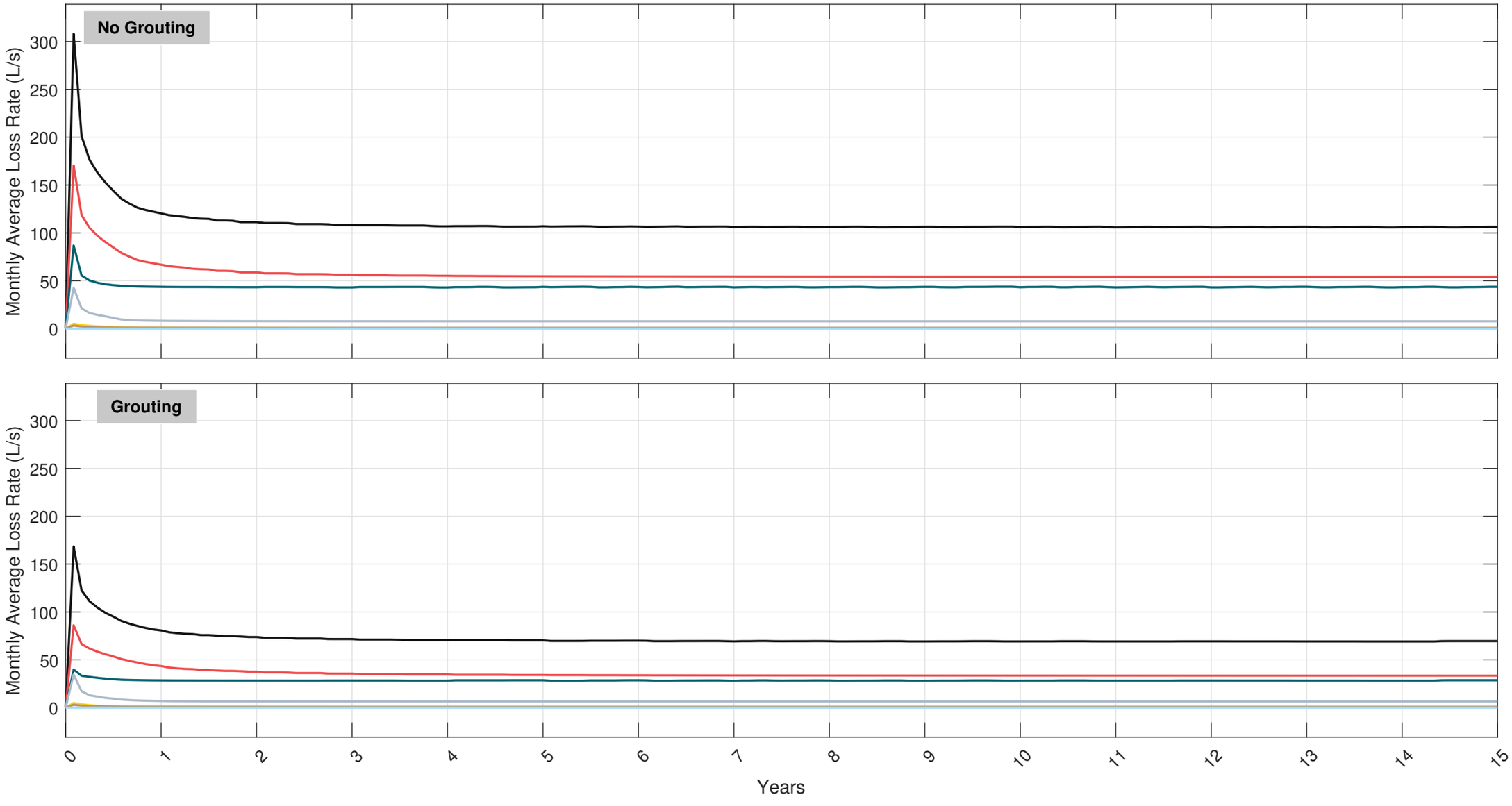
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TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure J2-1 (b)

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Combined
Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Surge Shaft and Connection Chamber
Penstock Tunnels

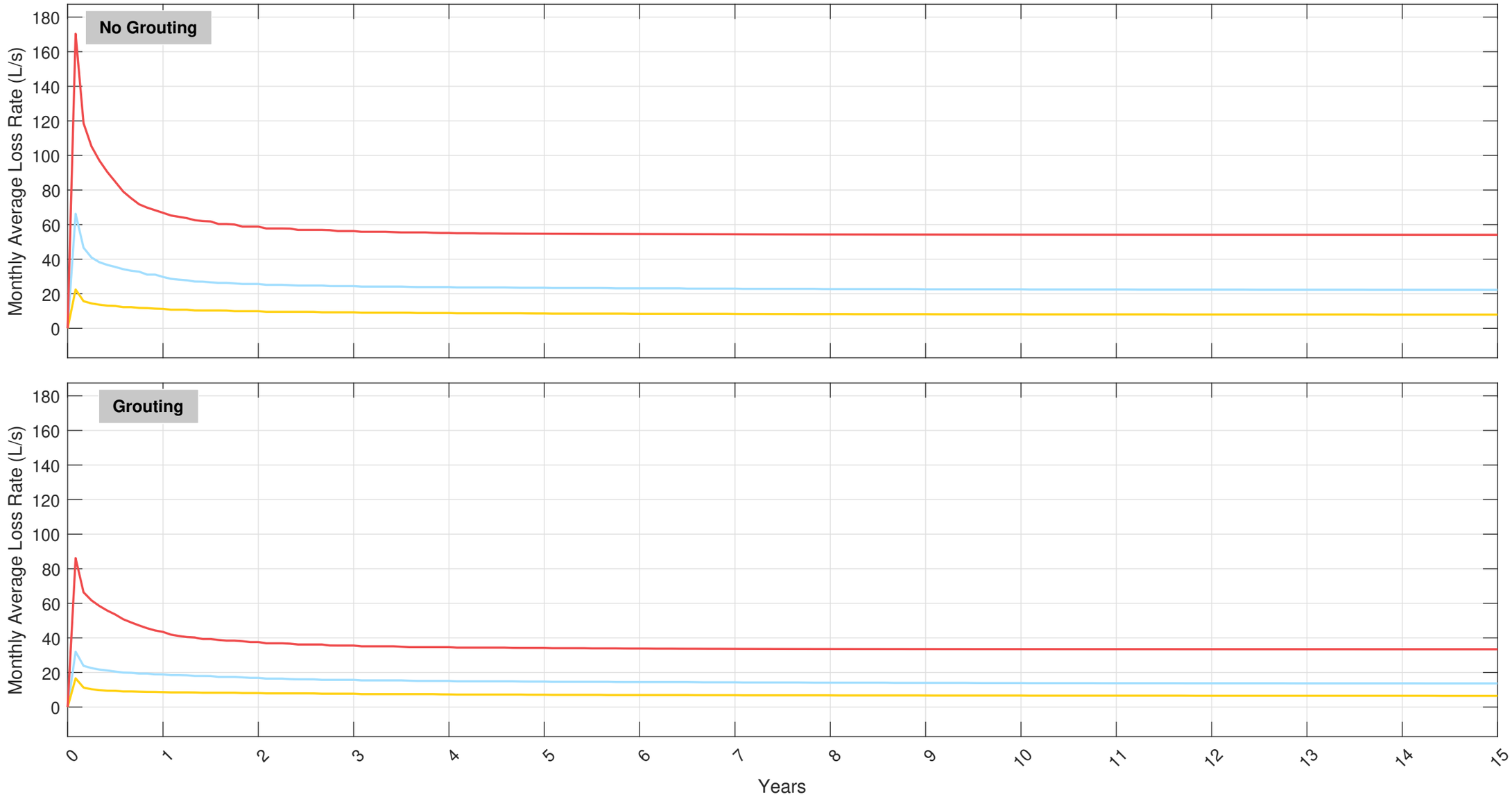
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Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED WATER LOSS RATE
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure J2-1 (c)

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Base Case

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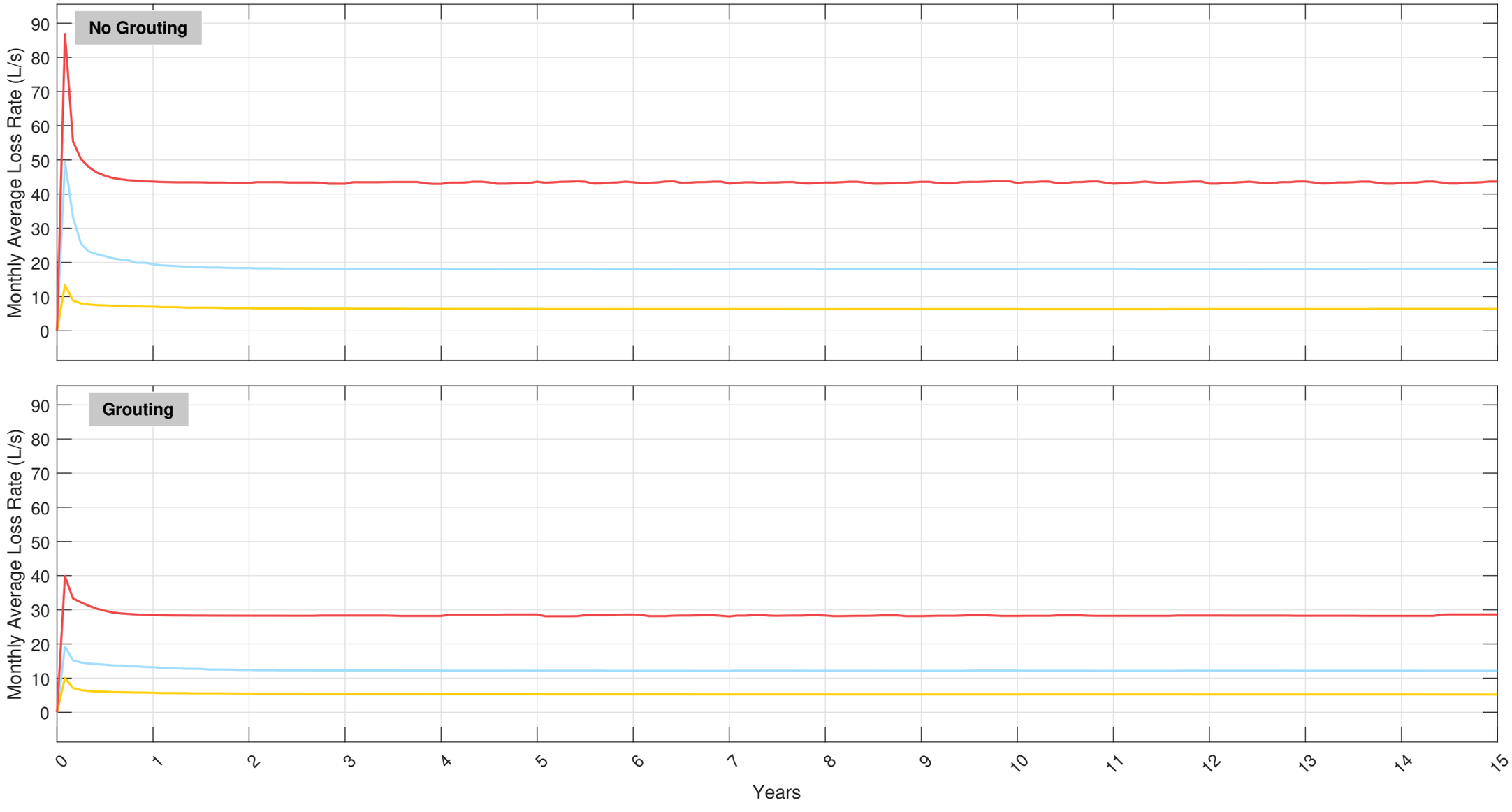
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HEADRACE TUNNEL
SIMULATED WATER LOSS RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-2

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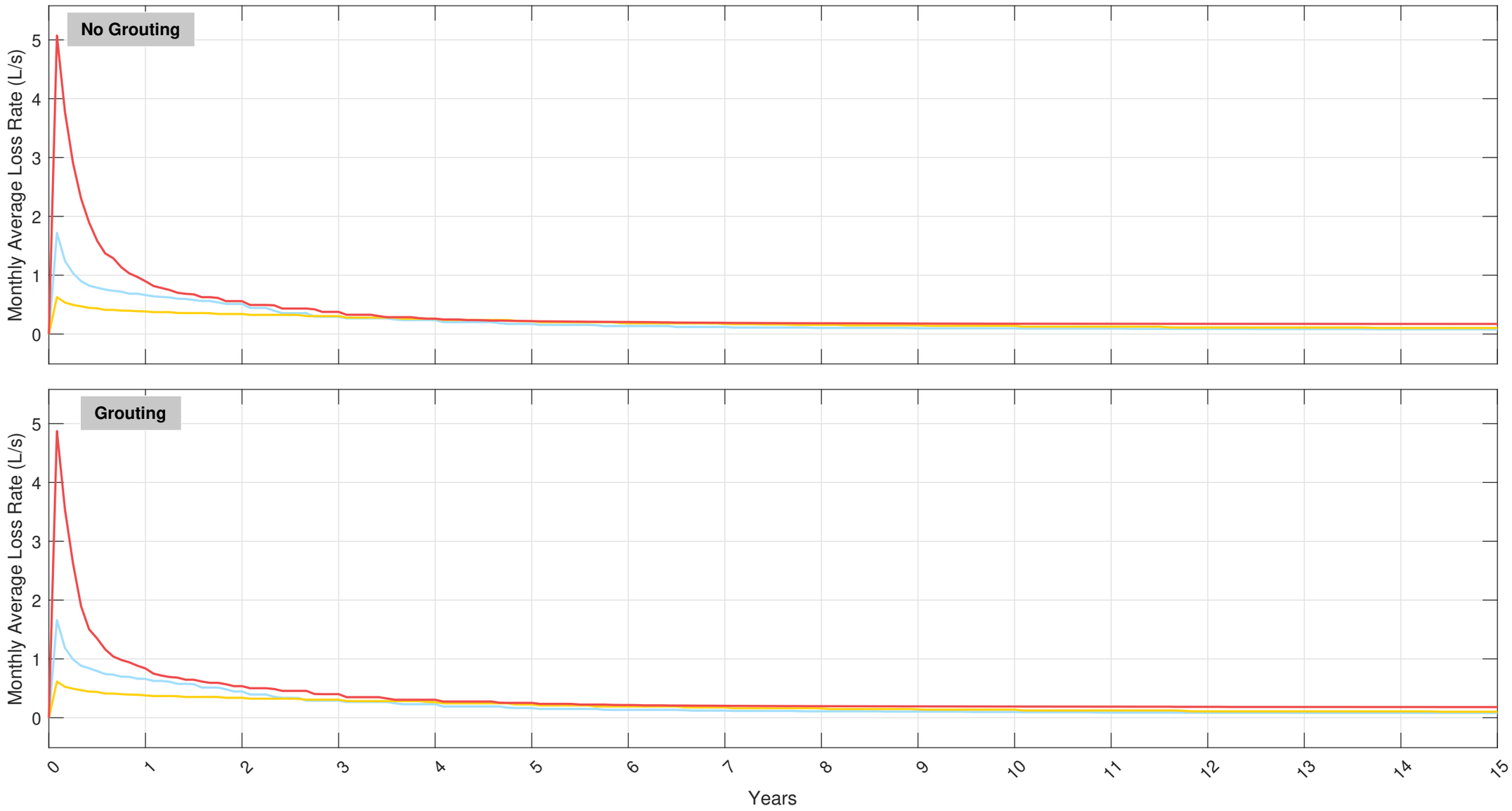
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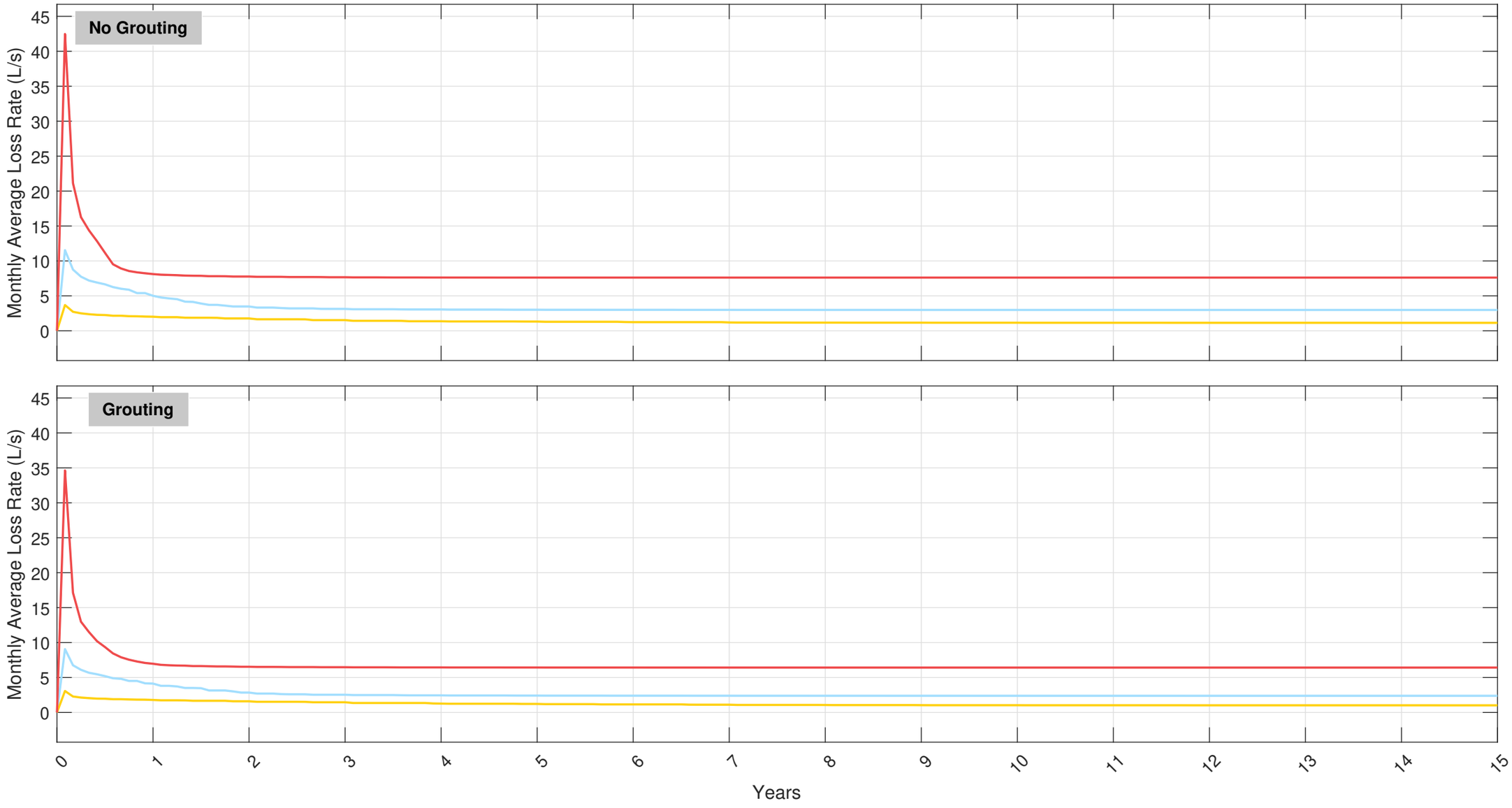
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MID ACCESS TUNNEL
SIMULATED WATER LOSS RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-4

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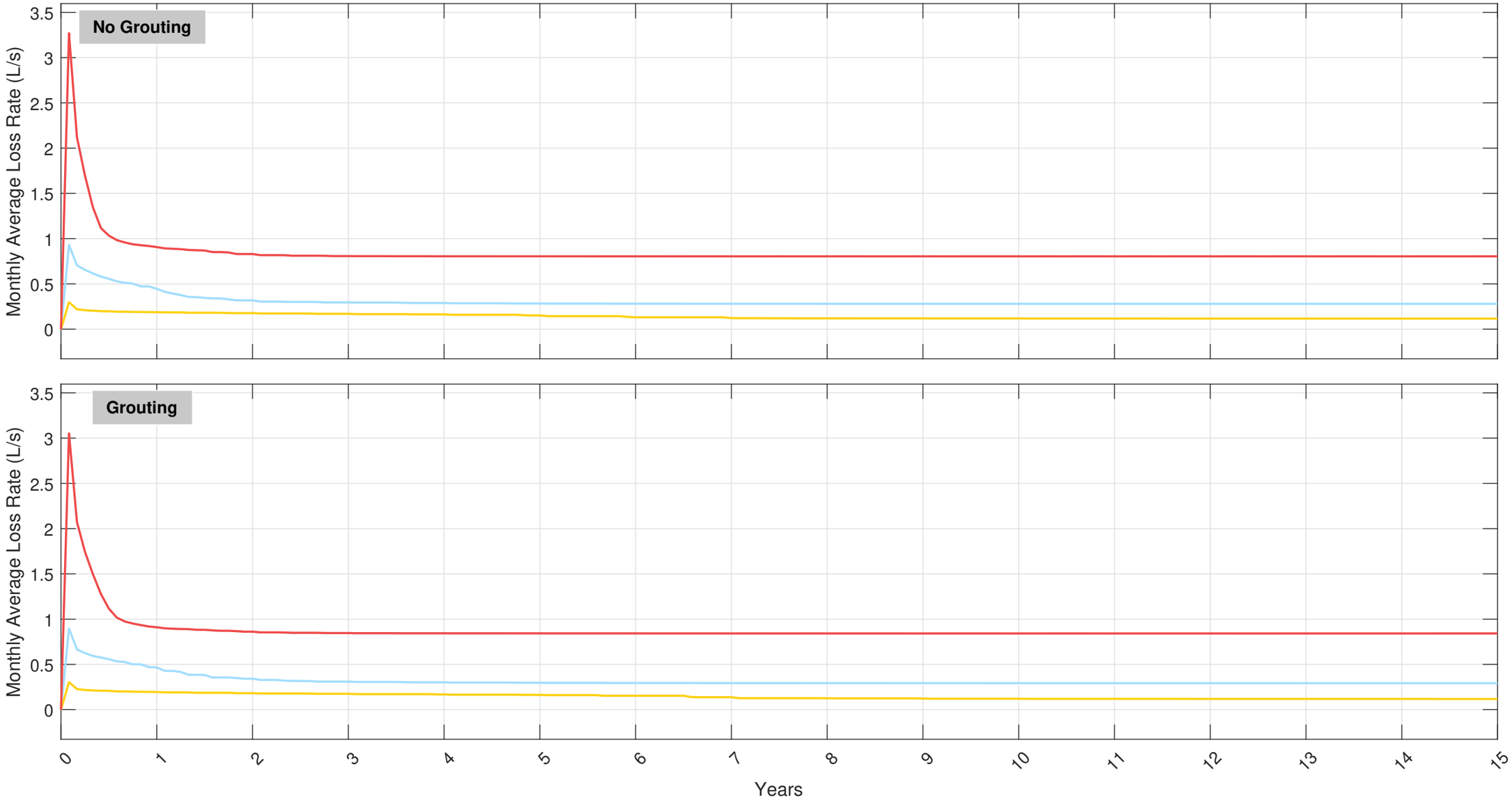
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Hydrogeological Interpretive Report
SURGE ACCESS TUNNEL
SIMULATED WATER LOSS RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-5

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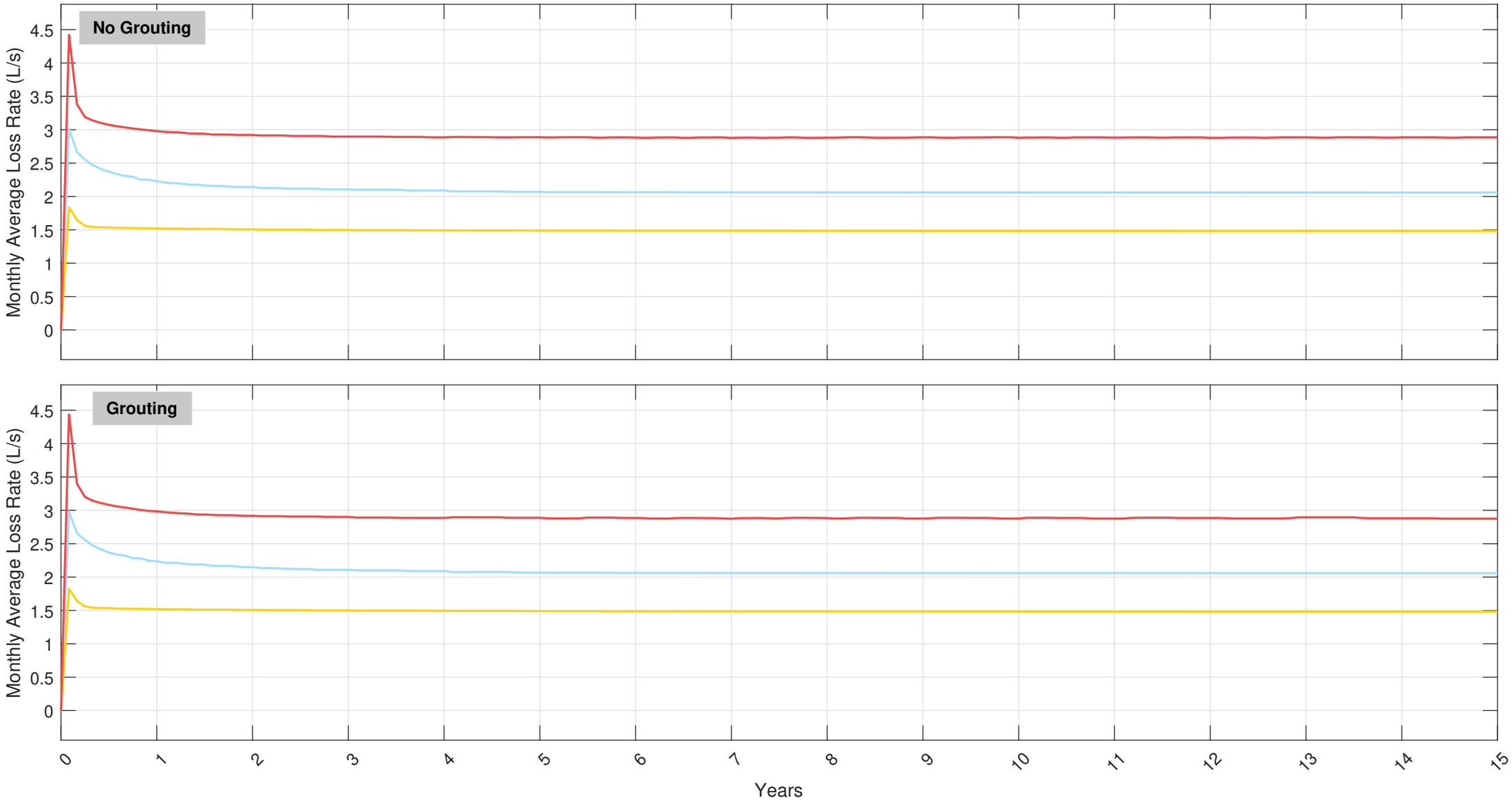
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SURGE SHAFT AND CHAMBER
SIMULATED WATER LOSS RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-6

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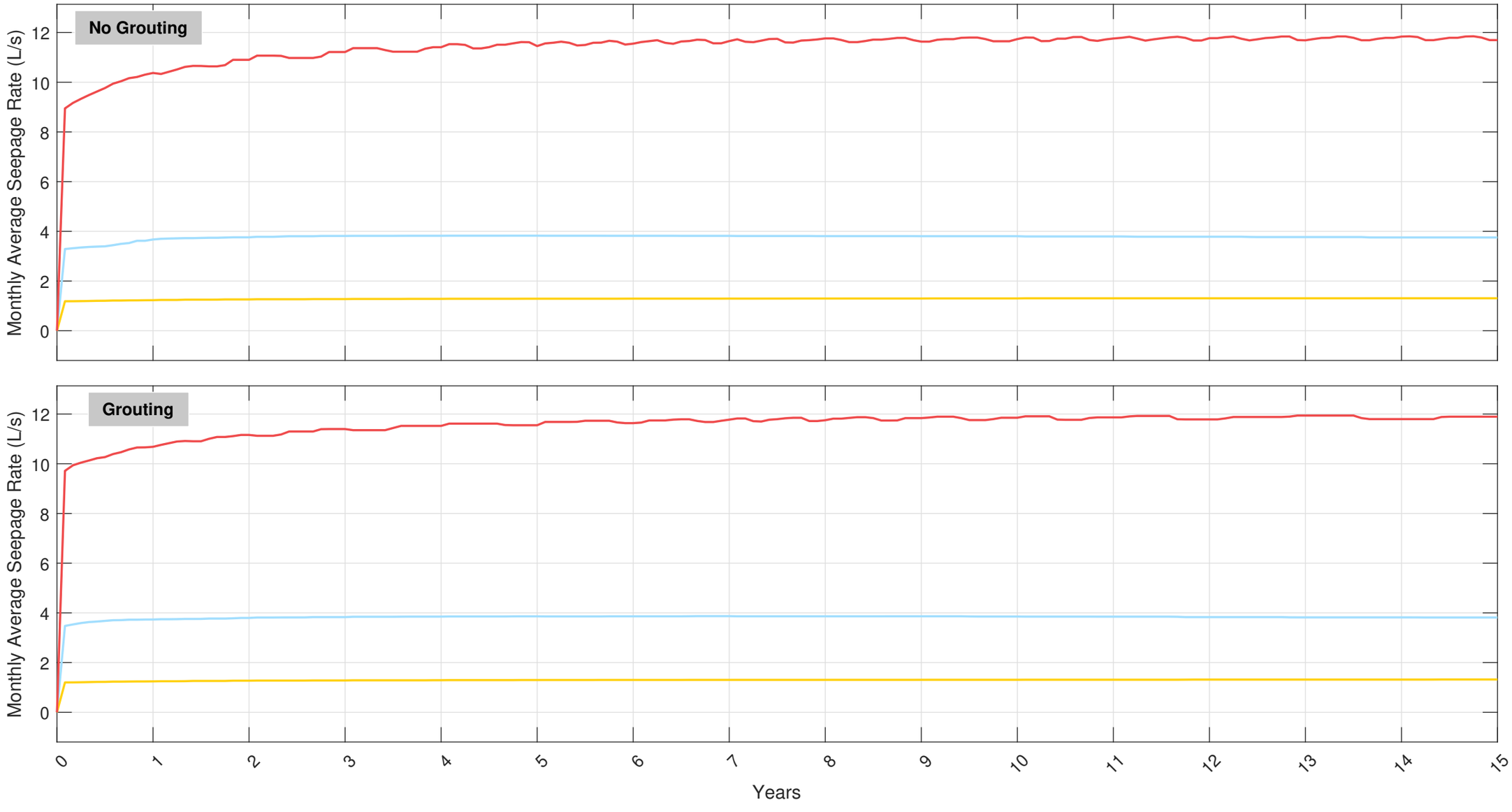
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Tarraleah Redevelopment Project
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LAKE KING WILLIAM TUNNEL
SIMULATED WATER LOSS RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-7

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Base Case

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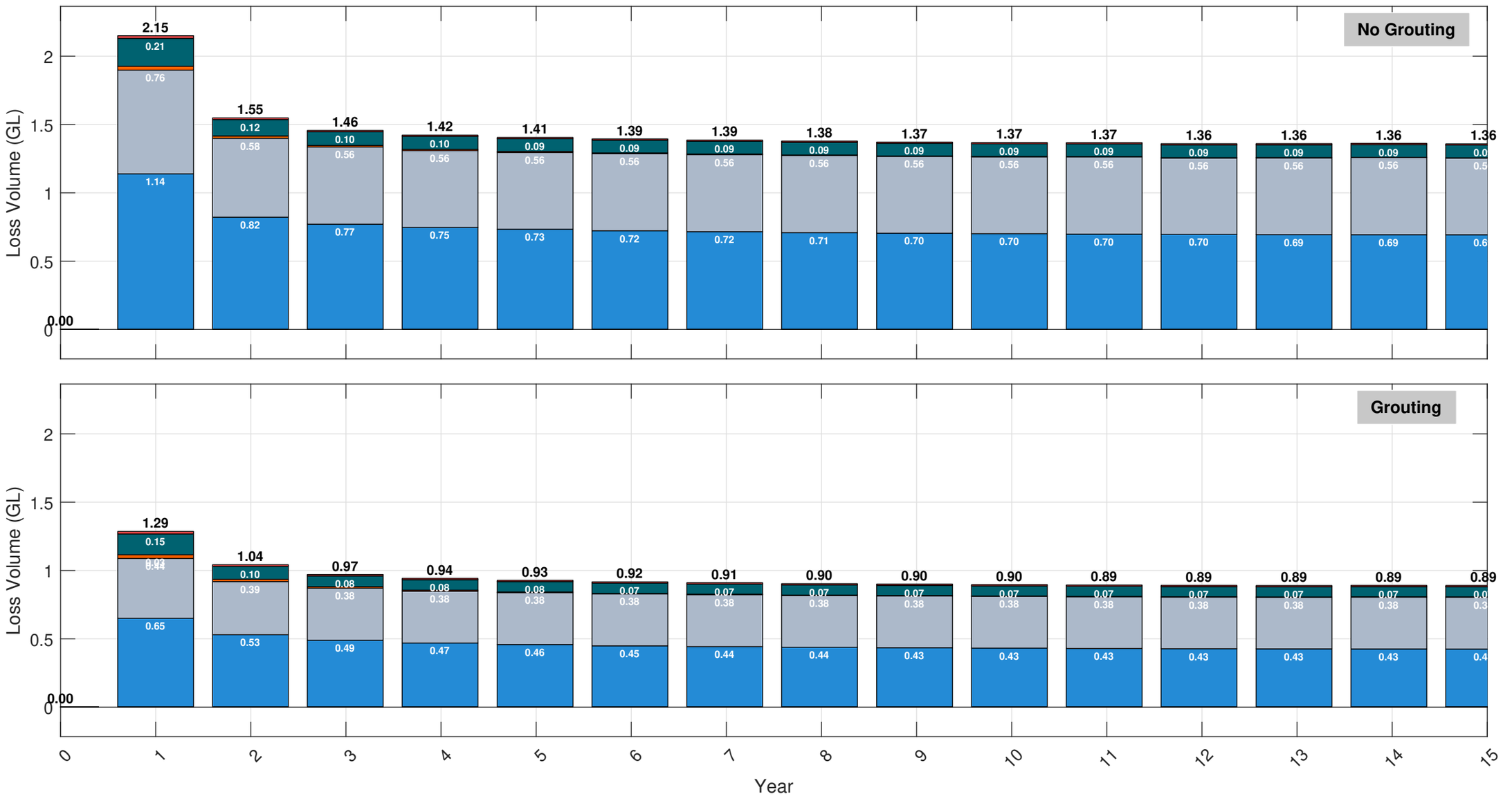
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MOSSY MARSH TUNNEL
SIMULATED WATER SEEPAGE RATE
P90 SCHEDULE

PSM4346-115R | Figure J2-8

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Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

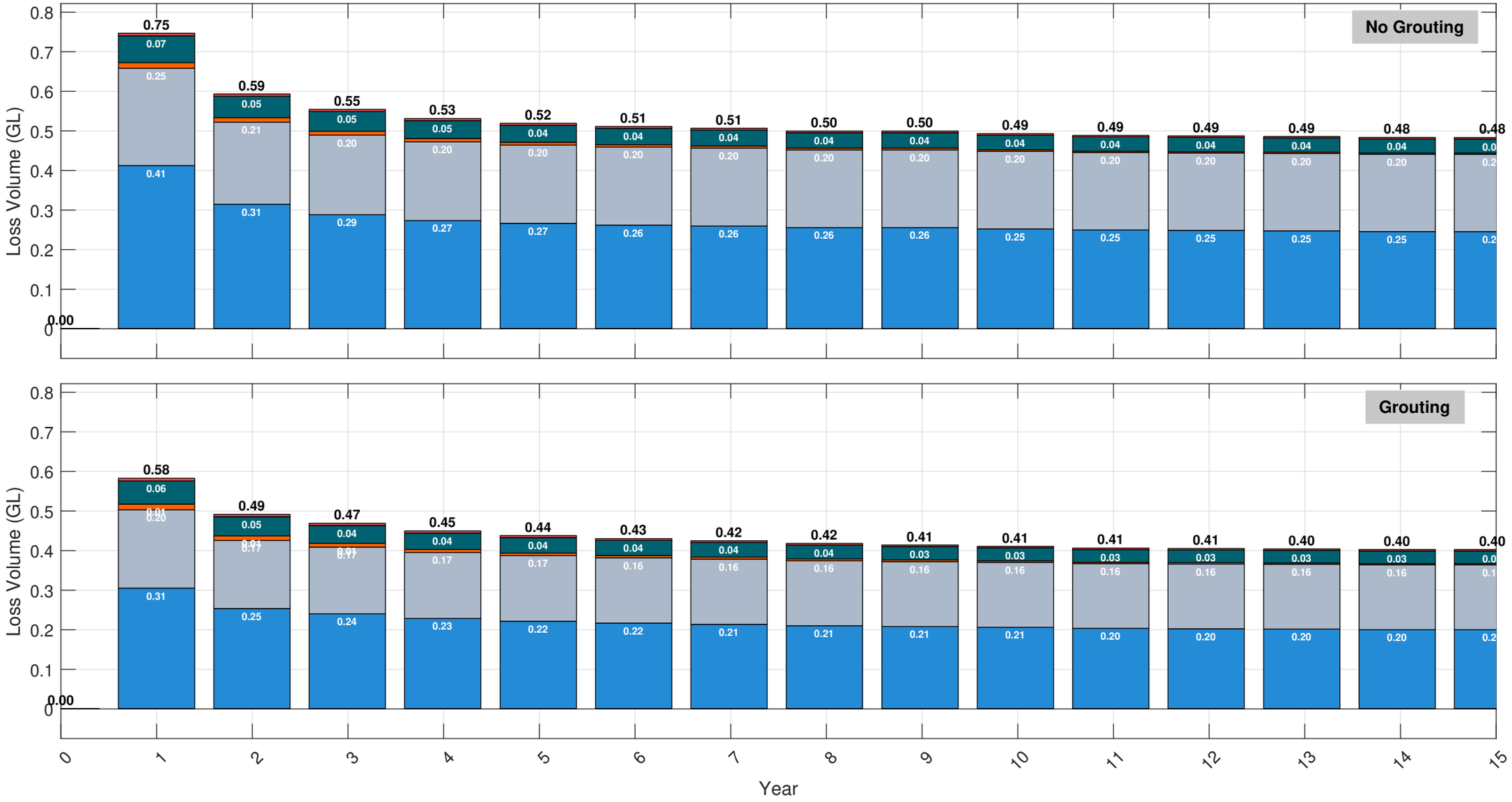
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Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
BASE SCHEDULE - BASE CASE

PSM4346-115R | Figure J3-1 (a)

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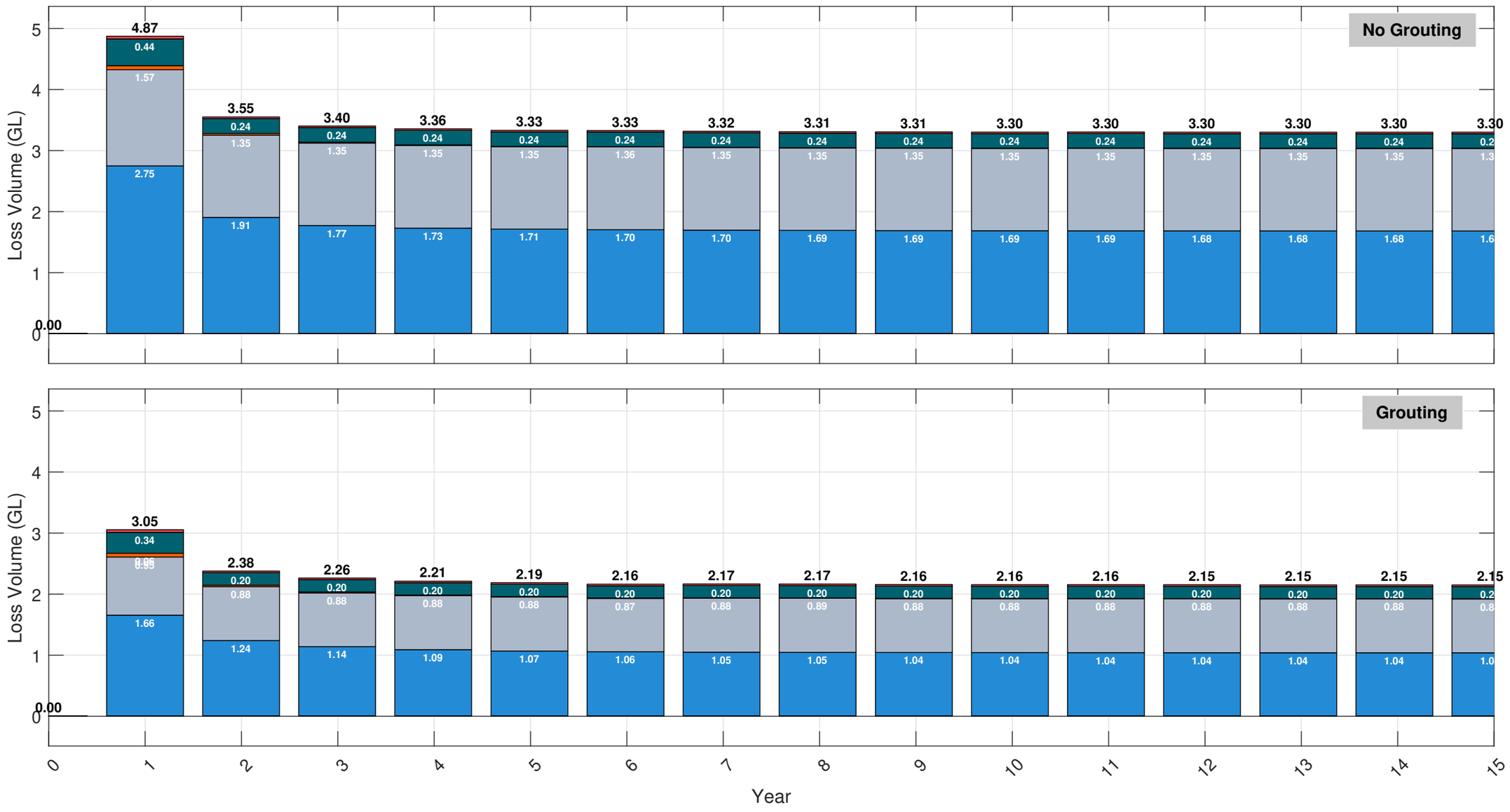
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
BASE SCHEDULE - LOWER BOUND

PSM4346-115R | Figure J3-1 (b)

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Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

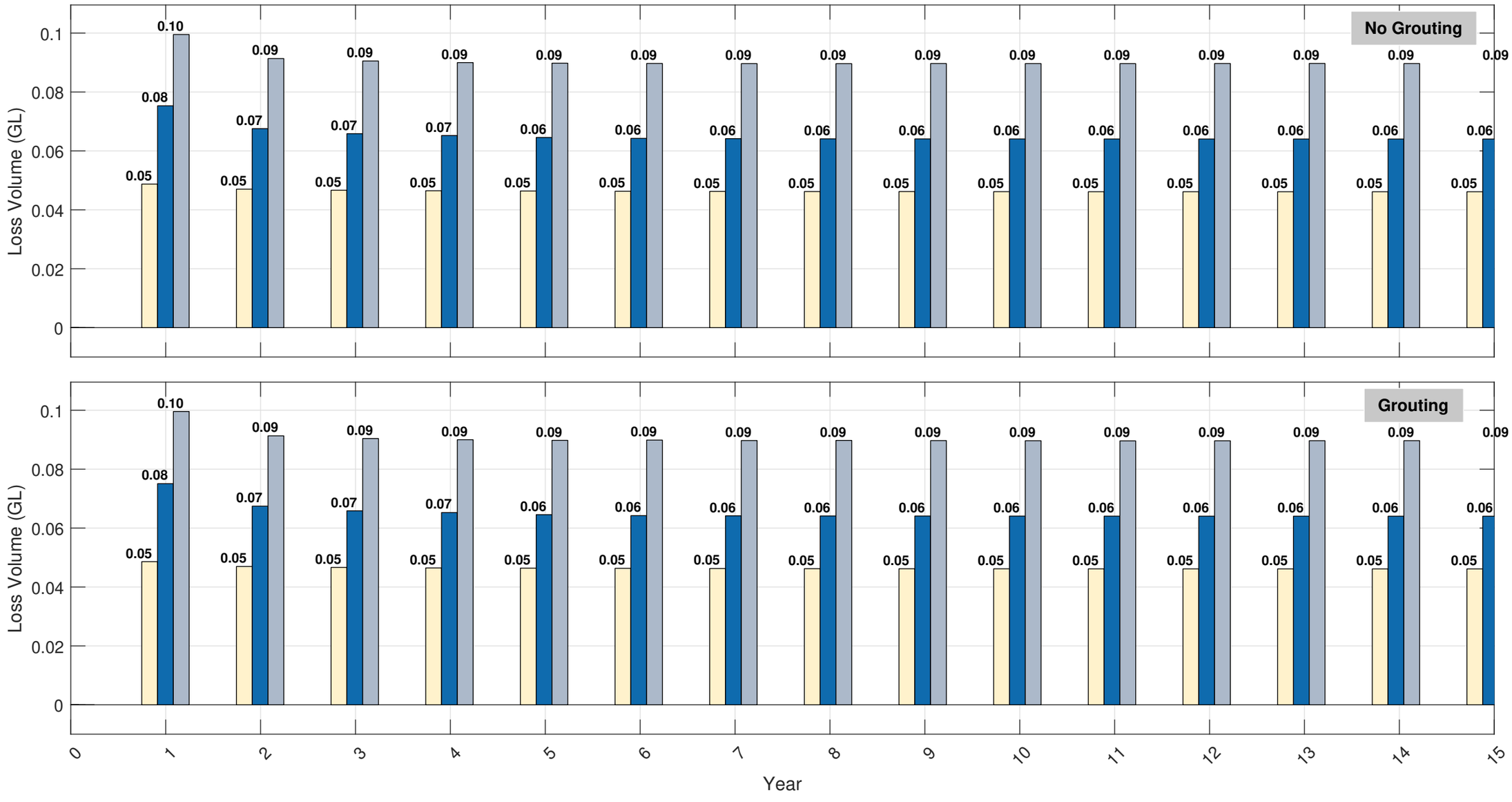
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
BASE SCHEDULE - UPPER BOUND

PSM4346-115R | Figure J3-1 (c)

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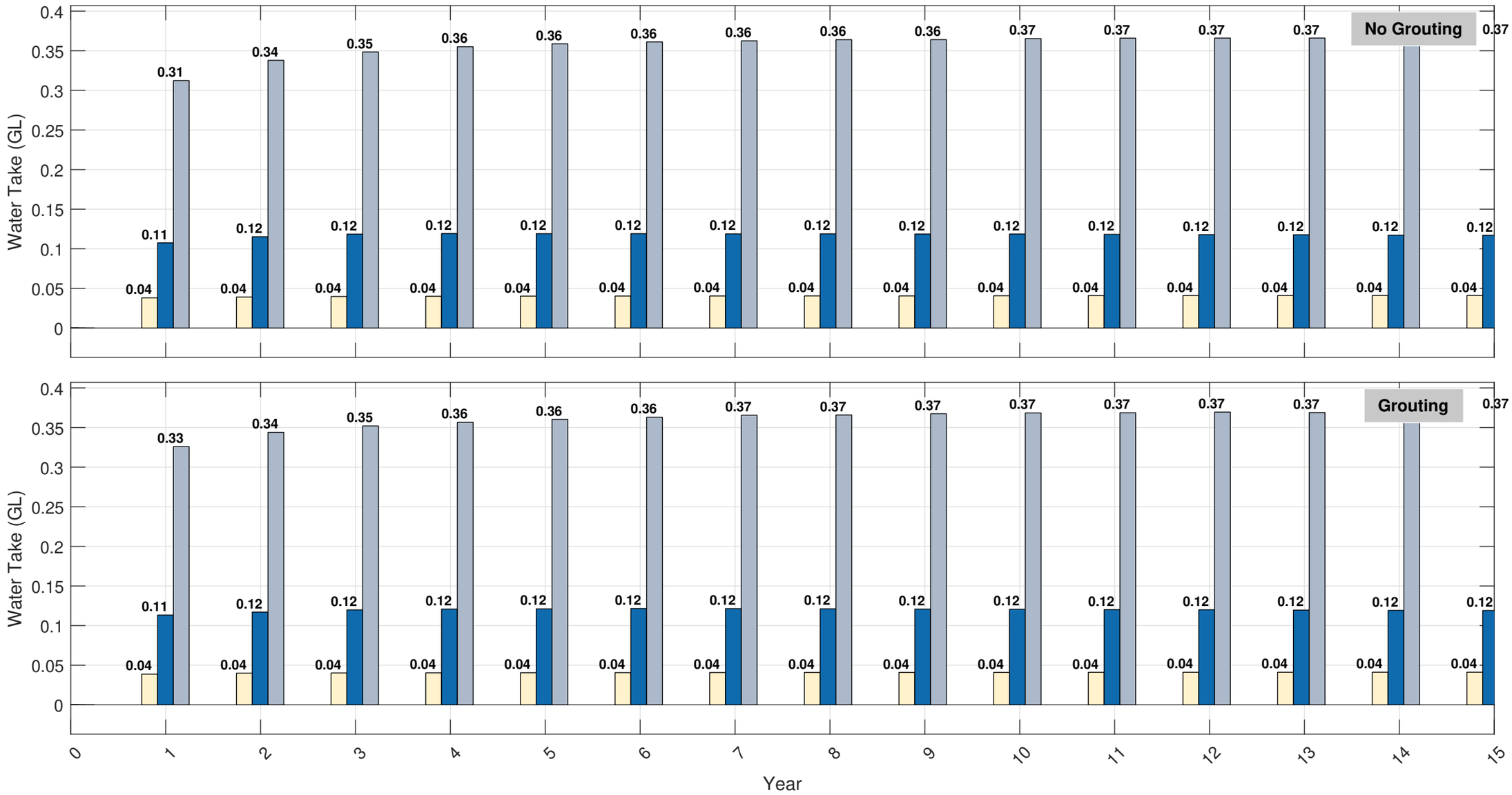
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
LAKE KING WILLIAM TUNNEL
SIMULATED WATER LOSS VOLUME
BASE SCHEDULE

PSM4346-115R | Figure J3-2

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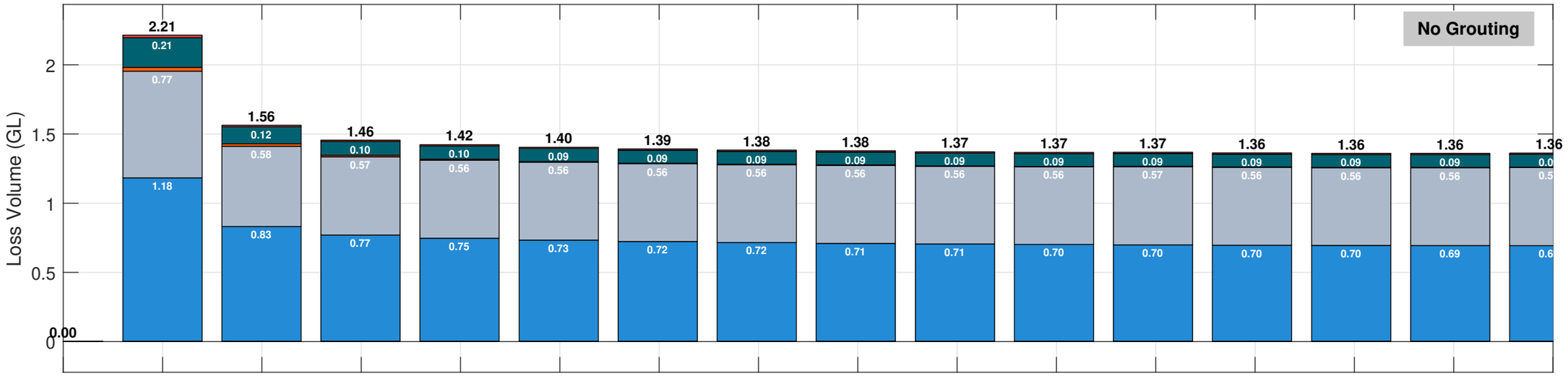
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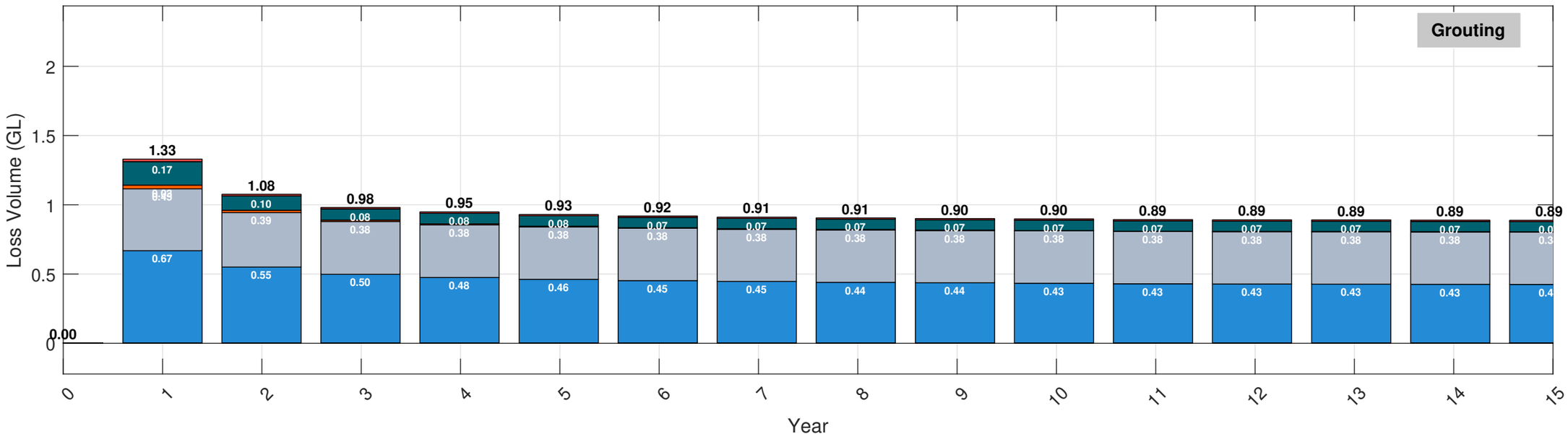
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
MOSSY MARSH TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
BASE SCHEDULE

PSM4346-115R | Figure J3-3

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Headrace Tunnel
Power Tunnel
Mid Access Tunnel
Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

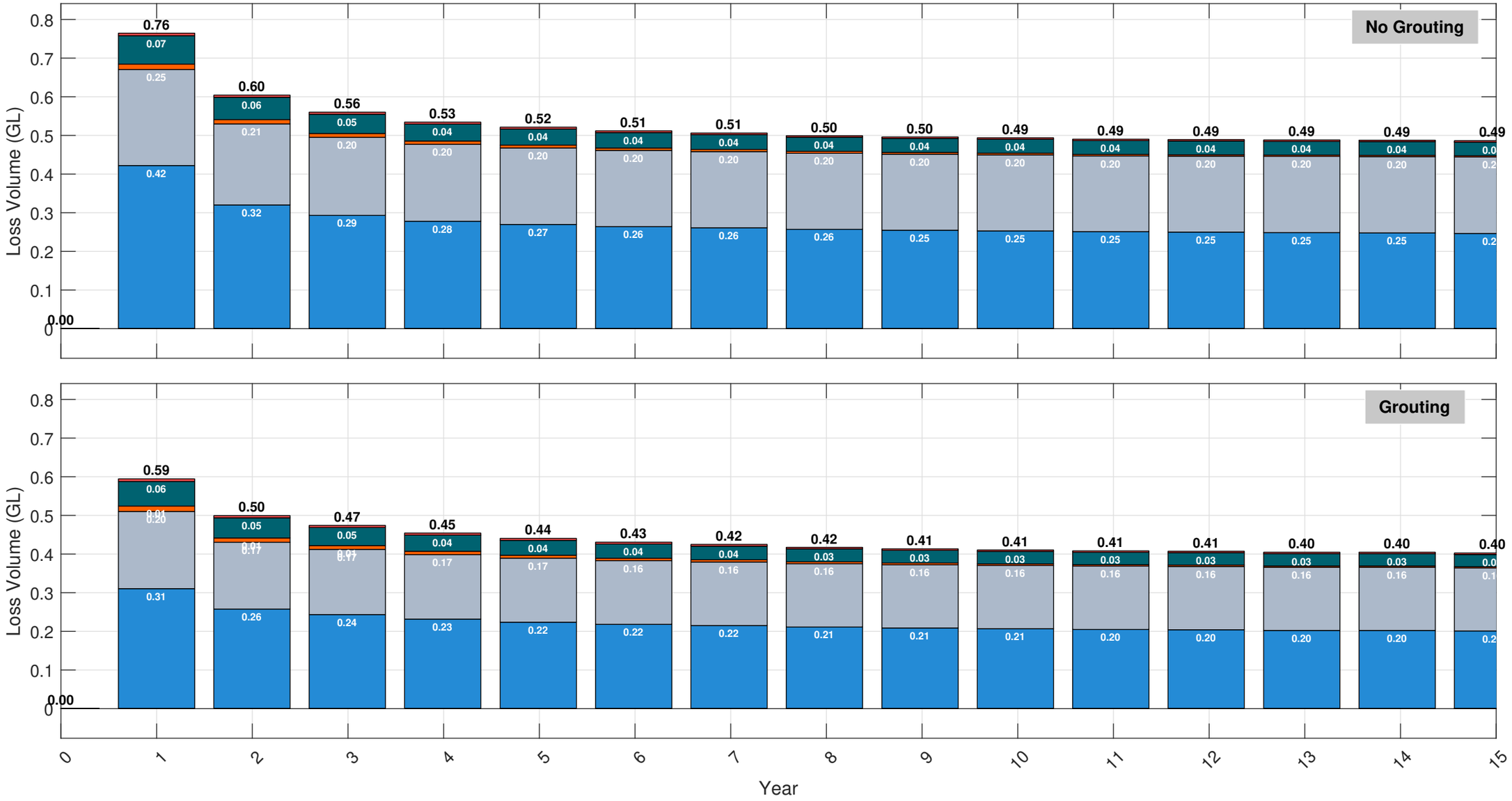
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Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
P90 SCHEDULE - BASE CASE

PSM4346-115R | Figure J4-1 (a)

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Headrace Tunnel
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Penstock Tunnels
Surge Shaft and Connection Chamber

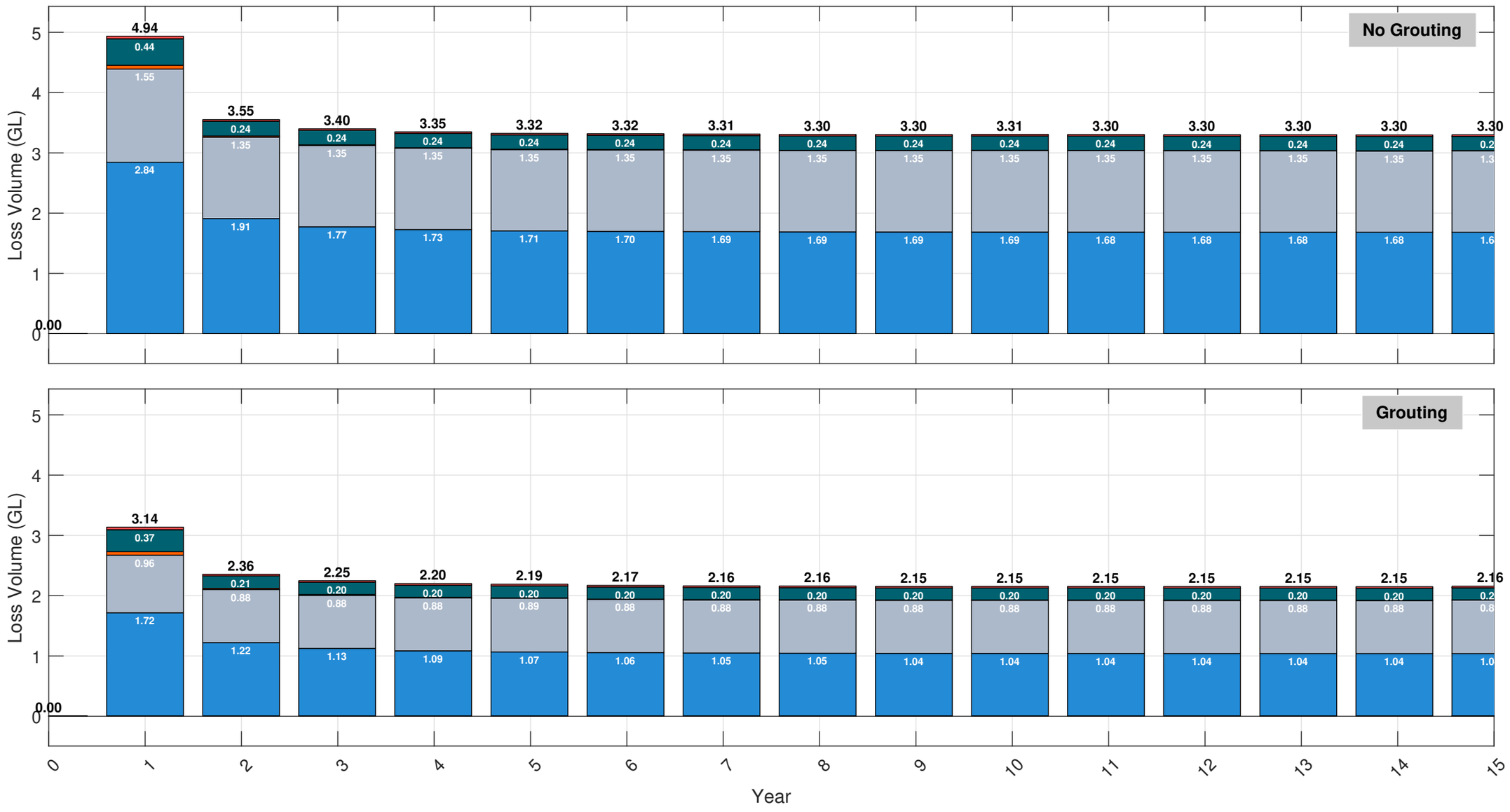
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TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
P90 SCHEDULE - LOWER BOUND

PSM4346-115R | Figure J4-1 (b)

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Headrace Tunnel
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Surge Access Tunnel
Penstock Tunnels
Surge Shaft and Connection Chamber

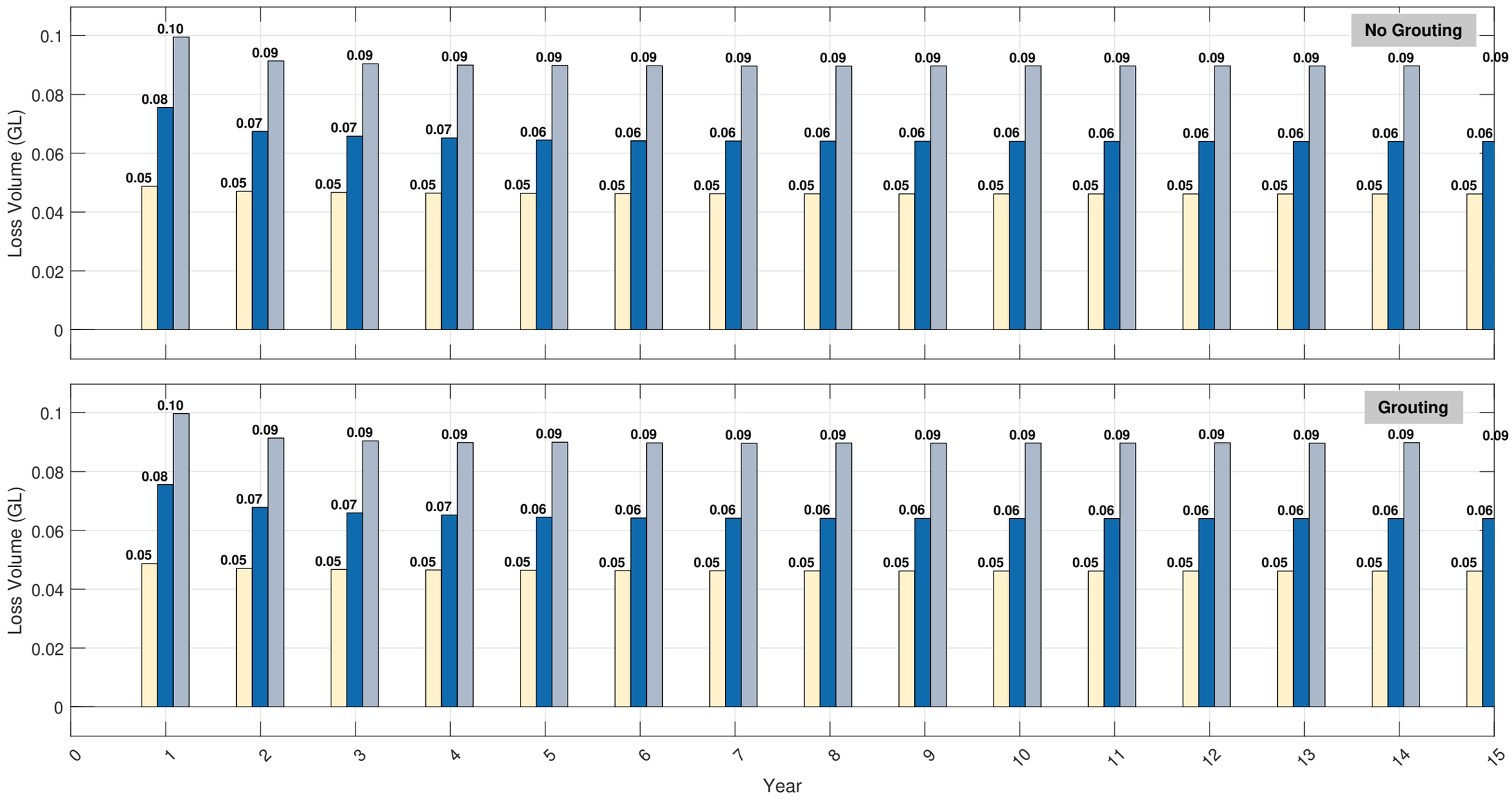
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TARRALEAH TUNNELS
SIMULATED WATER LOSS VOLUME
P90 SCHEDULE - UPPER BOUND

PSM4346-115R | Figure J4-1 (c)

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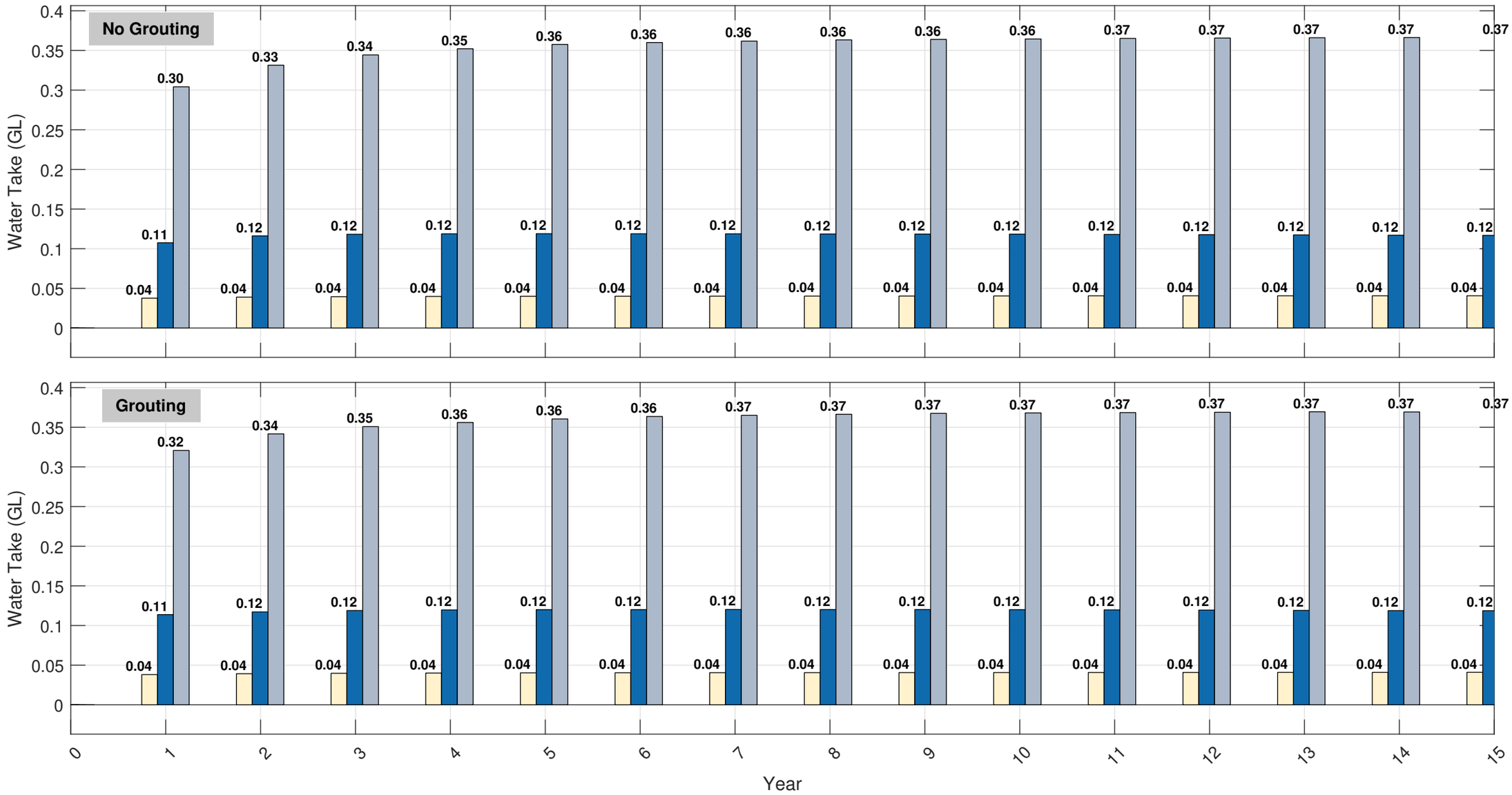
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Hydrogeological Interpretive Report
LAKE KING WILLIAM TUNNEL
SIMULATED WATER LOSS VOLUME
P90 SCHEDULE

PSM4346-115R | Figure J4-2

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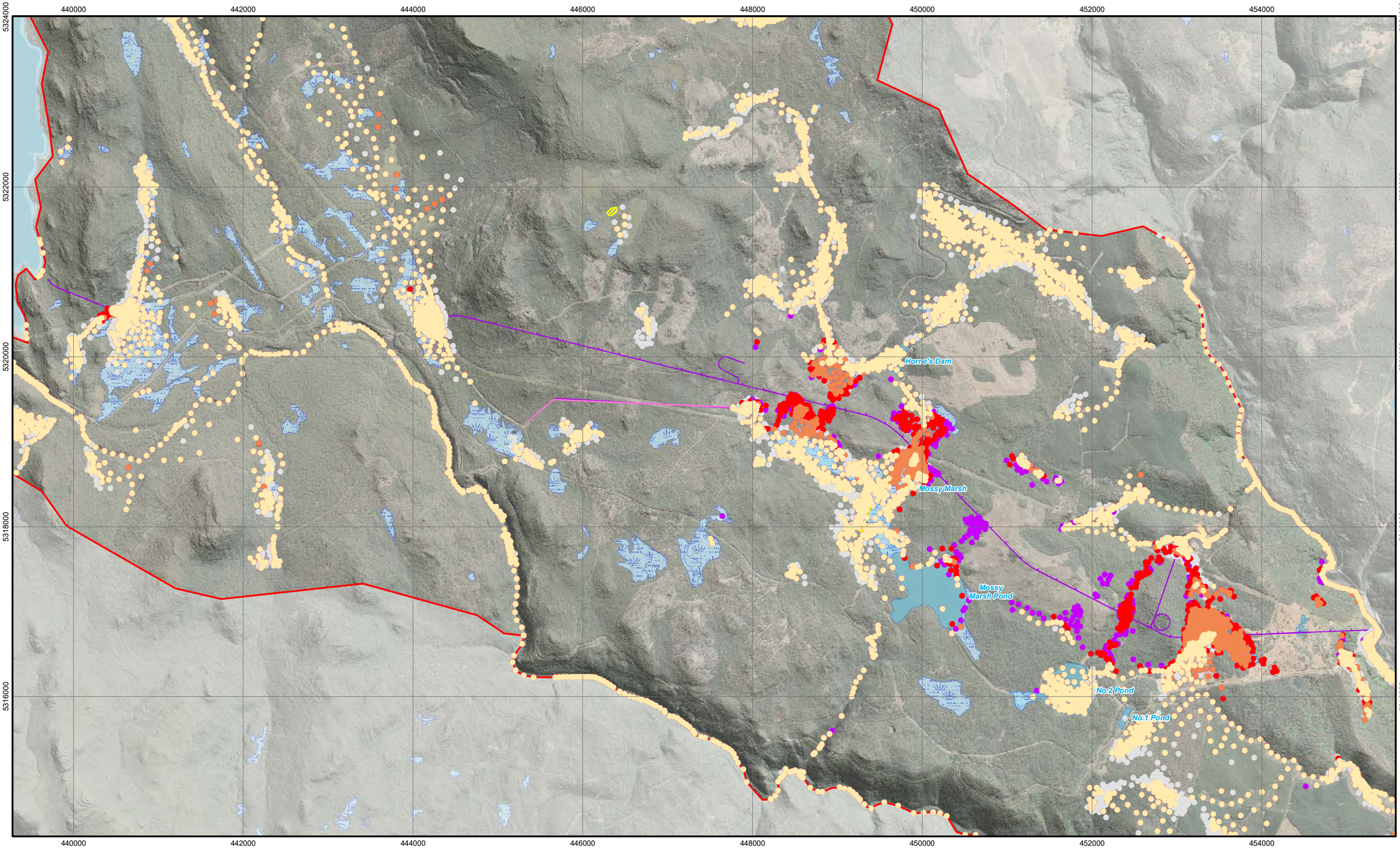
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
MOSSY MARSH TUNNEL
SIMULATED ANNUAL GROUNDWATER TAKE
P90 SCHEDULE

PSM4346-115R | Figure J4-3

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Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

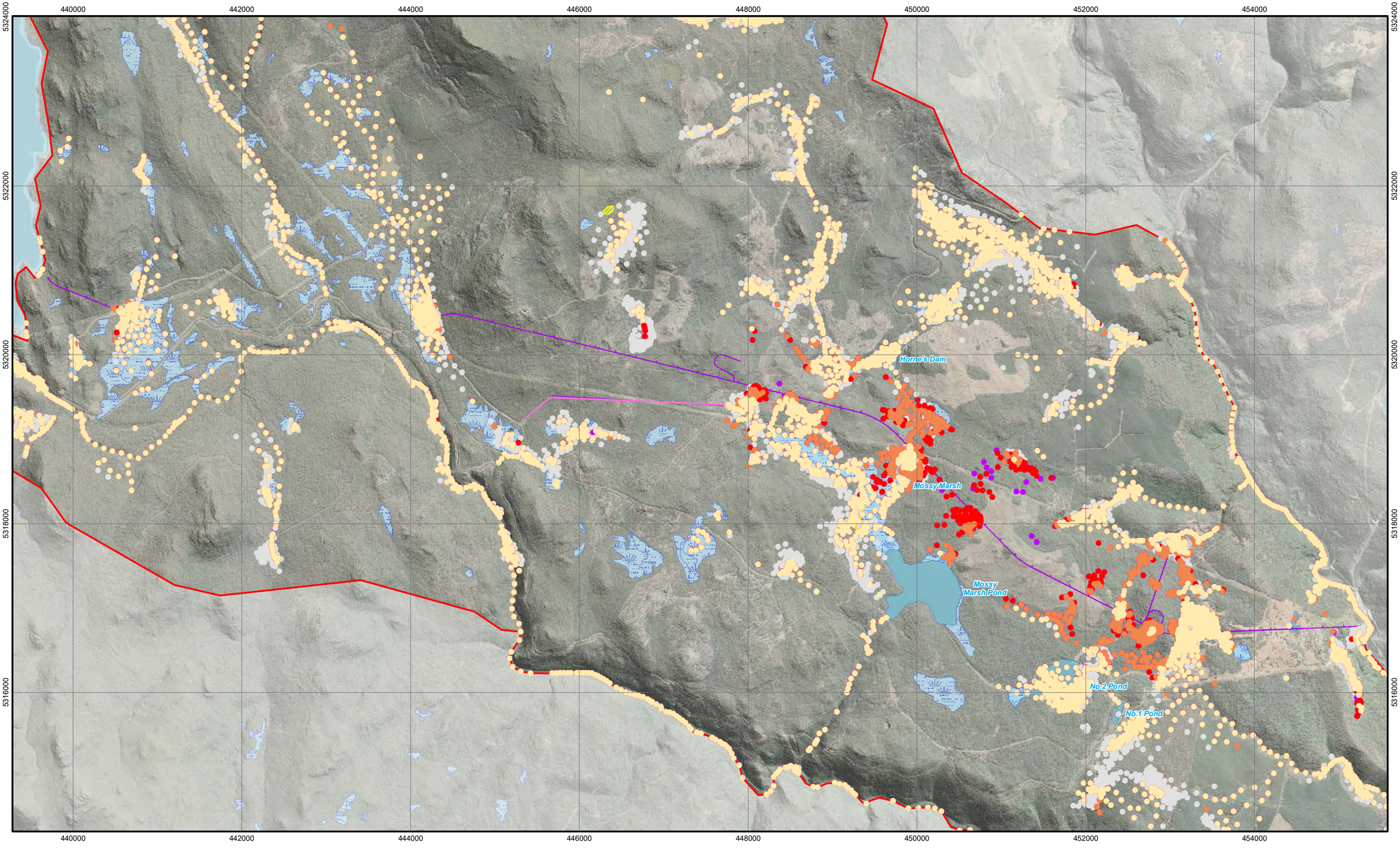
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED DISCHARGE LOCATIONS
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure J5-1(a)

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Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

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Scale 1:42,000

0 0.25 0.5 1 1.5 2 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

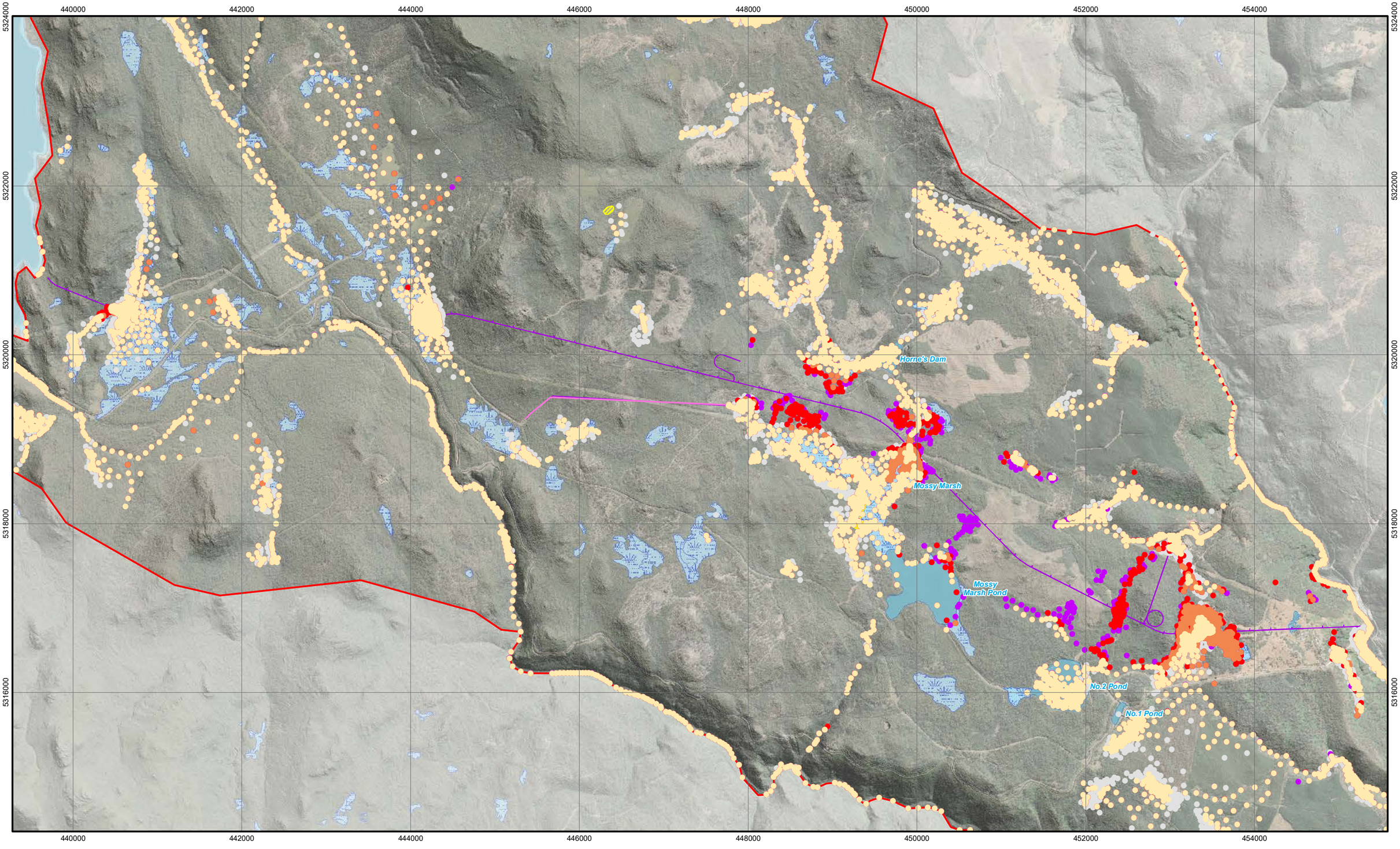
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Hydrogeological Interpretative Report

INDUCED DISCHARGE LOCATIONS
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure J5-1(b)

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Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:42,000

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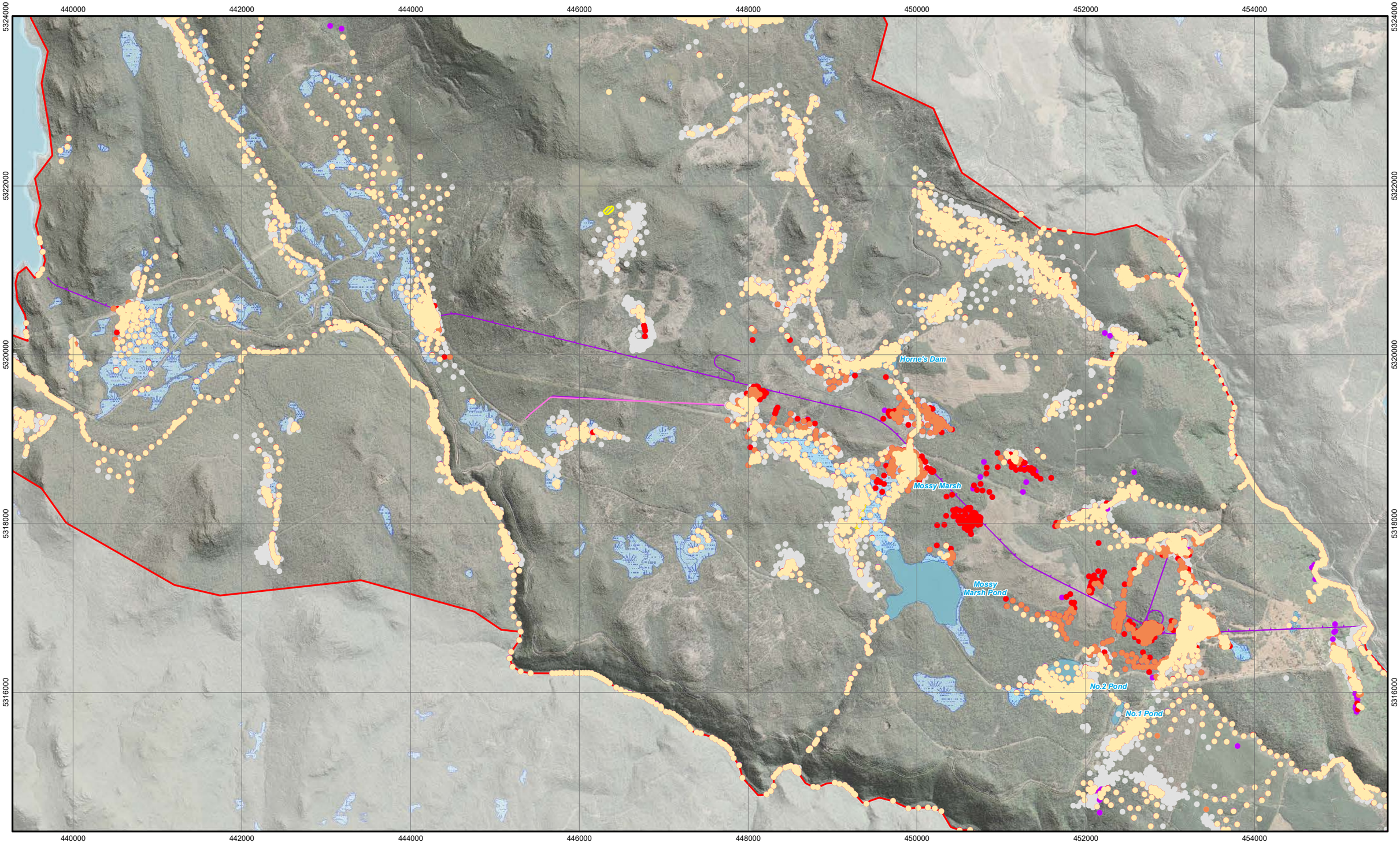
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED DISCHARGE LOCATIONS BASE SCHEDULE - GROUTING (LOWER BOUND)

PSM4346-115R | Figure J5-2(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix J\Figure J5-2(a) Induced Discharge Locations Base Schedule - Grouting (Lower Bound).mxd



Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

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Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

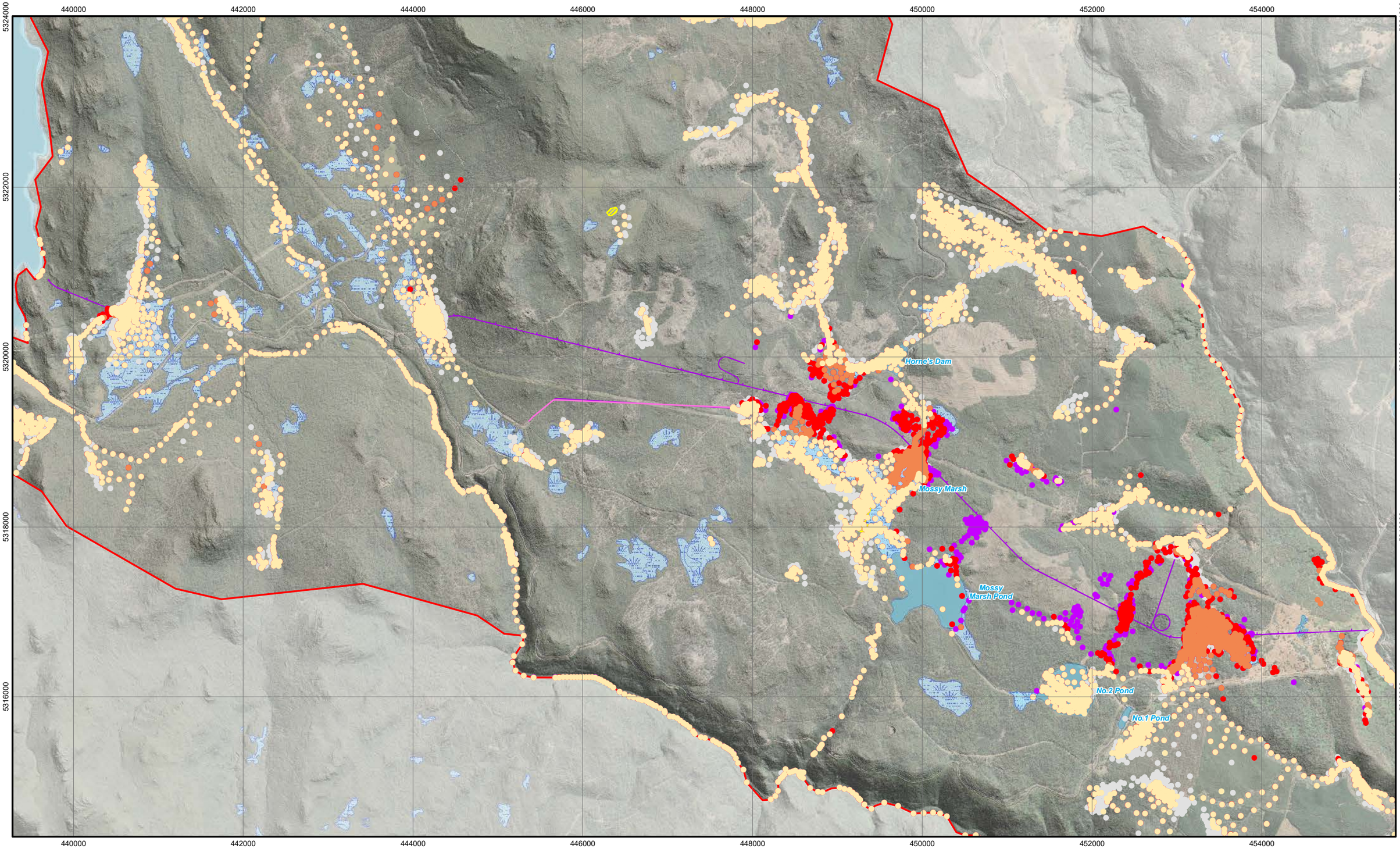
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Hydrogeological Interpretative Report

INDUCED DISCHARGE LOCATIONS
BASE SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure J5-2(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix J\Figure J5-2(b) Induced Discharge Locations Base Schedule - Grouting (Upper Bound).mxd



Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:42,000

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Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

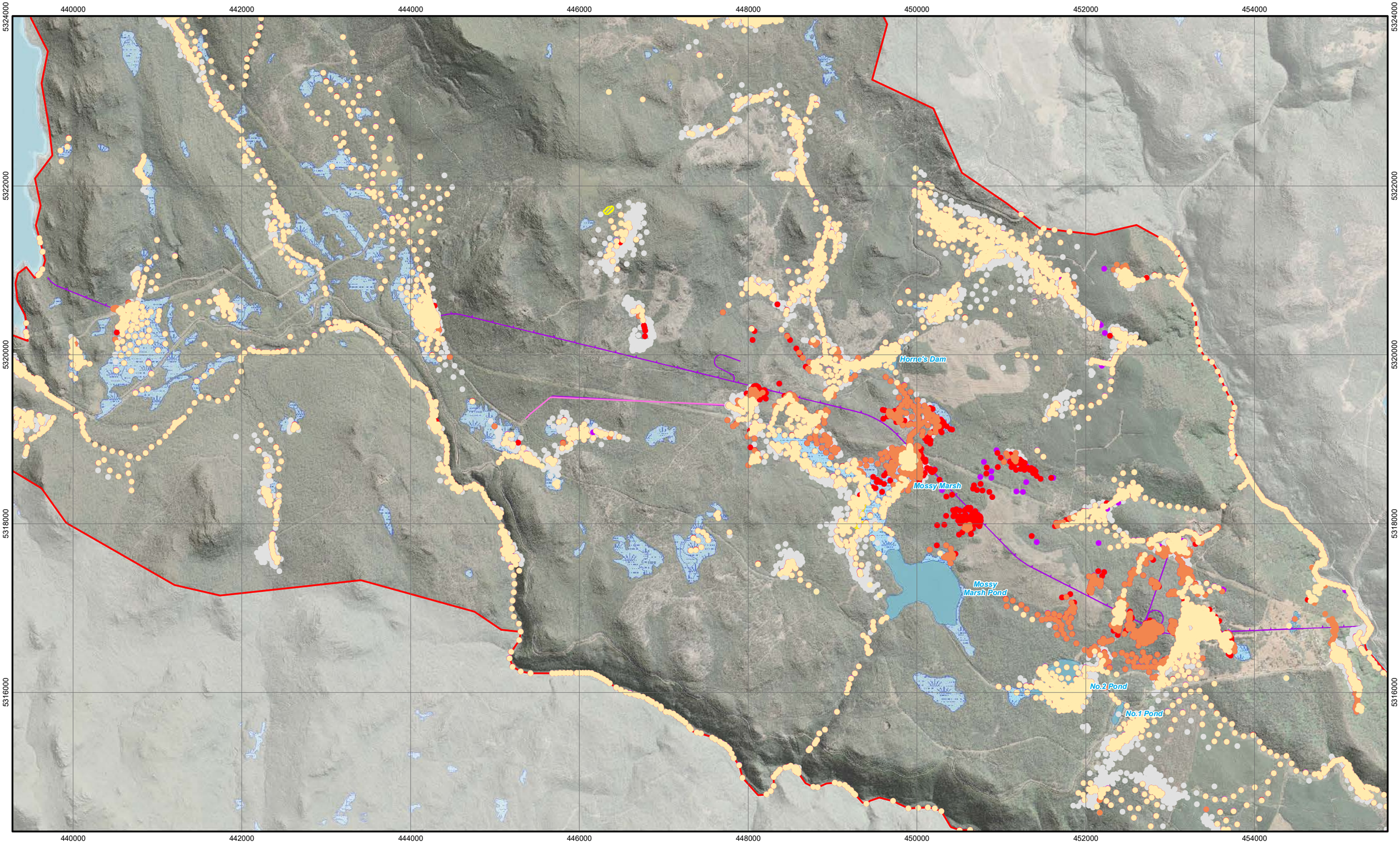
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INDUCED DISCHARGE LOCATIONS
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure J6-1(a)

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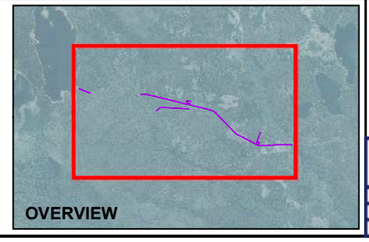
Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:42,000

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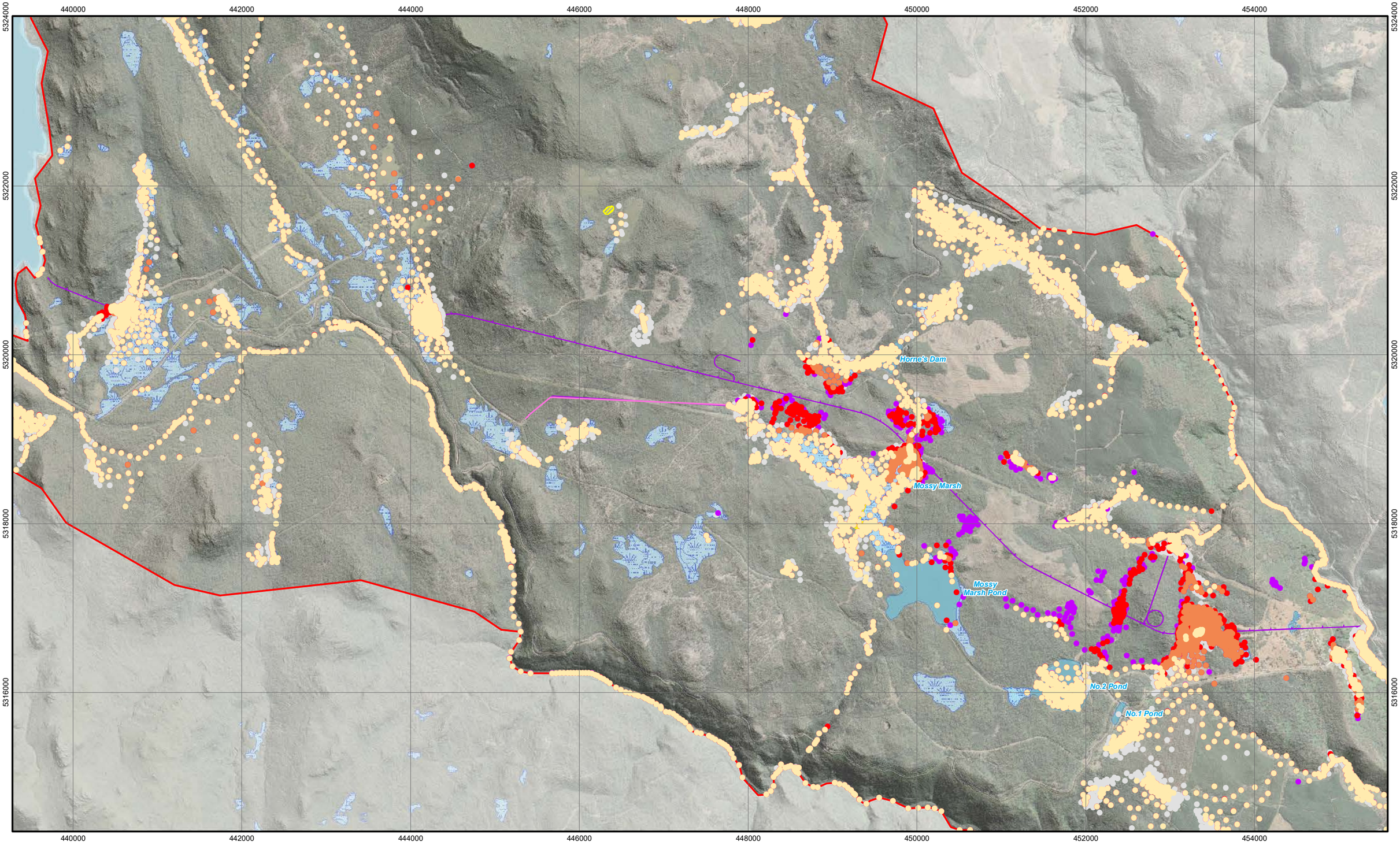
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INDUCED DISCHARGE LOCATIONS
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure J6-1(b)

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Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- Baseline Discharge Location
- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:42,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

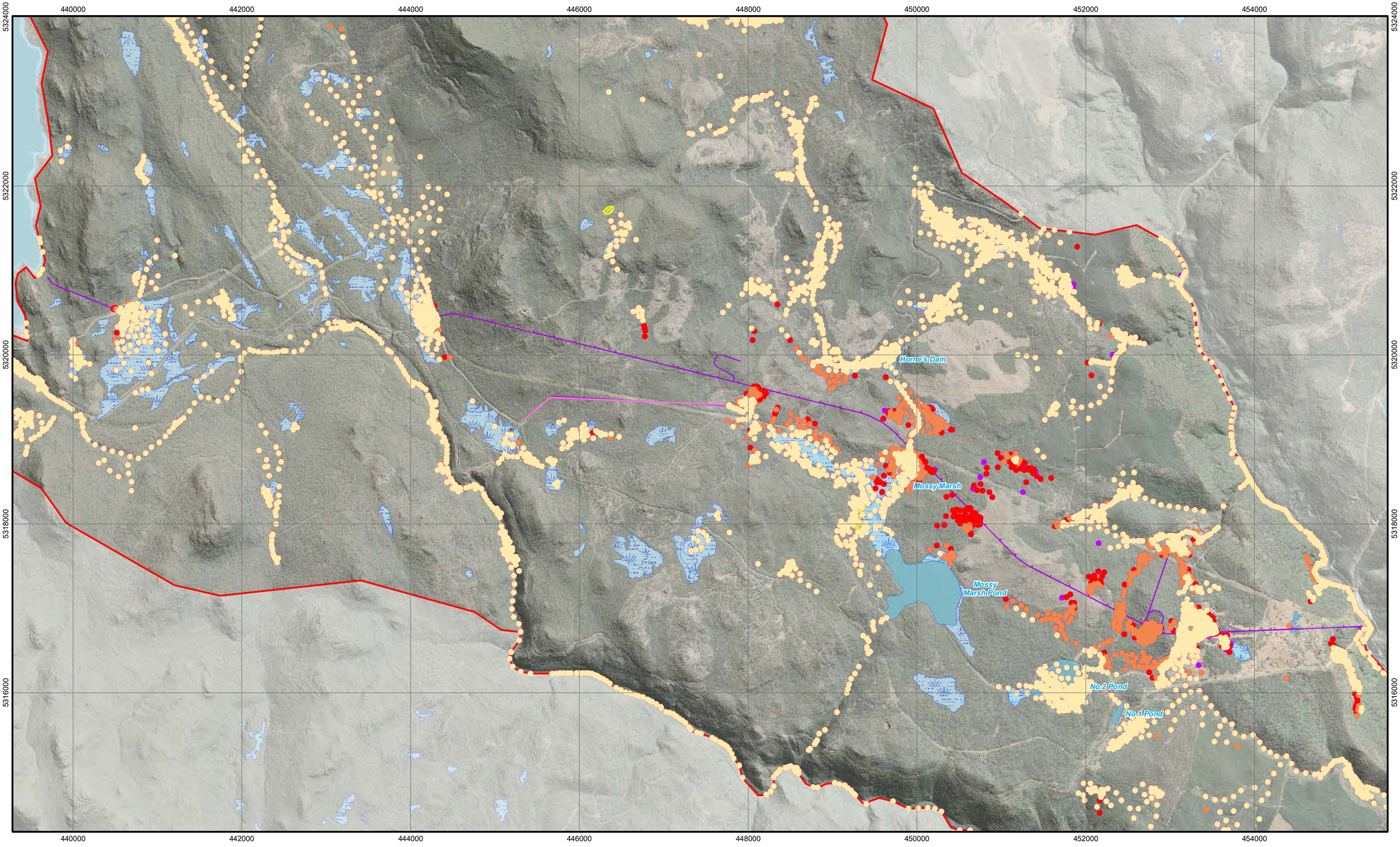
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INDUCED DISCHARGE LOCATIONS
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure J6-2(a)

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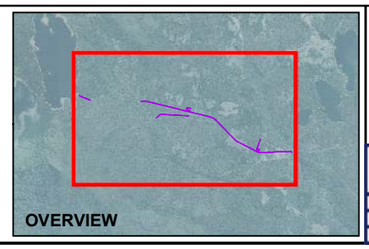
Legend

- Tarraleah Redevelopment Alignment

Induced Discharge Locations

- 1 Year
- 3 Years
- 10 Years
- 80 Years

- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:42,000

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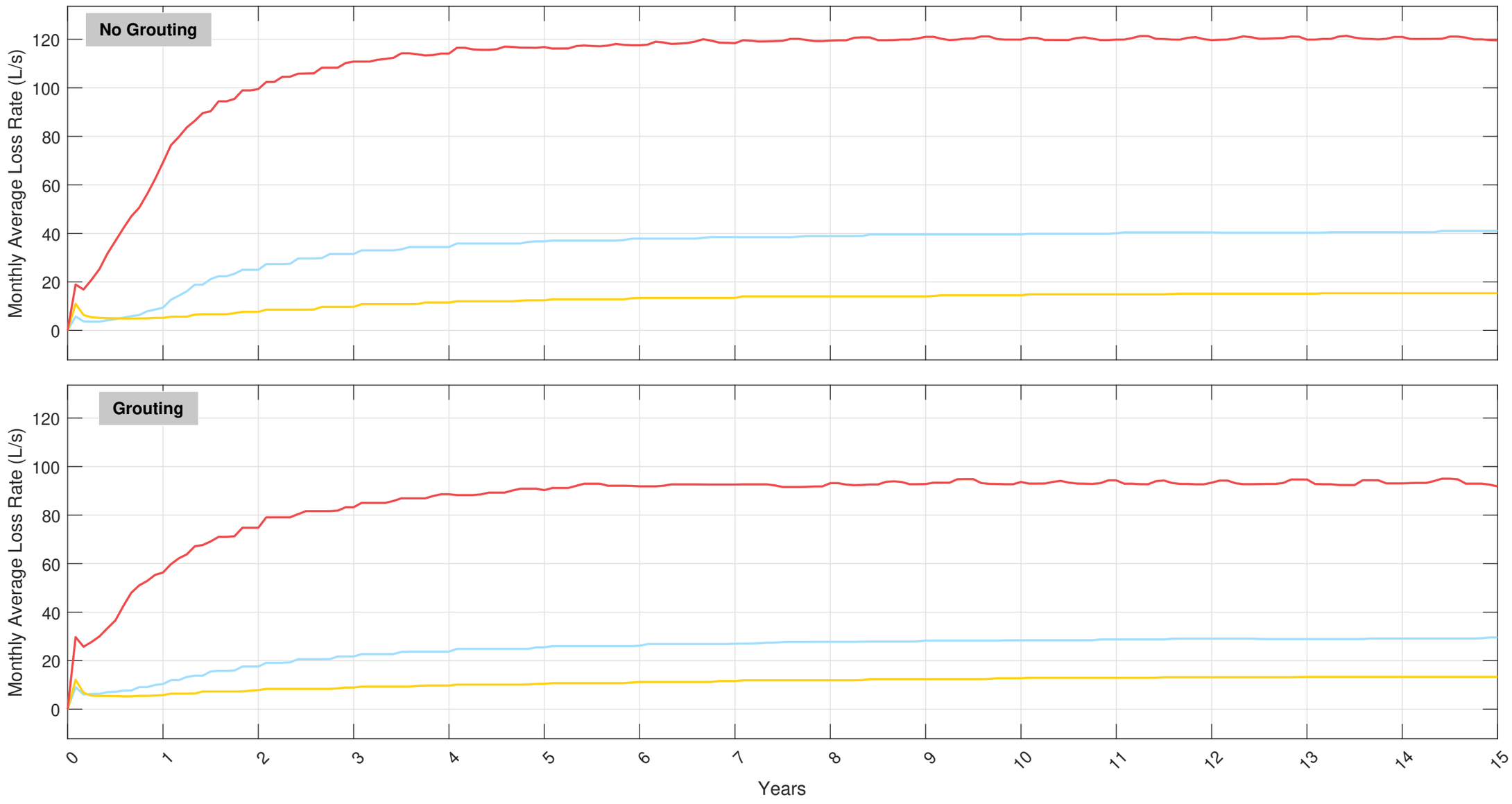
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

INDUCED DISCHARGE LOCATIONS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure J6-2(b)

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Base Case

Lower Bound

Upper Bound

Notes:

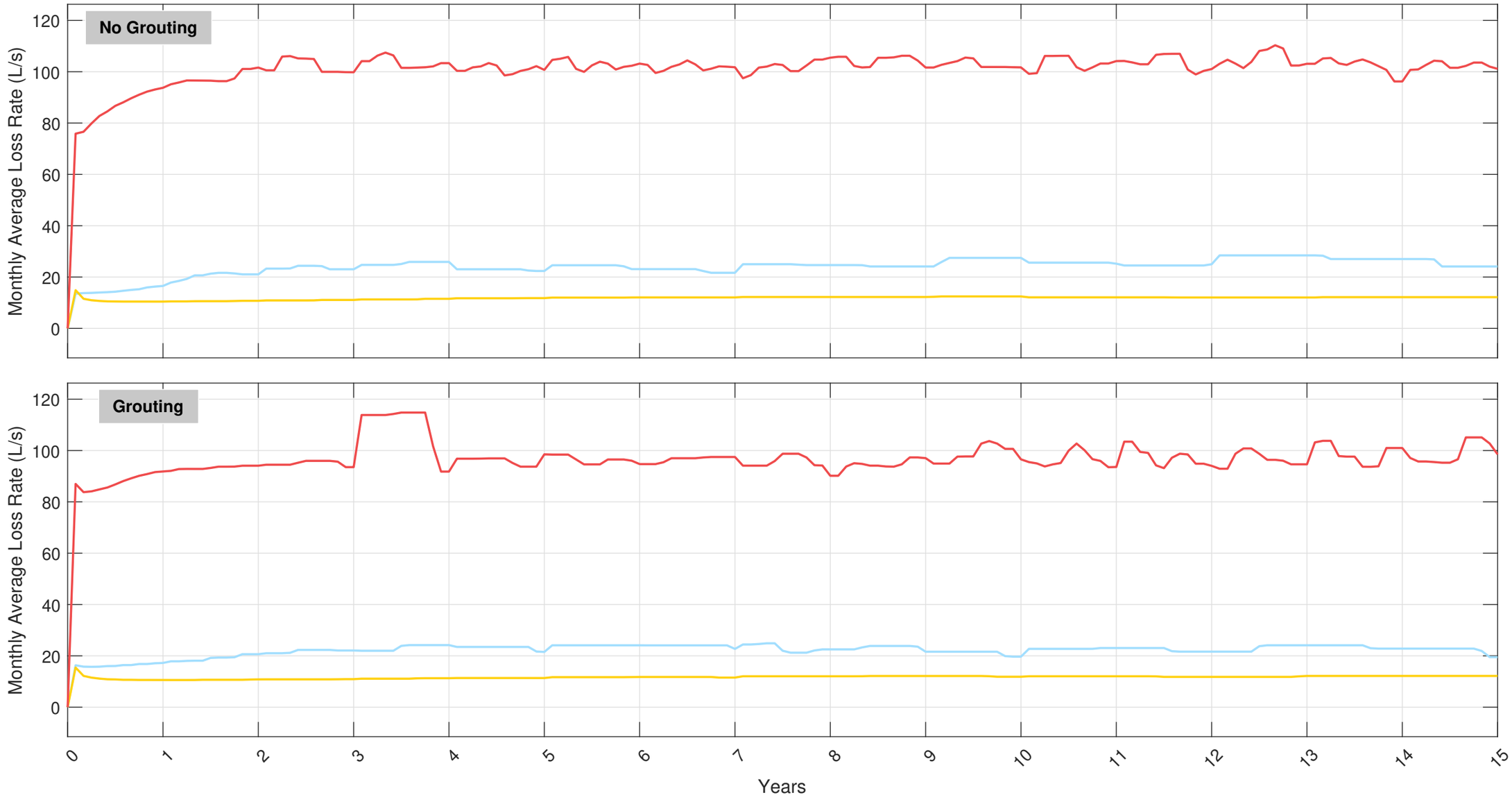
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Hydrogeological Interpretive Report

TARRALEAH TUNNELS
SIMULATED NET SURFACE DISCHARGE RATE
BASE SCHEDULE

PSM4346-115R | Figure J7-1

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Base Case

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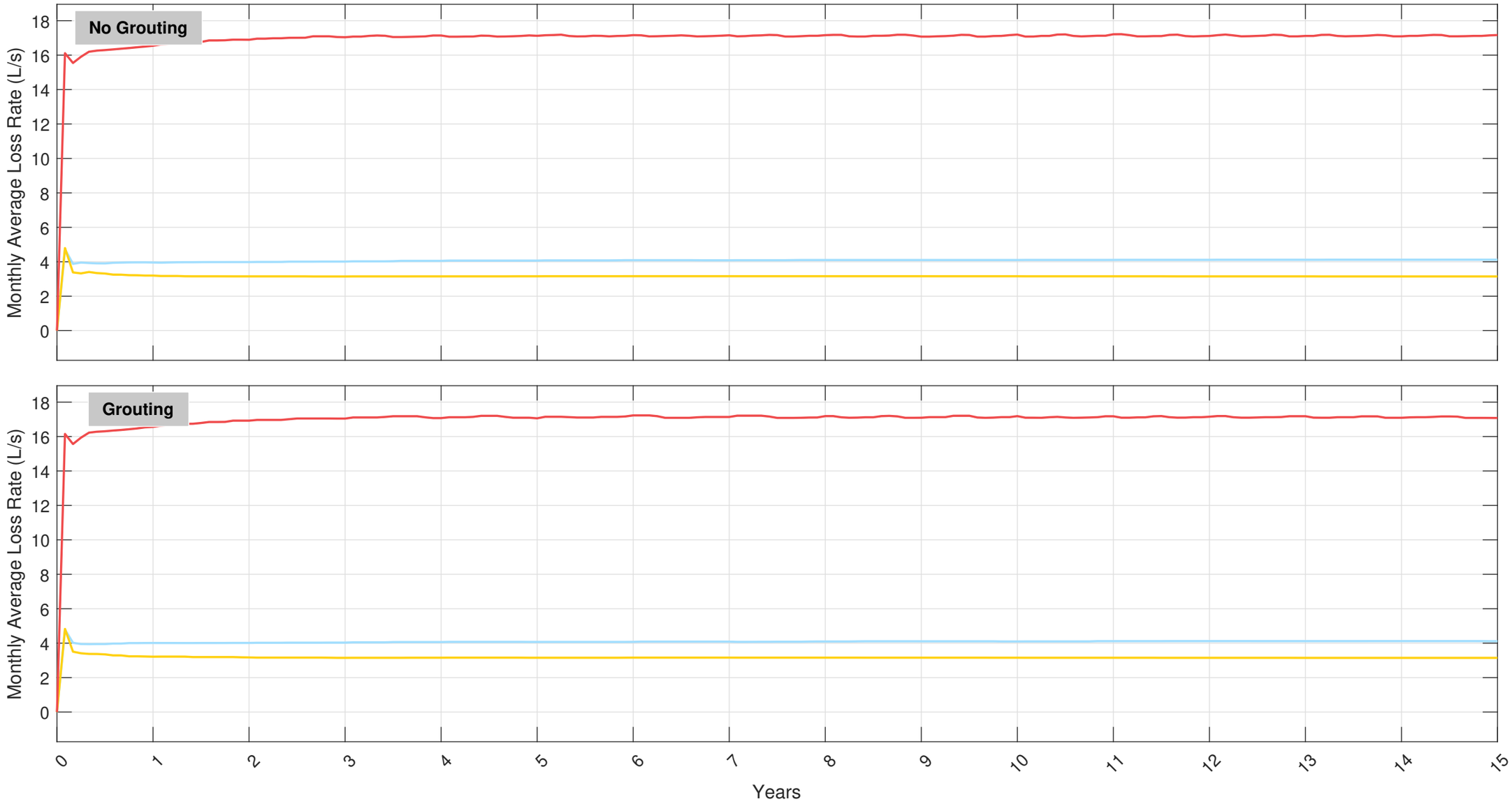
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TARRALEAH HILLSIDE
SIMULATED NET SURFACE DISCHARGE RATE
BASE SCHEDULE

PSM4346-115R | Figure J7-2

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Base Case

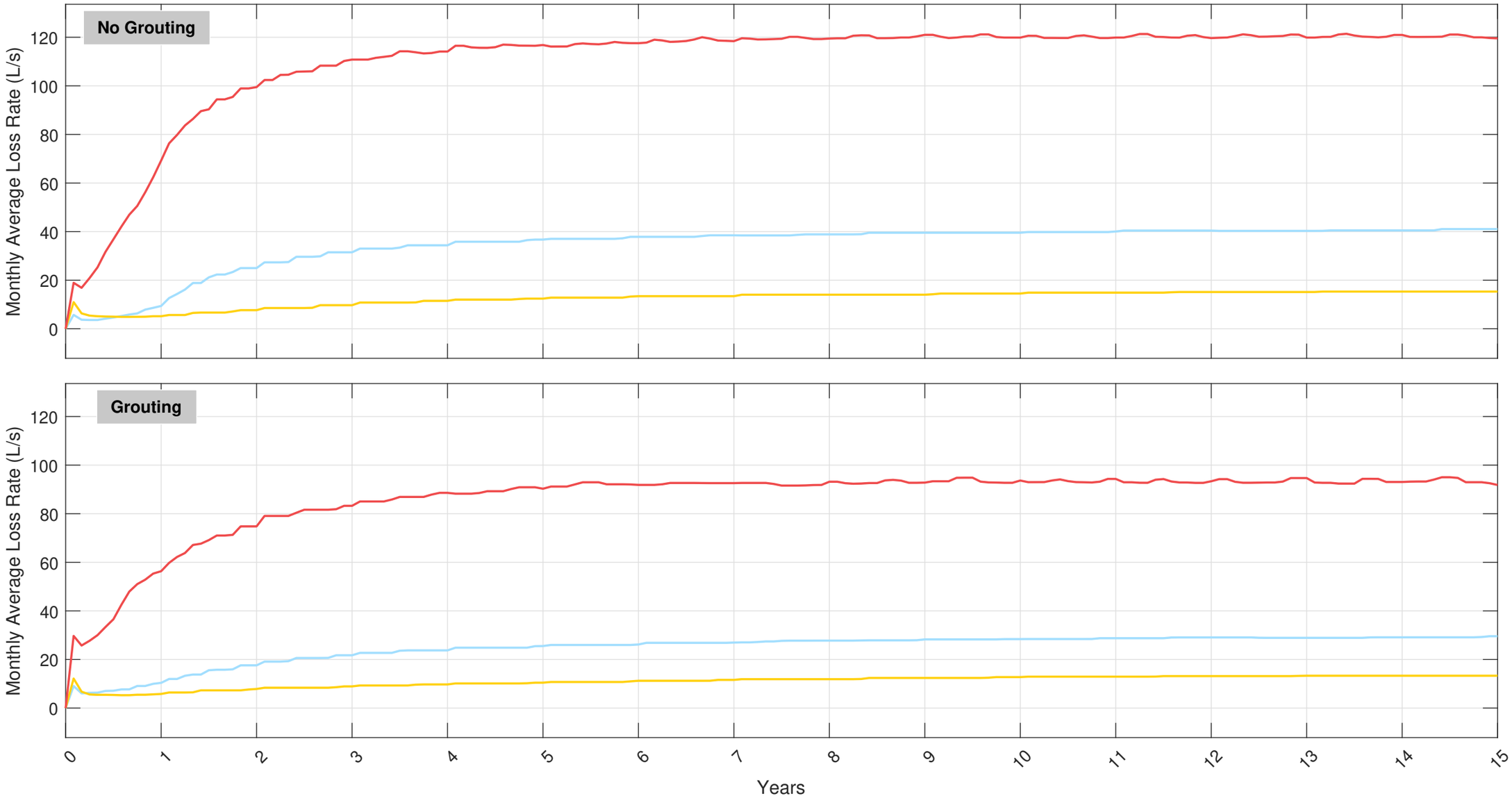
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Base Case

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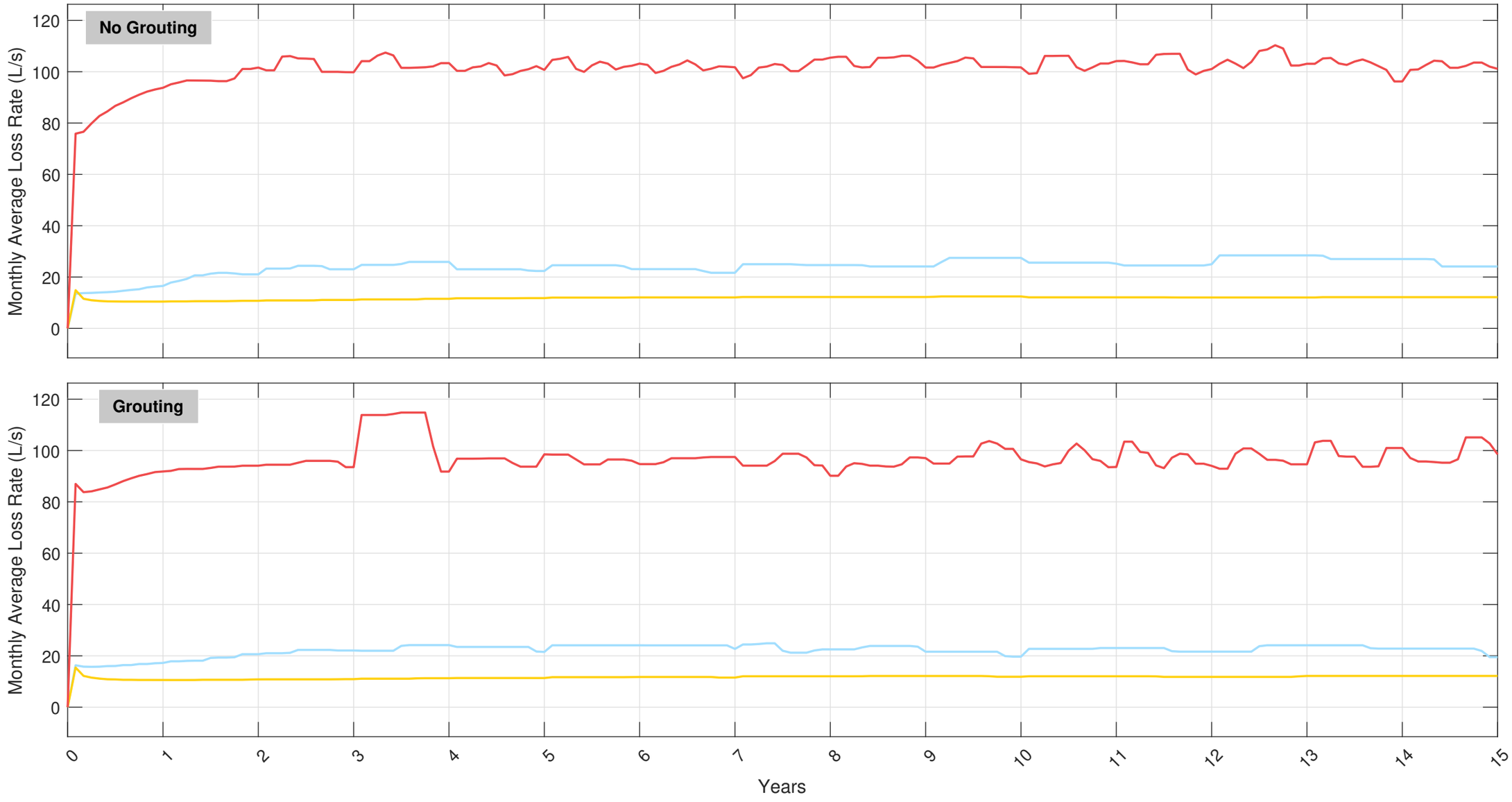
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

TARRALEAH TUNNELS
SIMULATED NET SURFACE DISCHARGE RATE
P90 SCHEDULE

PSM4346-115R | Figure J8-1

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Base Case

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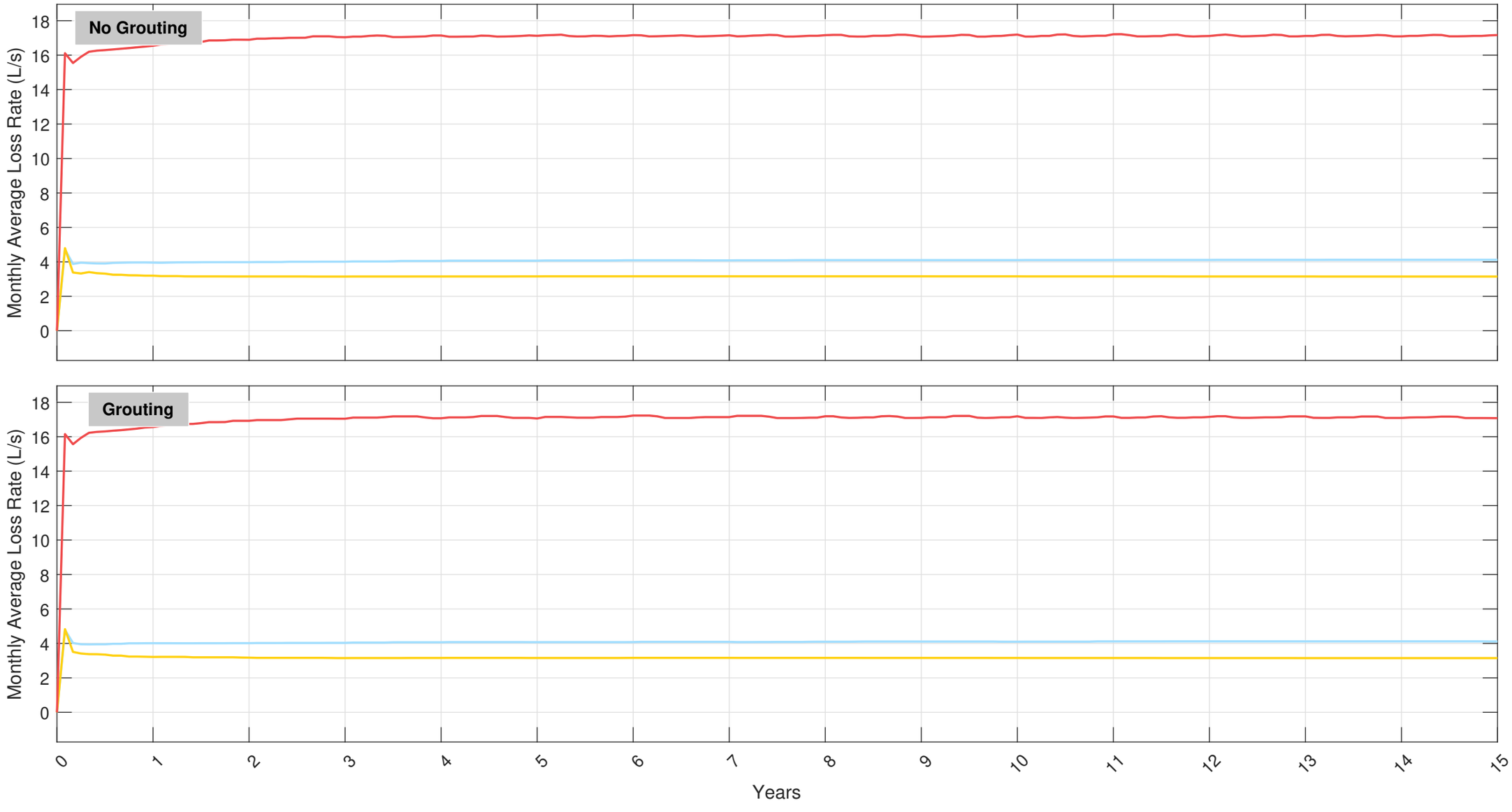
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

TARRALEAH HILLSIDE
SIMULATED NET SURFACE DISCHARGE RATE
P90 SCHEDULE

PSM4346-115R | Figure J8-2

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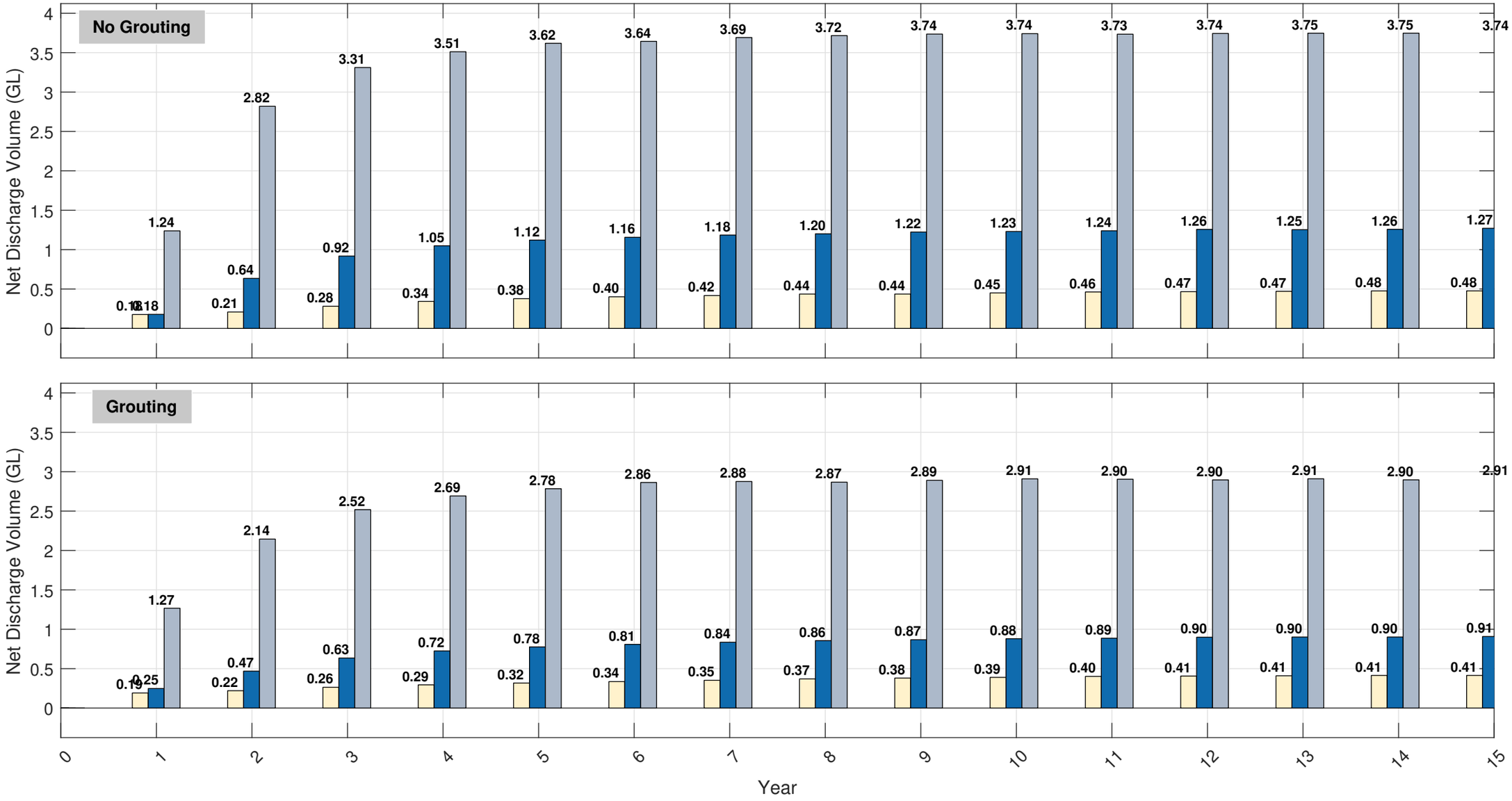
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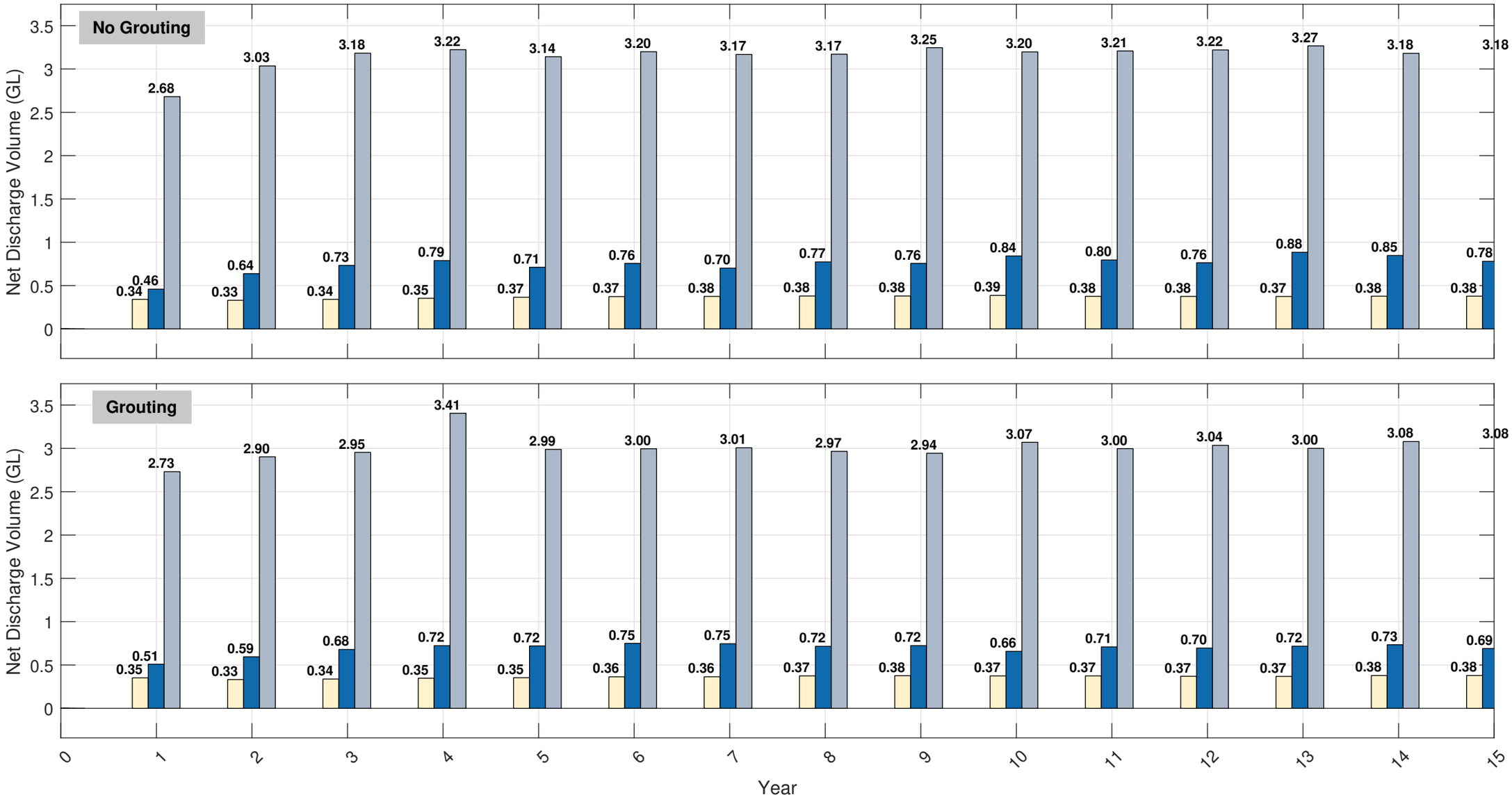
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Hydro Tasmania
Tarraleah Redevelopment Project
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TARRALEAH TUNNELS
SIMULATED SURFACE DISCHARGE VOLUME
BASE SCHEDULE

PSM4346-115R | Figure J9-1

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Base Case

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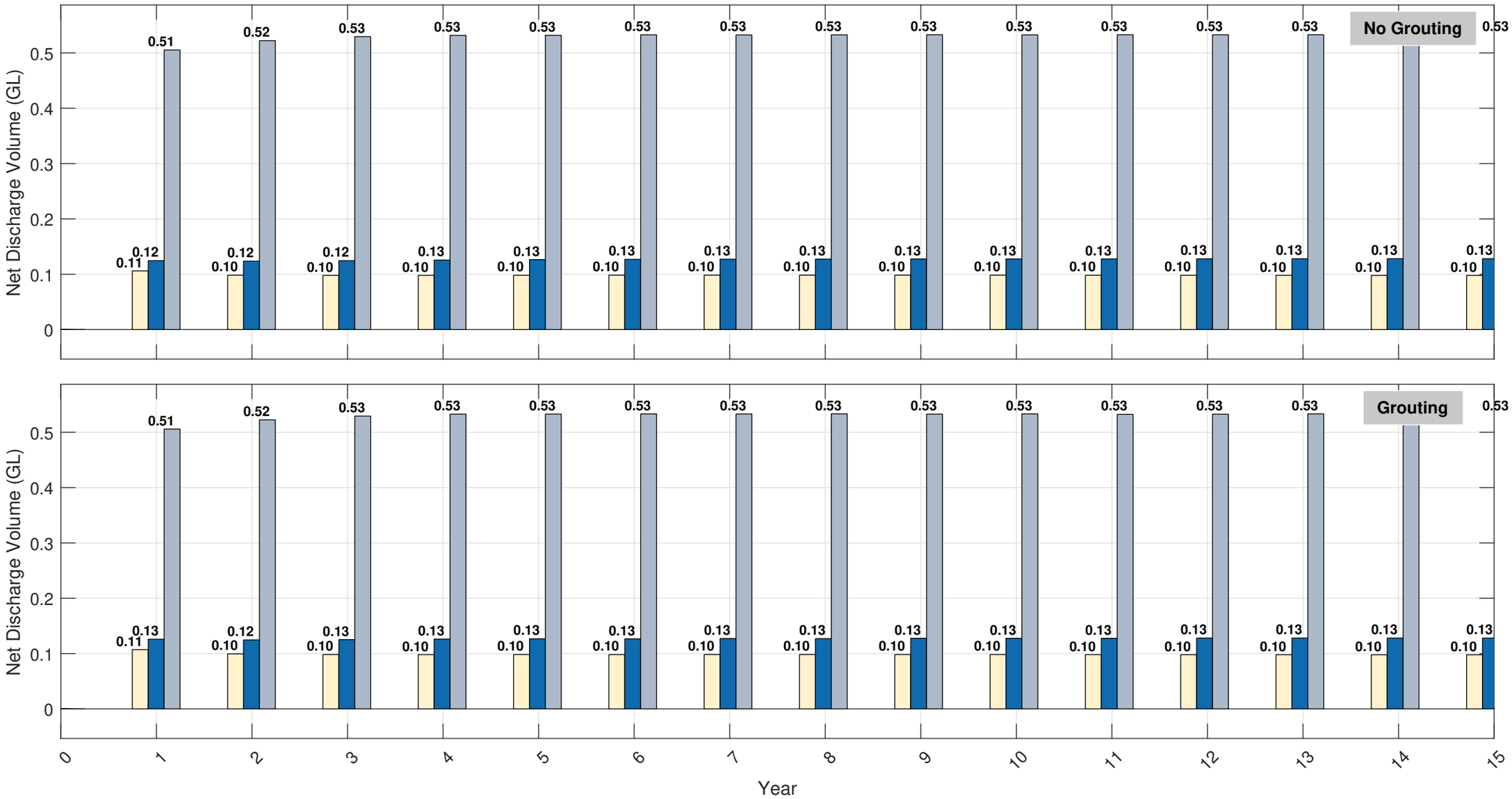
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report

TARRALEAH Hillside
SIMULATED SURFACE DISCHARGE VOLUME
BASE SCHEDULE

PSM4346-115R | Figure J9-2

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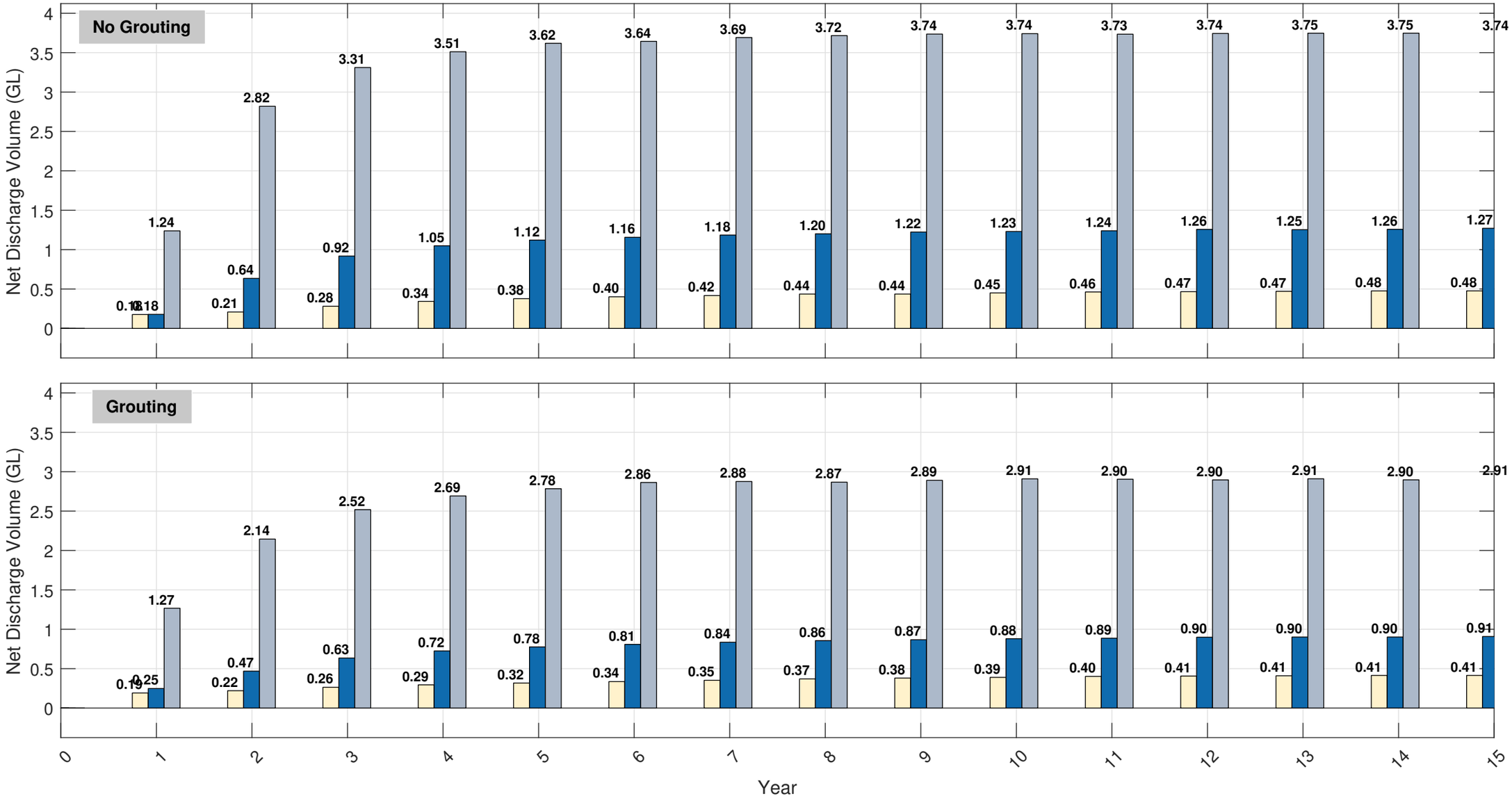
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
LAKE KING WILLIAM
SIMULATED SURFACE DISCHARGE VOLUME
BASE SCHEDULE

PSM4346-115R | Figure J9-3

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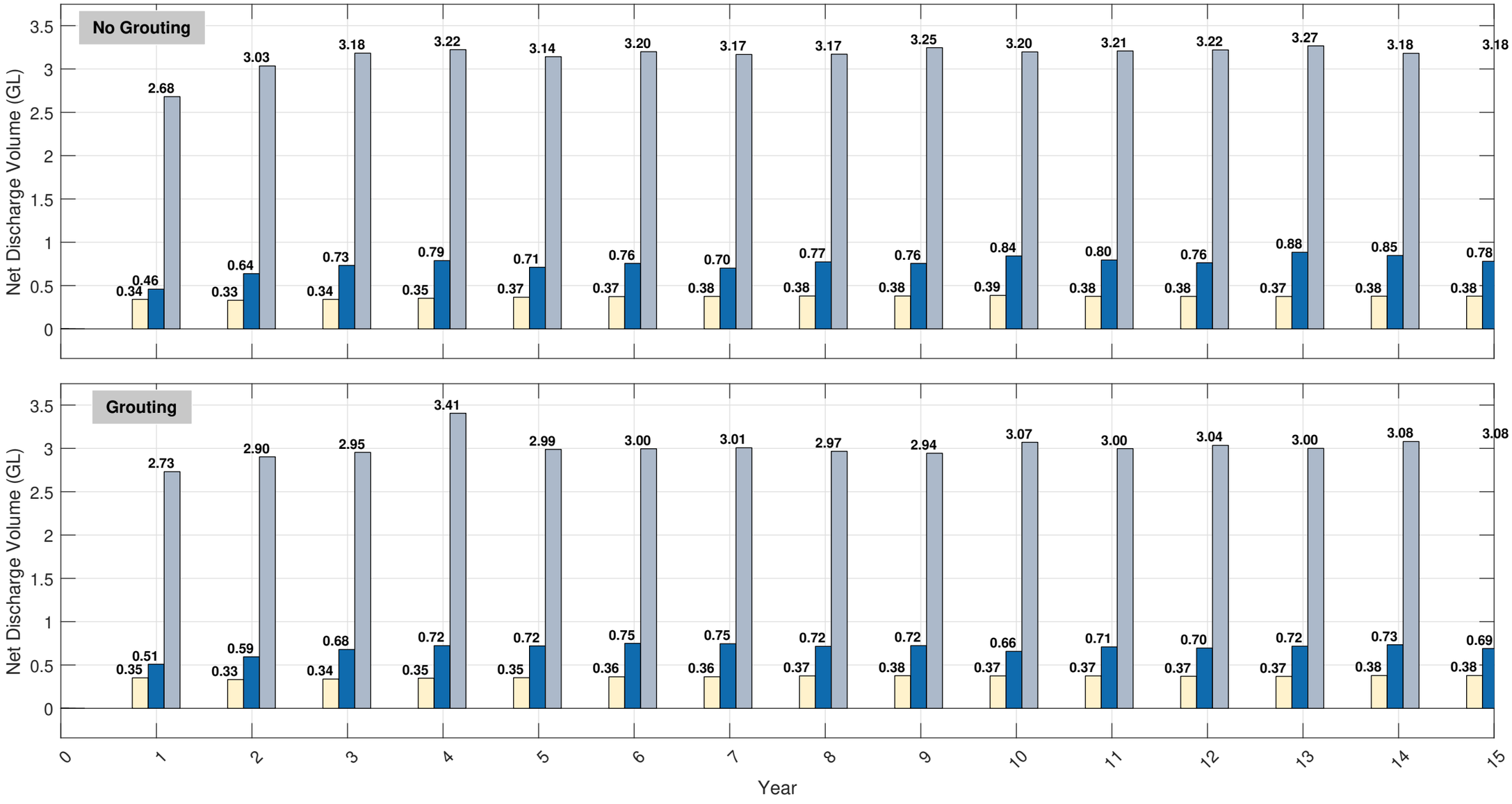
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Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
TARRALEAH TUNNELS
SIMULATED SURFACE DISCHARGE VOLUME
P90 SHCEDULE

PSM4346-115R | Figure J10-1

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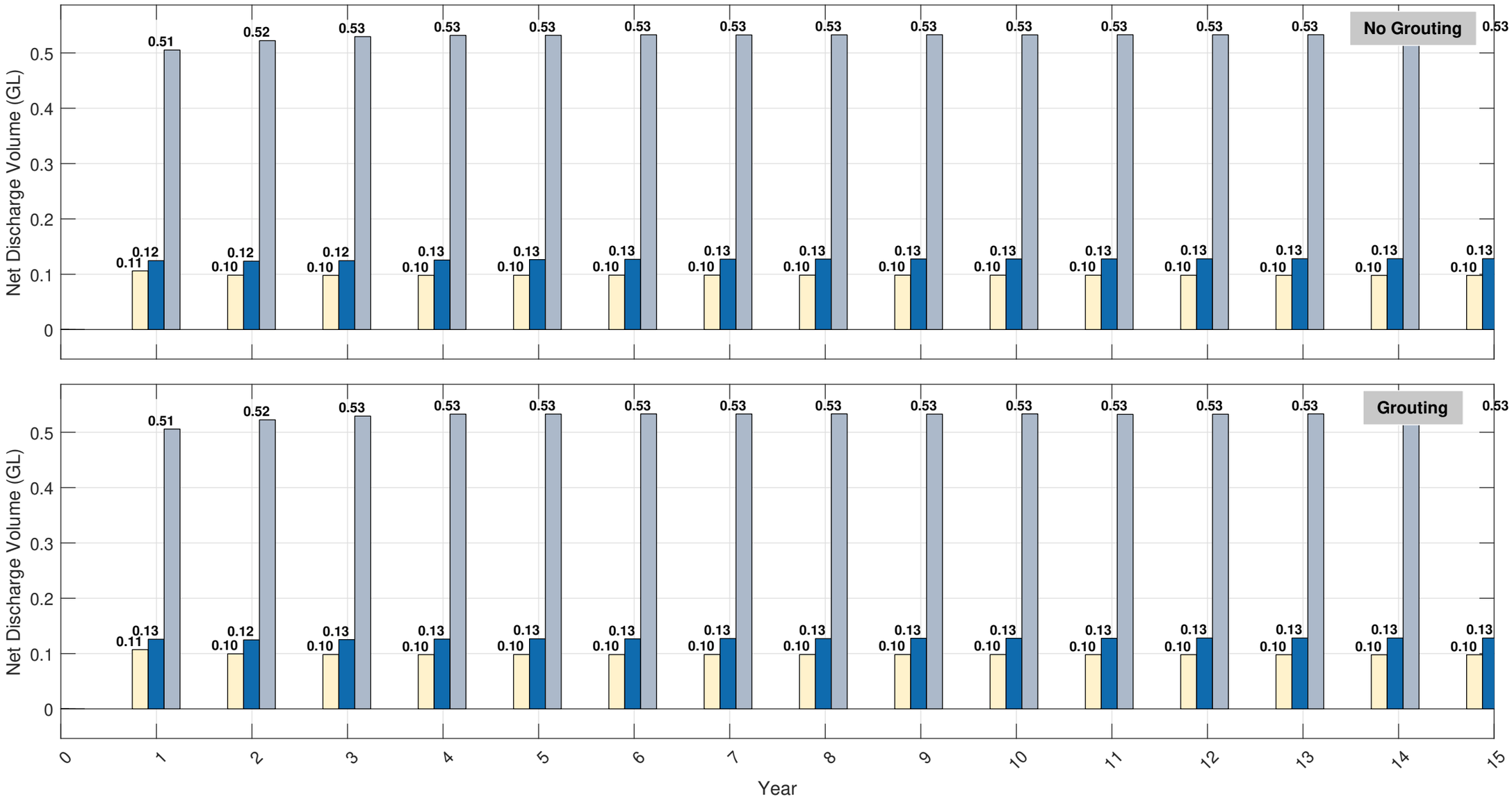
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Hydrogeological Interpretive Report

TARRALEAH Hillside
SIMULATED SURFACE DISCHARGE VOLUME
P90 SHCEDULE

PSM4346-115R | Figure J10-2

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Base Case

Upper Bound

Notes:

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretive Report
LAKE KING WILLIAM
SIMULATED SURFACE DISCHARGE VOLUME
P90 SHCEDULE

PSM4346-115R | Figure J10-3

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Appendix K
Operation Stage – Pressurisation Assessment

- Figure K1 - Tarraleah Tunnels: Transient Pressurisation Snapshots
- Figure K2 - Tarraleah Power Station: Transient Pressurisation Snapshots
- Figure K3 - Lake King William Tunnel: Transient Pressurisation Snapshots
- Figure K4 - Tarraleah Power Station: Virtual Monitoring Points and Sections
- Figure K5 - Baseline Hydraulic Head
- Figure K6 - Penstock Section: Transient Hydraulic Head Change
- Figure K7 – Power Tunnel Section: Transient Hydraulic Head Change

1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDULE (BASE CASE)

PSM4346-115R | Figure K1-1(a)

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1 Year

3 Years

5 Years

80 Years

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure K1-1(b)

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1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report

TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure K1-1(c)

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1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(BASE CASE)

PSM4346-115R | Figure K1-2(a)

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1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure K1-2(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-2(b) Tarraleah Tunnels Transient Pressurisation Snapshots Base Schedule - Grouting (Lower Bound).mxd

1 Year

3 Years

5 Years

80 Years

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

No.1 Pond

446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW

N

Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure K1-2(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-2(c) Tarraleah Tunnels Transient Pressurisation Snapshots Base Schedule - Grouting (Upper Bound).mxd

1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
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OVERVIEW

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Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS TRANSIENT PRESSURISATION SNAPSHOTS P90 SCHEDULE (BASE CASE)

PSM4346-115R | Figure K1-3(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-3(a) Tarraleah Tunnels Transient Pressurisation Snapshots P90 Schedule (Base Case).mxd

1 Year

3 Years

5 Years

80 Years

Horne's Dam

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Mossy Marsh Pond

No.2 Pond

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Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
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- Wetland
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OVERVIEW

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Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure K1-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-3(b) Tarraleah Tunnels Transient Pressurisation Snapshots P90 Schedule (Lower Bound).mxd

1 Year

3 Years

5 Years

80 Years

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

446000 448000 450000 452000 454000
5322000 5320000 5318000 5316000

Legend

- Tarraleah Redevelopment
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OVERVIEW

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Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure K1-3(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-3(c) Tarraleah Tunnels Transient Pressurisation Snapshots P90 Schedule (Upper Bound).mxd

1 Year

3 Years

5 Years

80 Years

Horne's Dam

Mossy Marsh

Mossy Marsh Pond

No.2 Pond

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446000 448000 450000 452000 454000

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Legend

- Tarraleah Redevelopment
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Scale 1:61,000

0 0.5 1 2 3 Km

Map Projection: Transverse Mercator
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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(BASE CASE)

PSM4346-115R | Figure K1-4(a)

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Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

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5322000 5320000 5318000 5316000

Legend

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OVERVIEW

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Scale 1:61,000

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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure K1-4(b)

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1 Year

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80 Years

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Mossy Marsh Pond

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No.1 Pond

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Scale 1:61,000

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Map Projection: Transverse Mercator
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TARRALEAH TUNNELS
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure K1-4(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K1-4(c) Tarraleah Tunnels Transient Pressurisation Snapshots P90 Schedule - Grouting (Upper Bound).mxd

1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

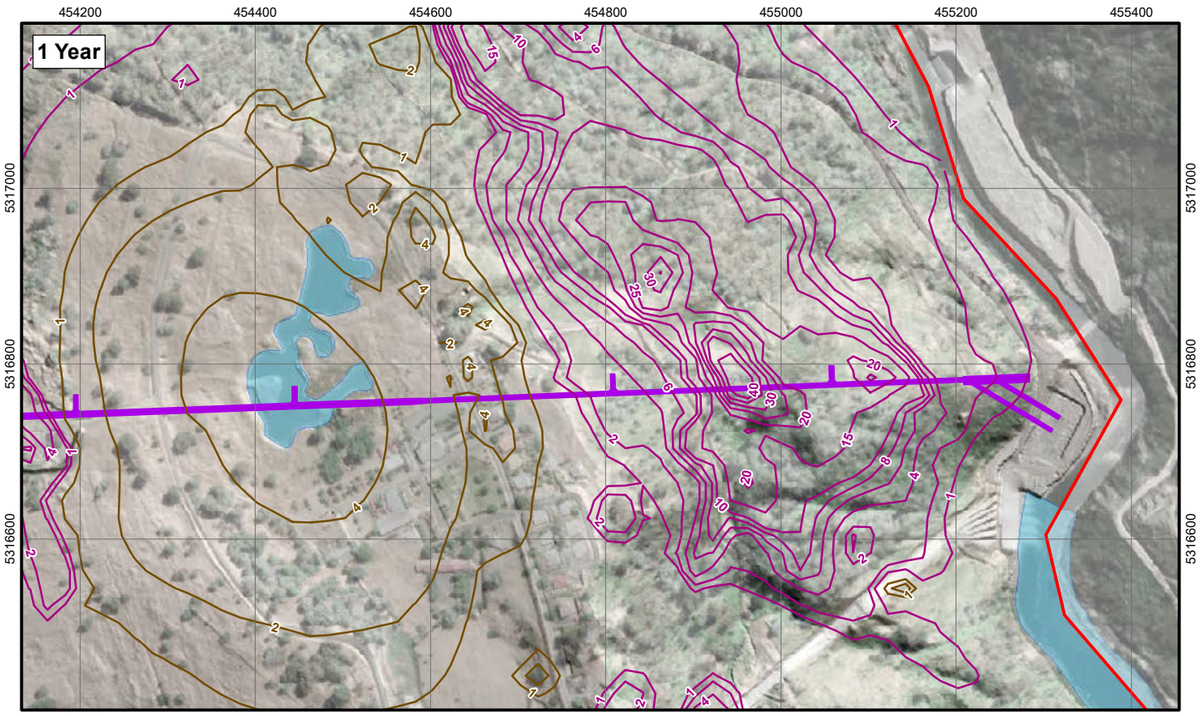
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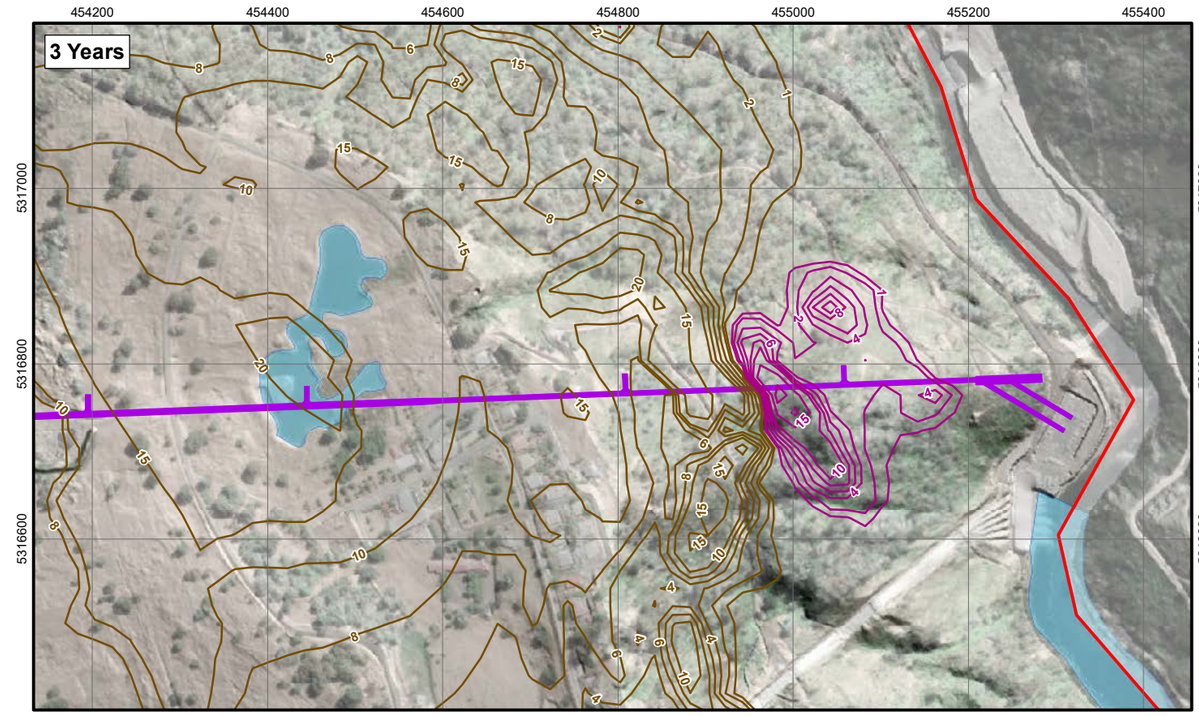
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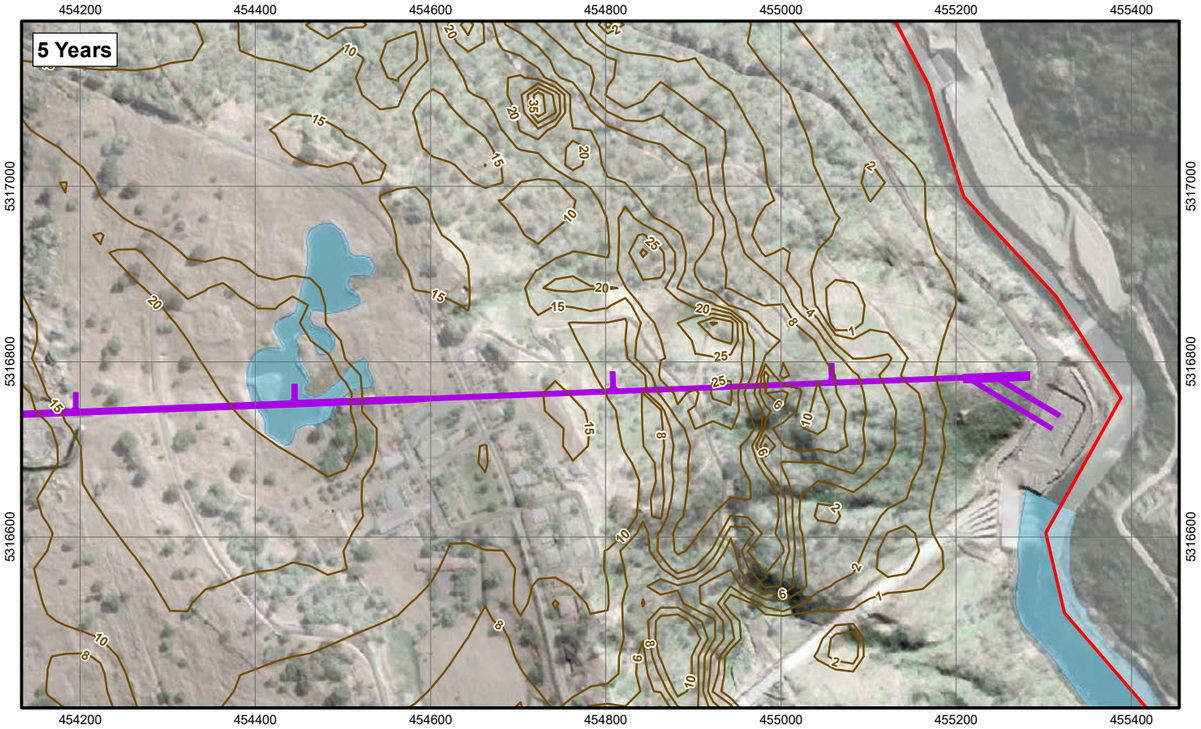
TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDULE (BASE CASE)

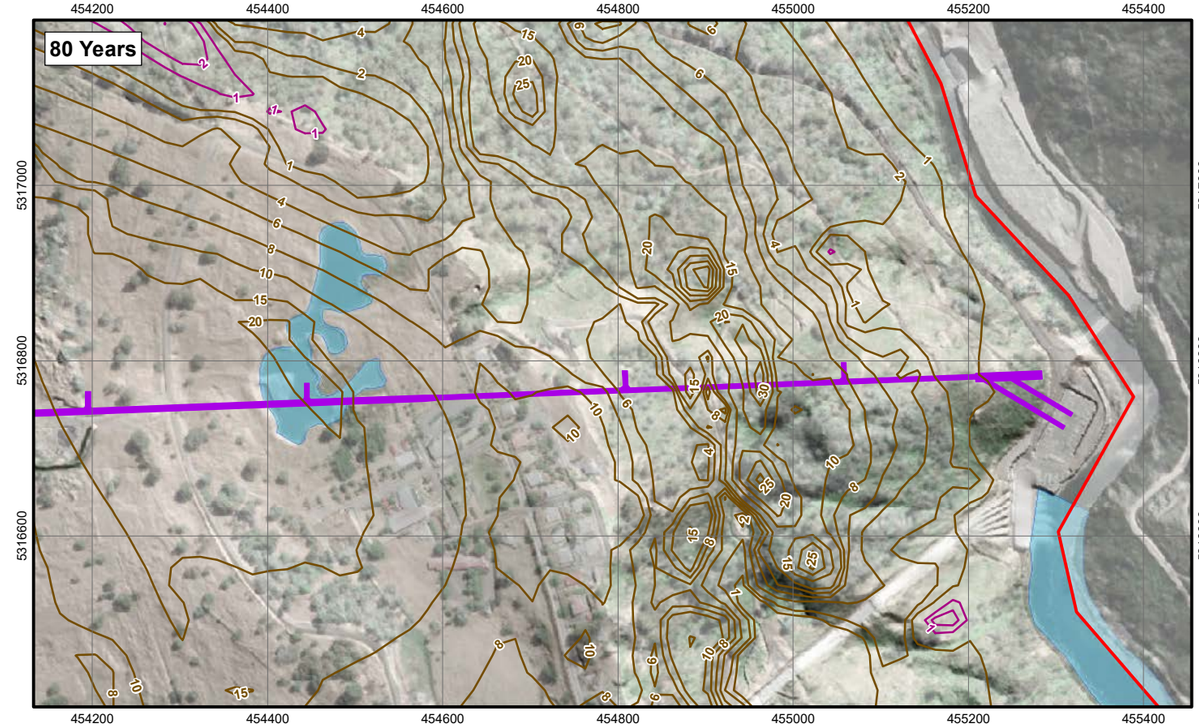
PSM4346-115R | Figure K2-1(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-1(a) Tarraleah Power Station Transient Pressurisation Snapshots Base Schedule (Base Case).mxd









Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDUEL (LOWER BOUND)

PSM4346-115R | Figure K2-1(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-1(b) Tarraleah Power Station Transient Pressurisation Snapshots Base Schedule (Lower Bound).mxd

1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH POWER STATION
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure K2-1(c)

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1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydrogeological Interpretative Report
TARRALEAH POWER STATION
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(BASE CASE)

PSM4346-115R | Figure K2-2(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-2(a) Tarraleah Power Station Transient Pressurisation Snapshots Base Schedule - Grouting (Base Case).mxd

1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDULE - GROUTING (LOWER BOUND)

PSM4346-115R | Figure K2-2(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-2(b) Tarraleah Power Station Transient Pressurisation Snapshots Base Schedule - Grouting (Lower Bound).mxd

1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

5317000 5316800 5316600

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
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Grid: GDA2020 MGA Zone 55

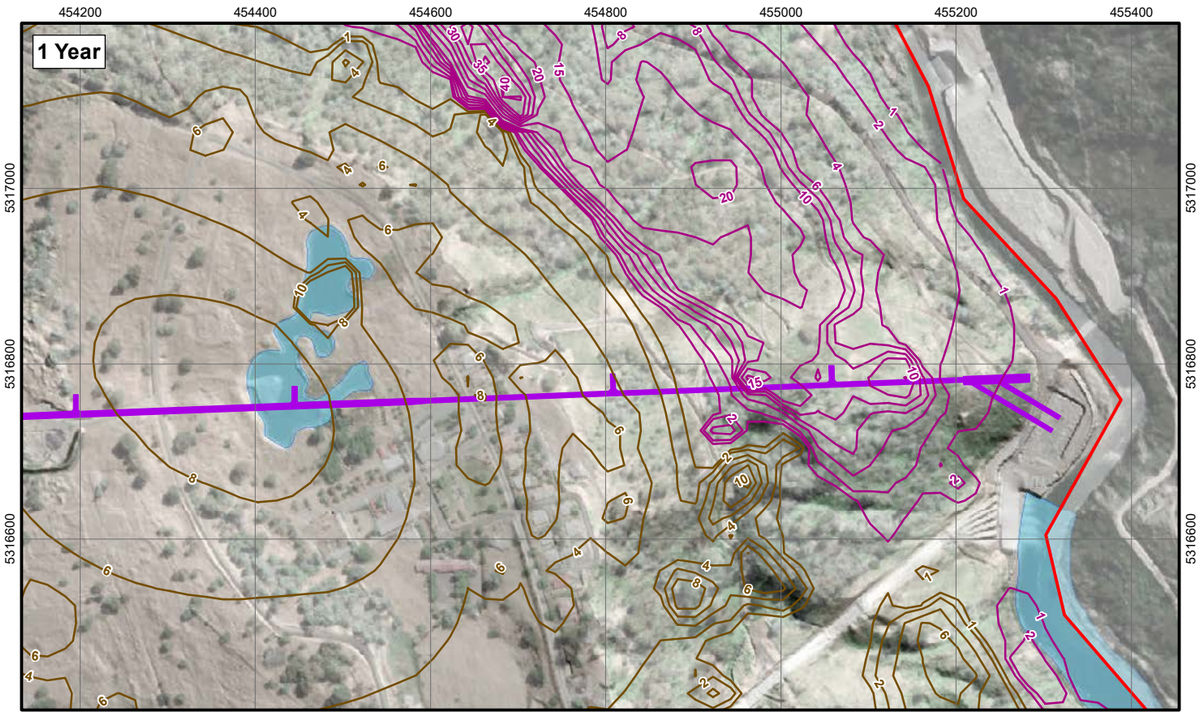
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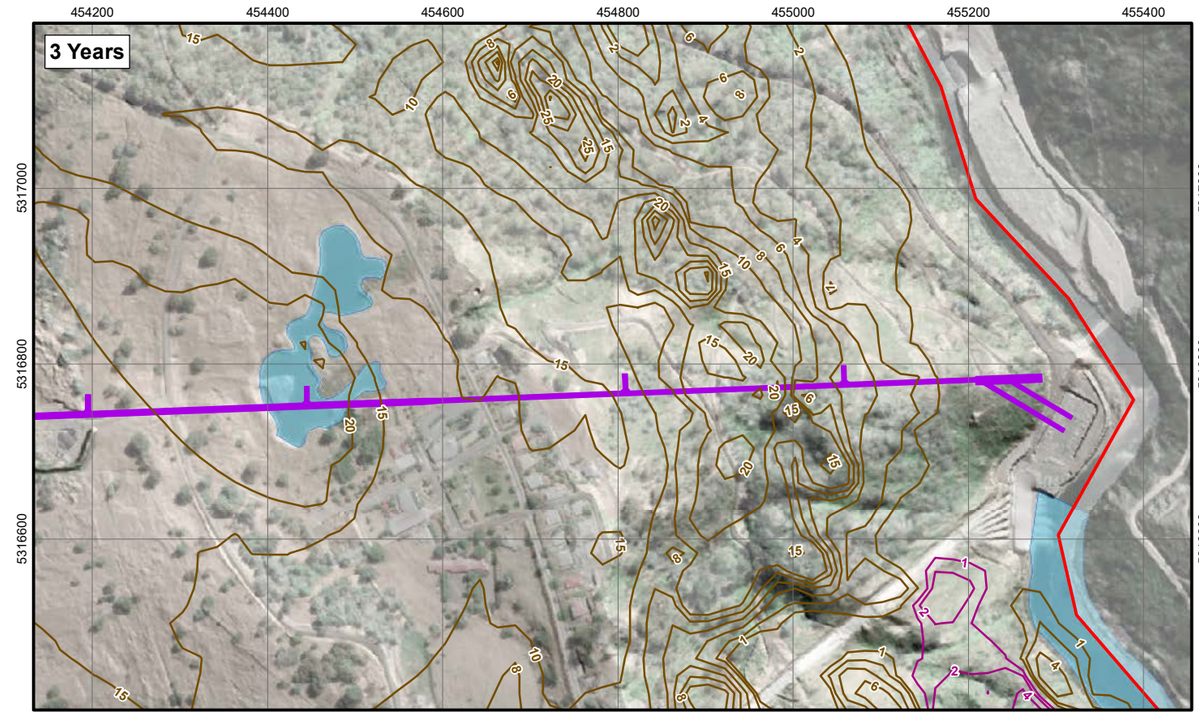
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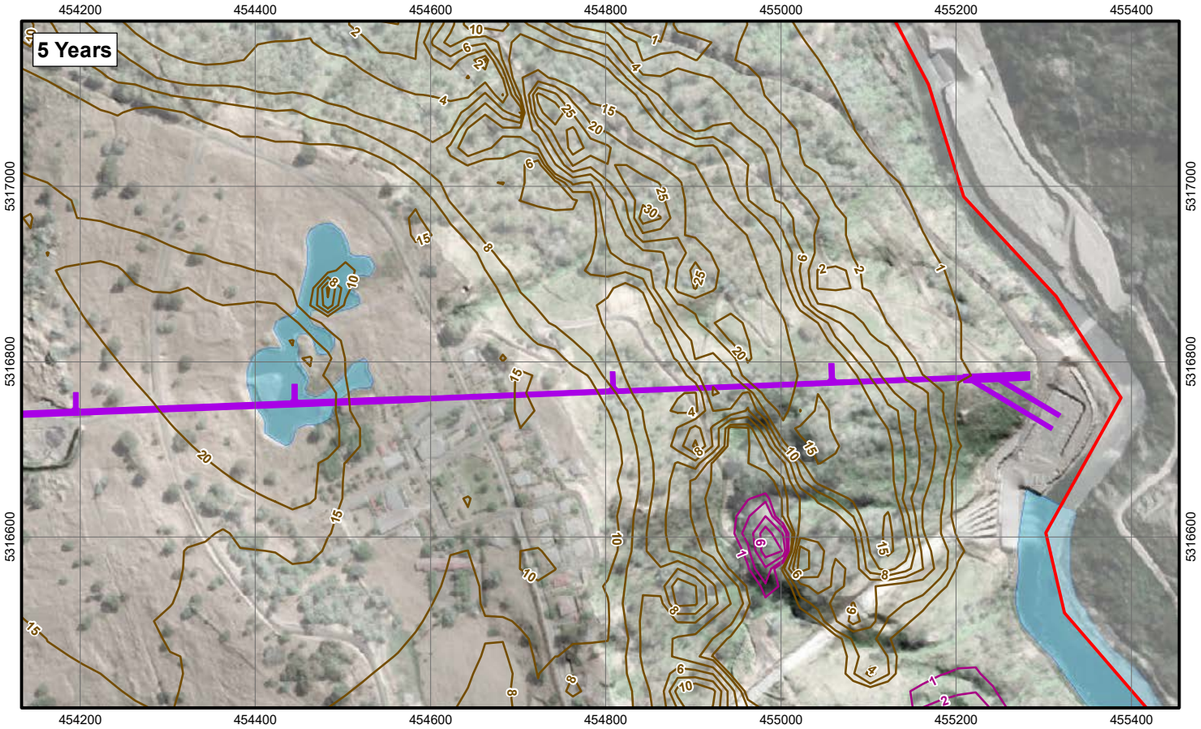
Hydro Tasmania
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Hydrogeological Interpretative Report
TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDULE - GROUTING (UPPER BOUND)

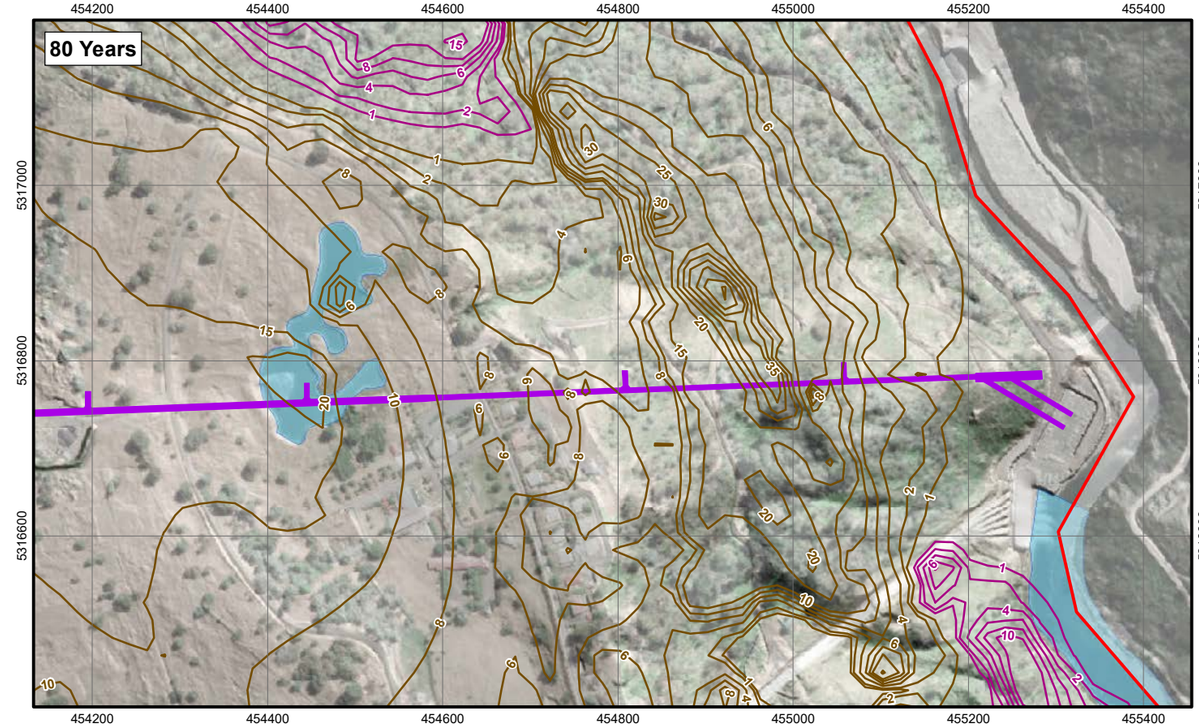
PSM4346-115R | Figure K2-2(c)

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Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: B	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 26 Feb 2025	Paper Size: A3	TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS P90 SCHEDULE (BASE CASE)	
		PSM4346-115R	Figure K2-3(a)

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1 Year

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454200 454400 454600 454800 455000 455200 455400

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Legend

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OVERVIEW

N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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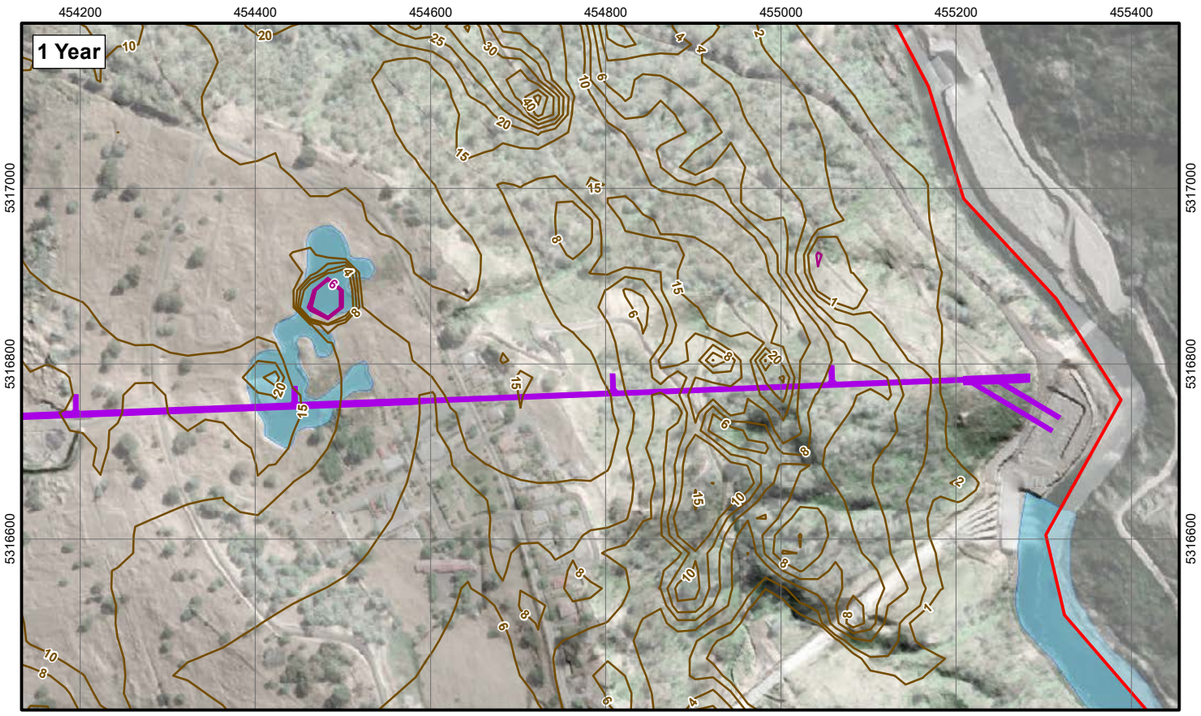
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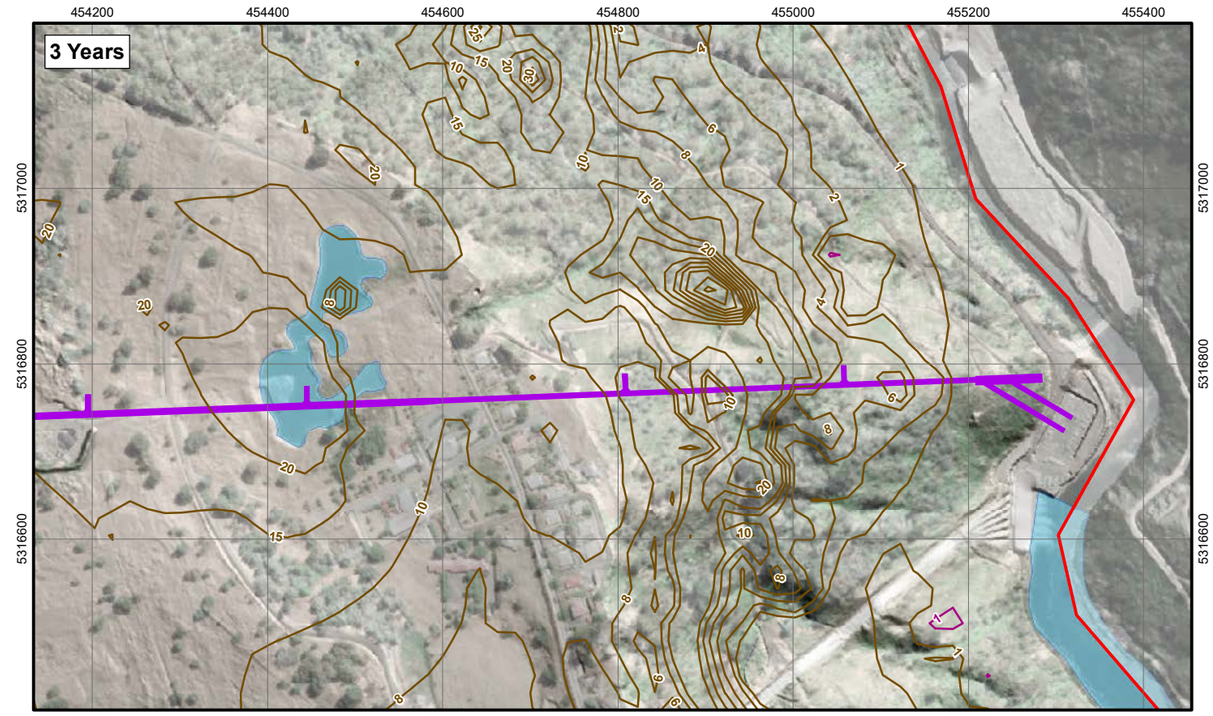
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Hydrogeological Interpretative Report

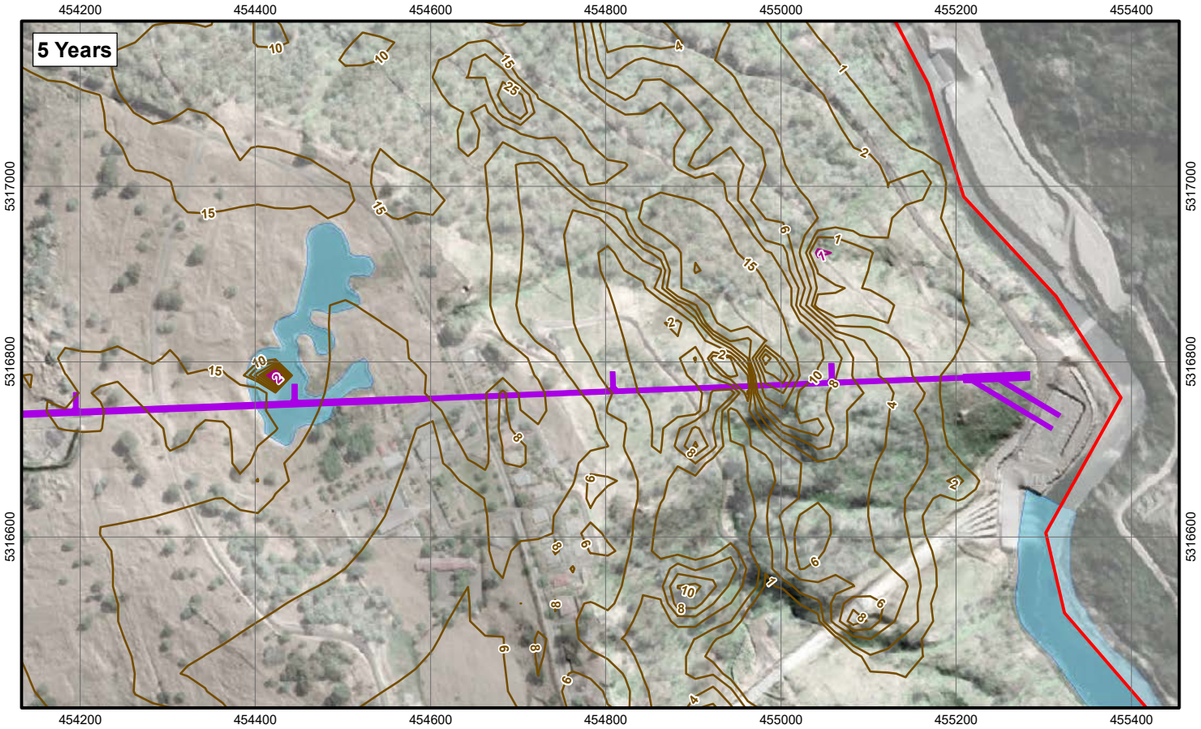
TARRALEAH POWER STATION
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (LOWER BOUND)

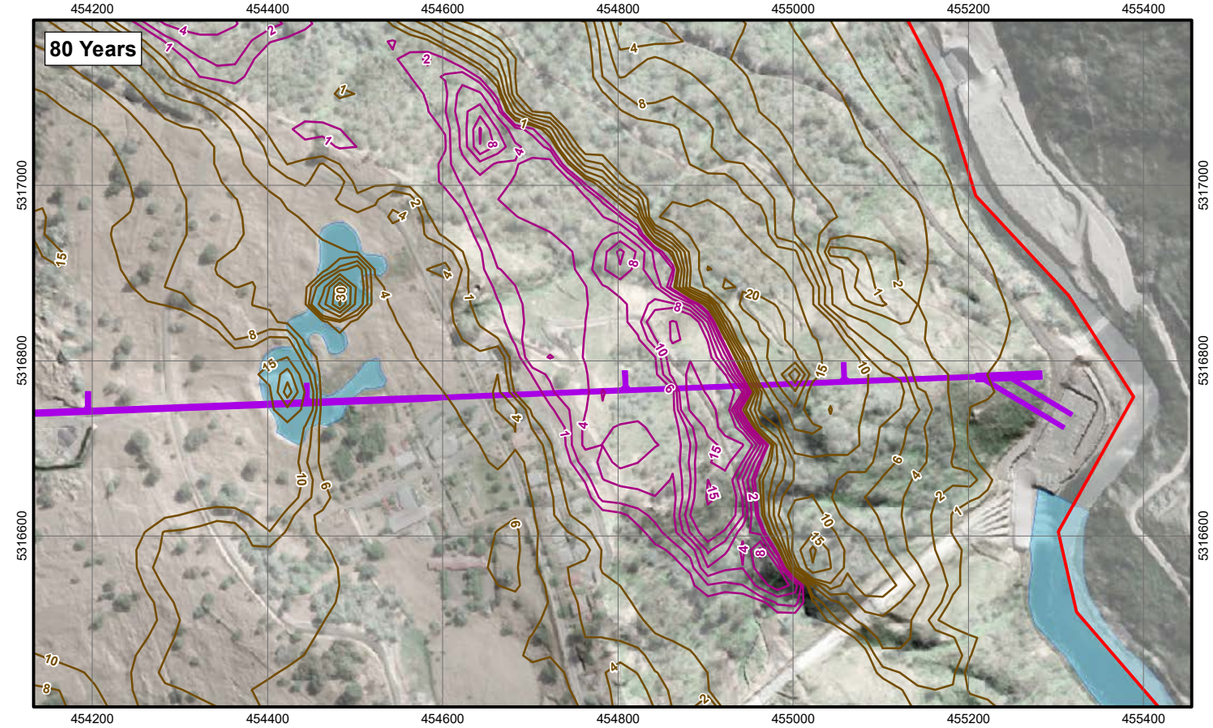
PSM4346-115R | Figure K2-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-3(b) Tarraleah Power Station Transient Pressurisation Snapshots P90 Schedule (Lower Bound).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
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- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
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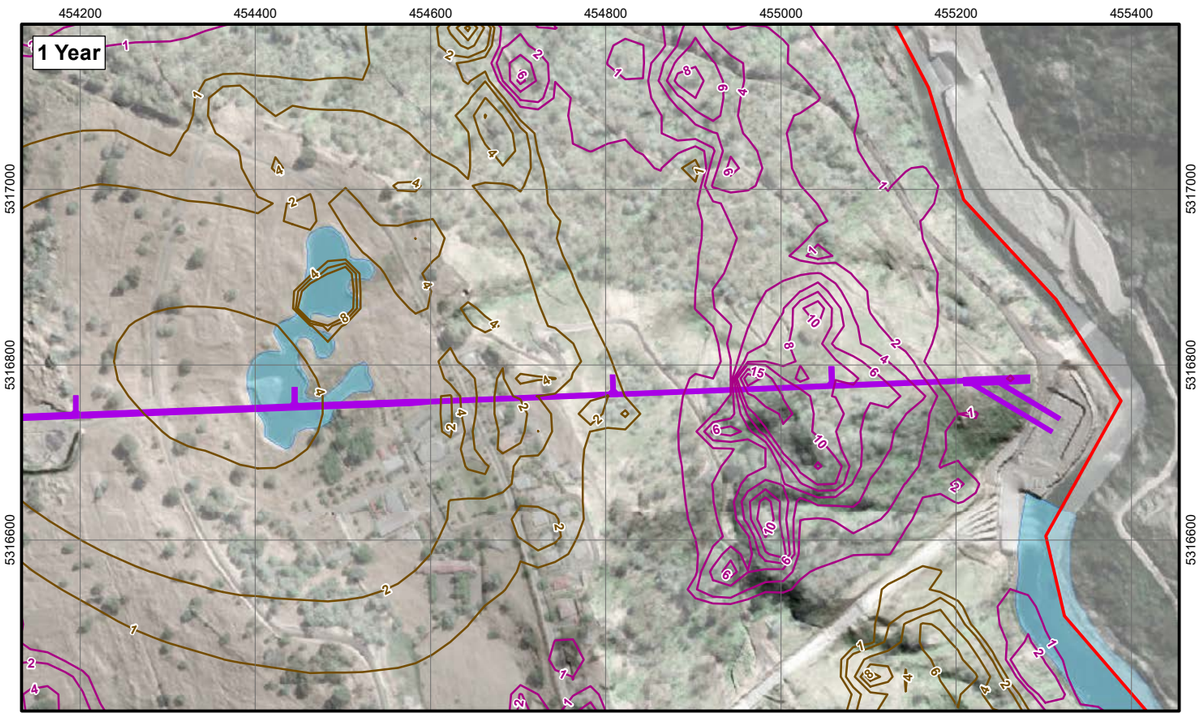
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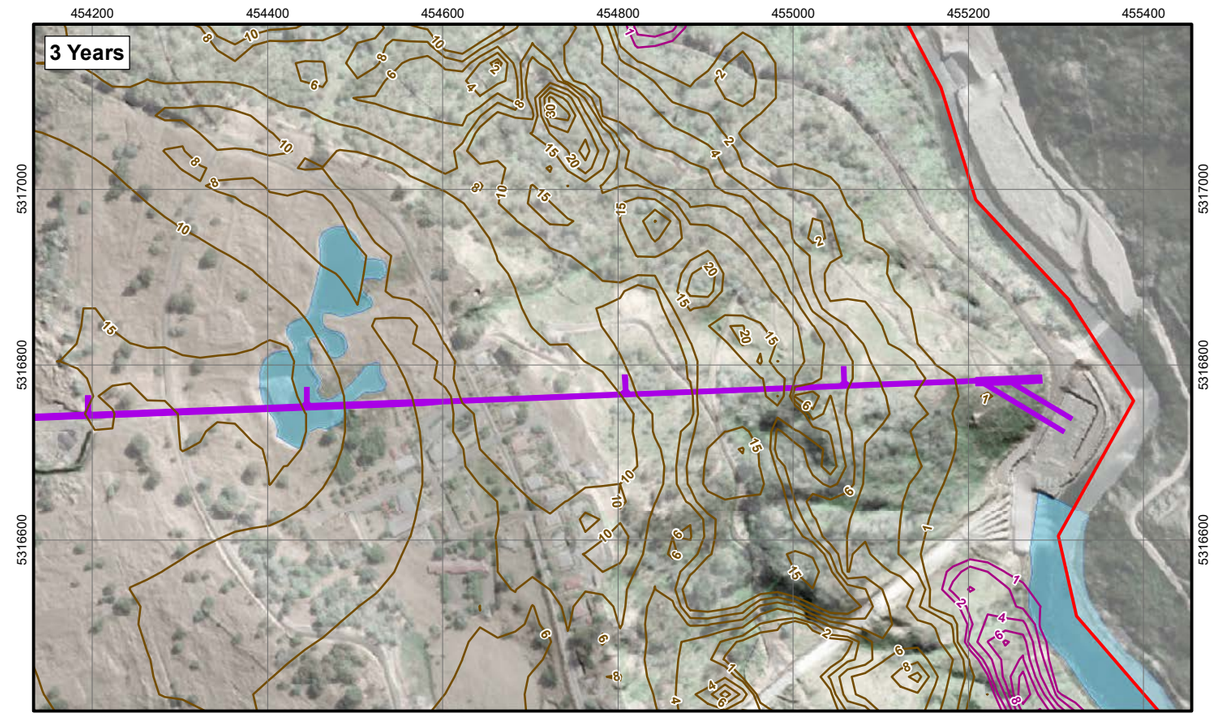
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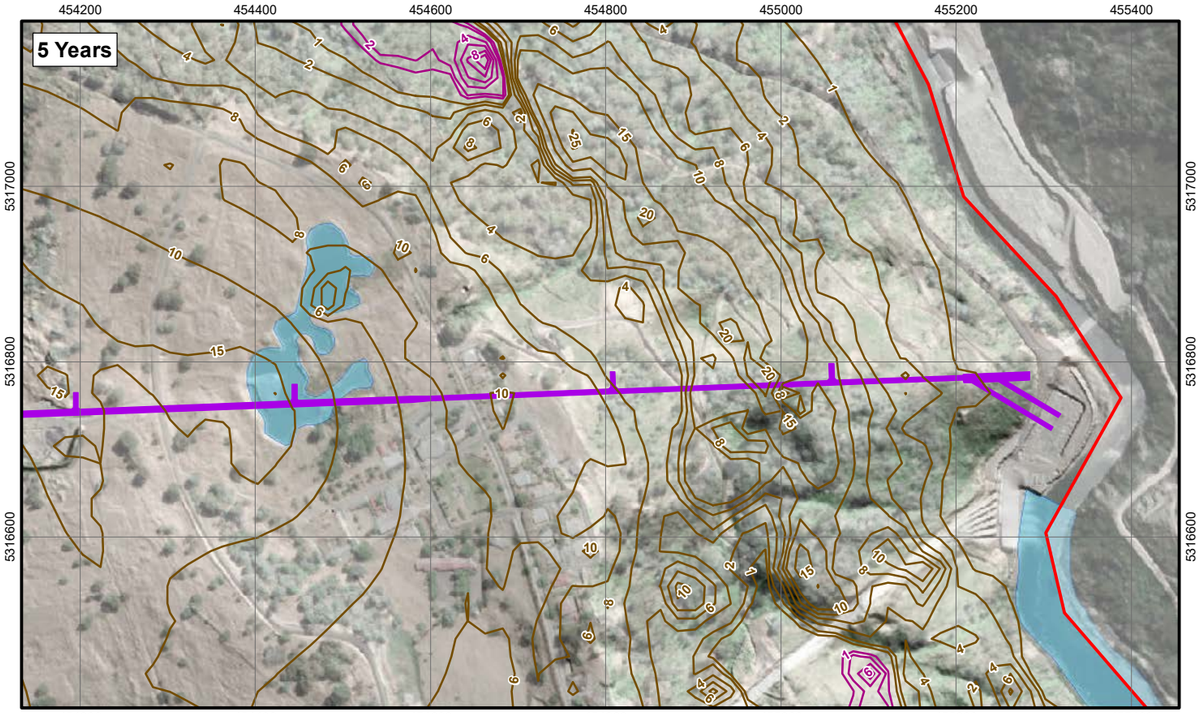
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TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (UPPER BOUND)

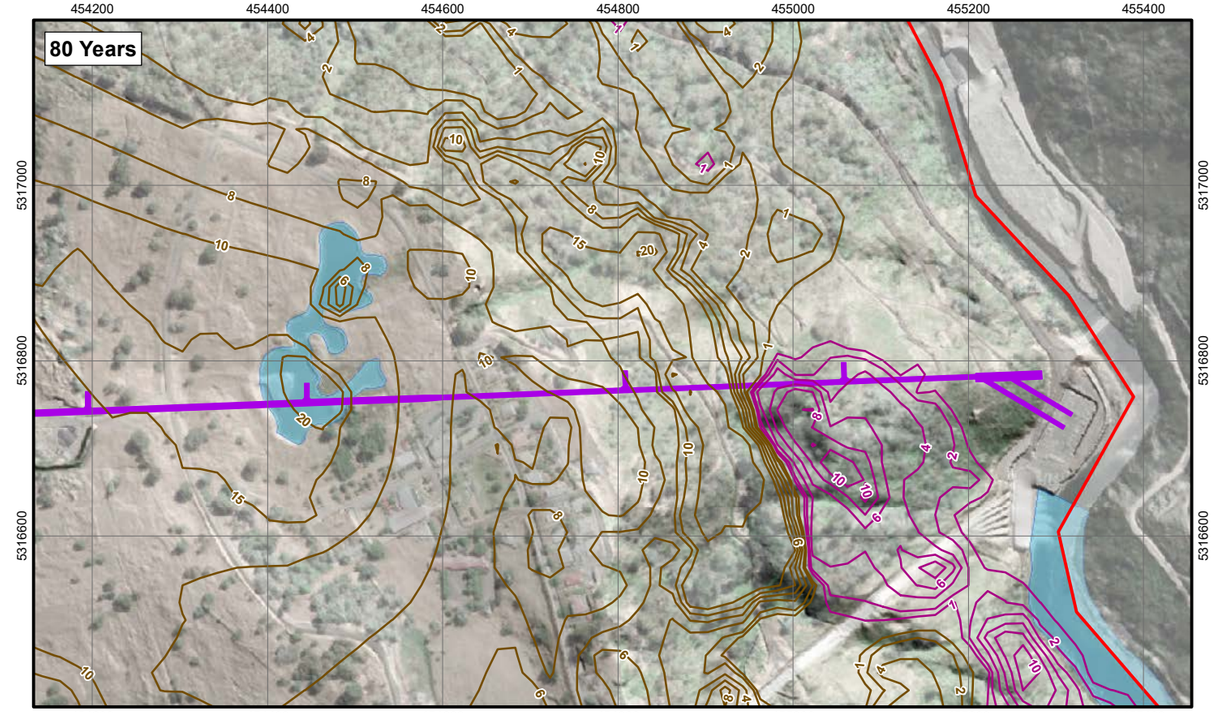
PSM4346-115R | Figure K2-3(c)

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Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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P90 SCHEDULE - GROUTING
(BASE CASE)

PSM4346-115R | Figure K2-4(a)

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1 Year

3 Years

5 Years

80 Years

454200 454400 454600 454800 455000 455200 455400

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Legend

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OVERVIEW

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Scale 1:7,000

0 50 100 200 300 400 m

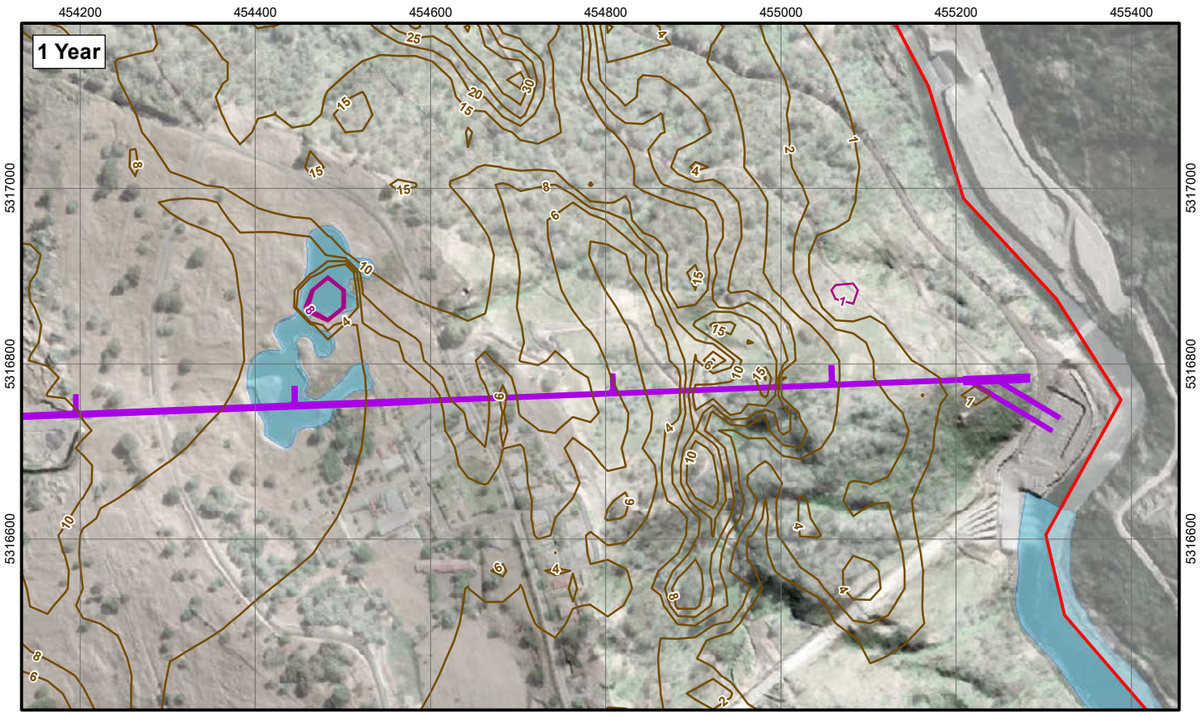
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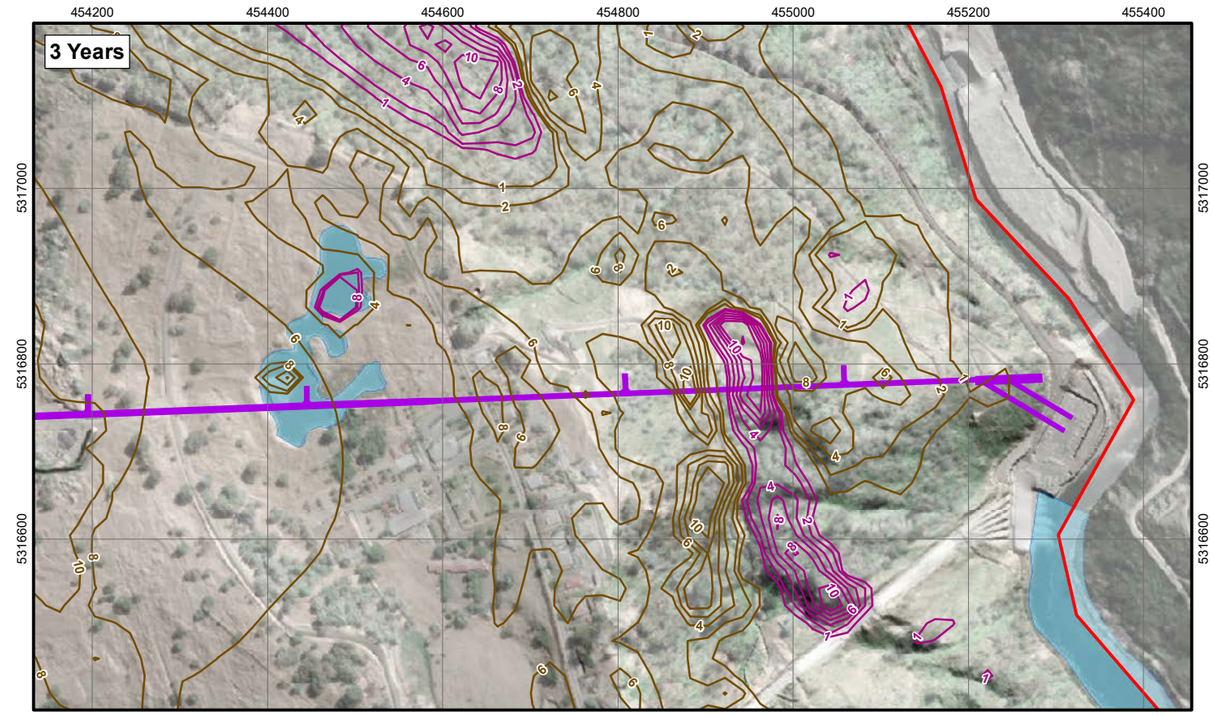
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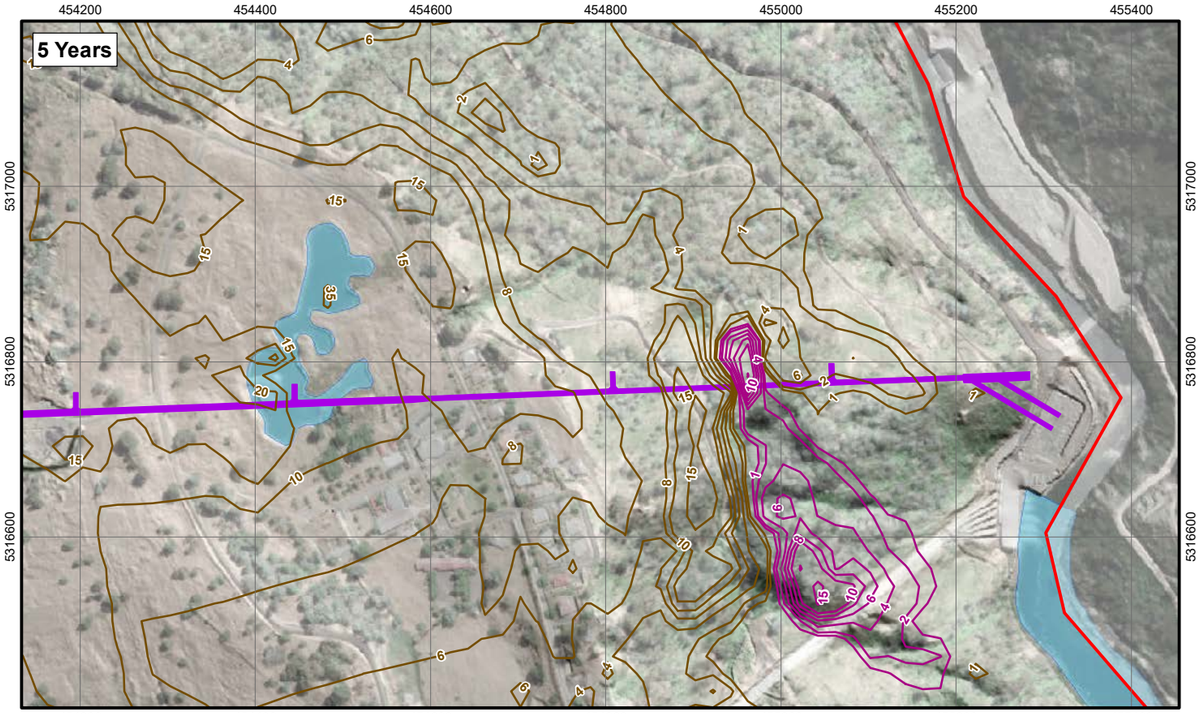
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH POWER STATION TRANSIENT PRESSURISATION SNAPSHOTS P90 SCHEDULE - GROUTING (LOWER BOUND)

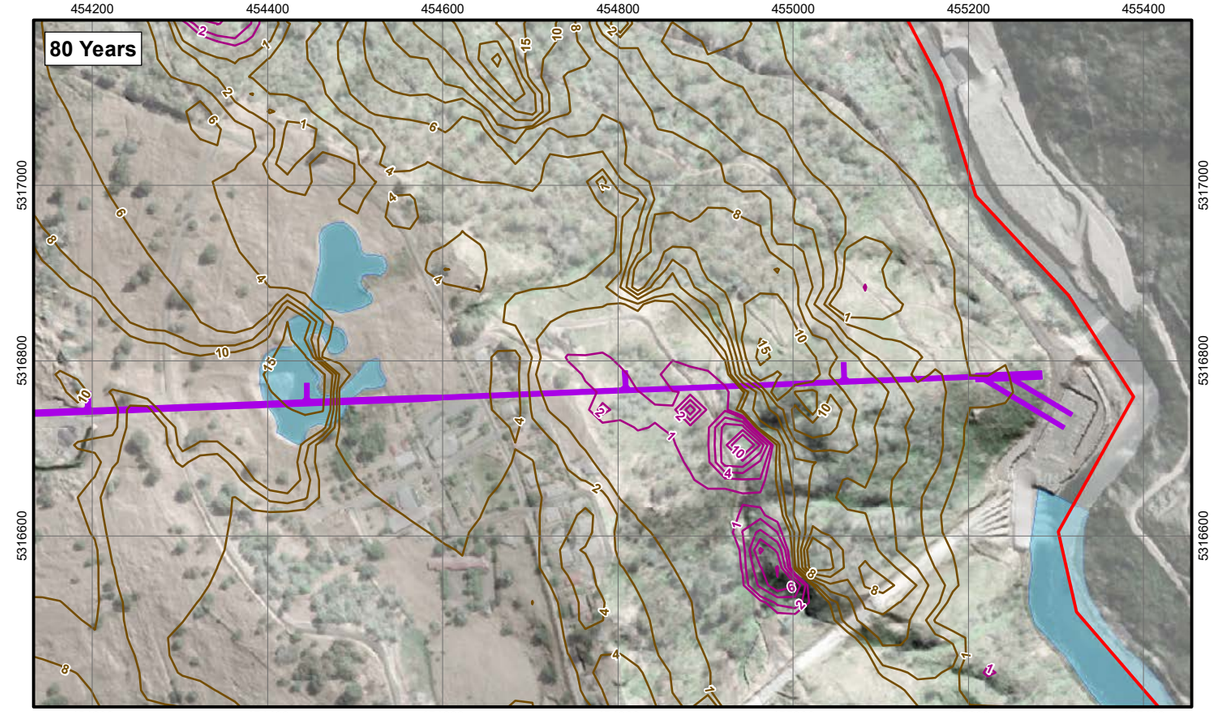
PSM4346-115R | Figure K2-4(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-4(b) Tarraleah Power Station Transient Pressurisation Snapshots P90 Schedule - Grouting (Lower Bound).mxd









Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:7,000

0 50 100 200 300 400 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: B	
	Date: 26 Feb 2025	Paper Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
TARRALEAH POWER STATION
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure K2-4(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K2-4(c) Tarraleah Power Station Transient Pressurisation Snapshots P90 Schedule - Grouting (Upper Bound).mxd

1 Year

3 Years

5 Years

80 Years

438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland

OVERVIEW

N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

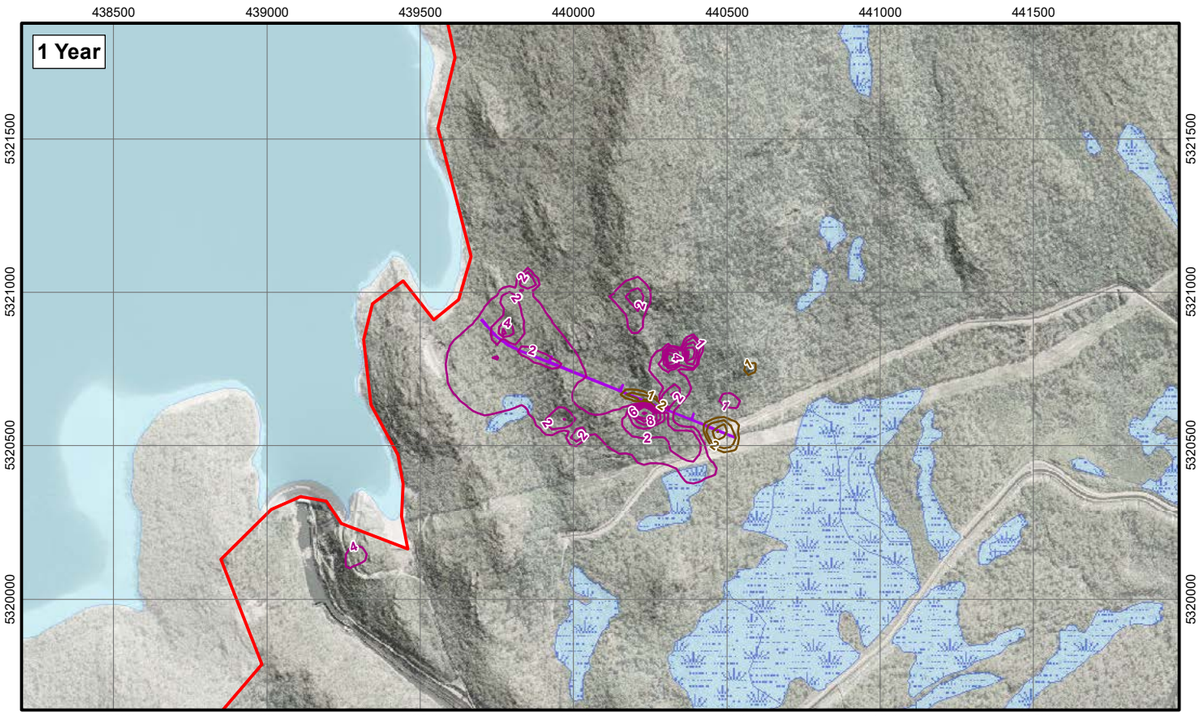
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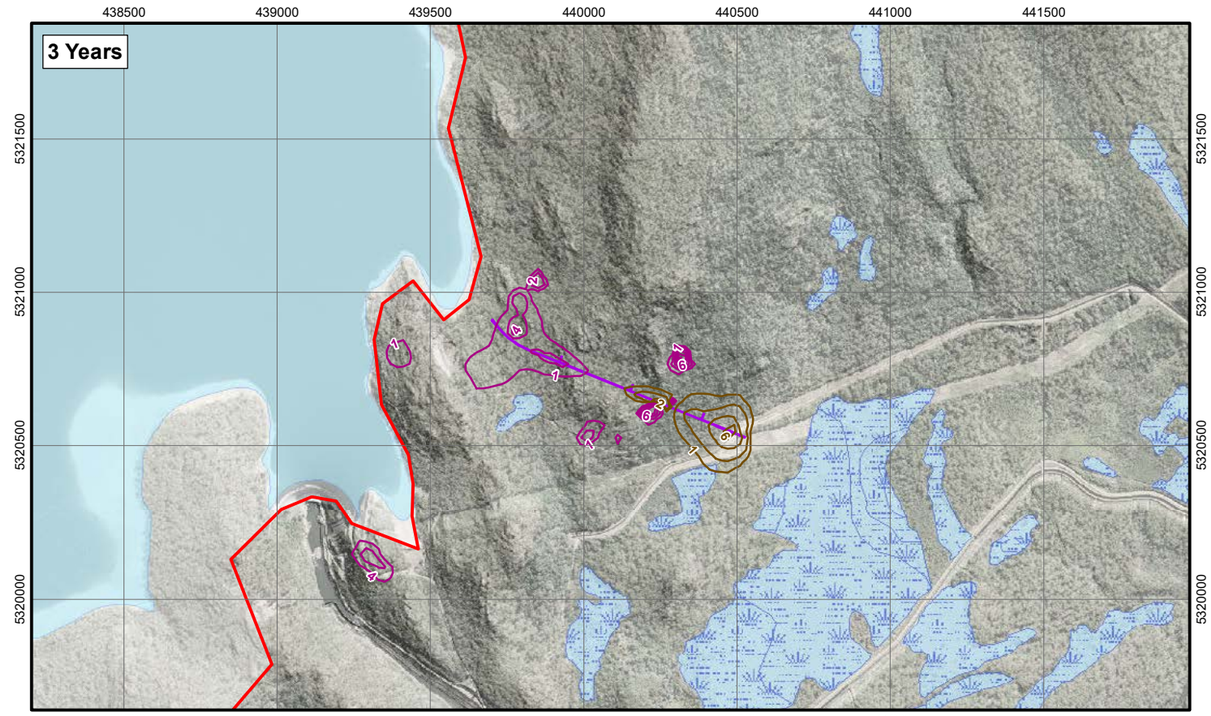
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

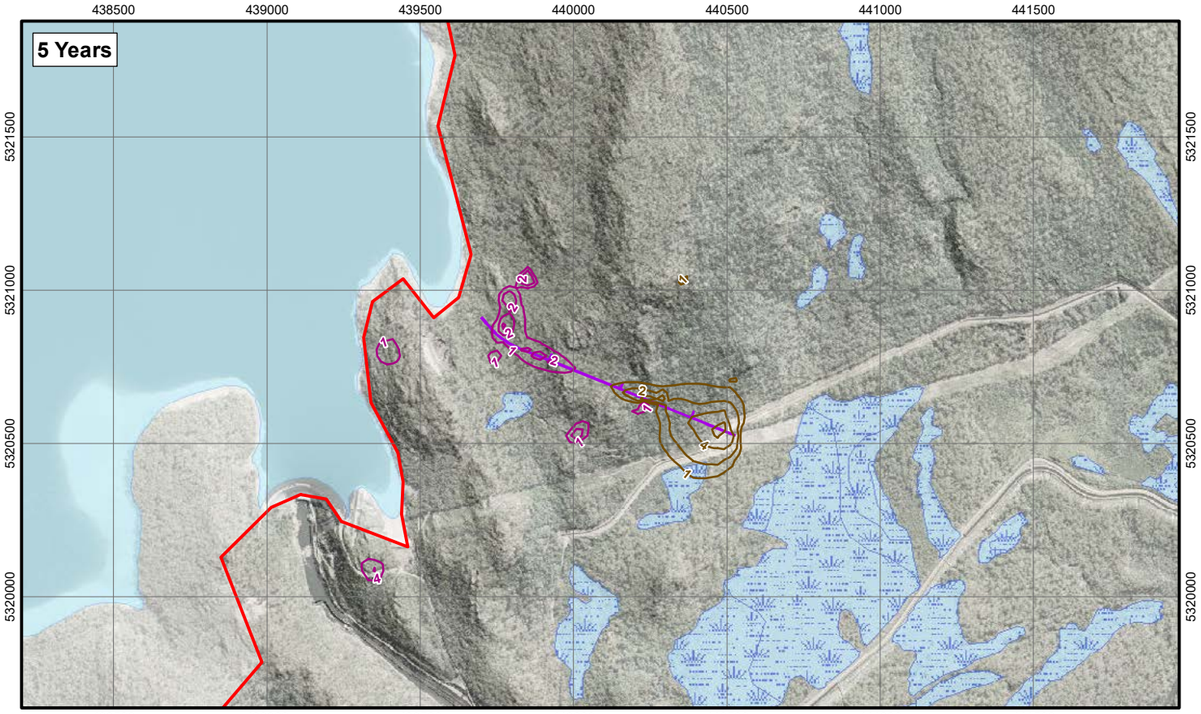
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (BASE CASE)

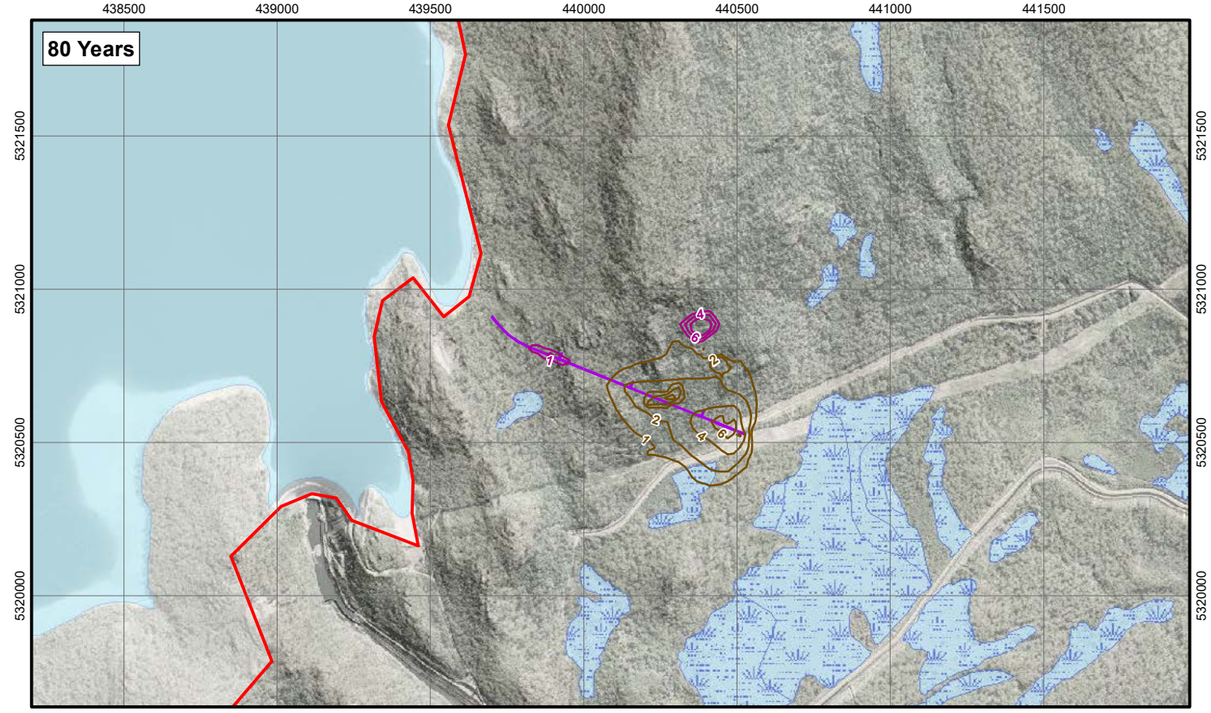
PSM4346-115R | Figure K3-1(a)

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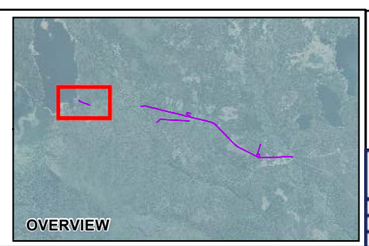






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

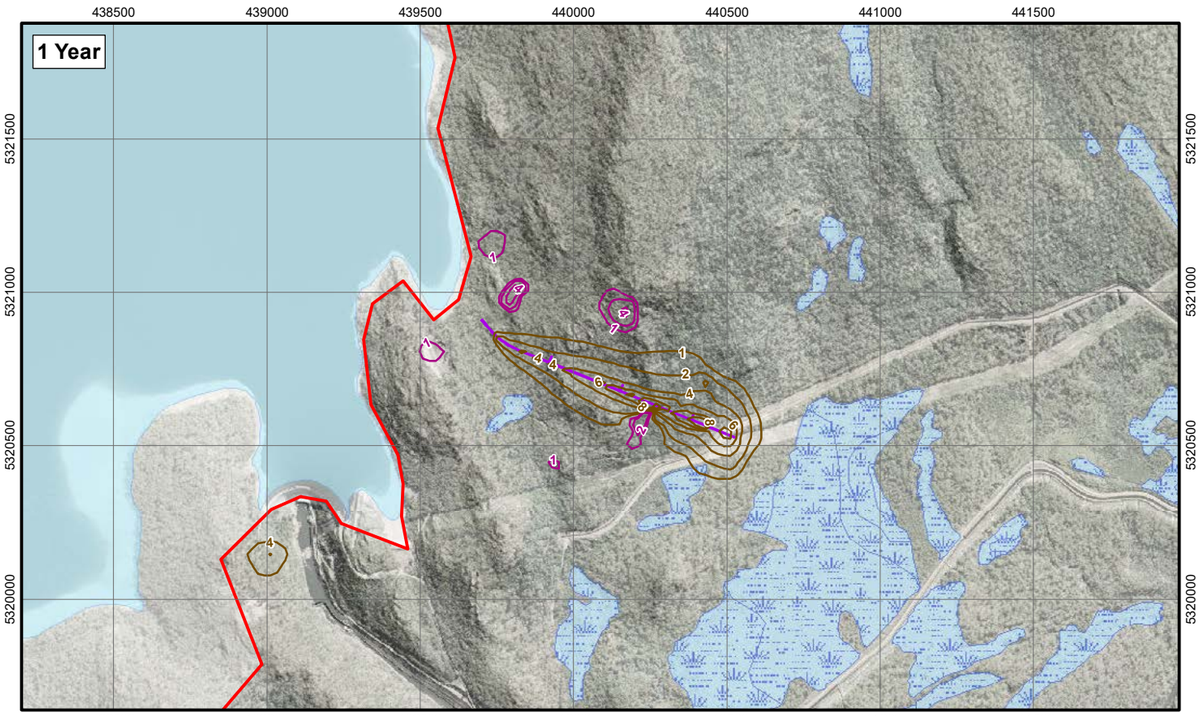
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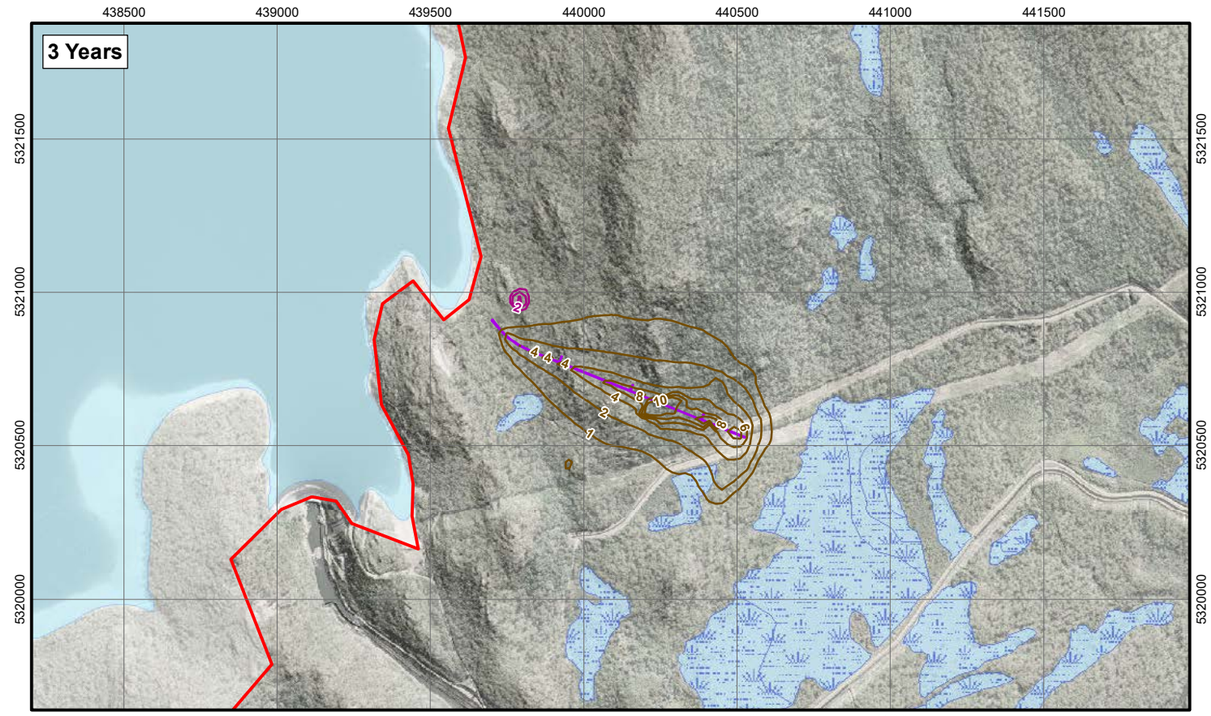
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

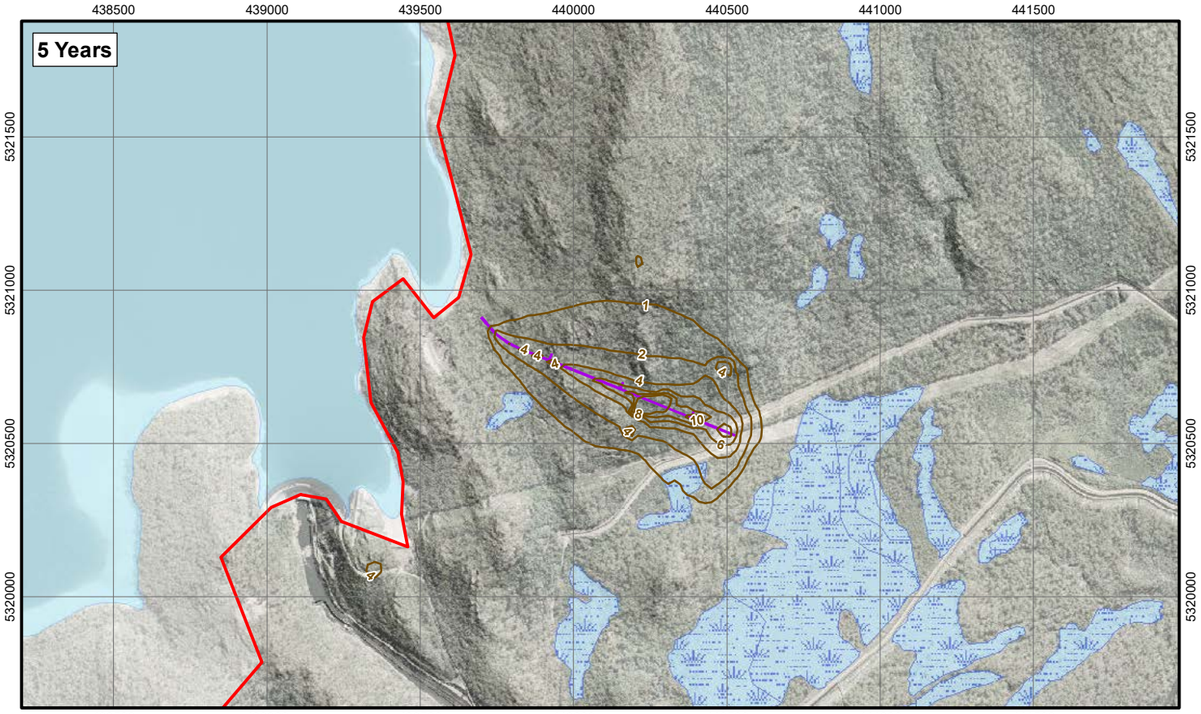
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (LOWER BOUND)

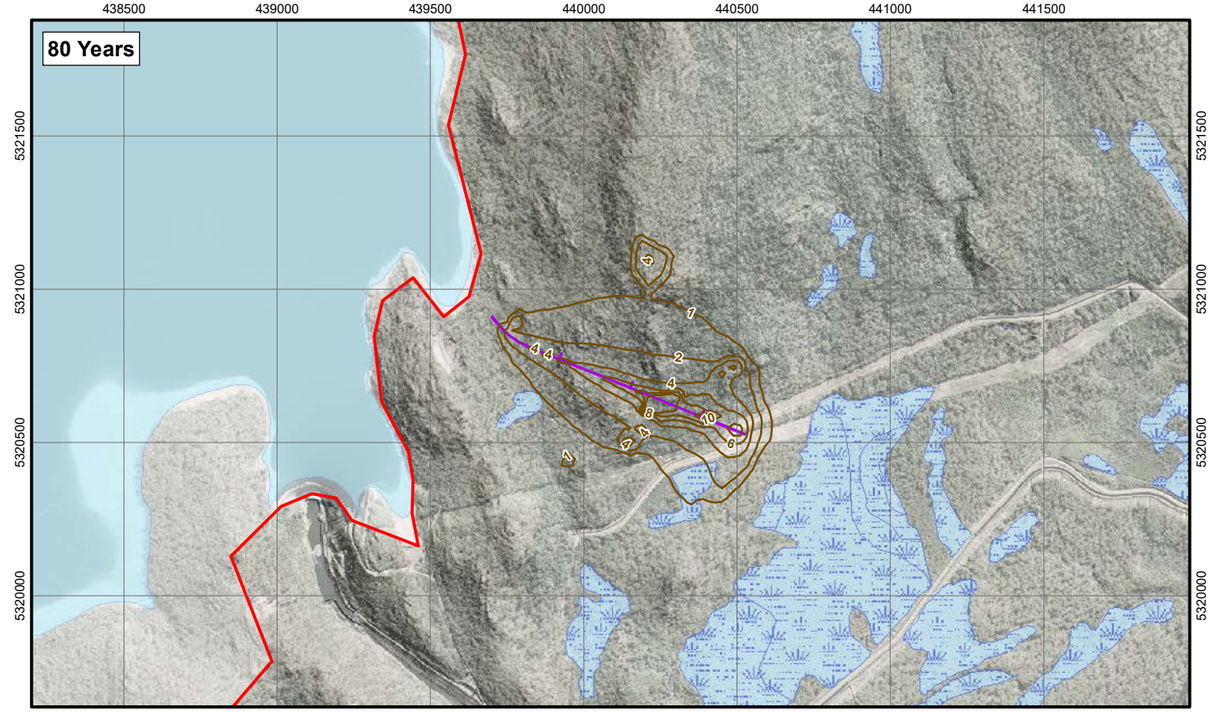
PSM4346-115R | Figure K3-1(b)

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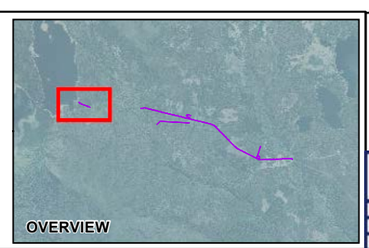






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

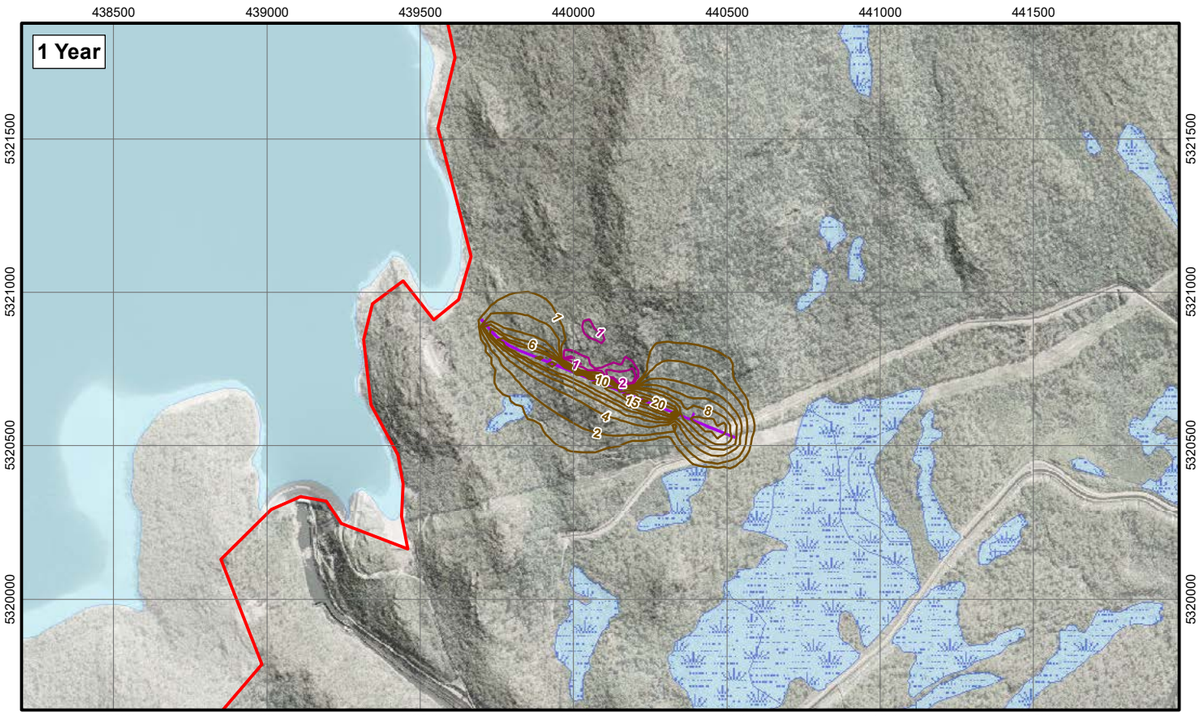
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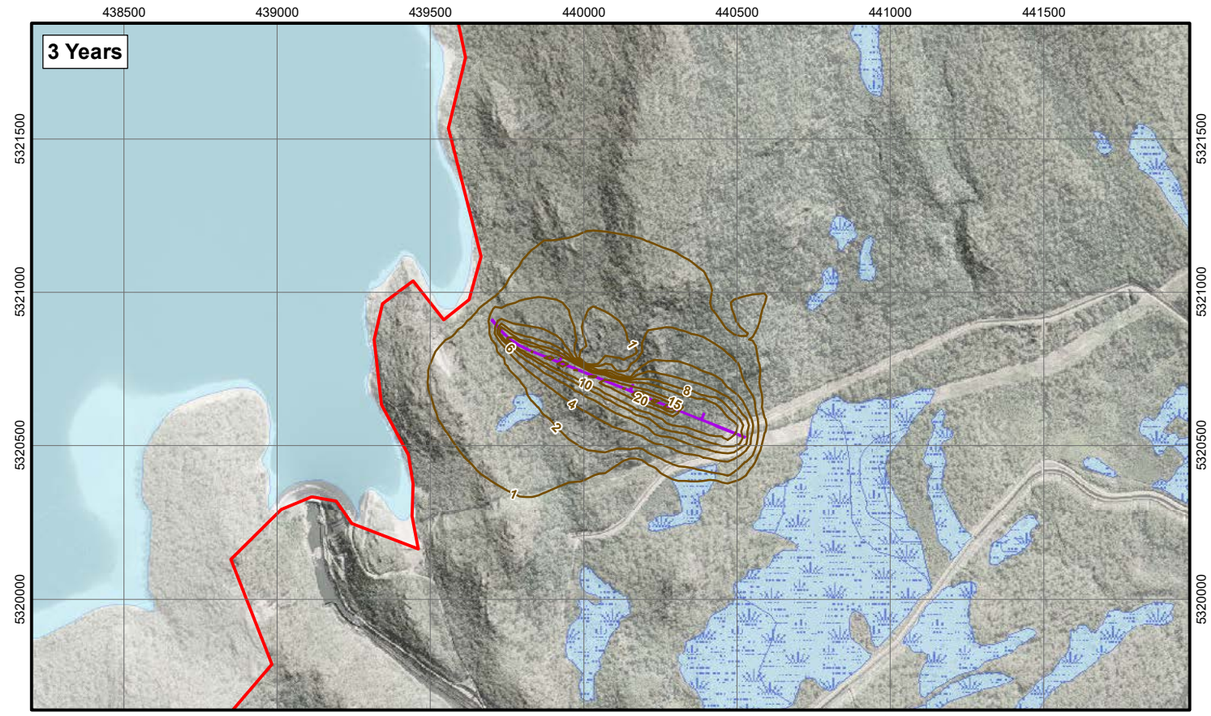
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

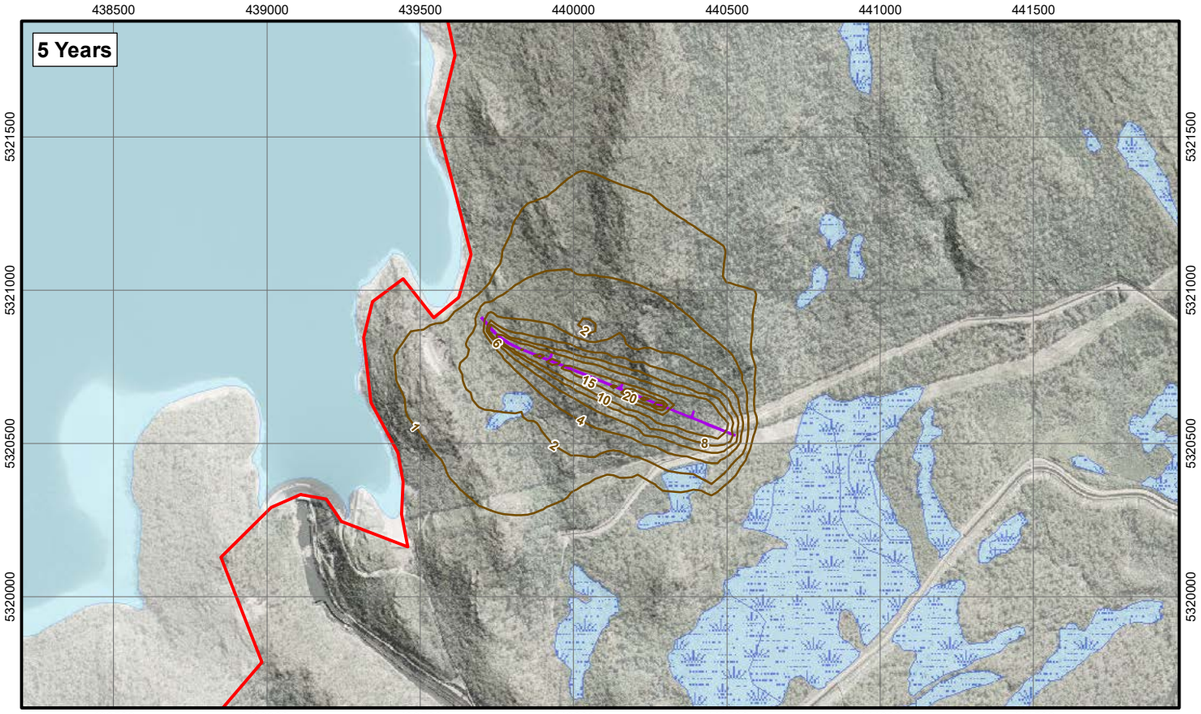
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE (UPPER BOUND)

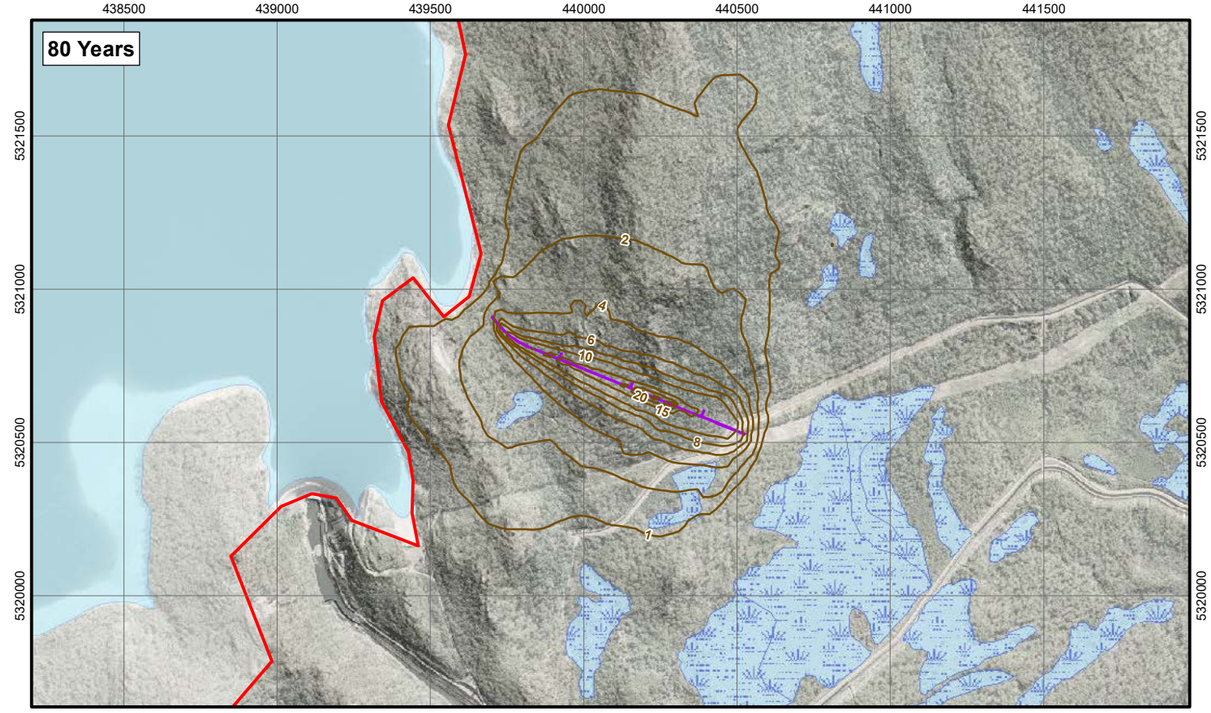
PSM4346-115R | Figure K3-1(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K3-1(c) Lake King William Tunnel Transient Pressurisation Snapshots Base Schedule (Upper Bound).mxd



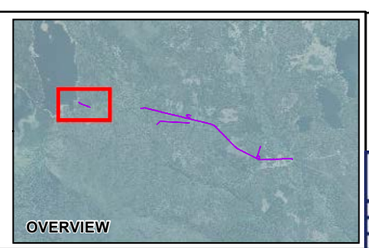






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

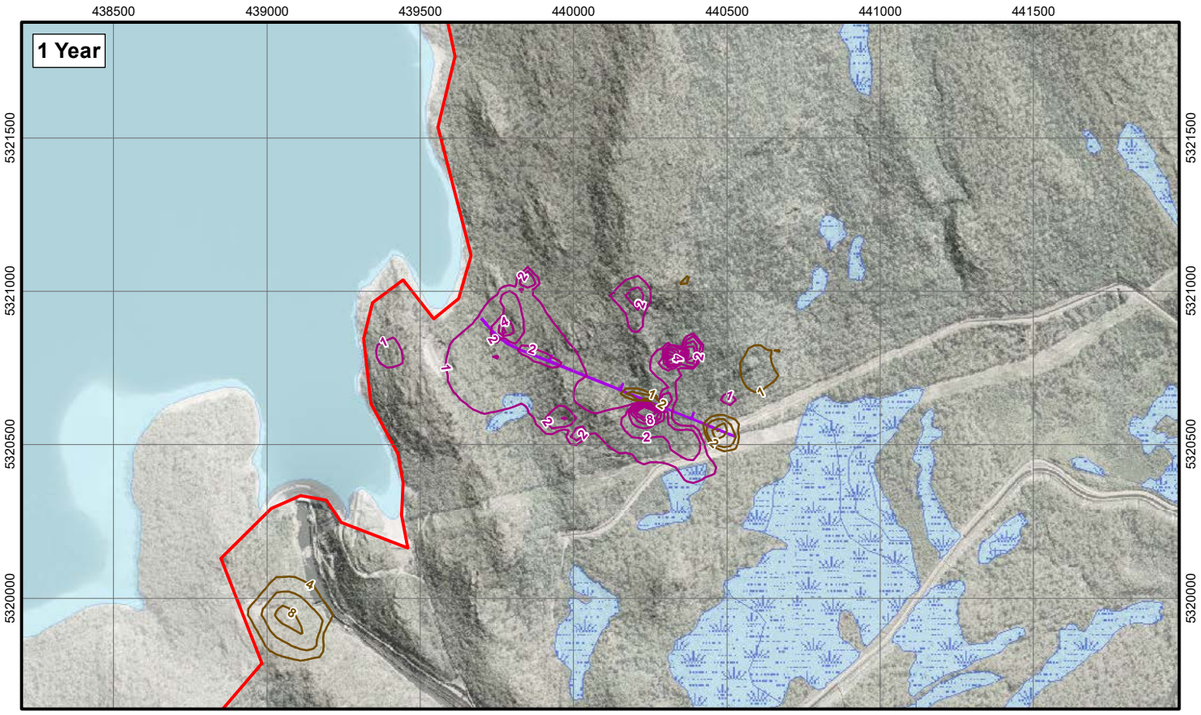
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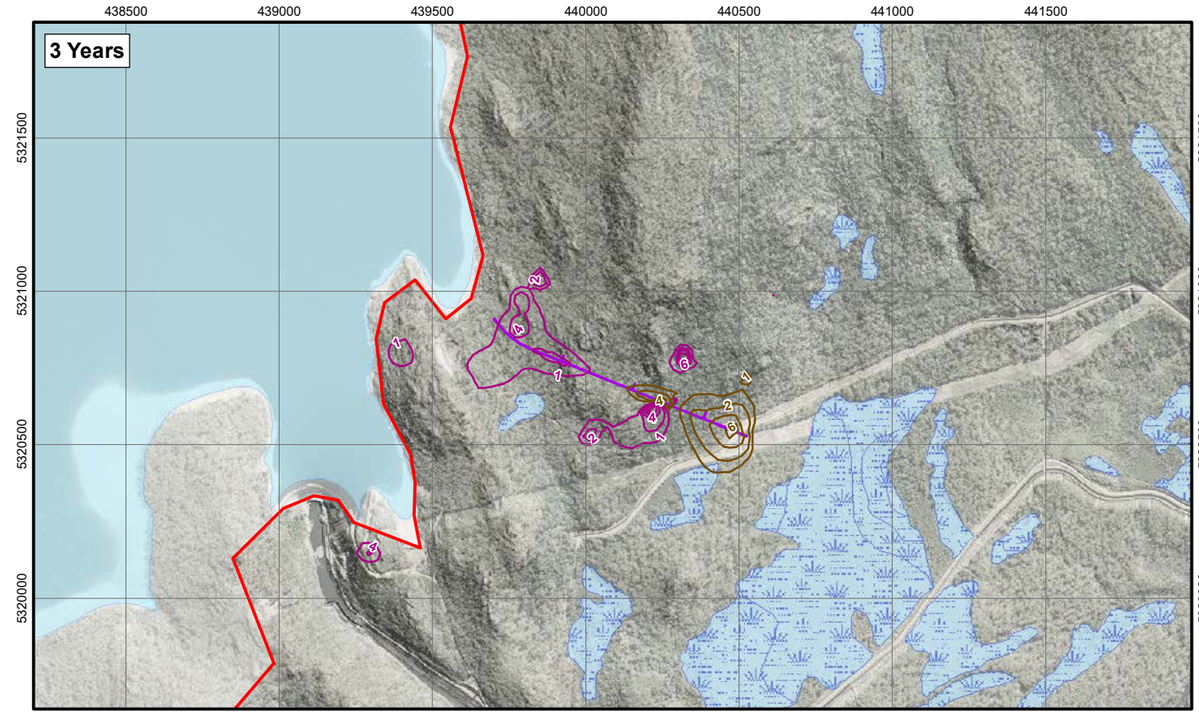
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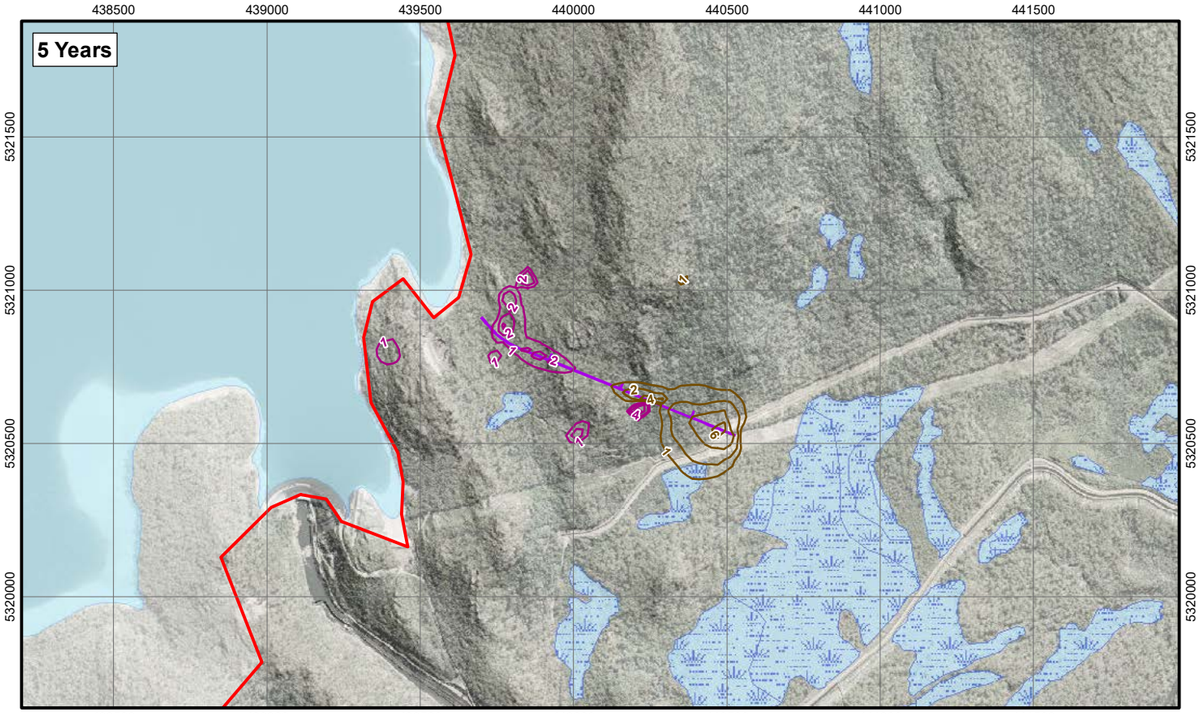
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(BASE CASE)

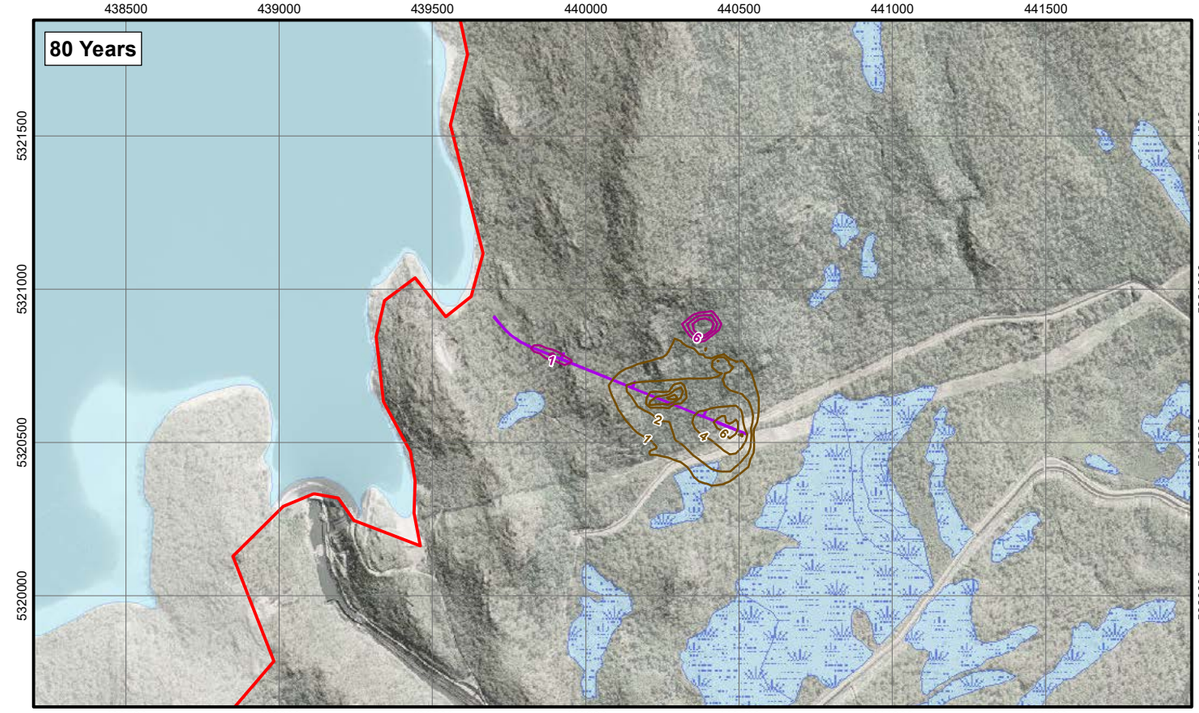
PSM4346-115R | Figure K3-2(a)

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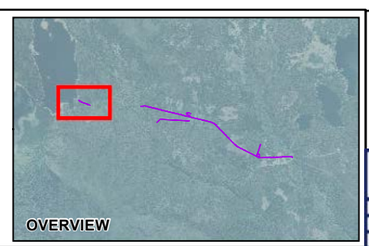


438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M	Created By: VC	Revision: B	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report LAKE KING WILLIAM TUNNEL TRANSIENT PRESSURISATION SNAPSHOTS BASE SCHEDULE - GROUTING (LOWER BOUND)
	Date: 26 Feb 2025	Paper Size: A3	PSM4346-115R | Figure K3-2(b)

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1 Year

3 Years

5 Years

80 Years

438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies

OVERVIEW

N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

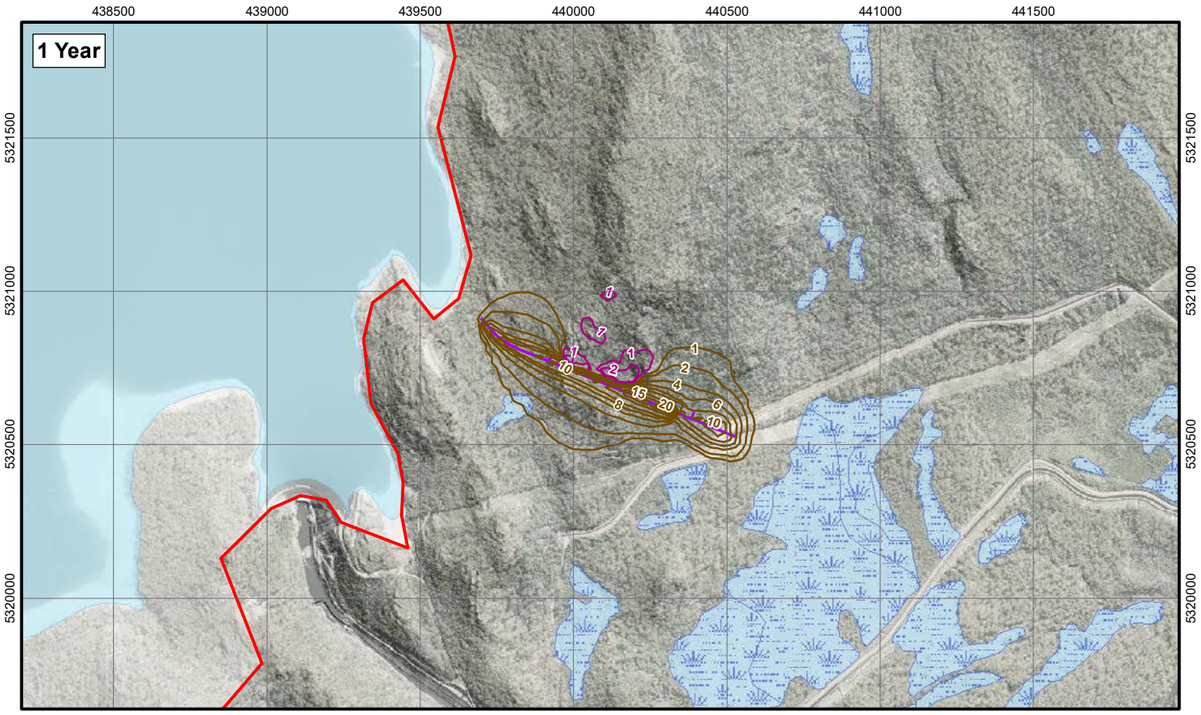
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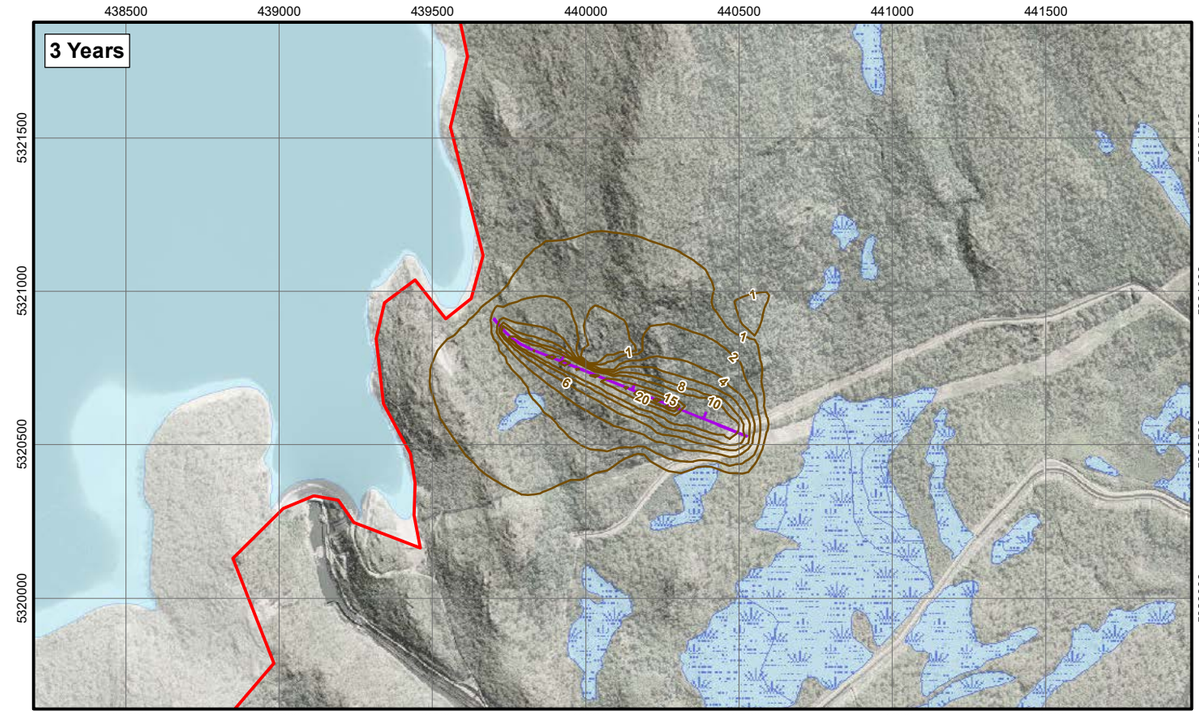
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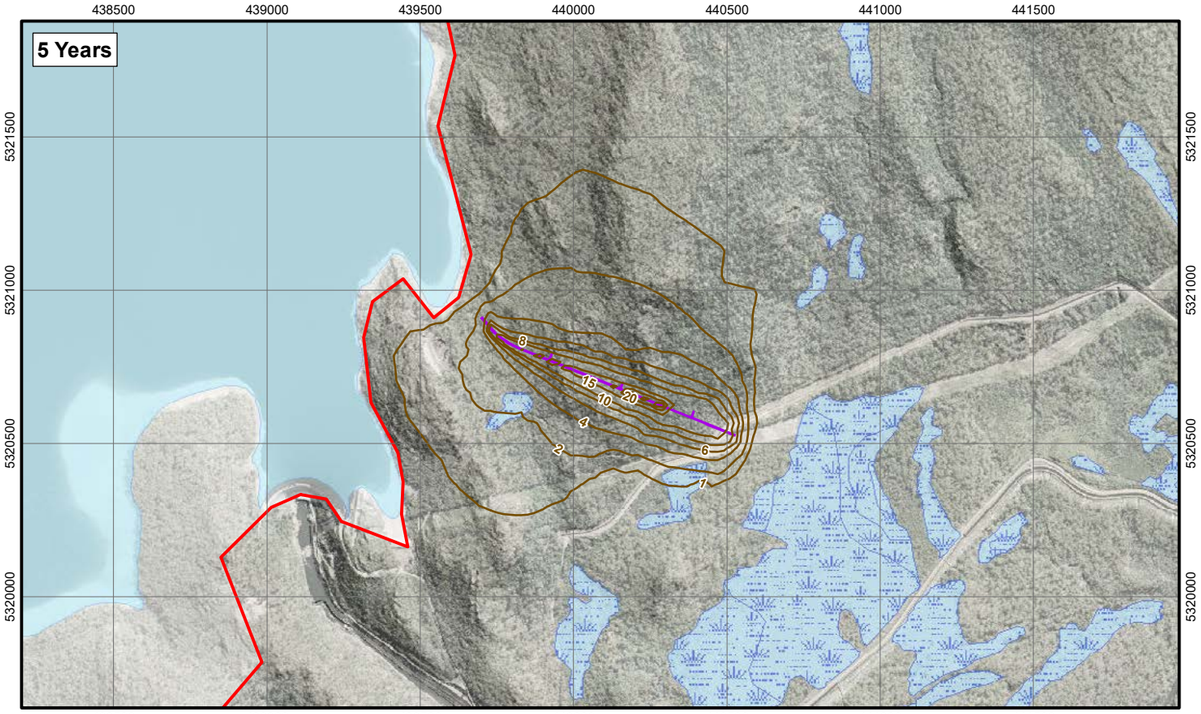
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
BASE SCHEDULE - GROUTING
(UPPER BOUND)

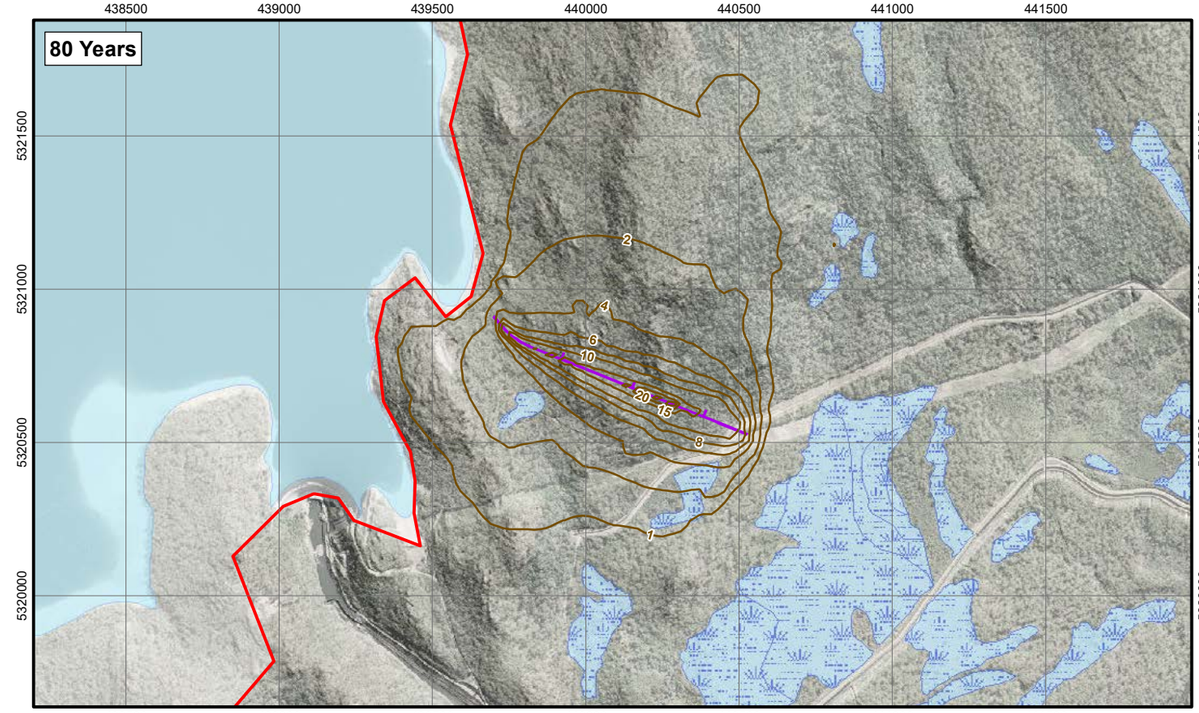
PSM4346-115R | Figure K3-2(c)

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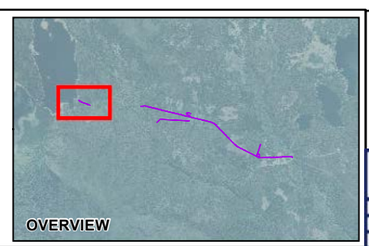






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

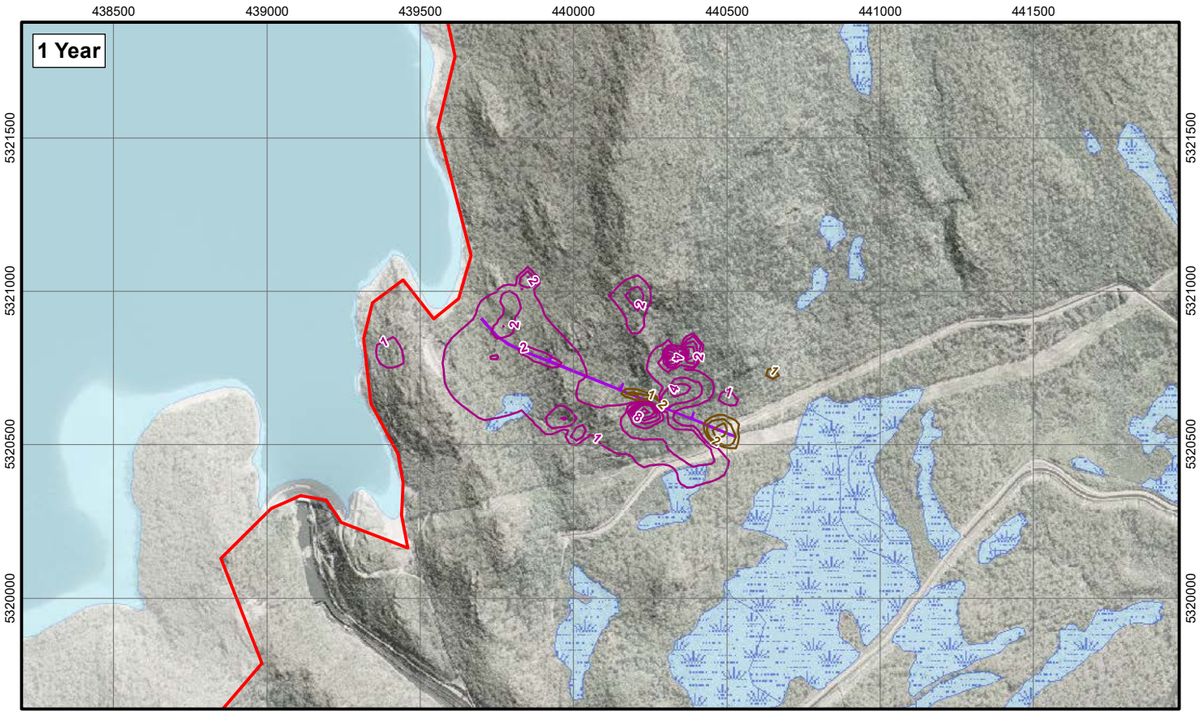
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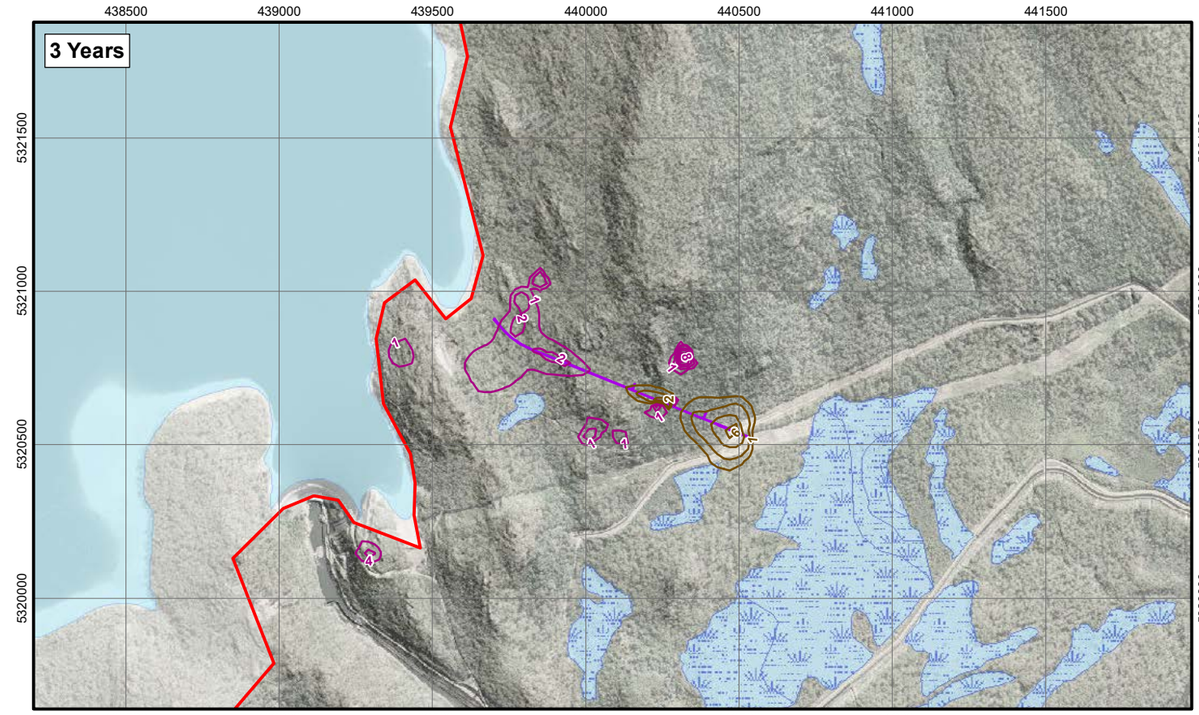
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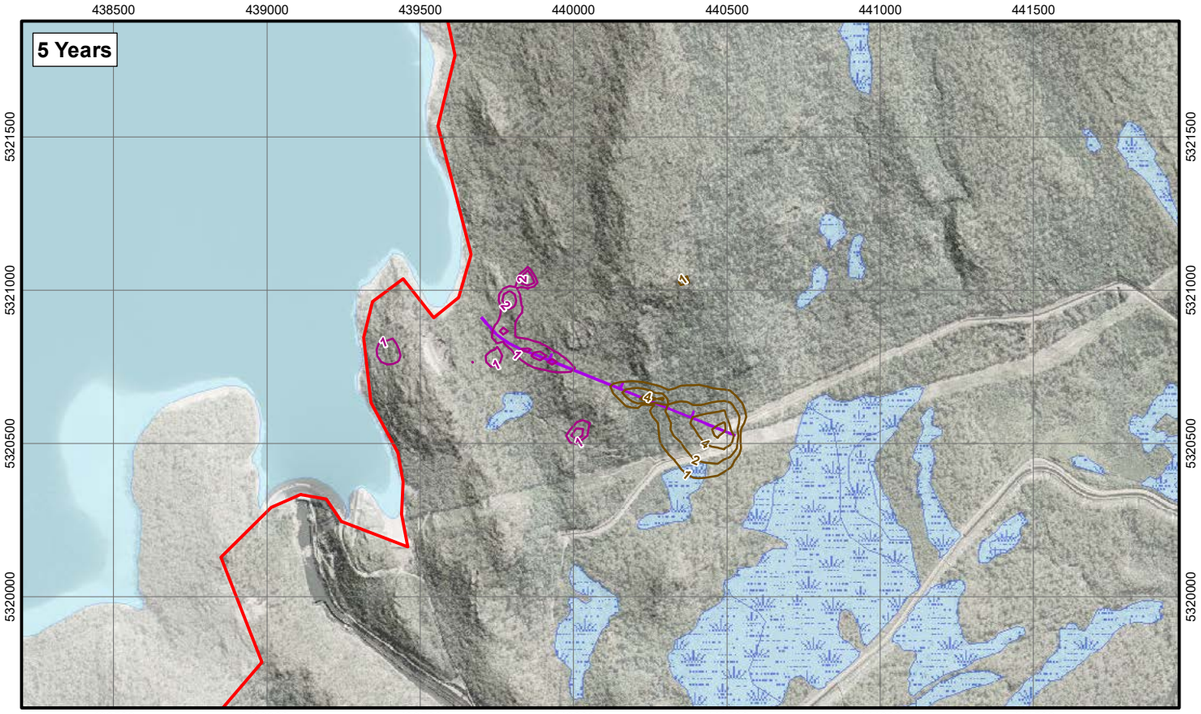
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (BASE CASE)

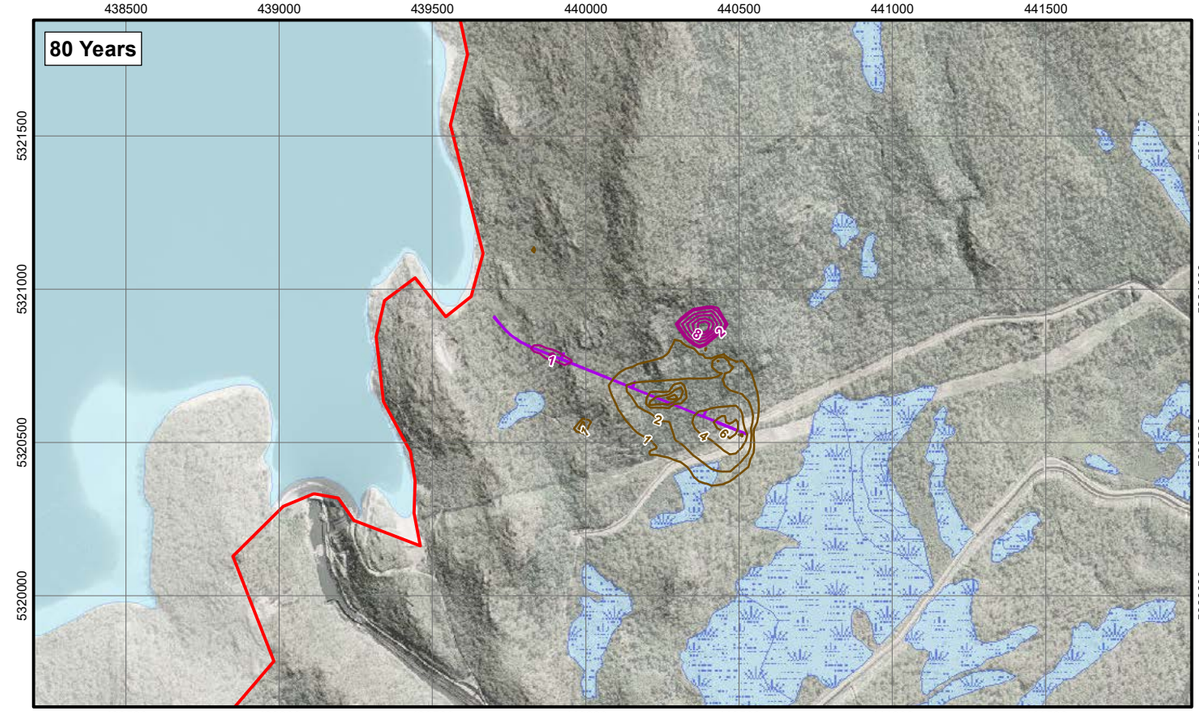
PSM4346-115R | Figure K3-3(a)

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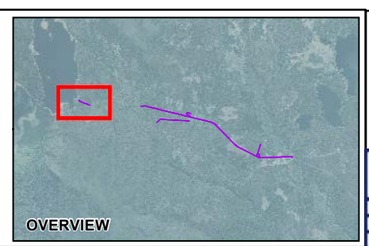


438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M

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VC	B
Date:	Paper Size:
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure K3-3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K3-3(b) Lake King William Tunnel Transient Pressurisation Snapshots P90 Schedule (Lower Bound).mxd

1 Year

3 Years

5 Years

80 Years

438500 439000 439500 440000 440500 441000 441500

5321500 5321000 5320500 5320000

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table Rise (m)
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland

OVERVIEW

N

Scale 1:20,000

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Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

P S M

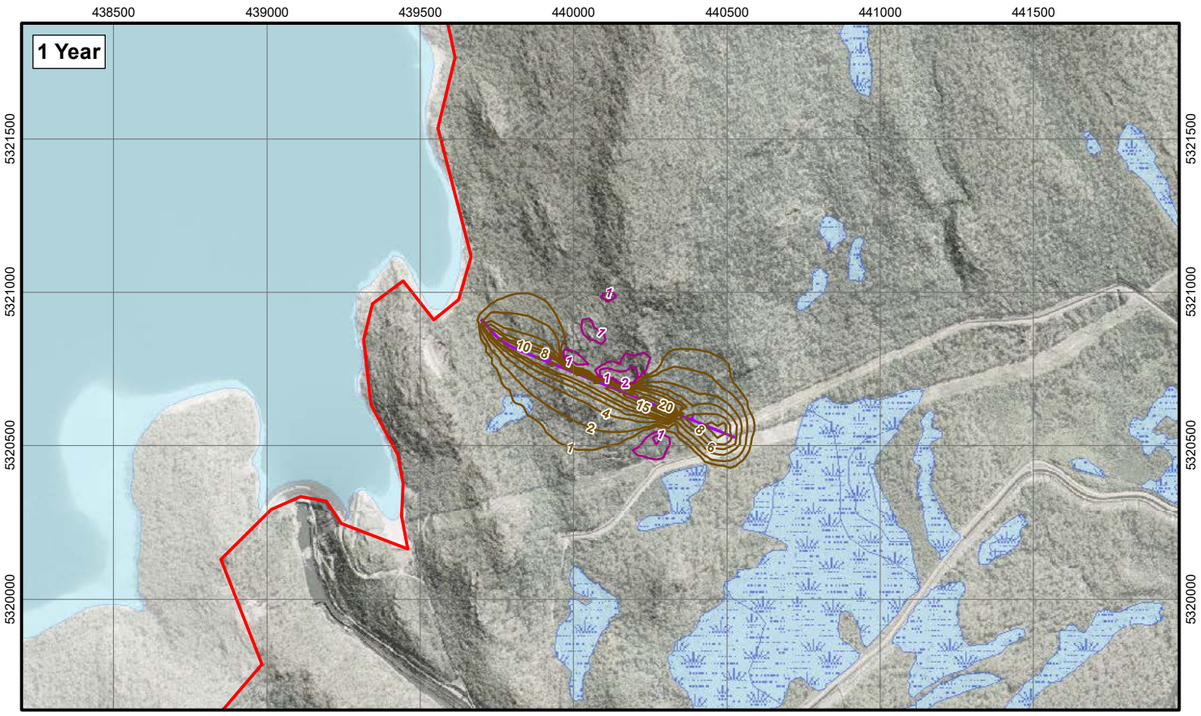
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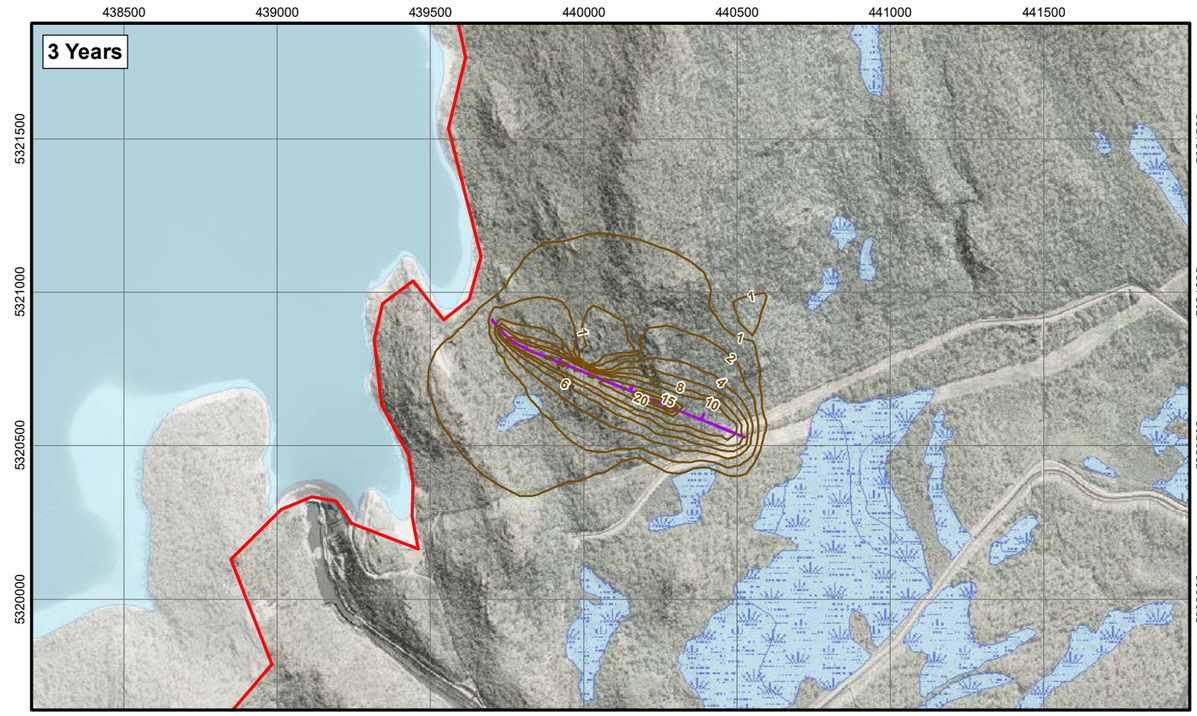
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

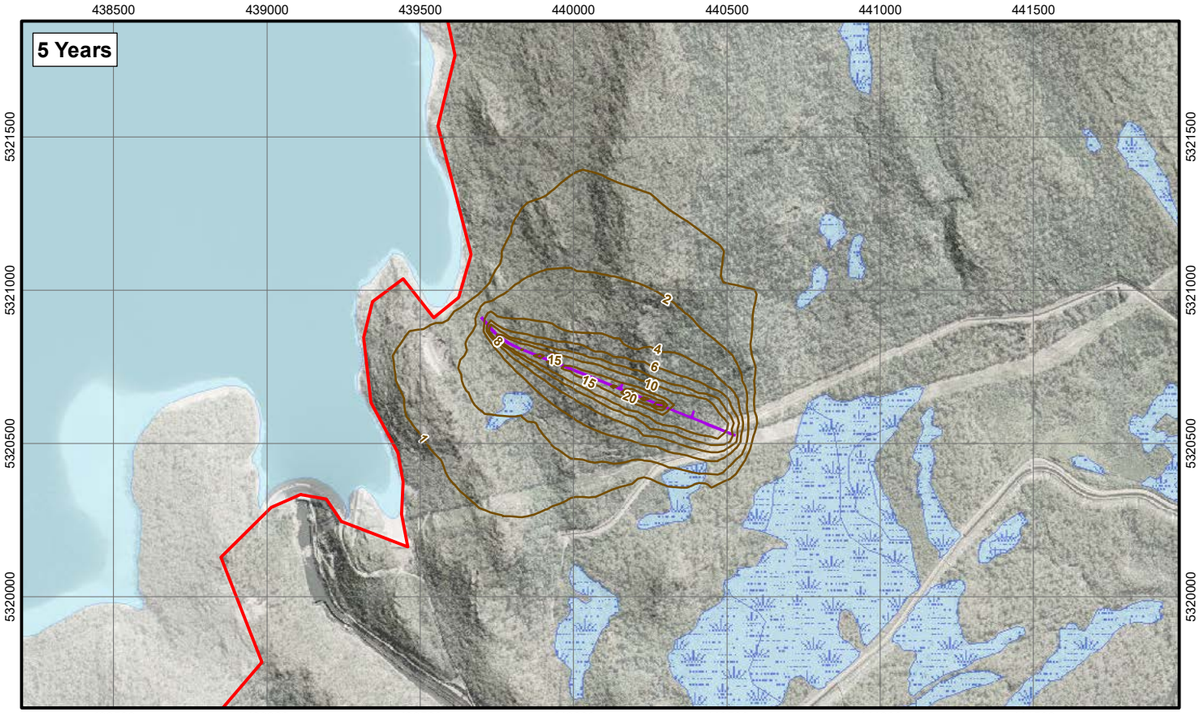
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE (UPPER BOUND)

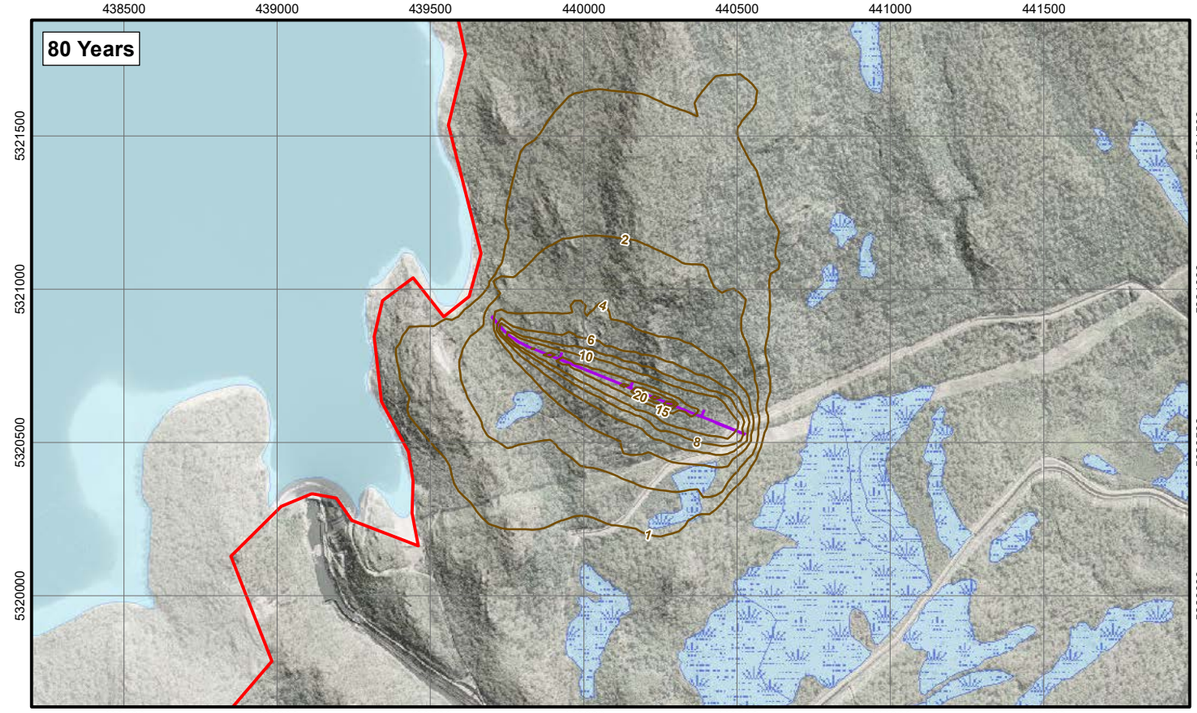
PSM4346-115R | Figure K3-3(c)

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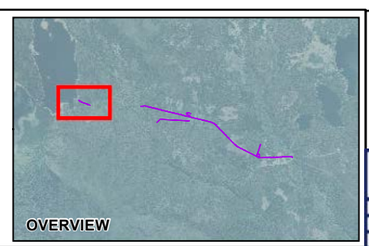






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

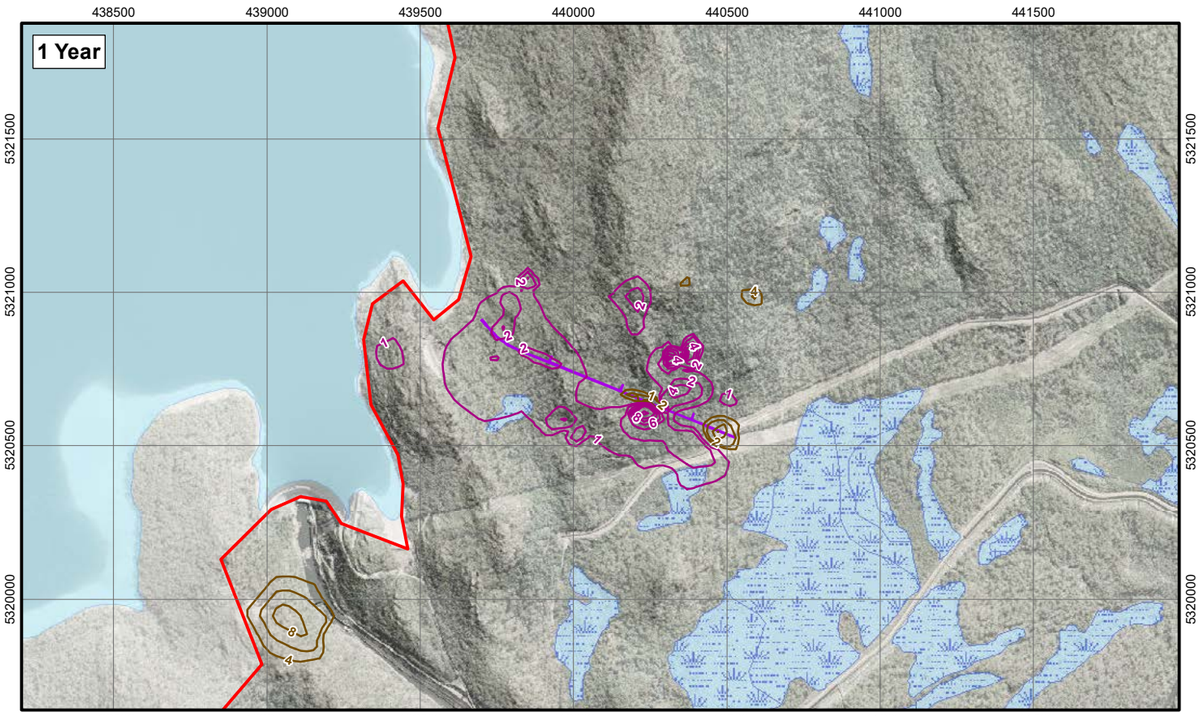
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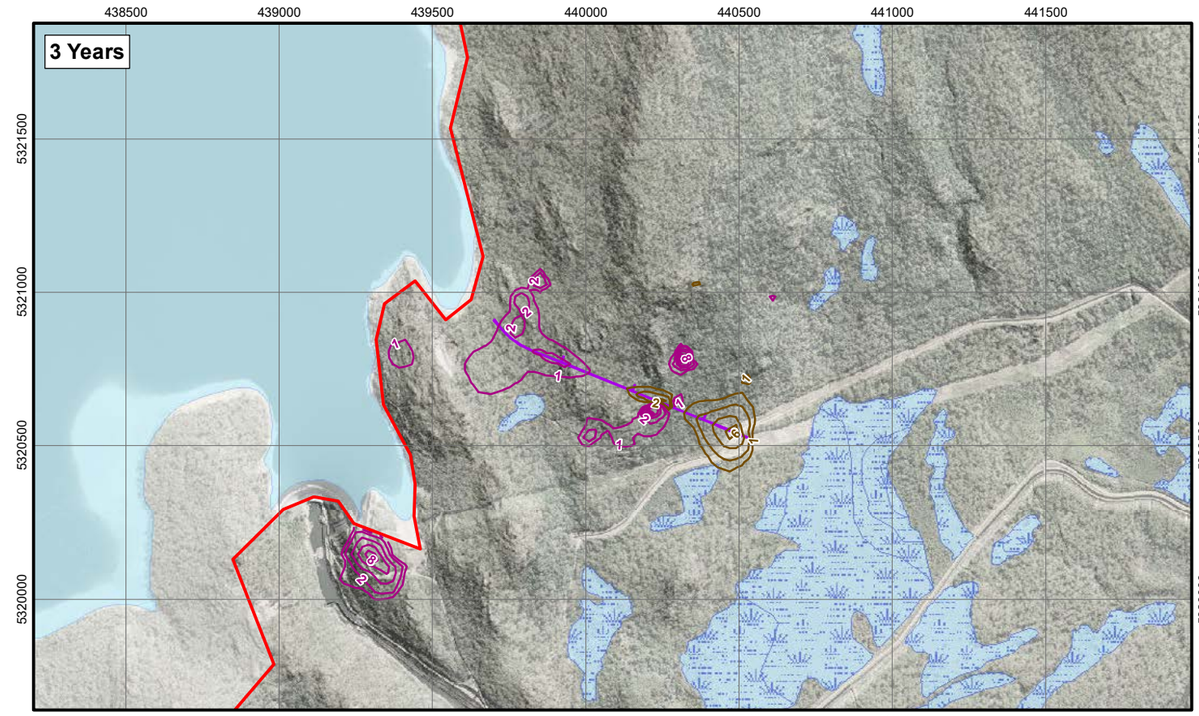
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	Date: 26 Feb 2025	Paper Size: A3	

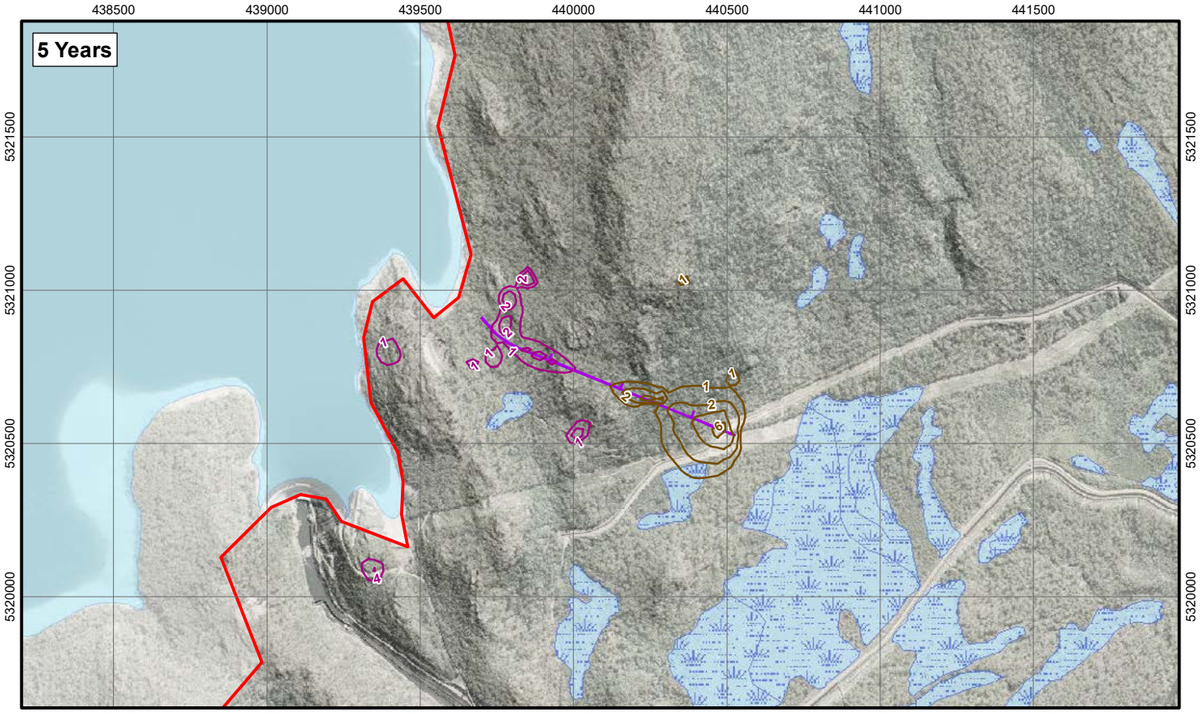
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(BASE CASE)

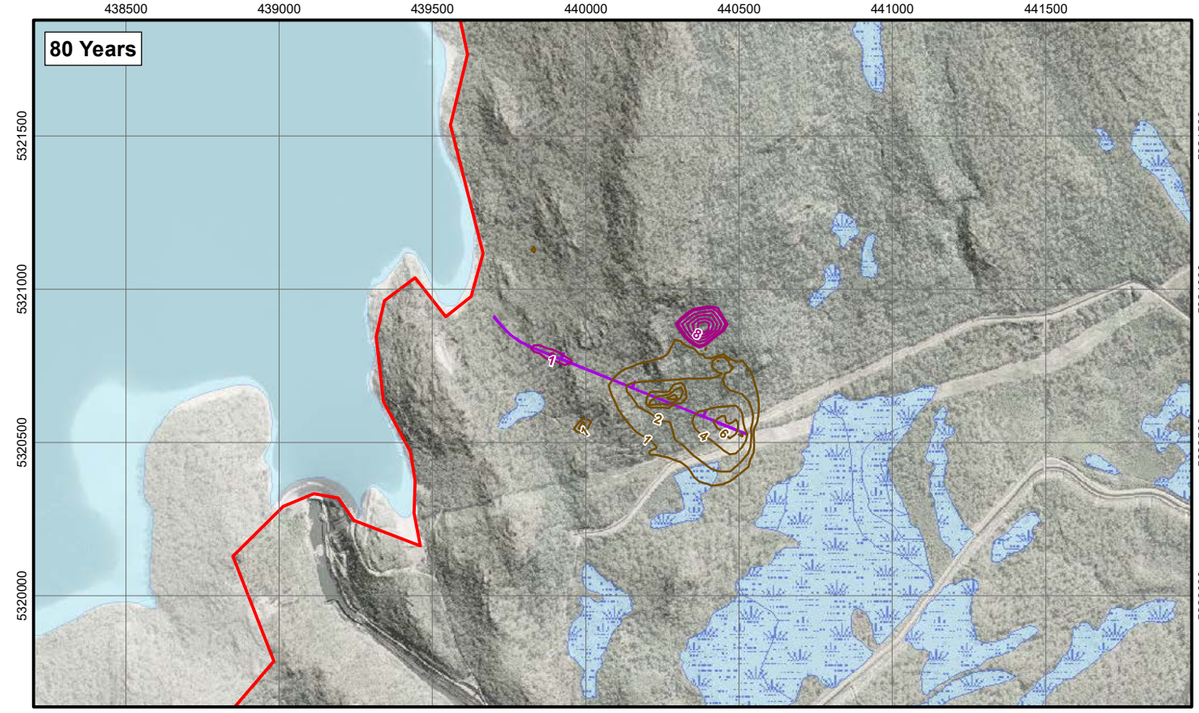
PSM4346-115R | Figure K3-4(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K3-4(a) Lake King William Tunnel Transient Pressurisation Snapshots P90 Schedule - Grouting (Base Case).mxd



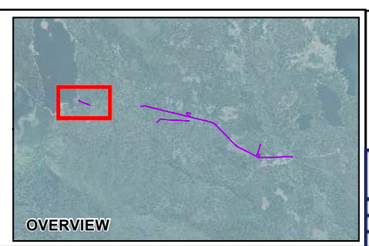






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

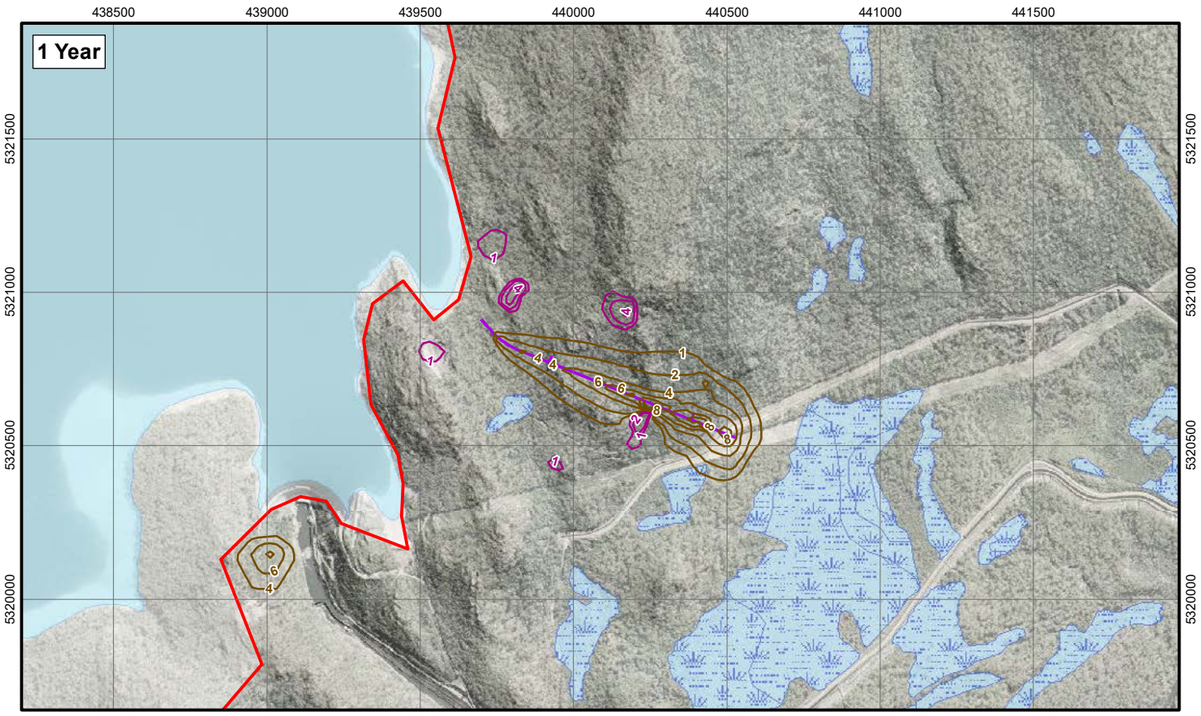
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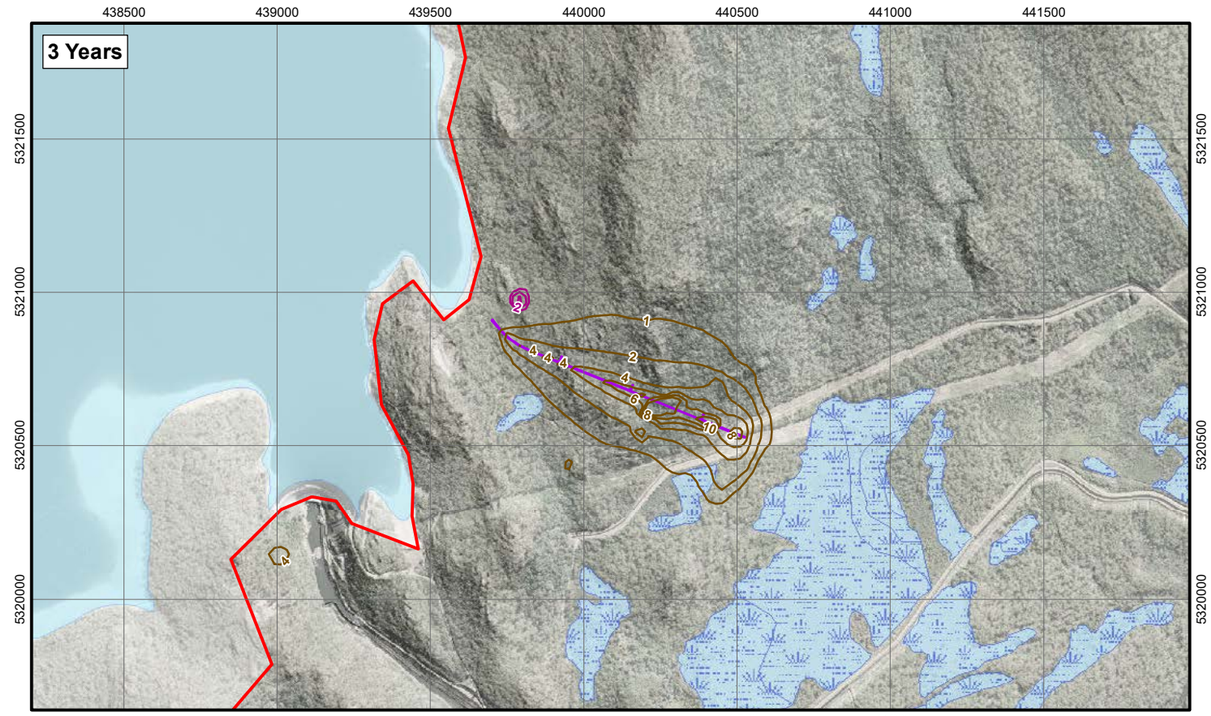
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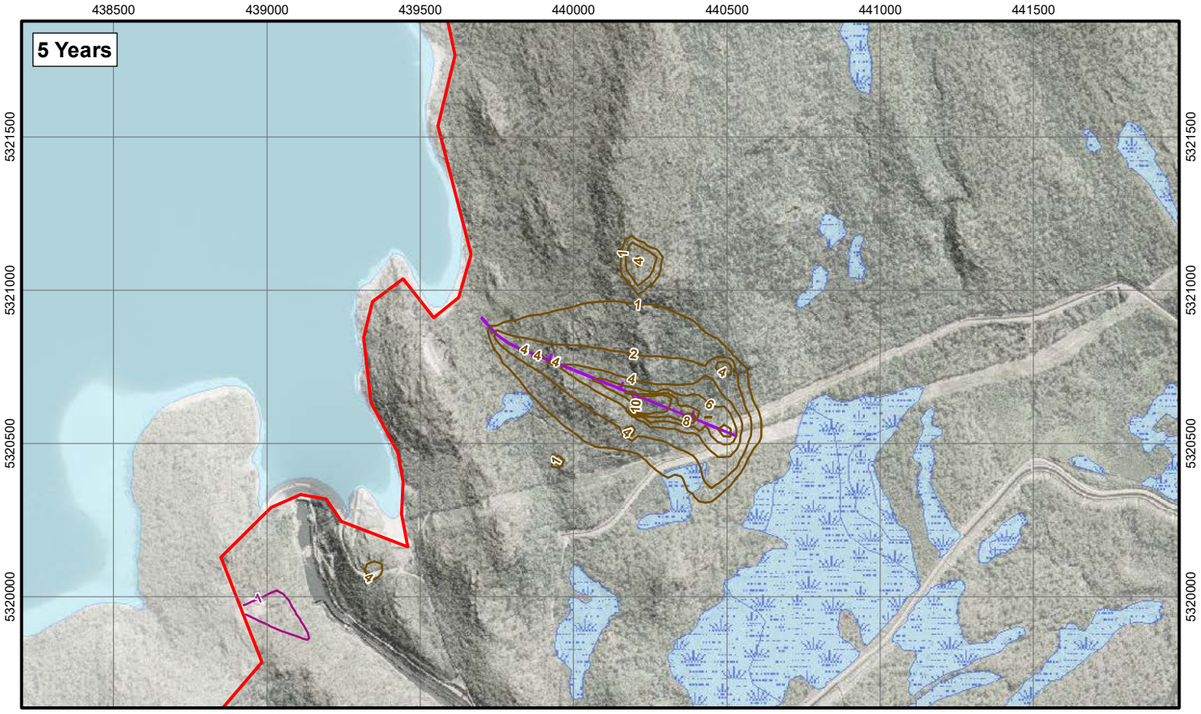
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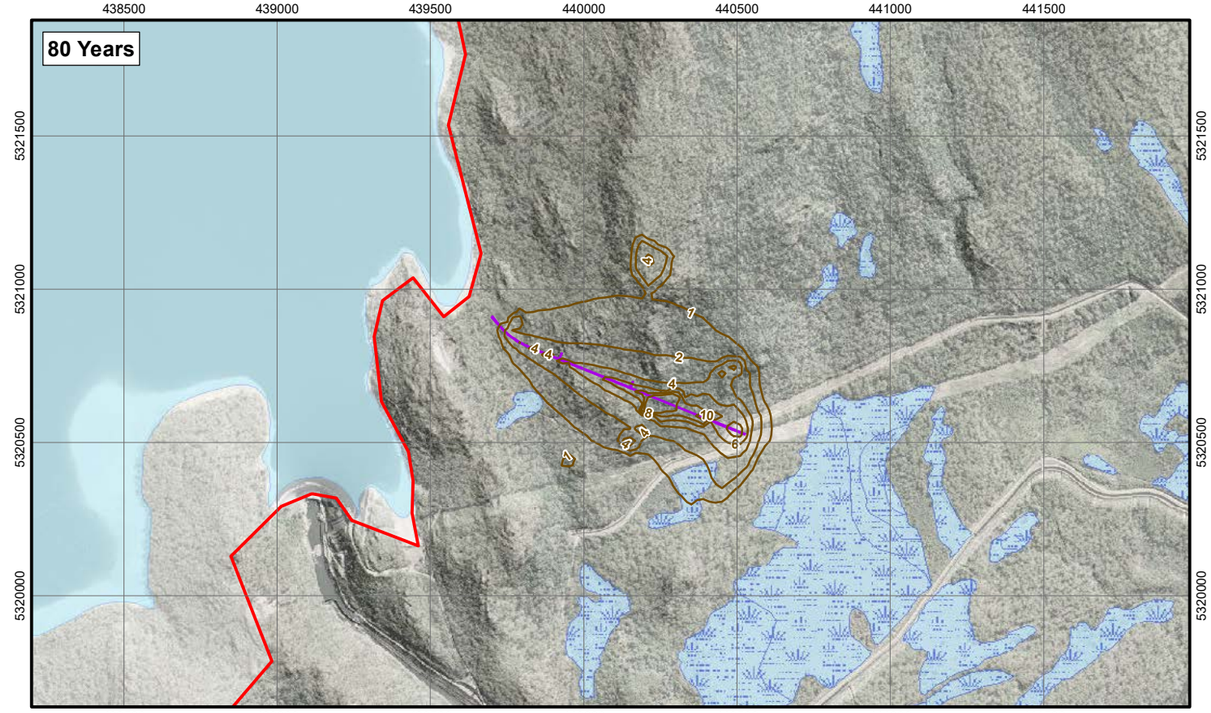
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	Date: 26 Feb 2025	Paper Size: A3	PSM4346-115R | Figure K3-4(b)

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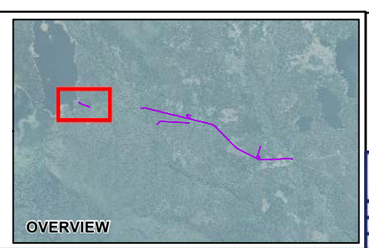






Legend

- Tarraleah Redevelopment
- Simulated Water Table Rise
- Simulated Drawdown (m)
- Model Domain
- Waterbodies
- Wetland



N

Scale 1:20,000

0 0.25 0.5 0.75 1 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 26 Feb 2025	Paper Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
LAKE KING WILLIAM TUNNEL
TRANSIENT PRESSURISATION SNAPSHOTS
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure K3-4(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K3-4(c) Lake King William Tunnel Transient Pressurisation Snapshots P90 Schedule - Grouting (Upper Bound).mxd

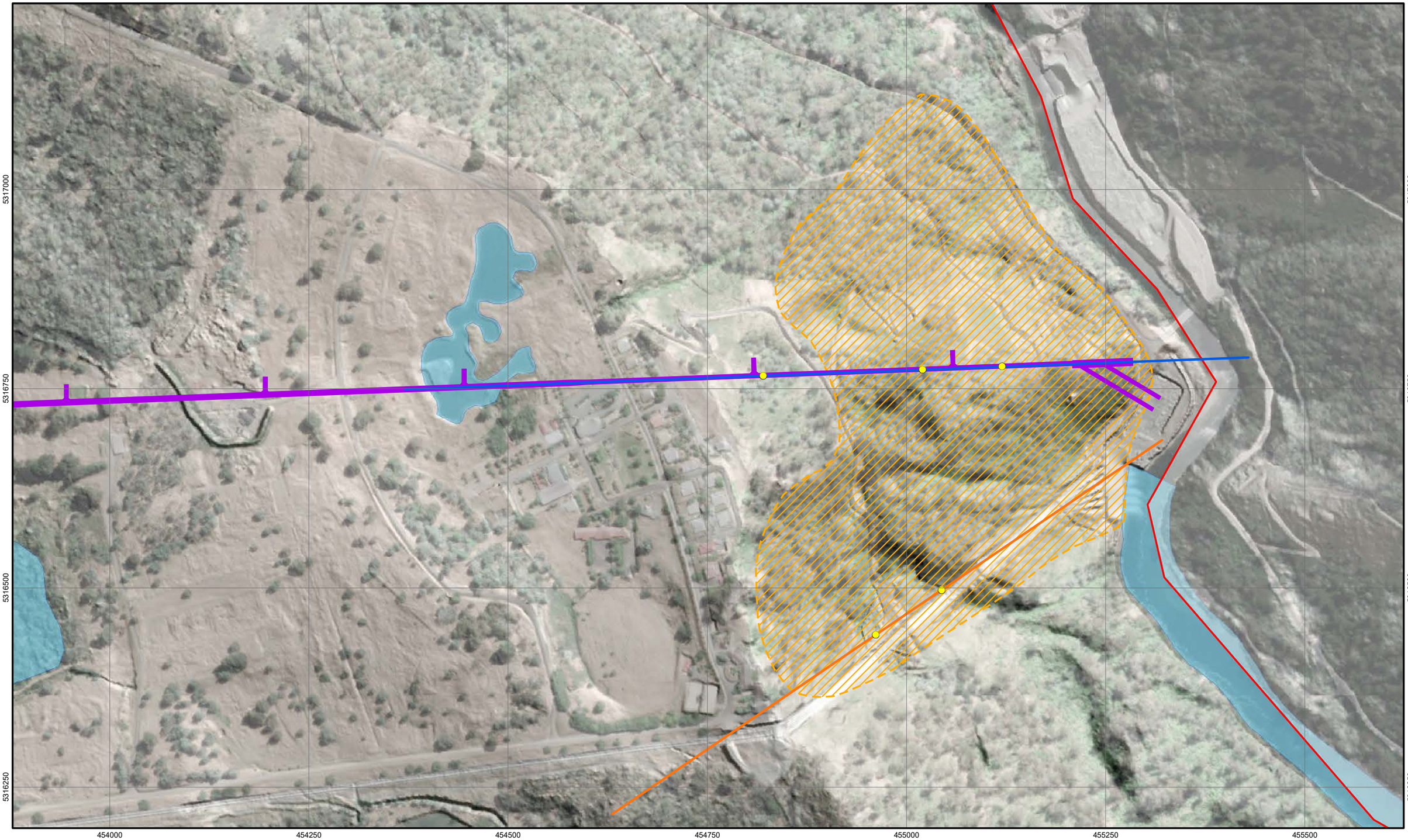
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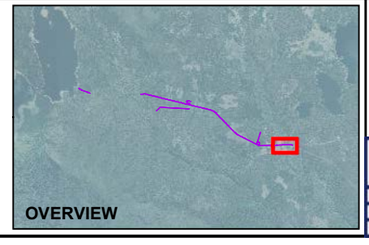
5316500

5316250



Legend

- Tarraleah Redevelopment Alignment
- Virtual Monitoring Points
- Penstock Section
- Power Tunnel Long Section
- Suspicious Landslide Zone
- Model Domain
- Waterbodies



N

Scale 1:4,500

0 25 50 100 150 200 250 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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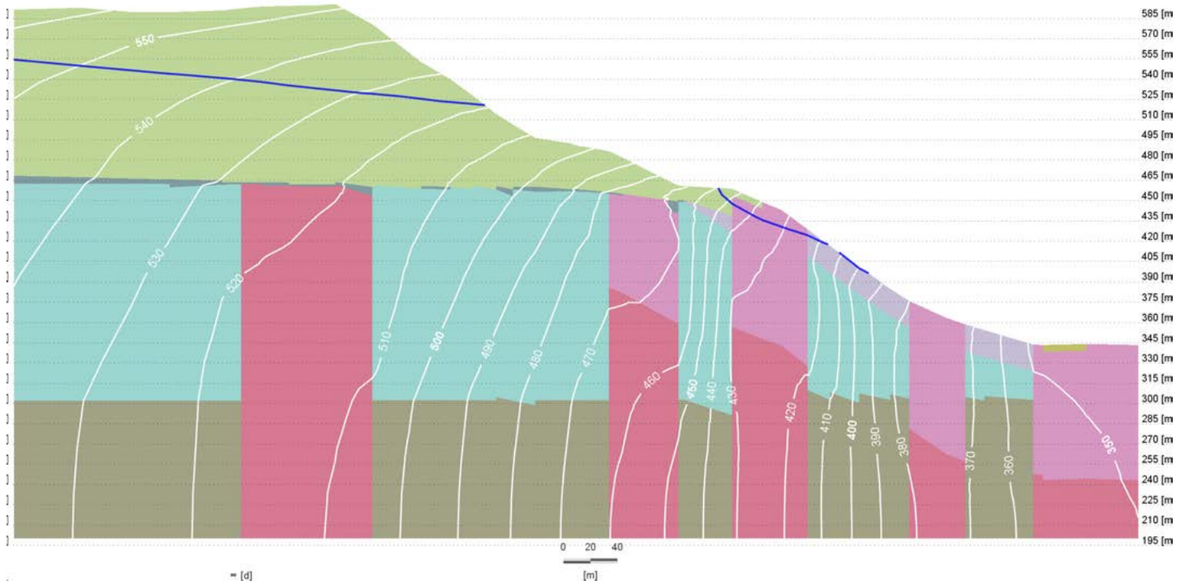
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

TARRALEAH POWER STATION
VIRTUAL MONITORING POINTS
AND SECTIONS

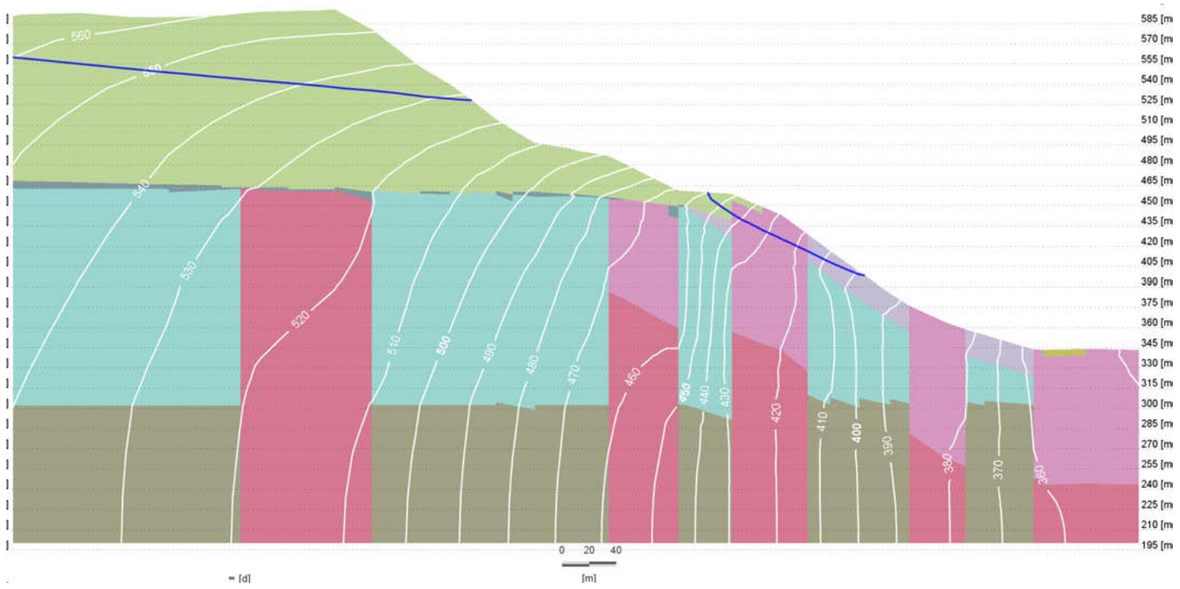
PSM4346-115R | Figure K4-1

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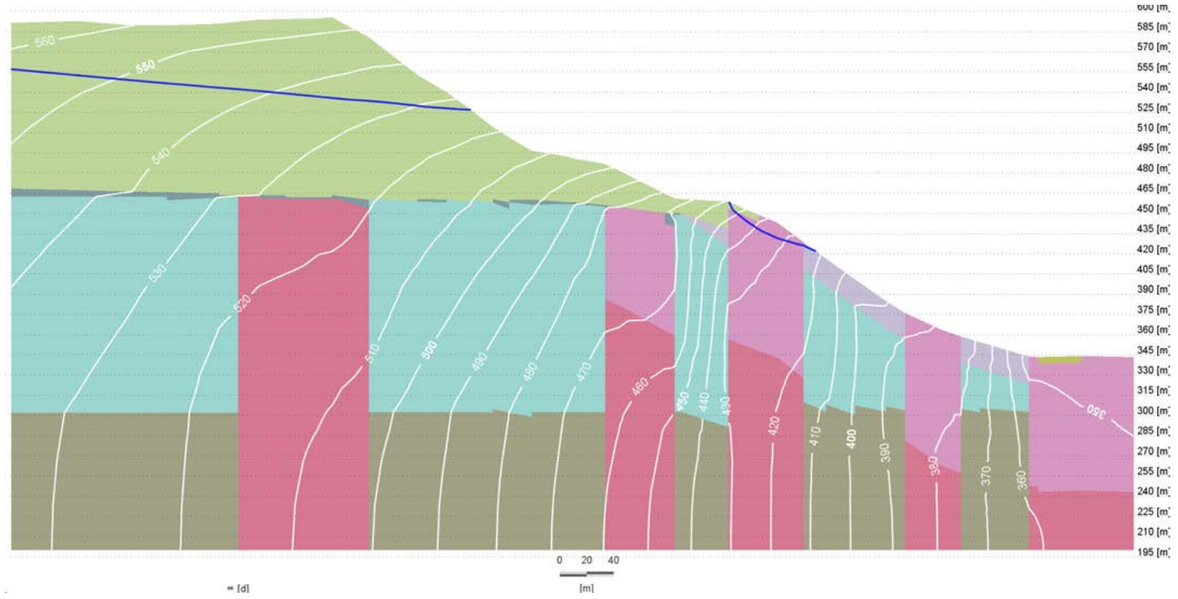
Basecase



Lower Bound

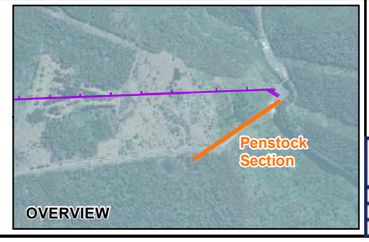


Upper Bound



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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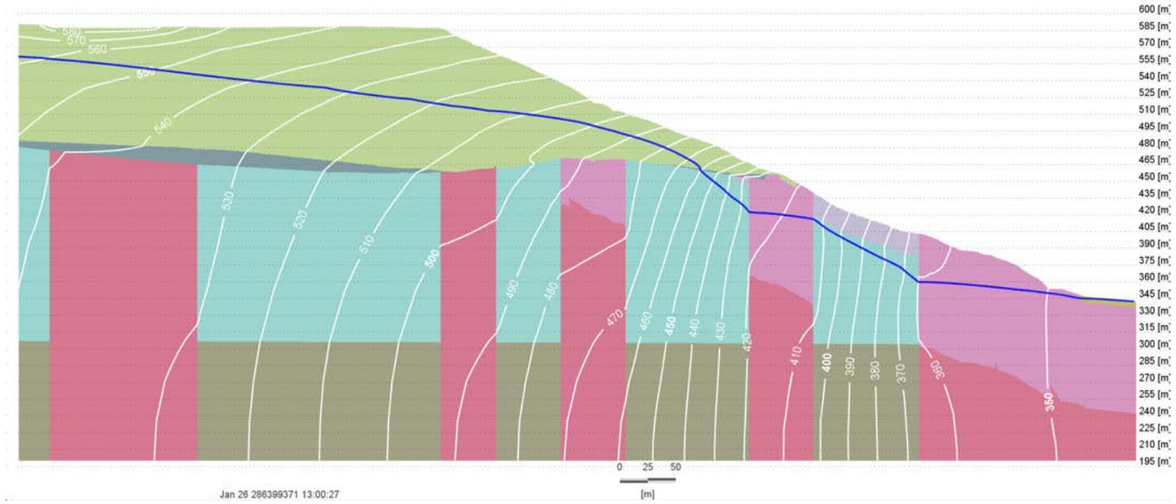
Hydro Tasmania
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Hydrogeological Interpretative Report

PENSTOCK SECTION
BASELINE HYDRAULIC HEAD

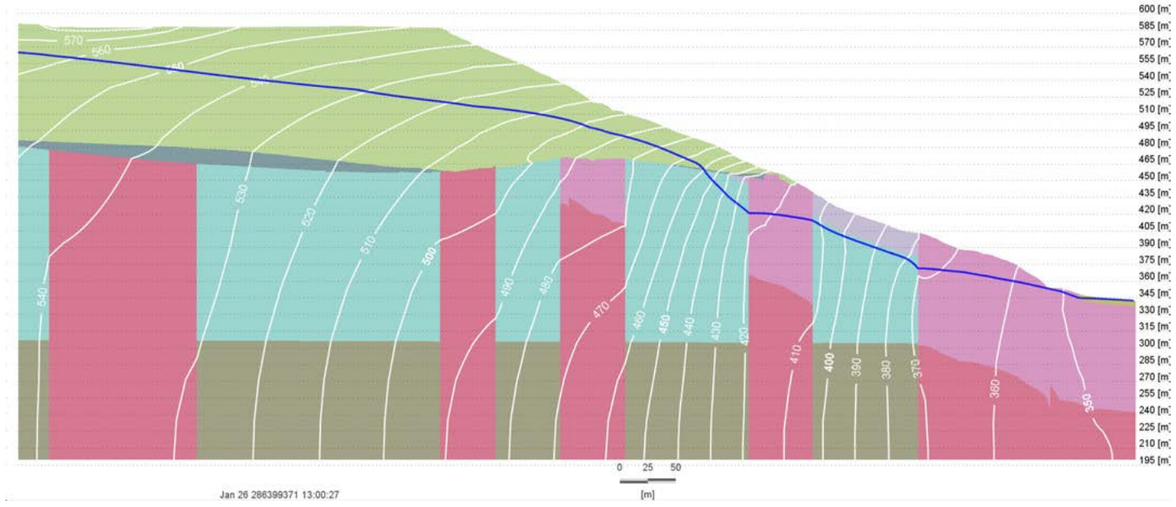
PSM4346-115R | Figure K5-1

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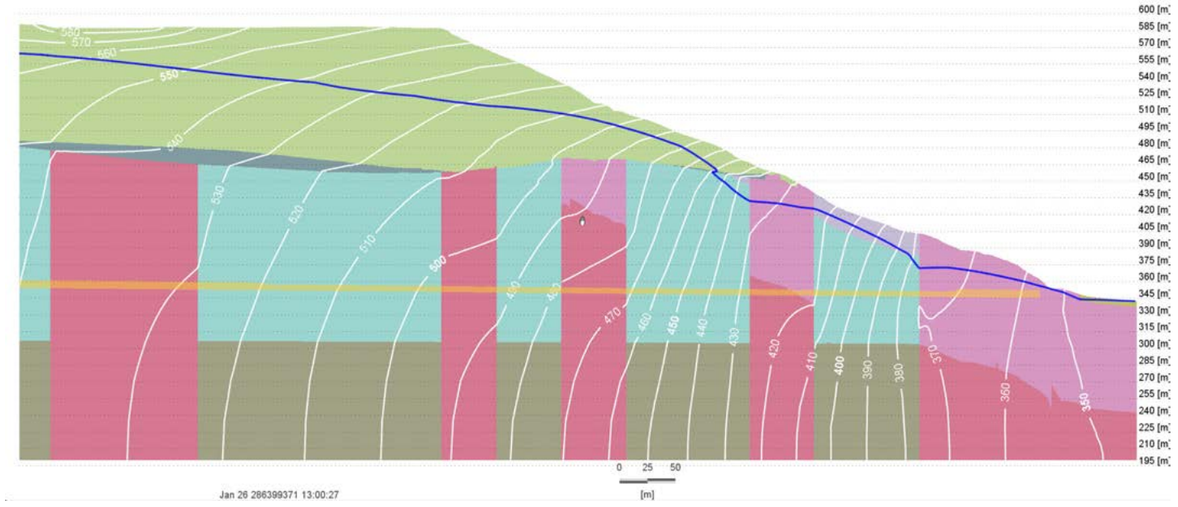
Basecase



Lower Bound

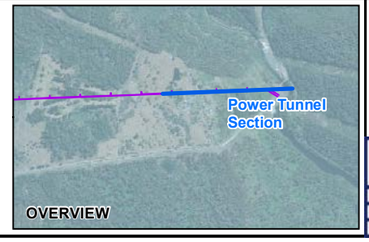


Upper Bound



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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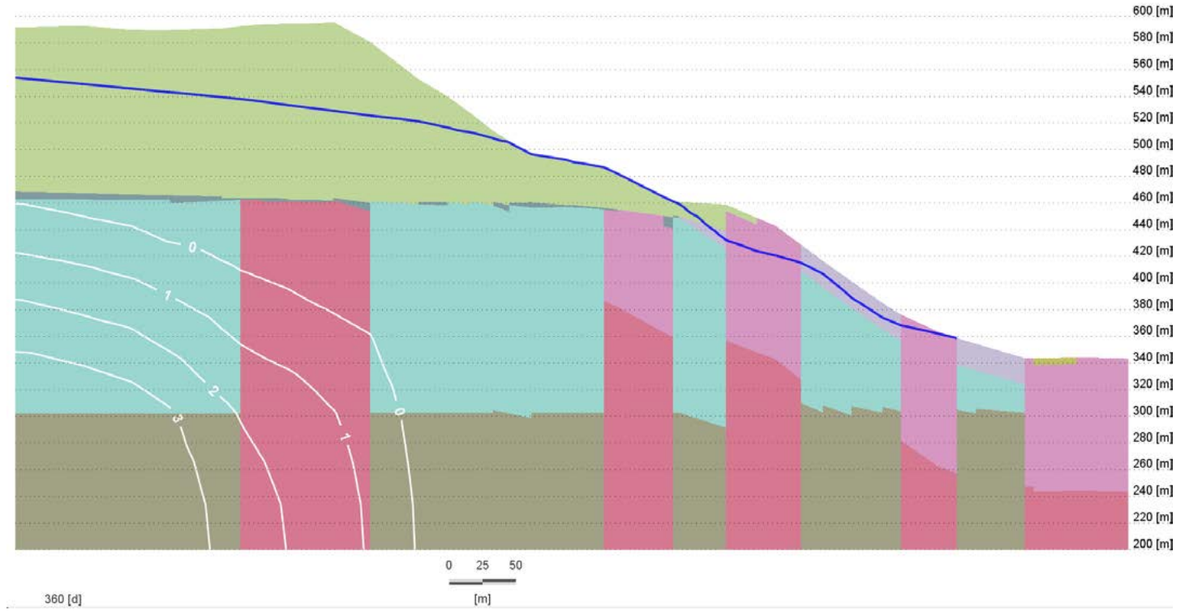
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
BASELINE HYDRAULIC HEAD

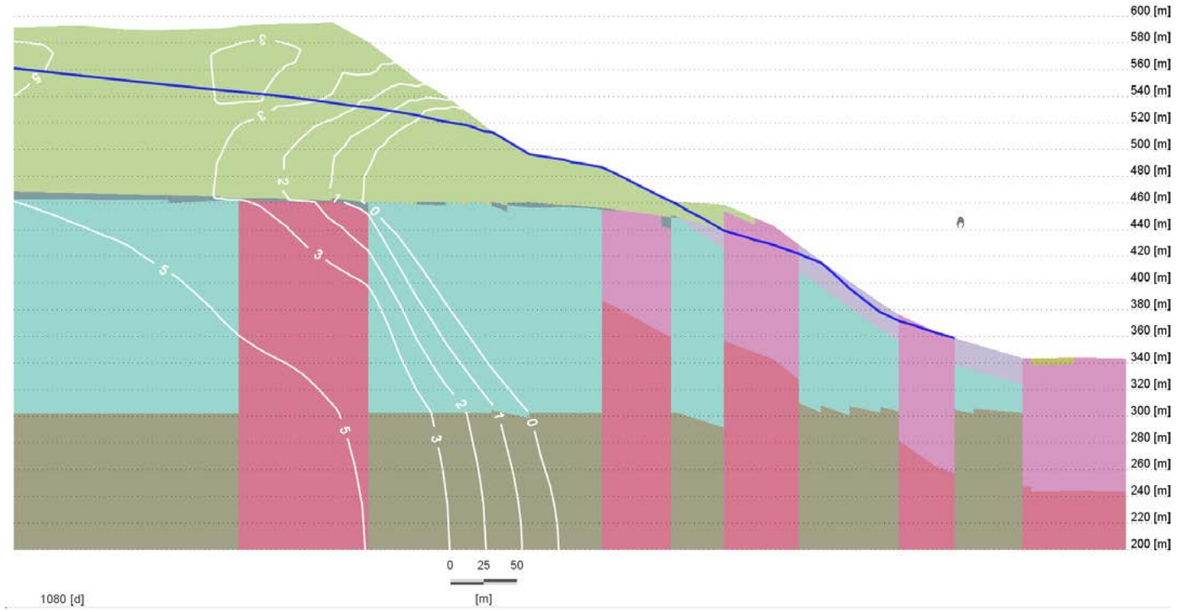
PSM4346-115R | Figure K5-2

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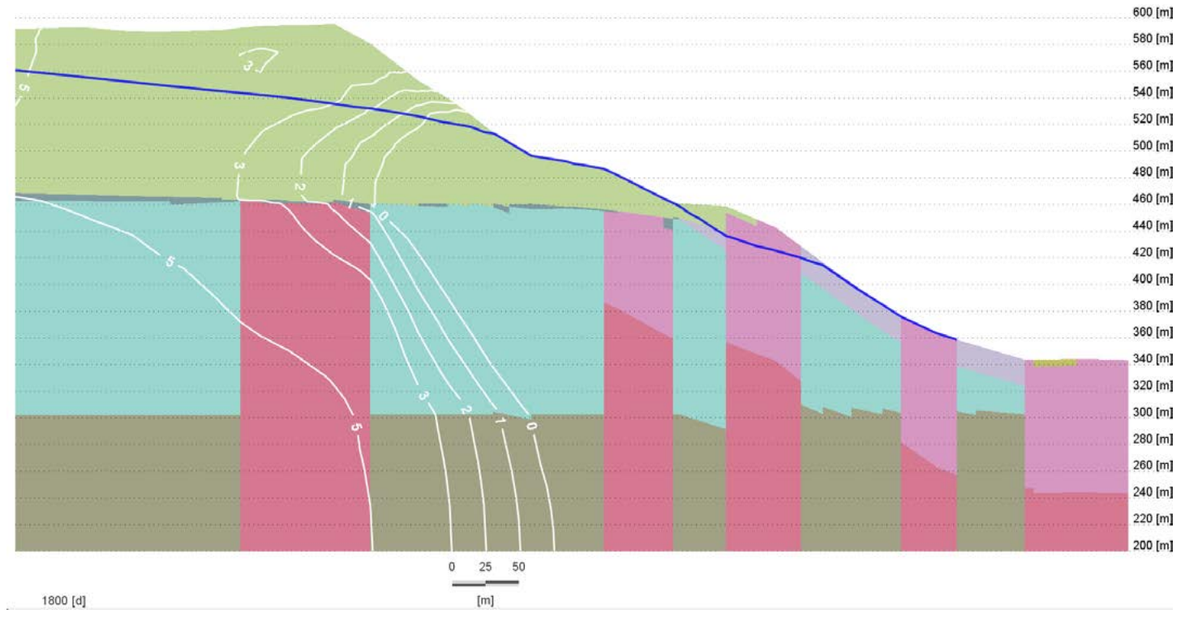
1 Year



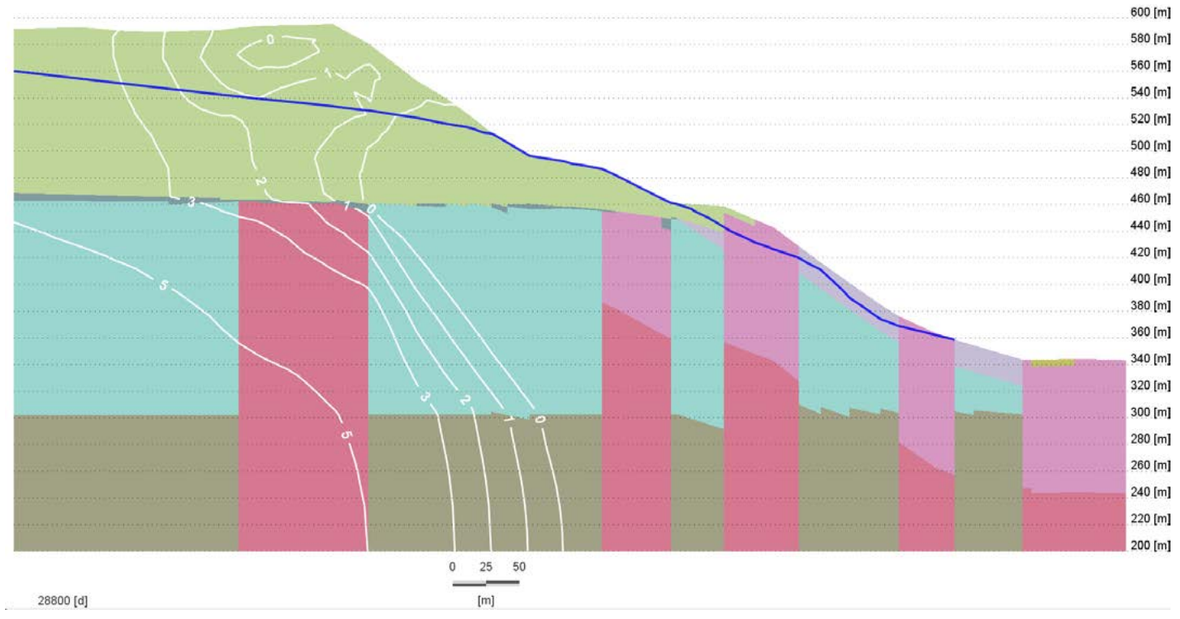
3 Years



5 Years

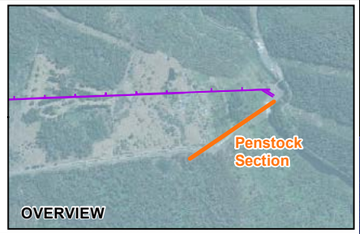


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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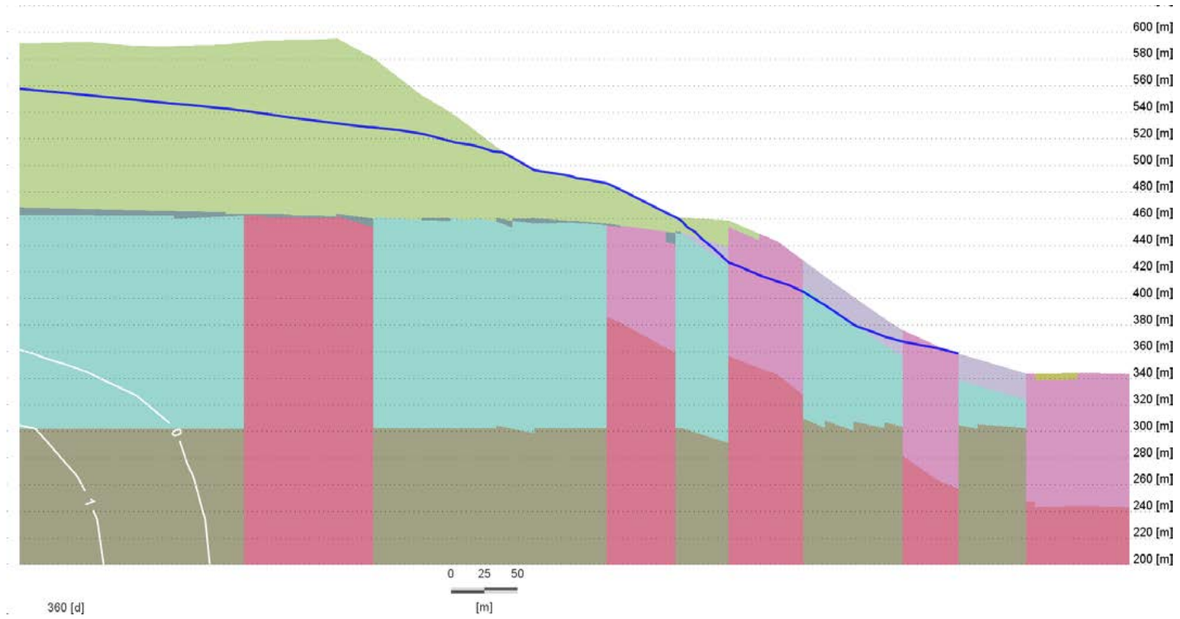
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE (BASE CASE)

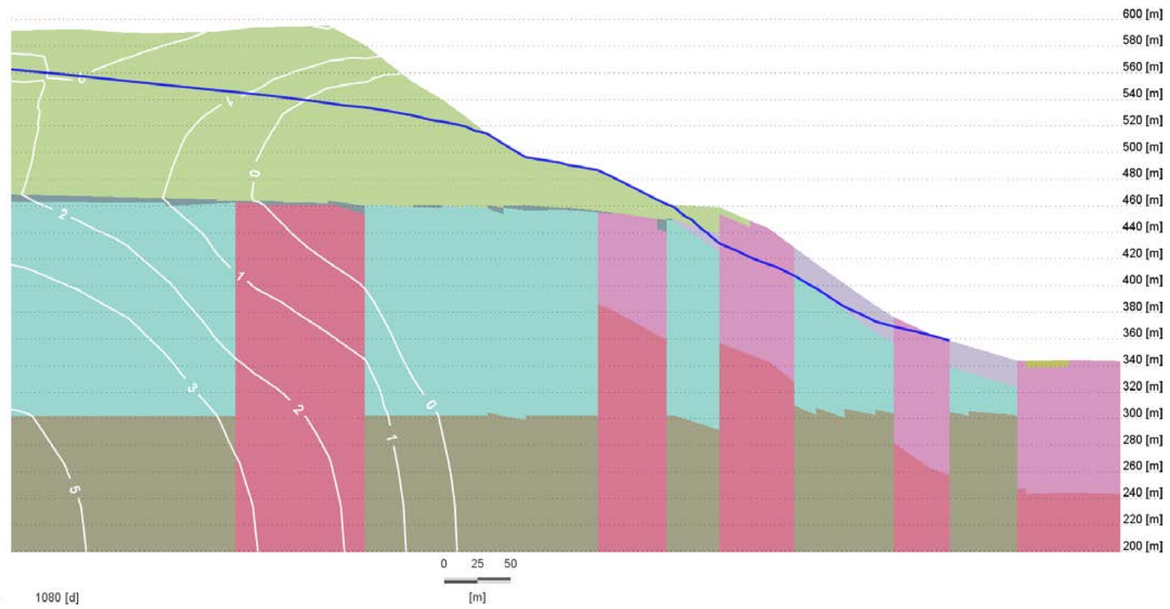
PSM4346-115R | Figure K6-1(a)

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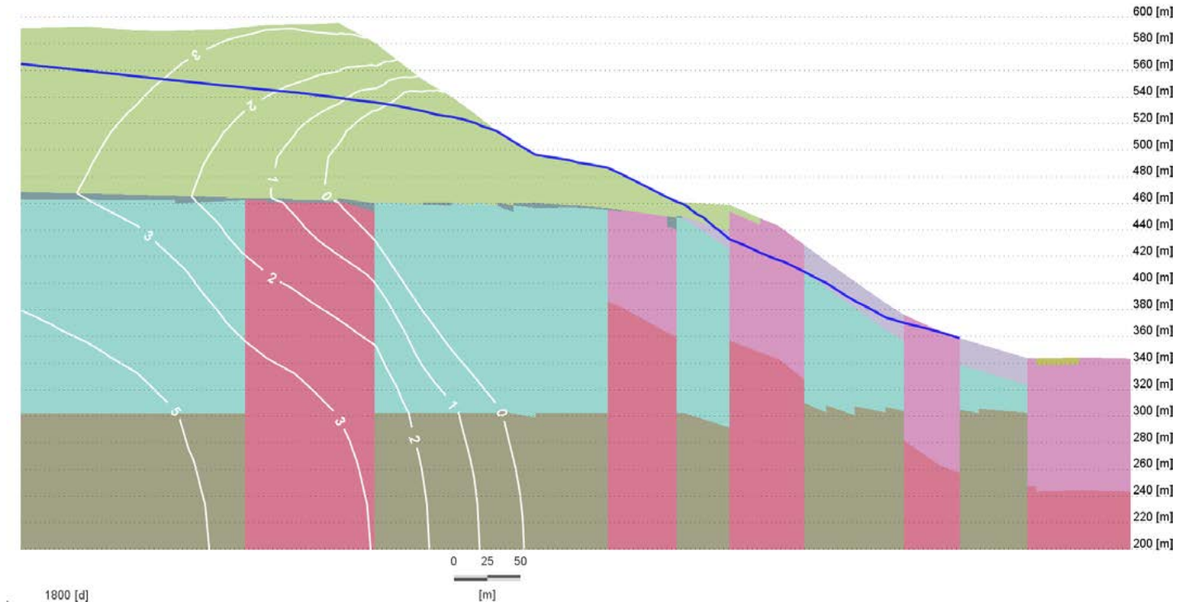
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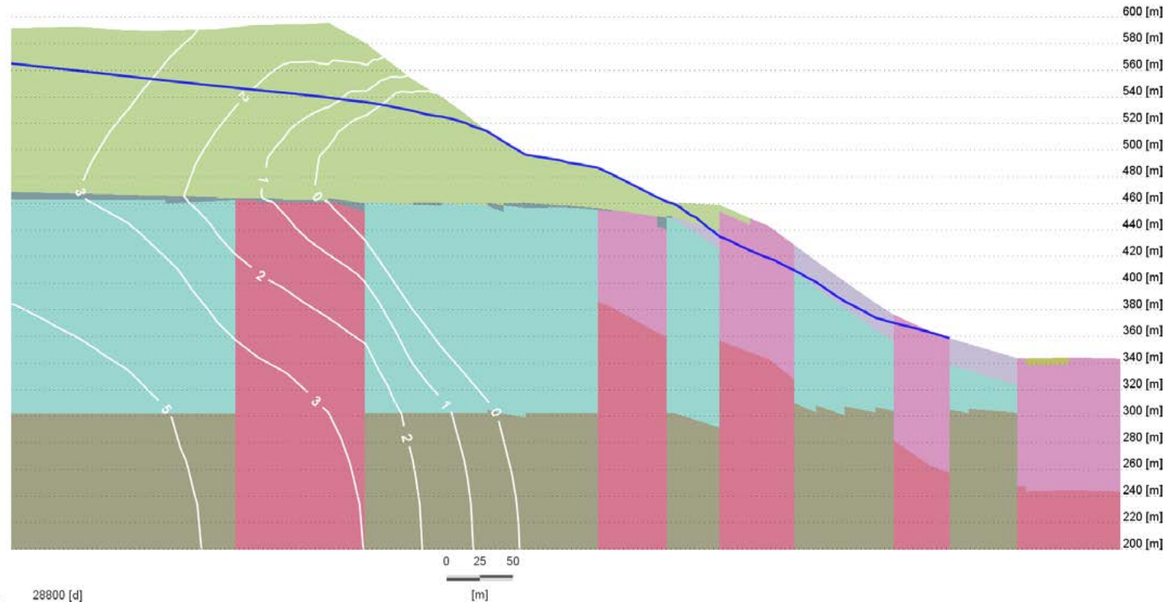
3 Years



5 Years

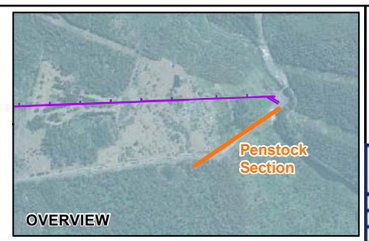


80 Years



Legend

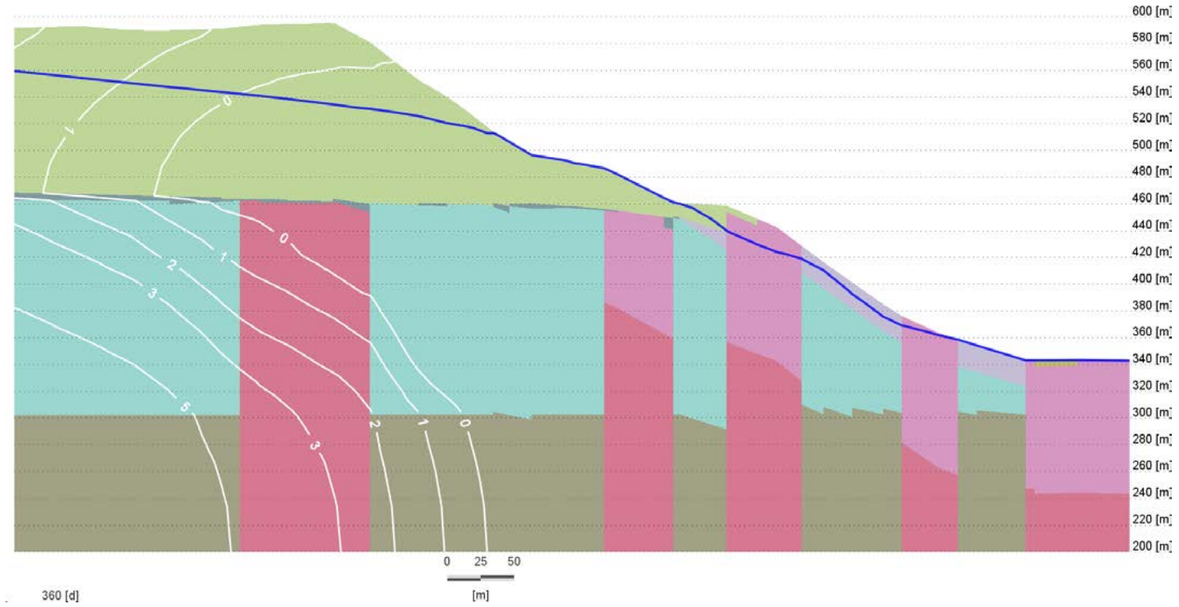
- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



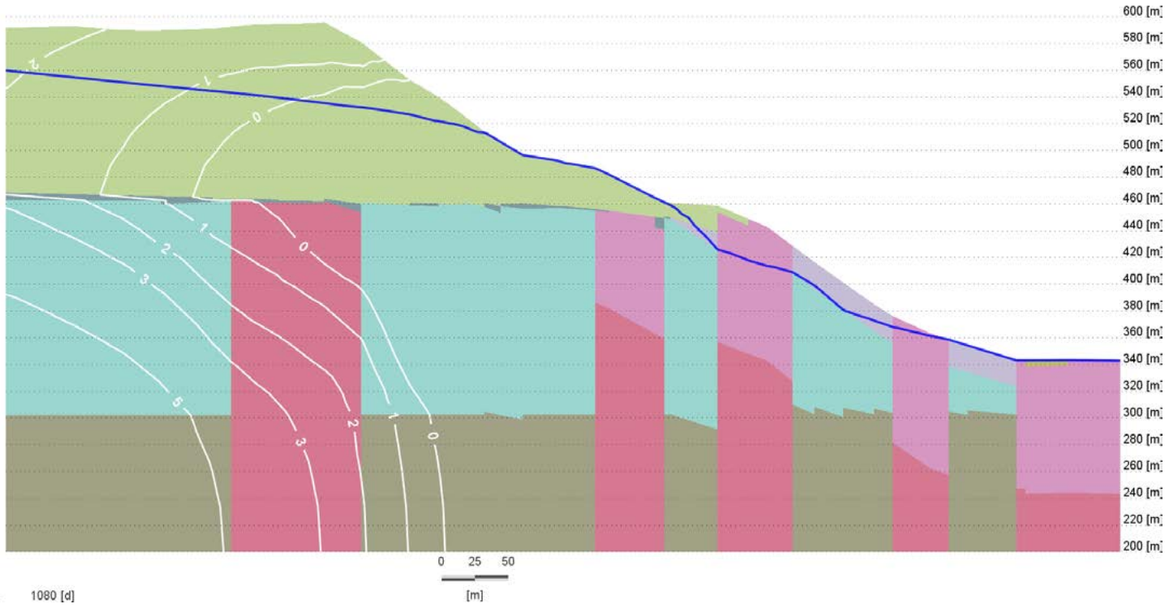
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	Date: 27 Feb 2025	Paper Size: A3	PSM4346-115R | Figure K6-1(b)

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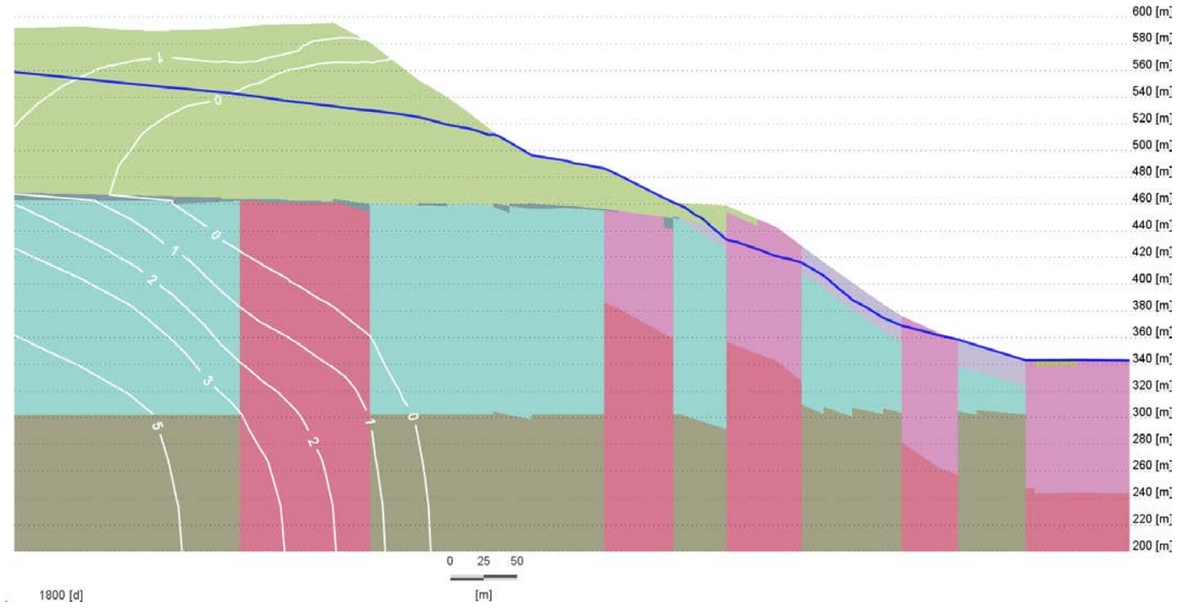
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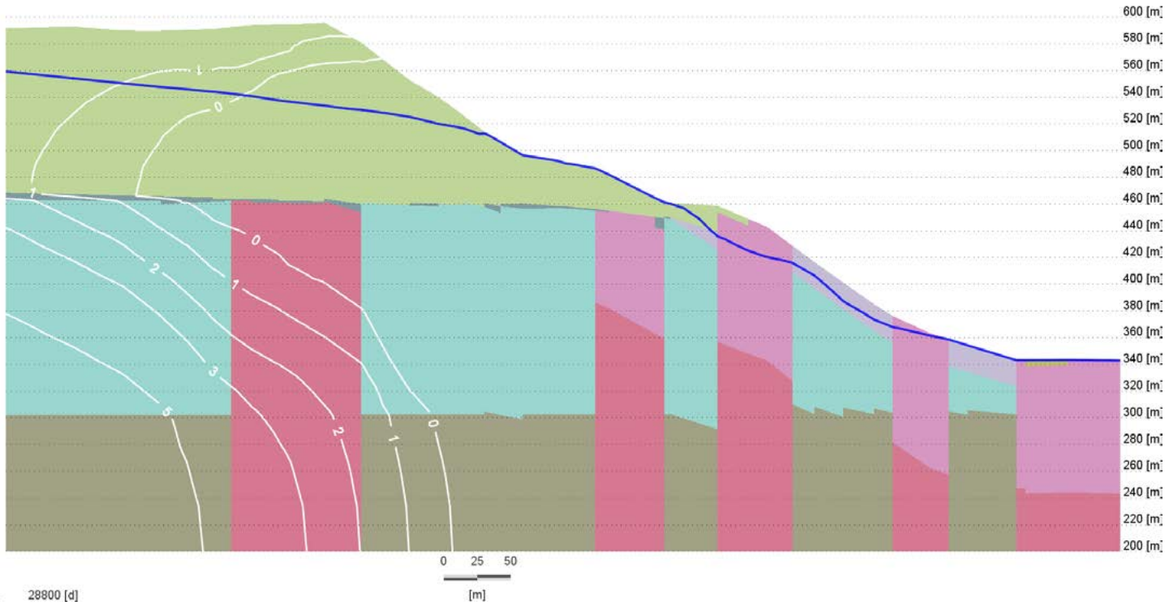
3 Years



5 Years

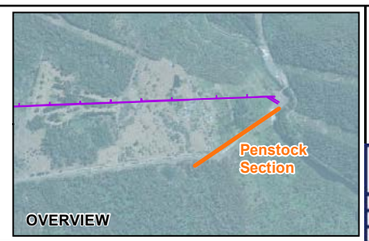


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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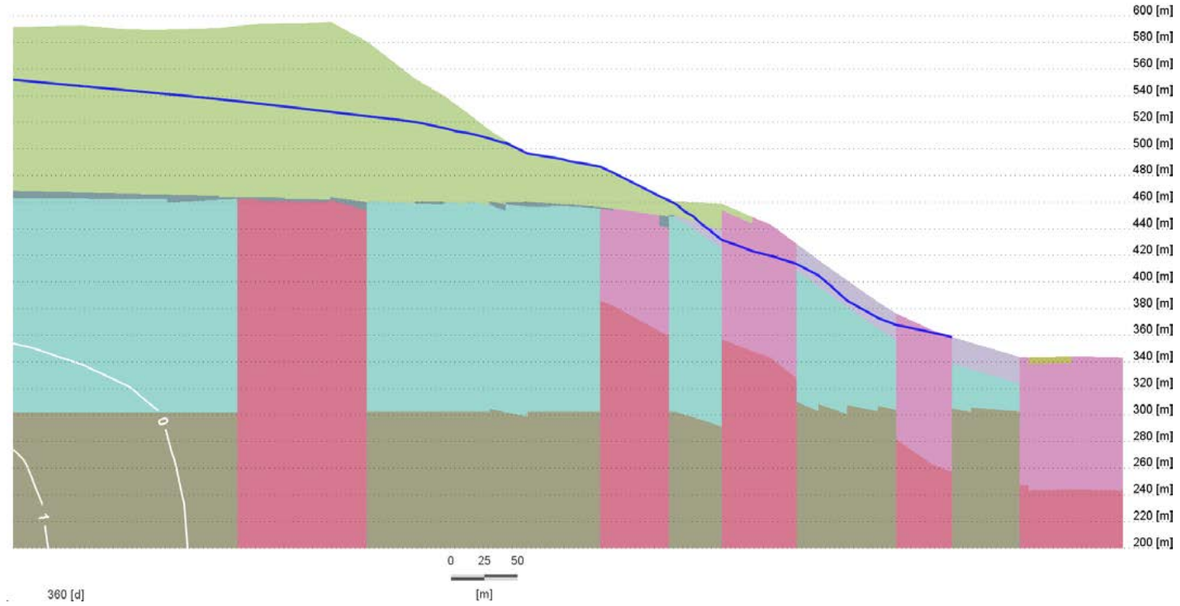
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
UPPER BOUND

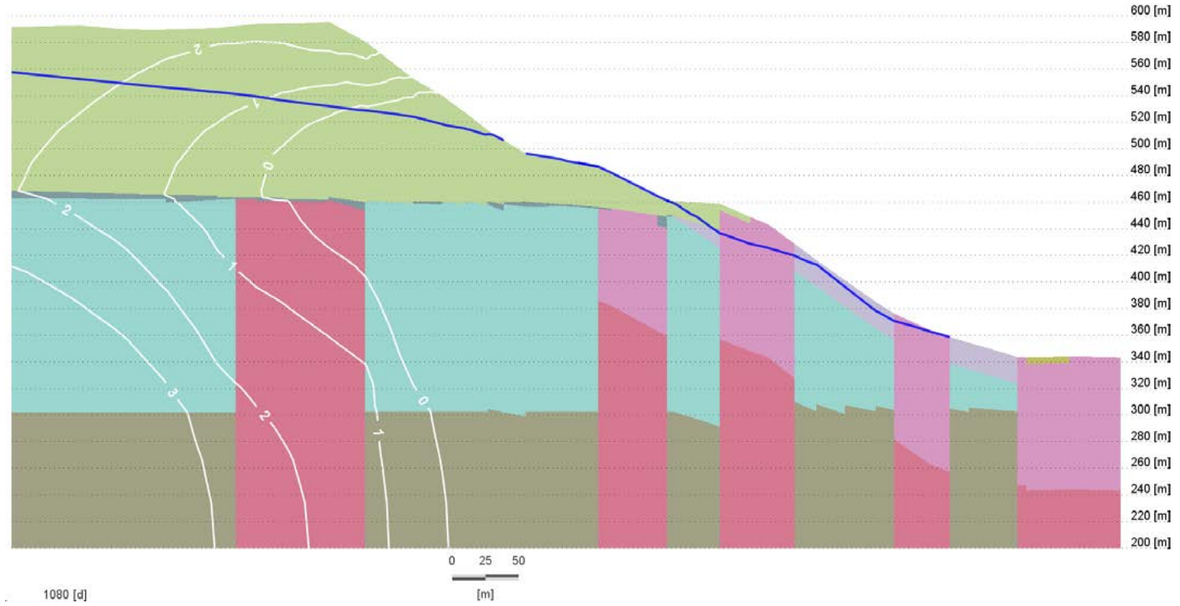
PSM4346-115R | Figure K6-1(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K6-1(c) Penstock Section Transient Hydraulic Head Change Base Schedle (Upper Bound).mxd

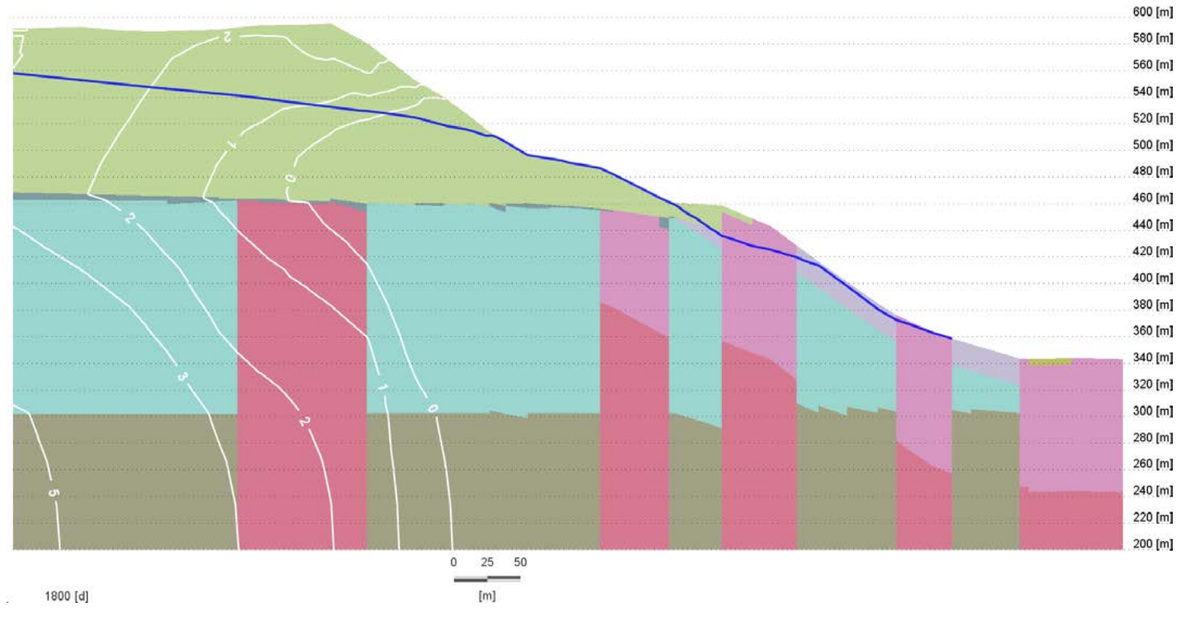
1 Year



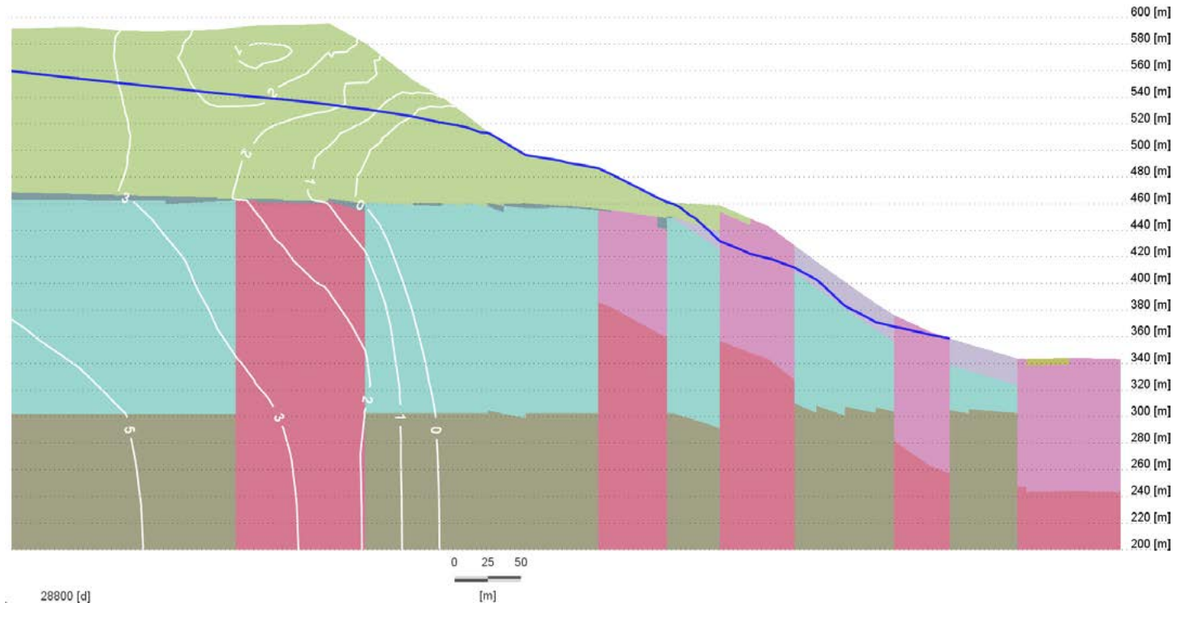
3 Years



5 Years

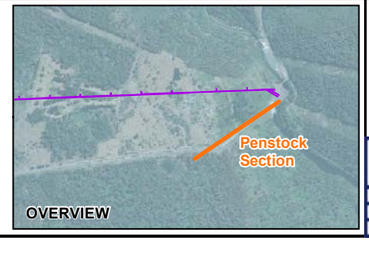


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

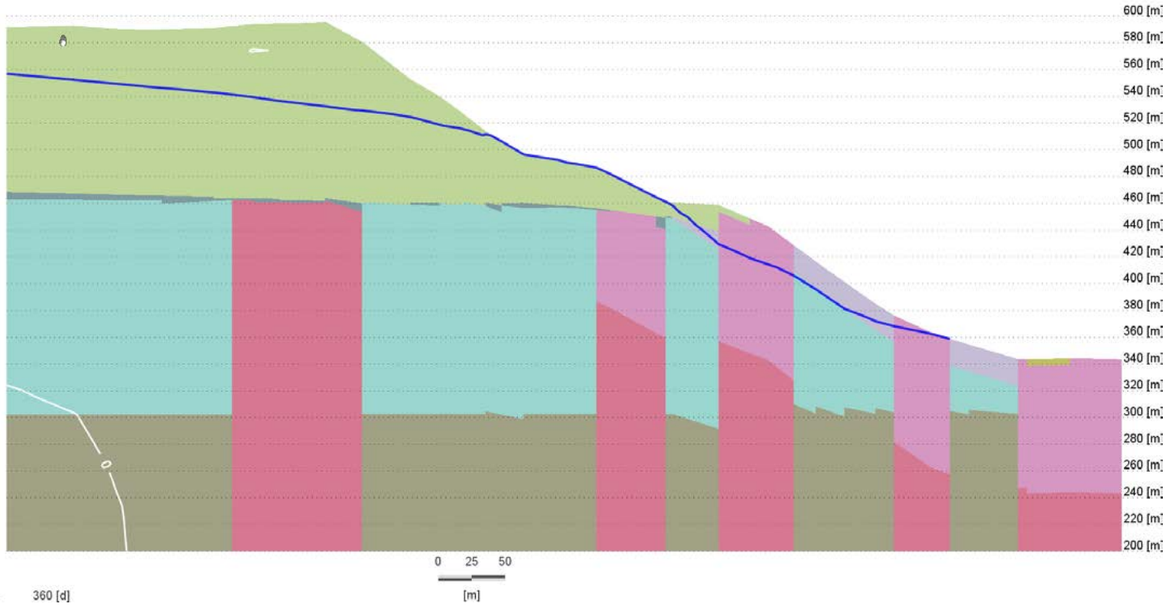
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Date: 27 Feb 2025	Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(BASE CASE)

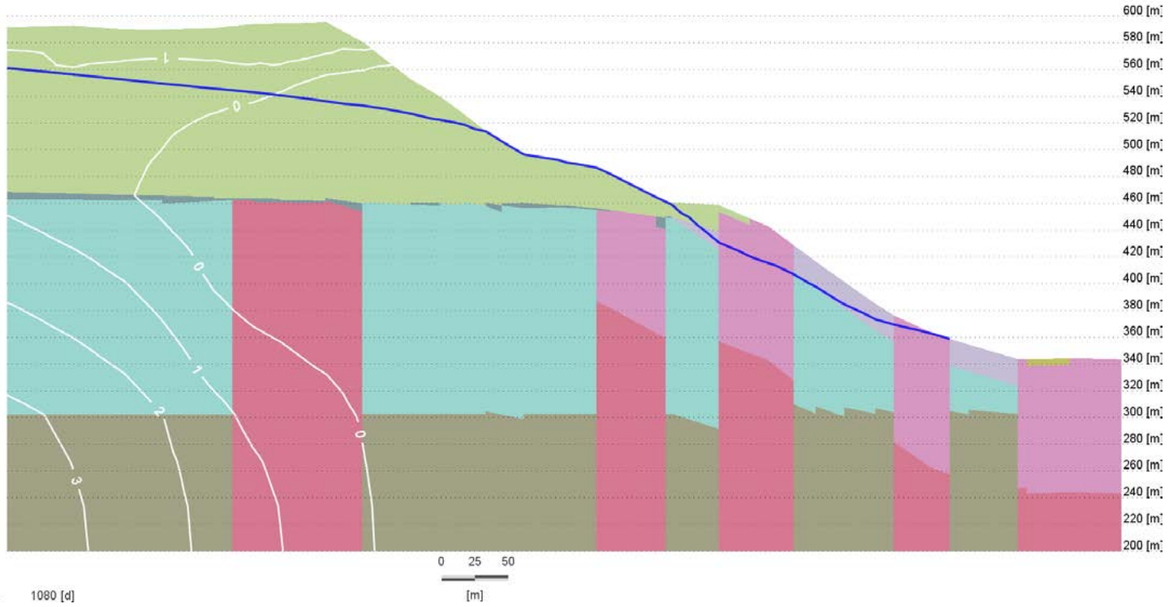
PSM4346-115R | Figure K6-2(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K6-2(a) Penstock Section Transient Hydraulic Head Change Base Schedule - Grouting (Base Case).mxd

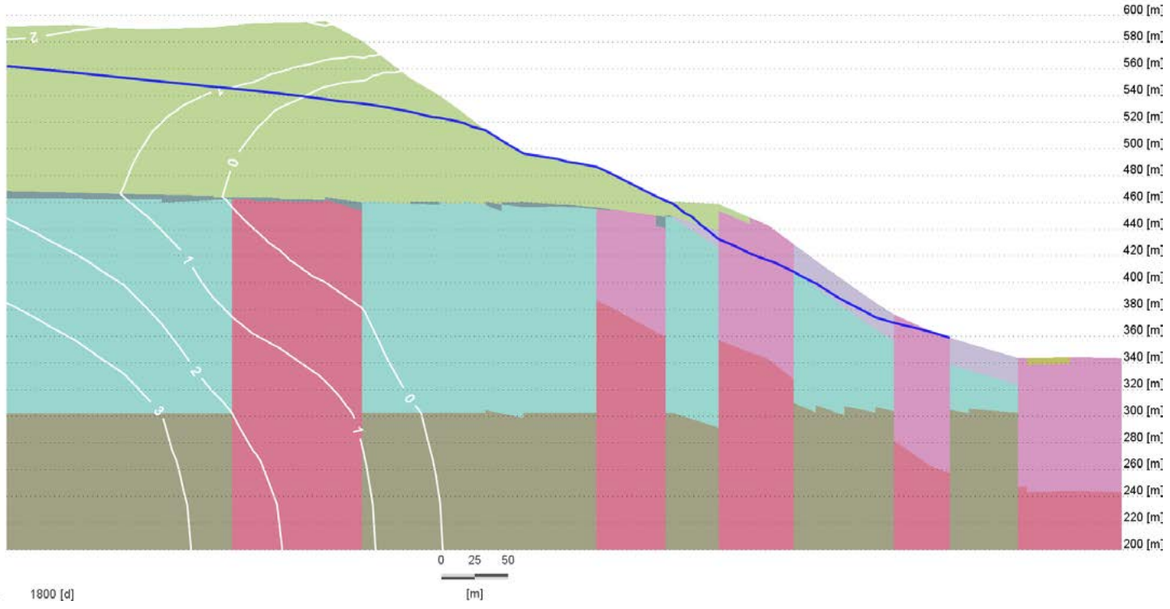
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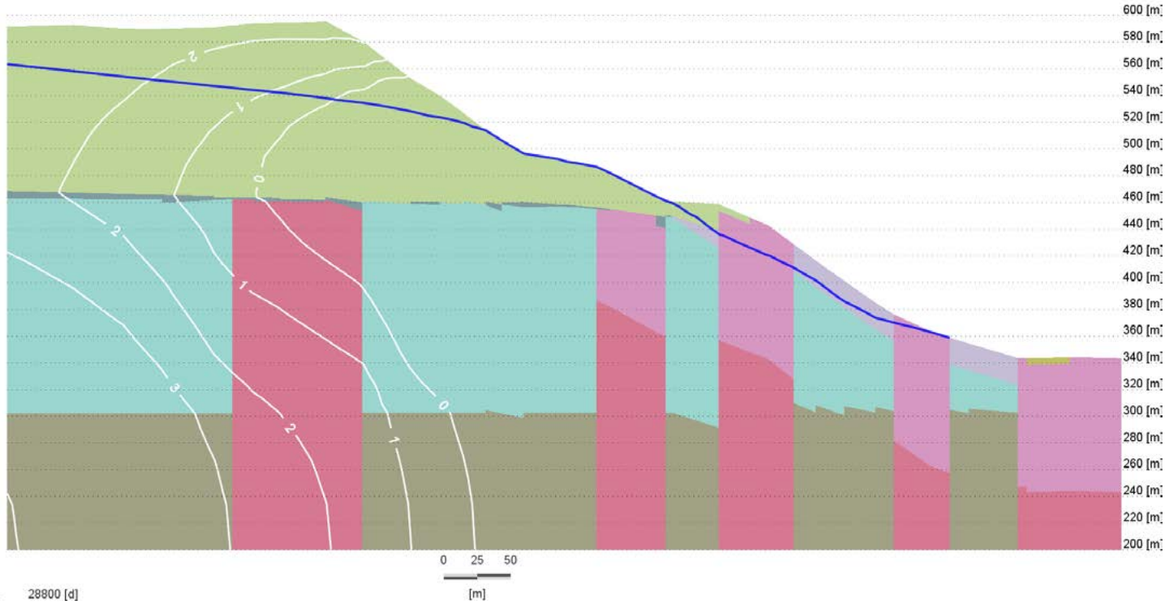
3 Years



5 Years

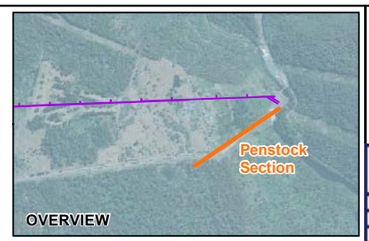


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

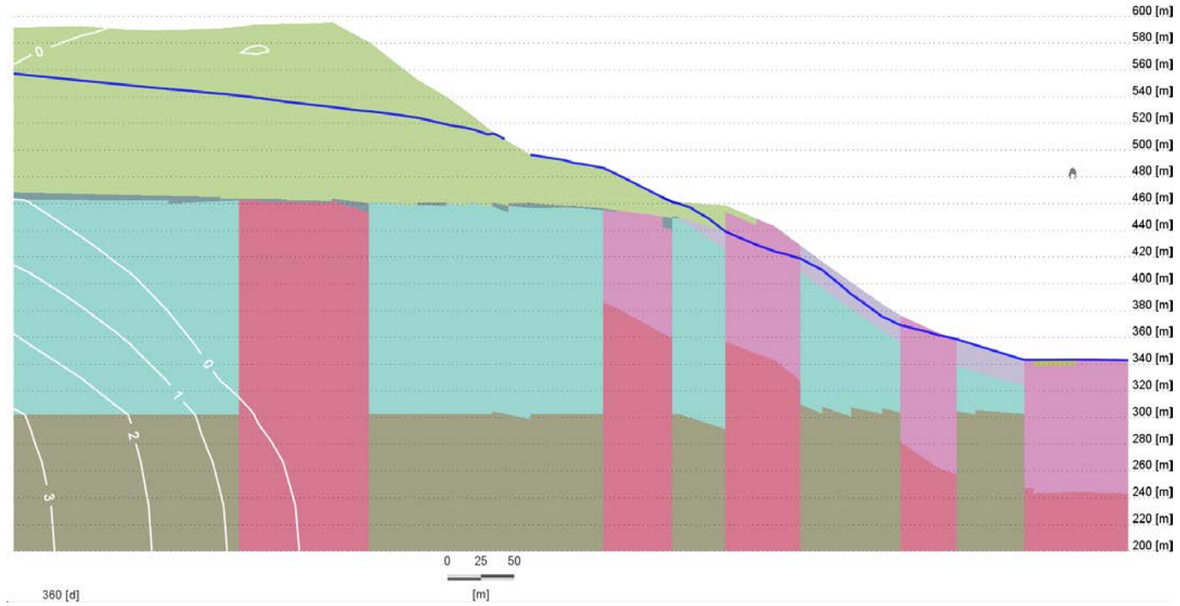
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Revision: B
Date: 27 Feb 2025
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(LOWER BOUND)

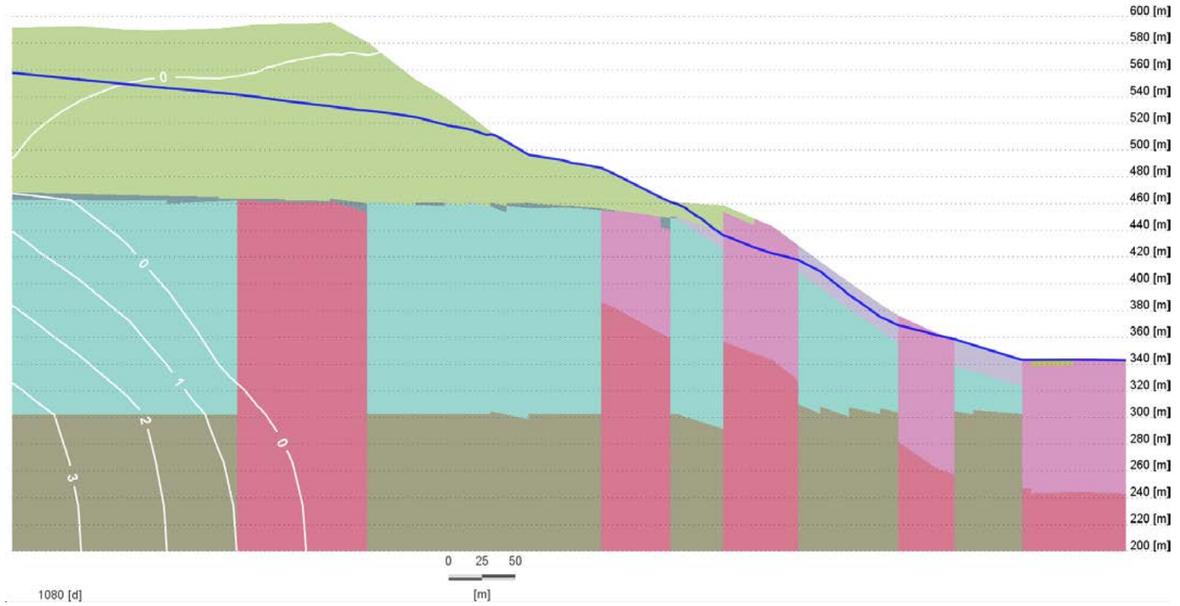
PSM4346-115R | Figure K6-2(b)

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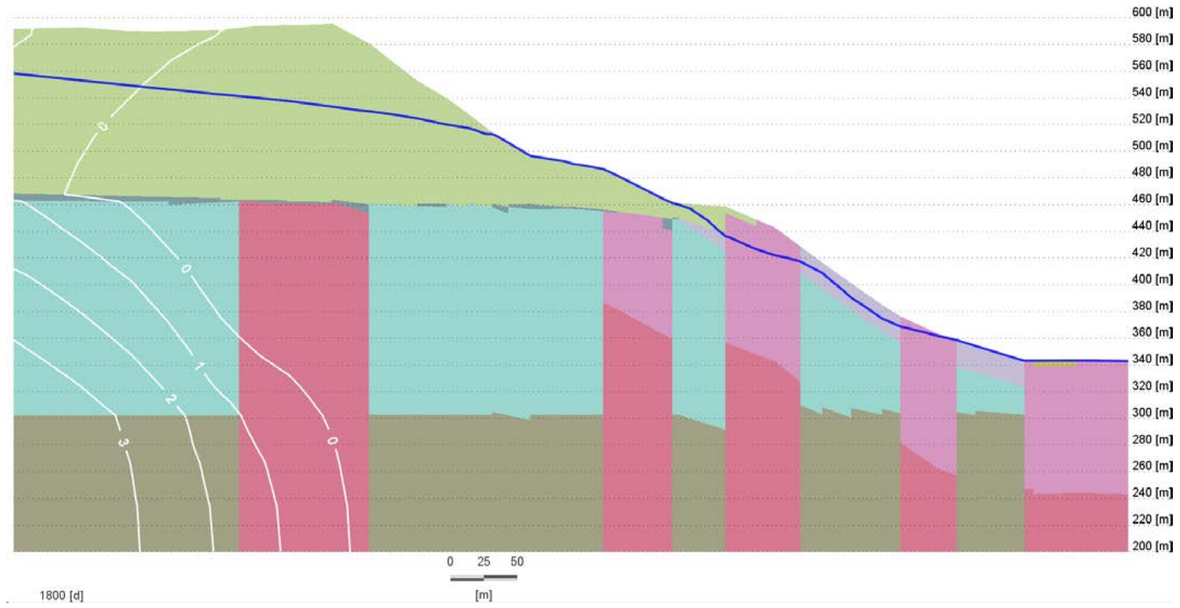
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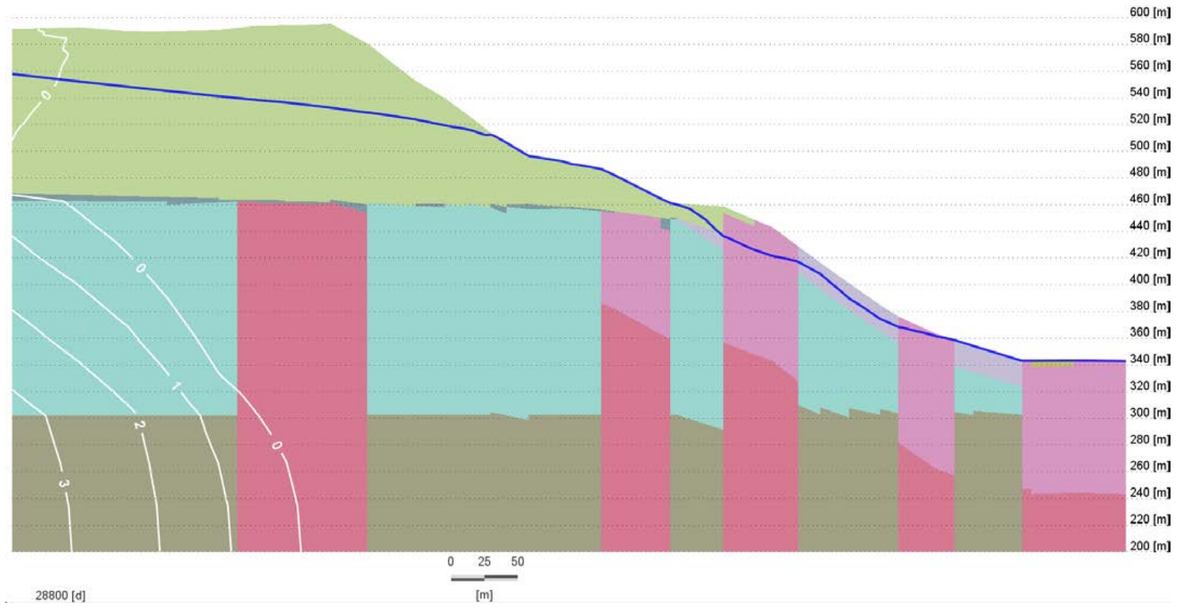
3 Years



5 Years

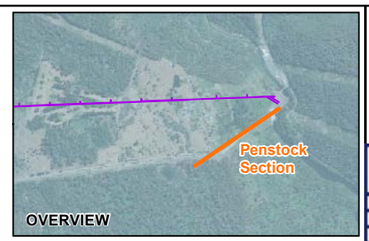


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

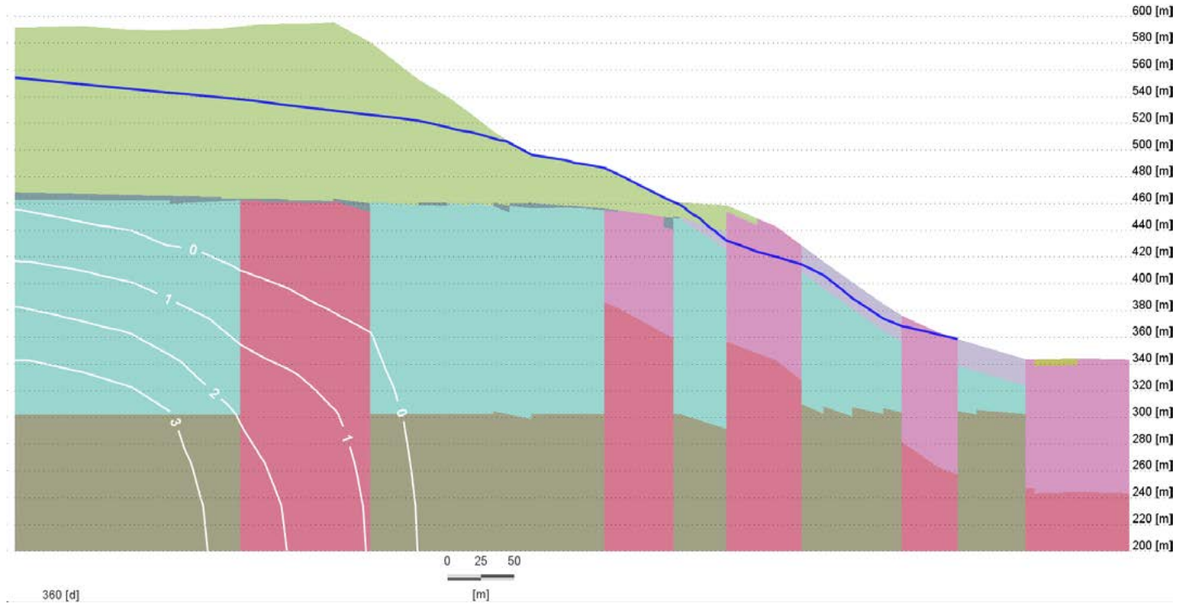
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(UPPER BOUND)

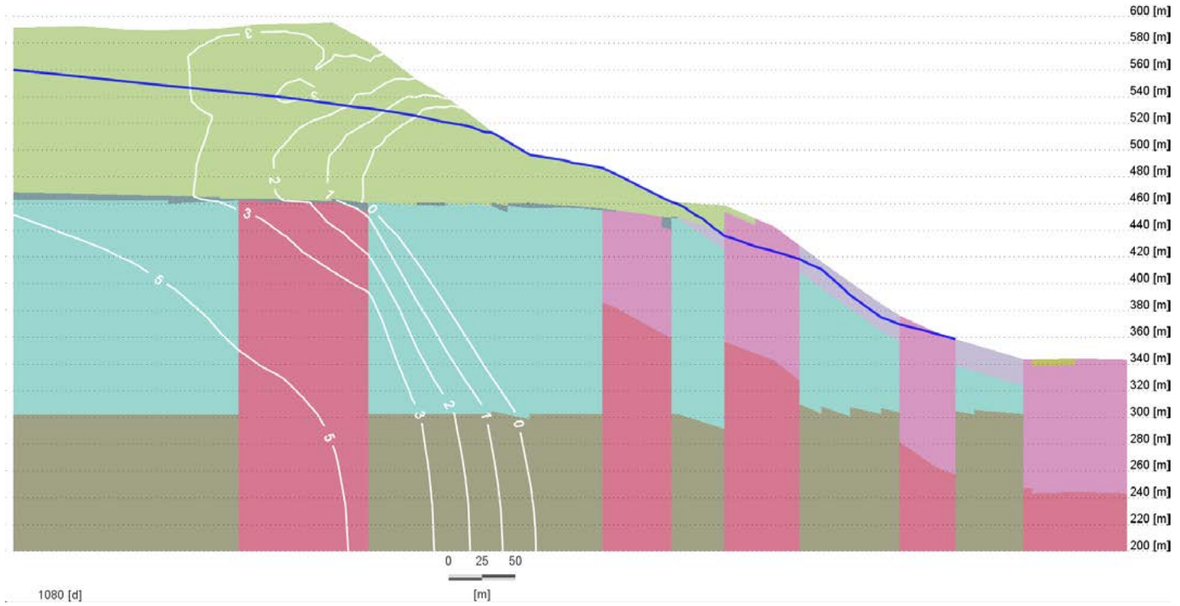
PSM4346-115R | Figure K6-2(c)

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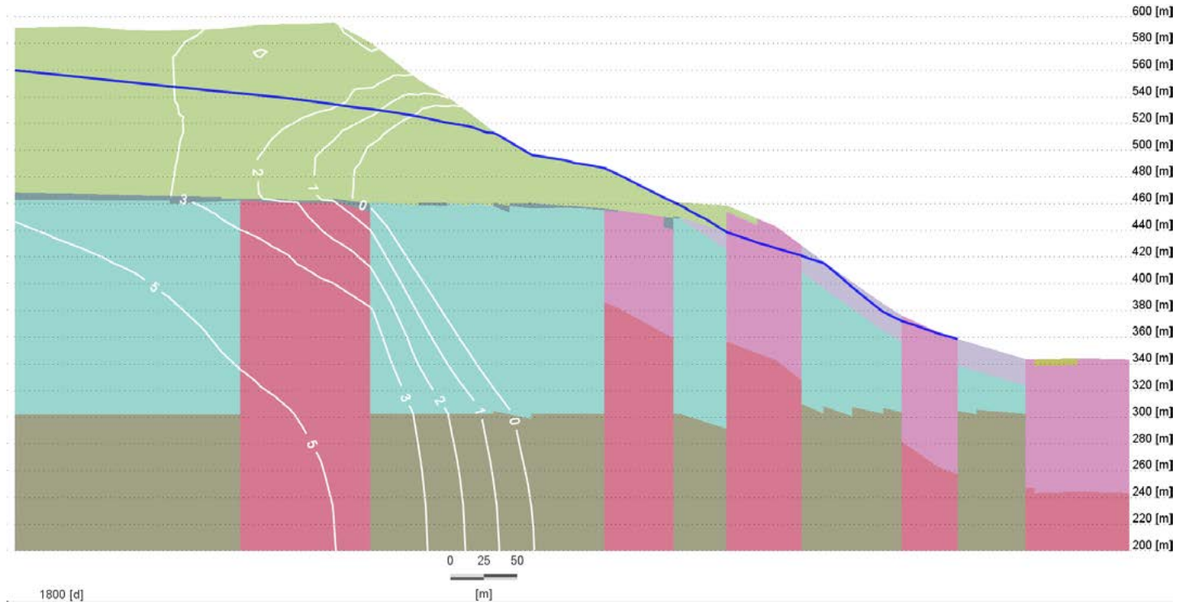
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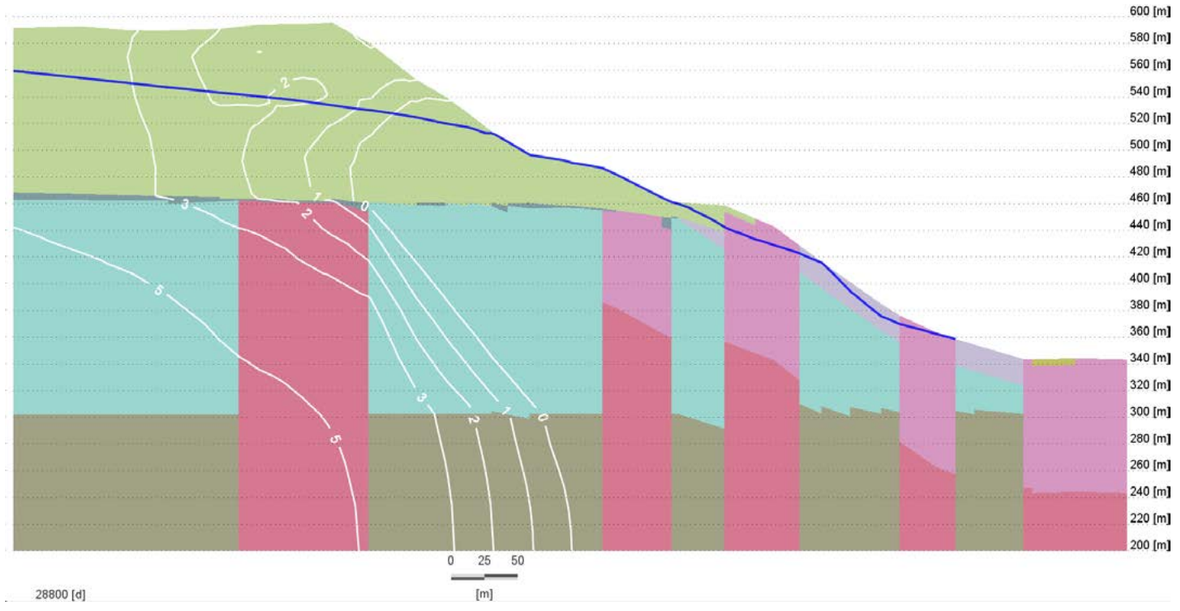
3 Years



5 Years

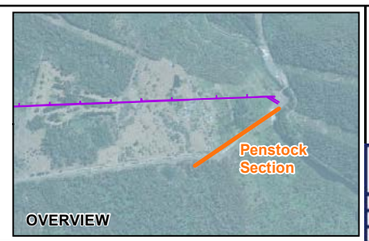


80 Years



Legend

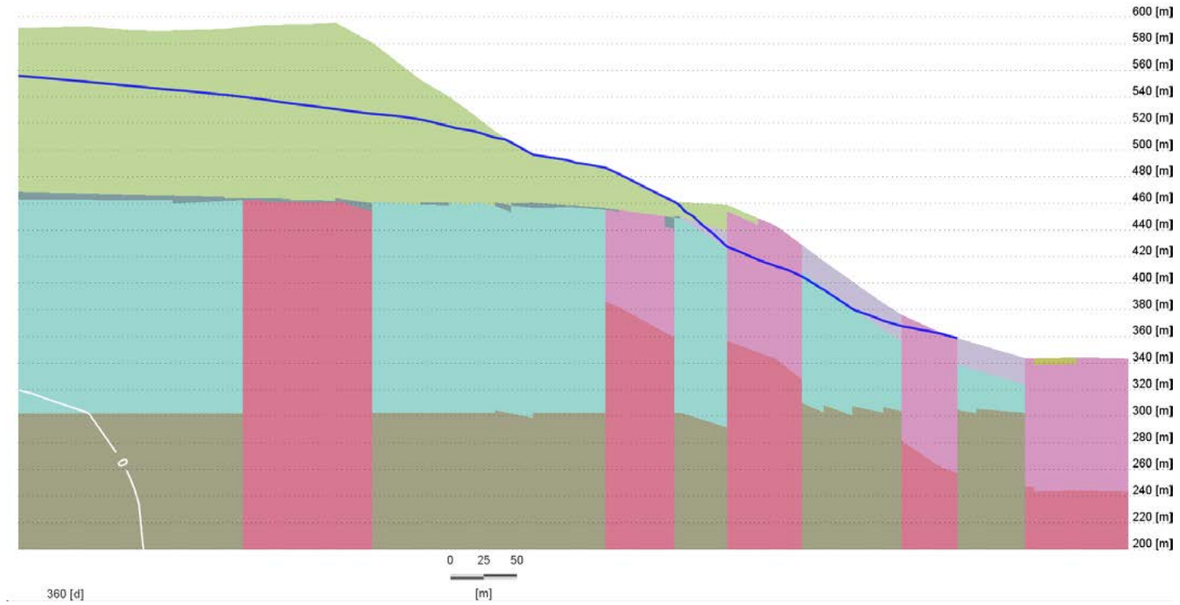
- Alluvium / Colluvium (Scol)
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- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



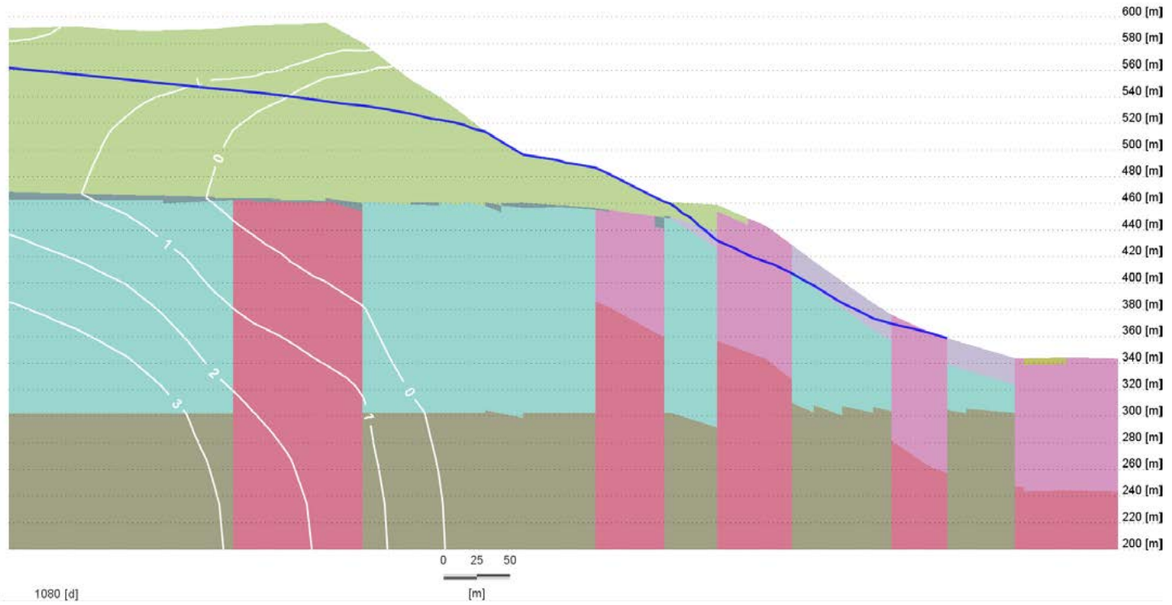
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	Date: 27 Feb 2025	Paper Size: A3	PENSTOCK SECTION TRANSIENT HYDRAULIC HEAD CHANGE P90 SCHEDULE (BASE CASE)
			PSM4346-115R | Figure K6-3(a)

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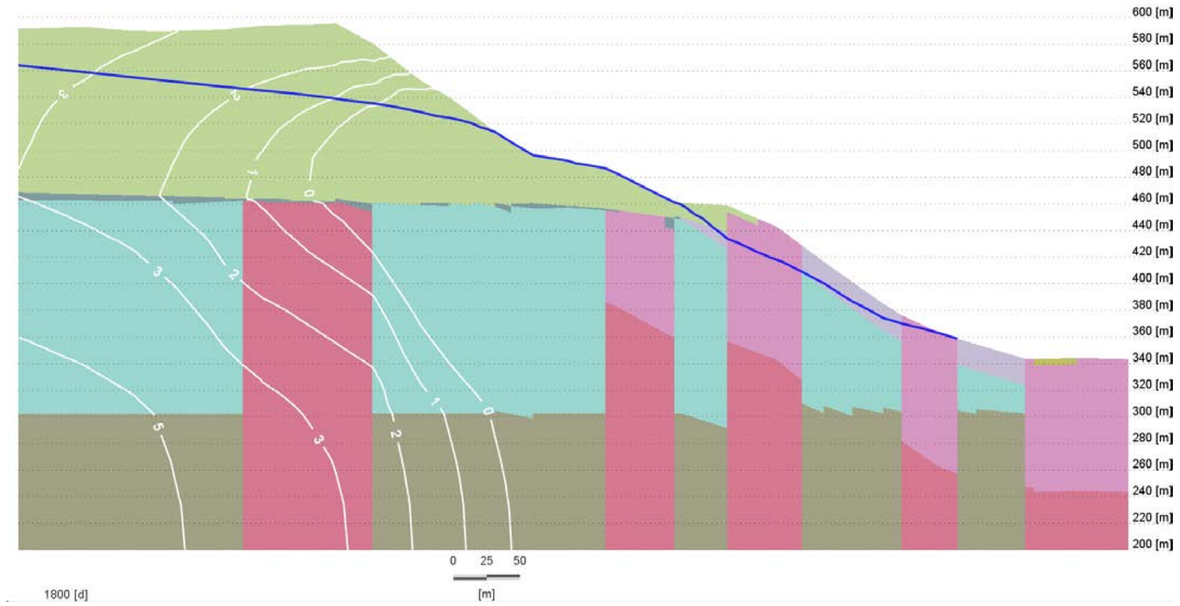
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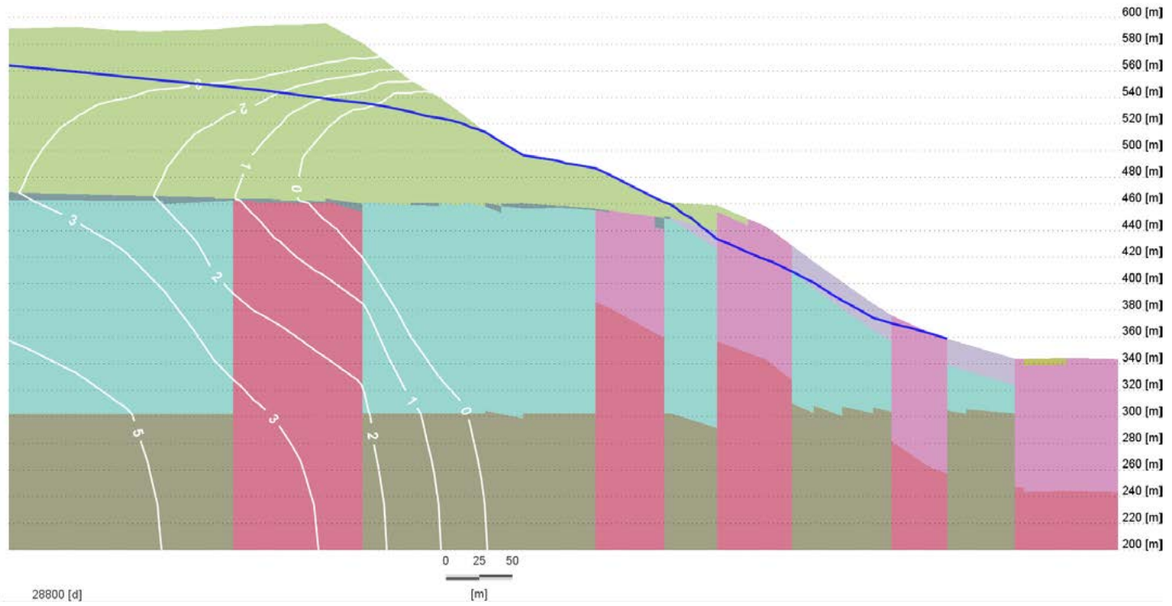
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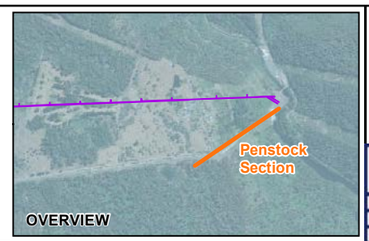


80 Years



Legend

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- Triassic Sandstone (H-TS)



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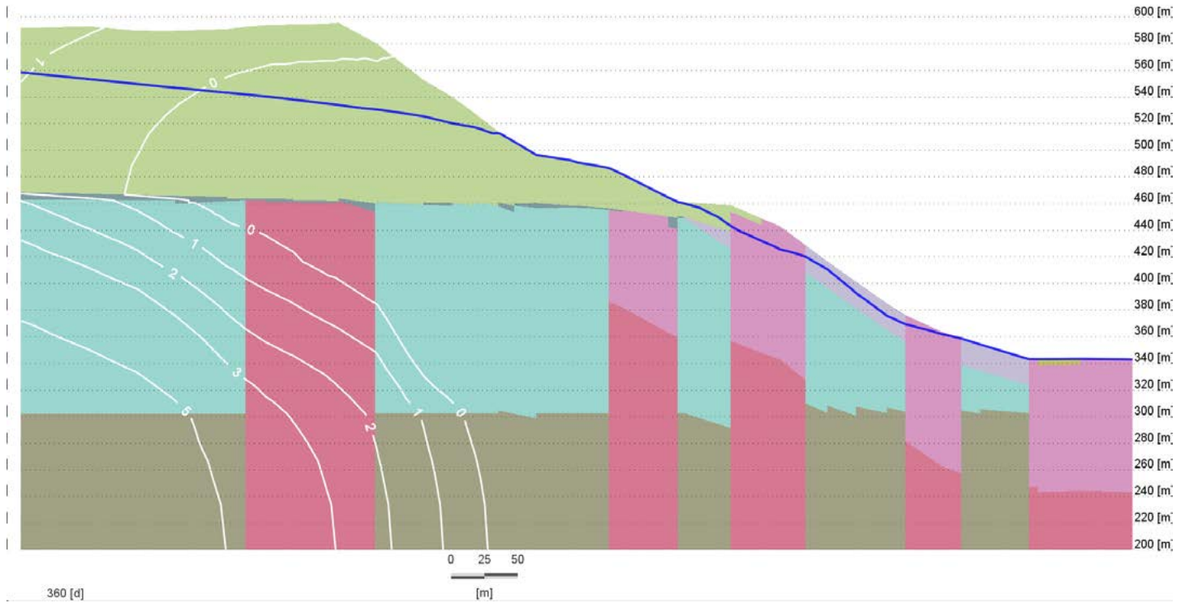
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE (LOWER BOUND)

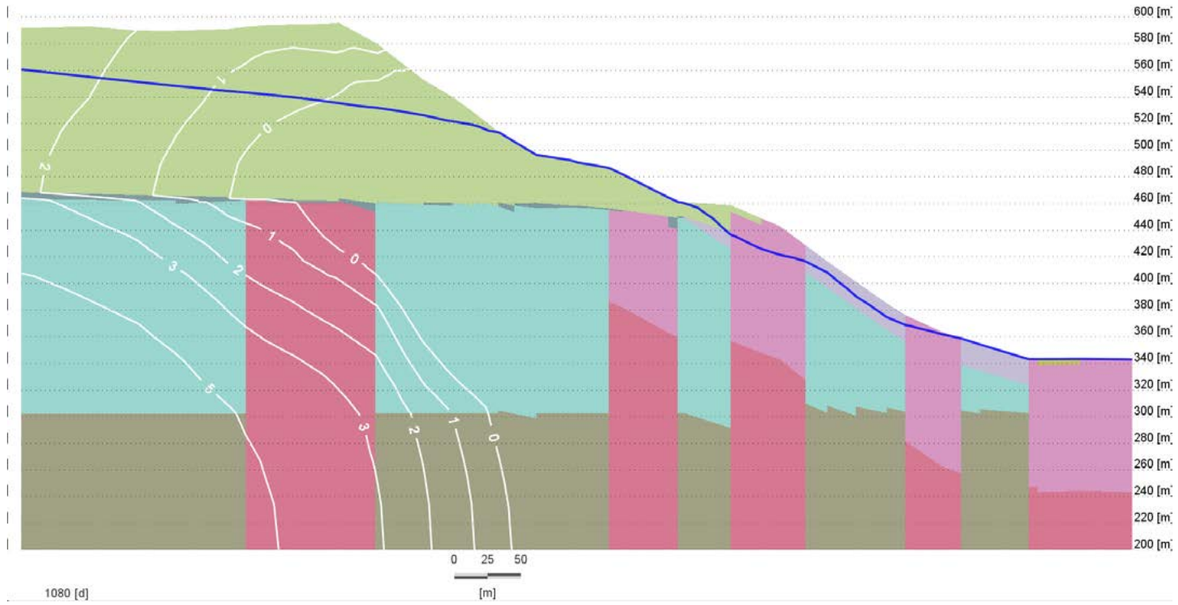
PSM4346-115R | Figure K6-3(b)

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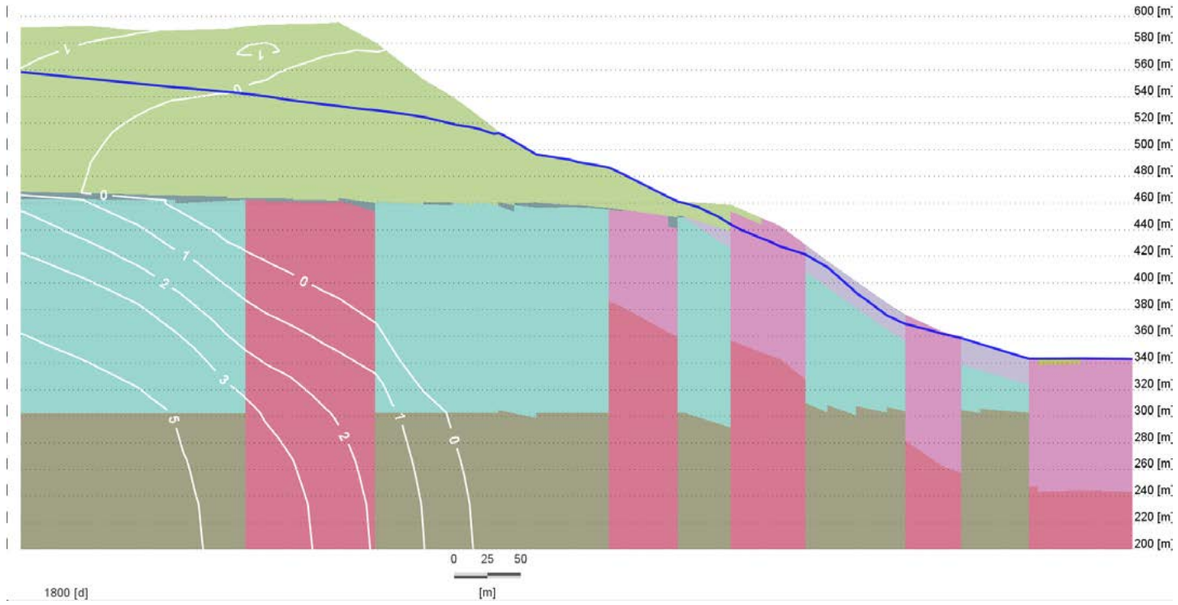
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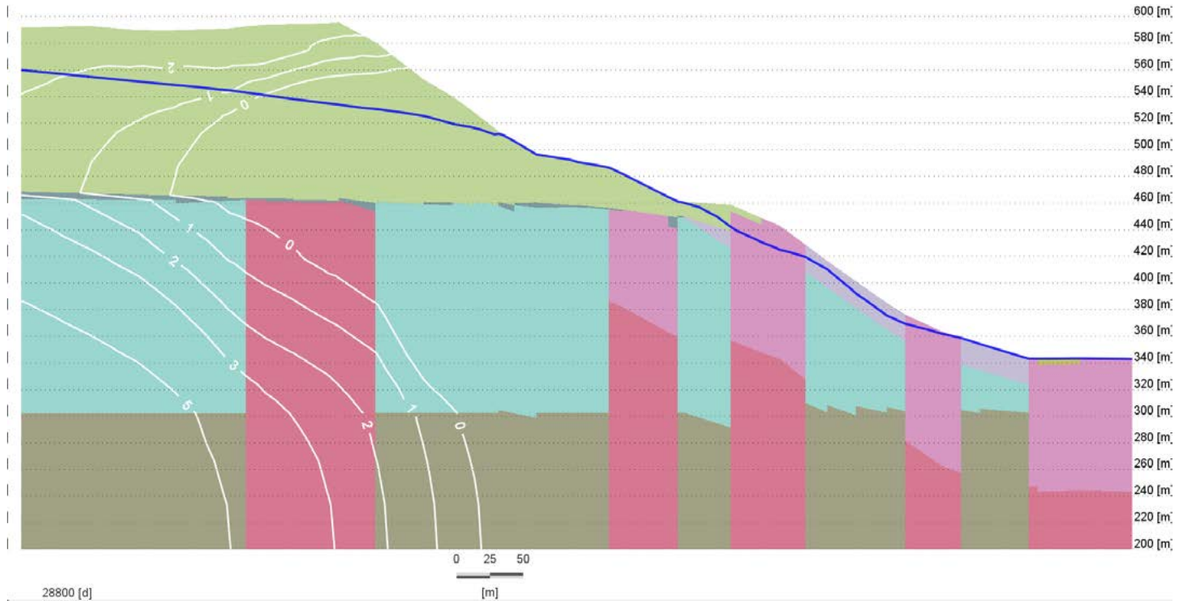
3 Years



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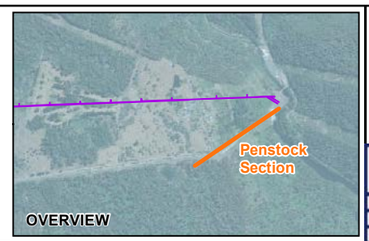


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
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- Shallow Fracture Zone (H-D3/H-D4/H-D5)
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- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



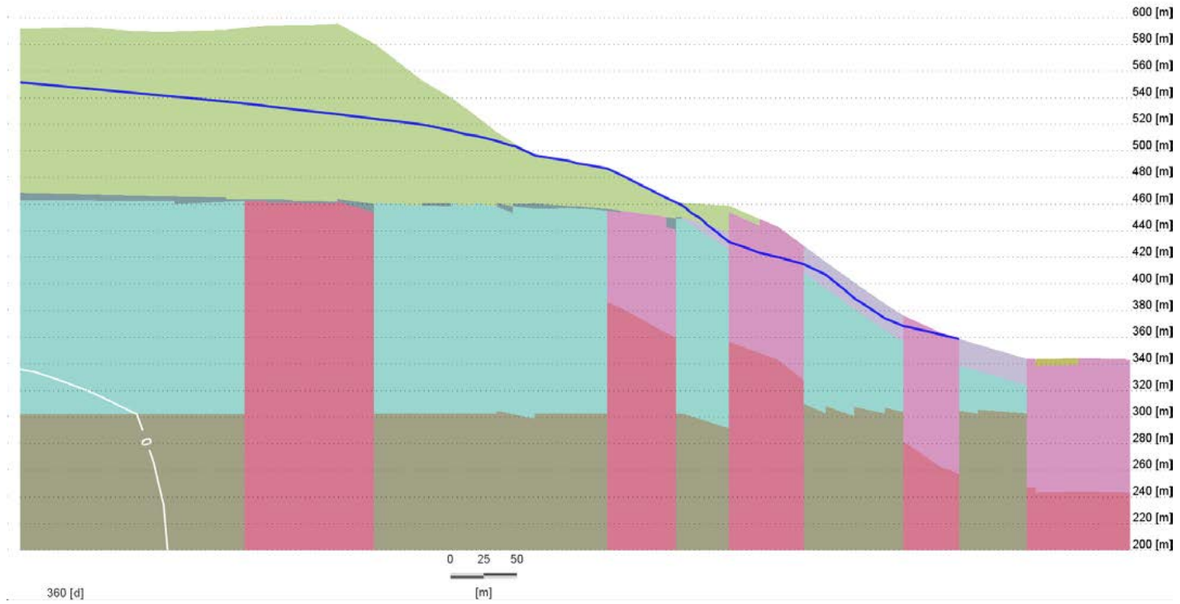
P S M	Created By: VC	Revision: B	
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

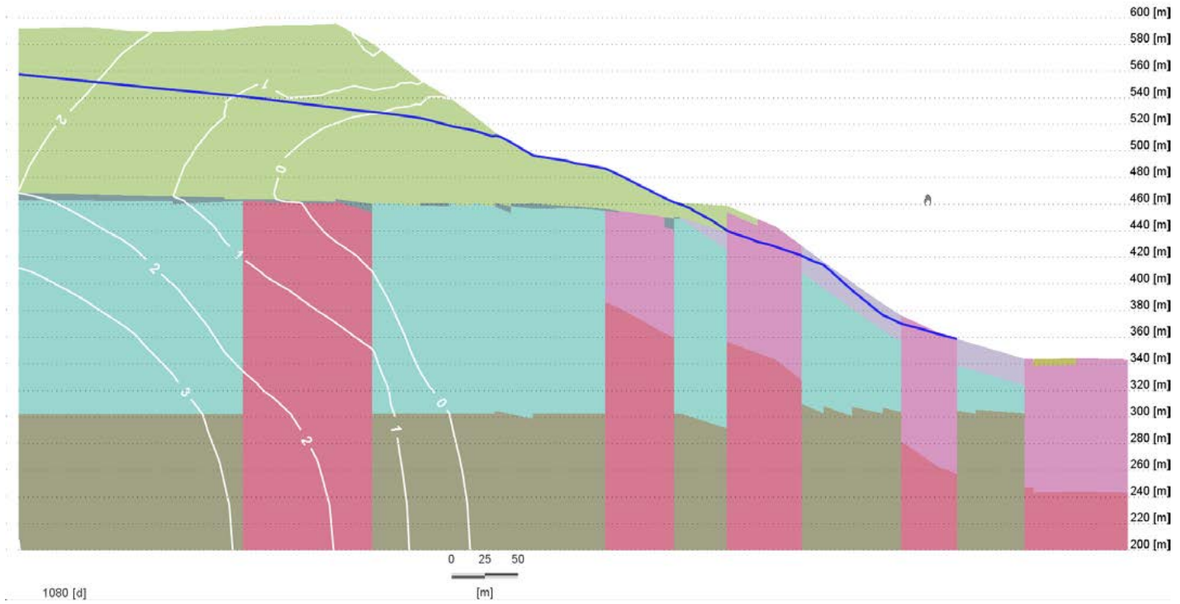
PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE (UPPER BOUND)

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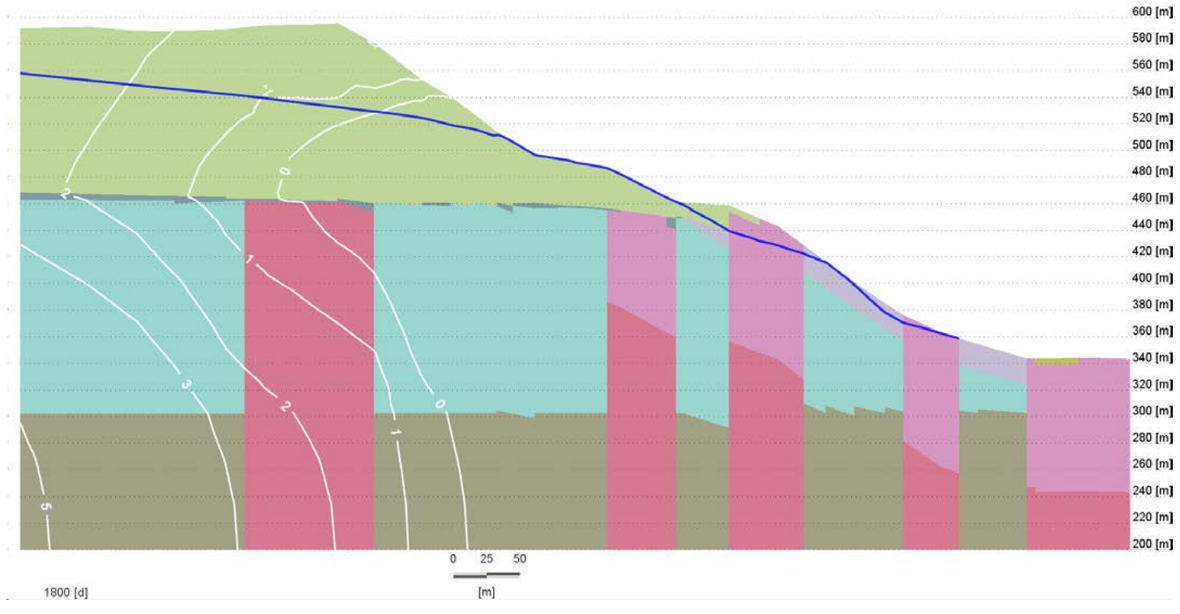
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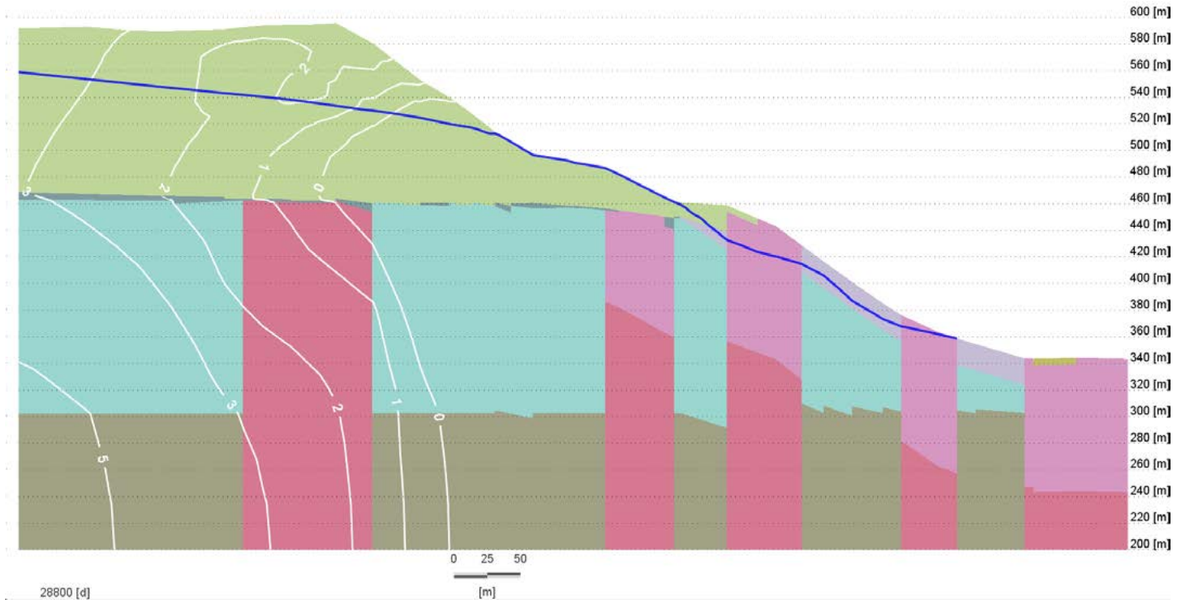
3 Years



5 Years

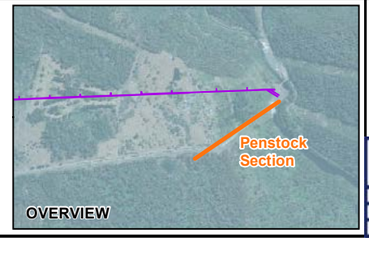


80 Years



Legend

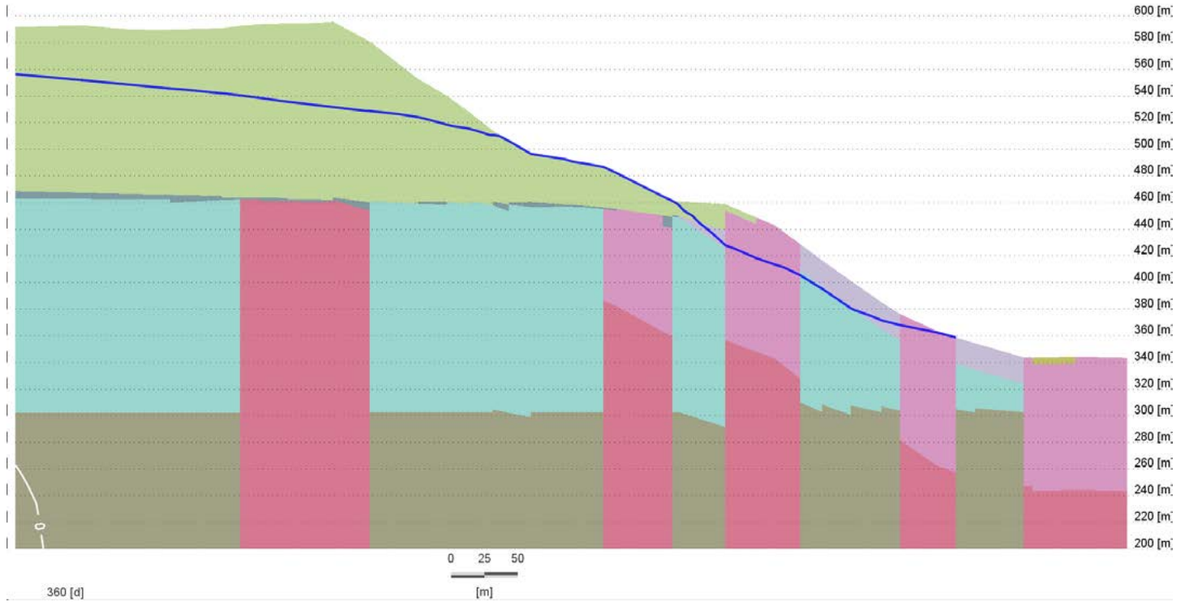
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- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



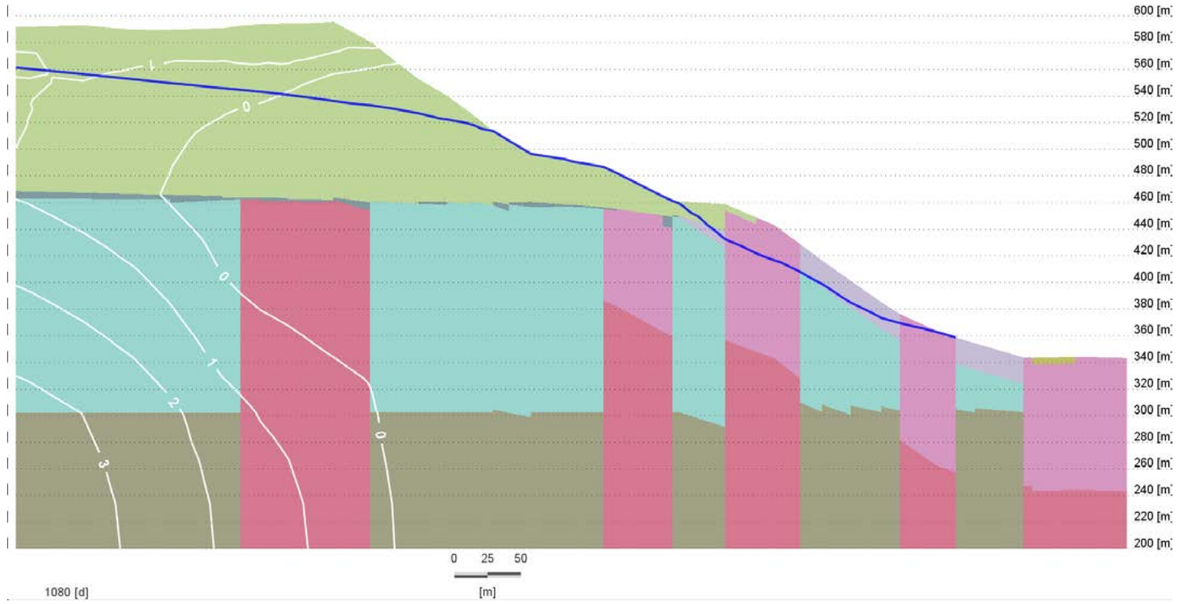
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Date: 27 Feb 2025	Paper Size: A3	PSM4346-115R	Figure K6-4(a)

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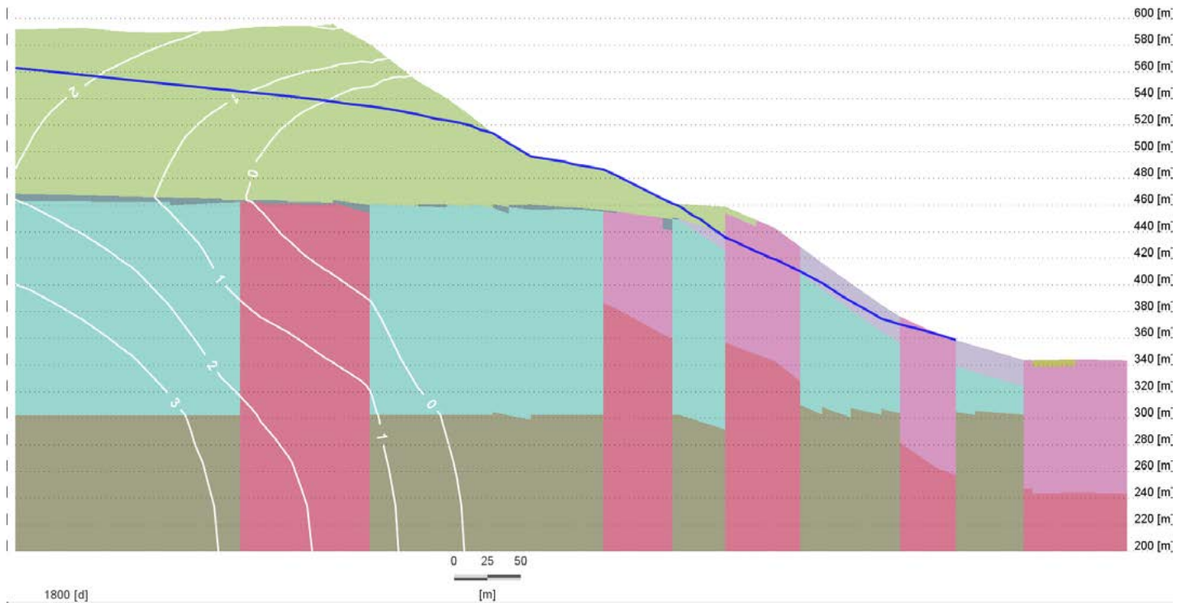
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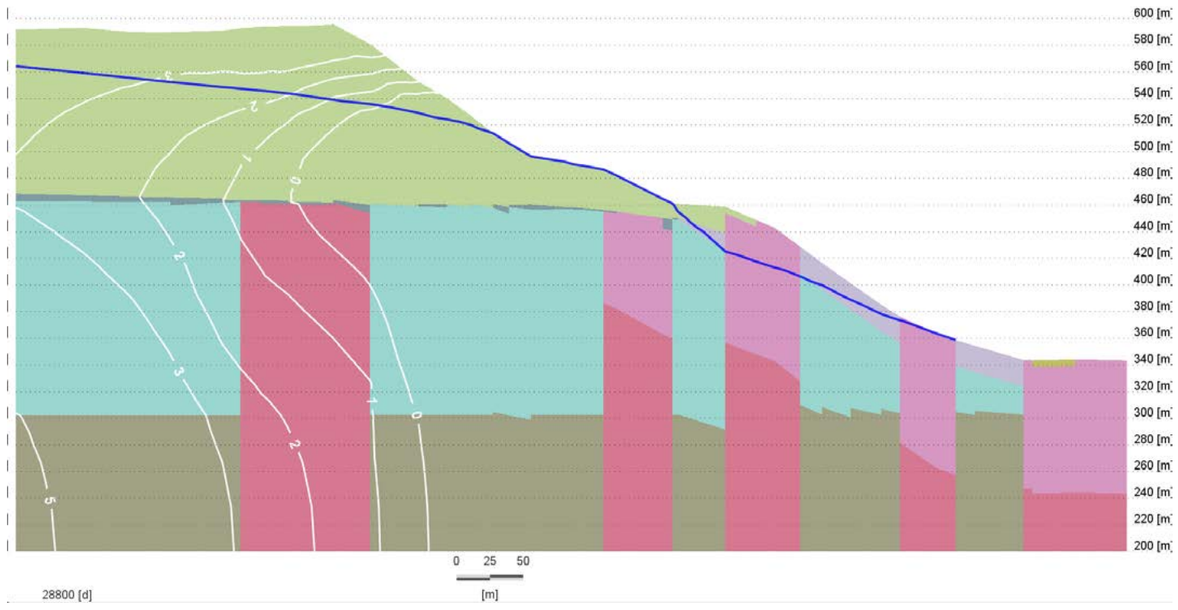
3 Years



5 Years

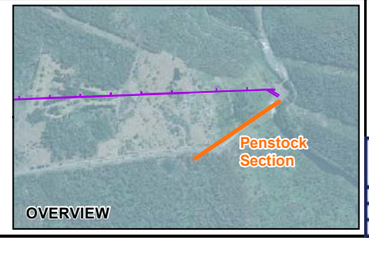


80 Years



Legend

- Alluvium / Colluvium (Scol)
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- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

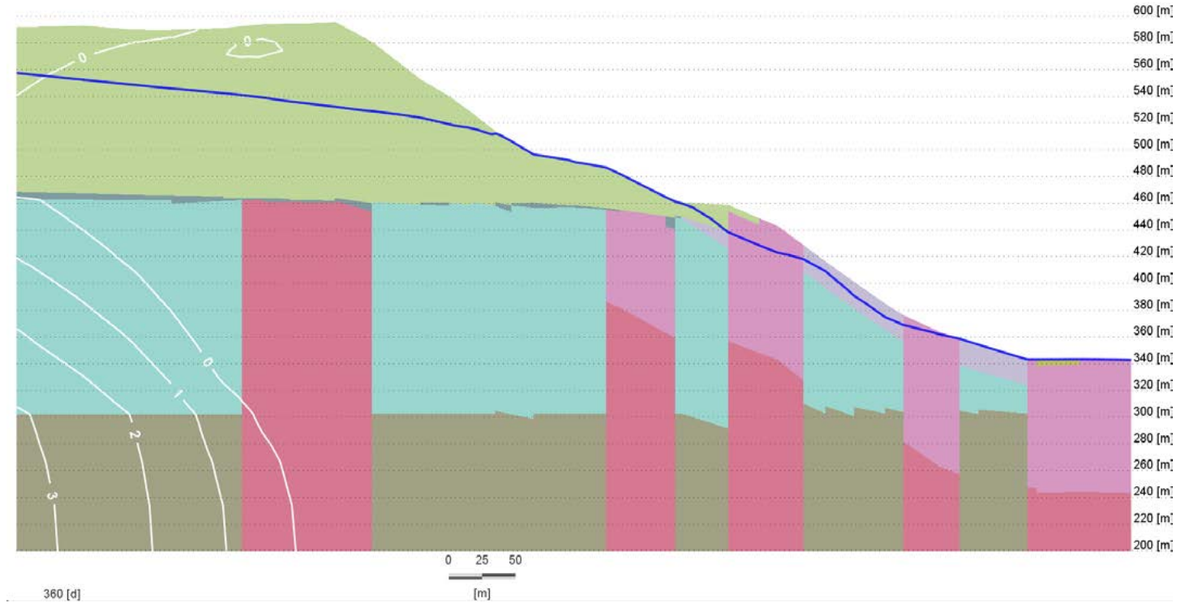
Created By: VC	Revision: B
Date: 27 Feb 2025	Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
PENSTOCK SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE - GROUTING
(LOWER BOUND)

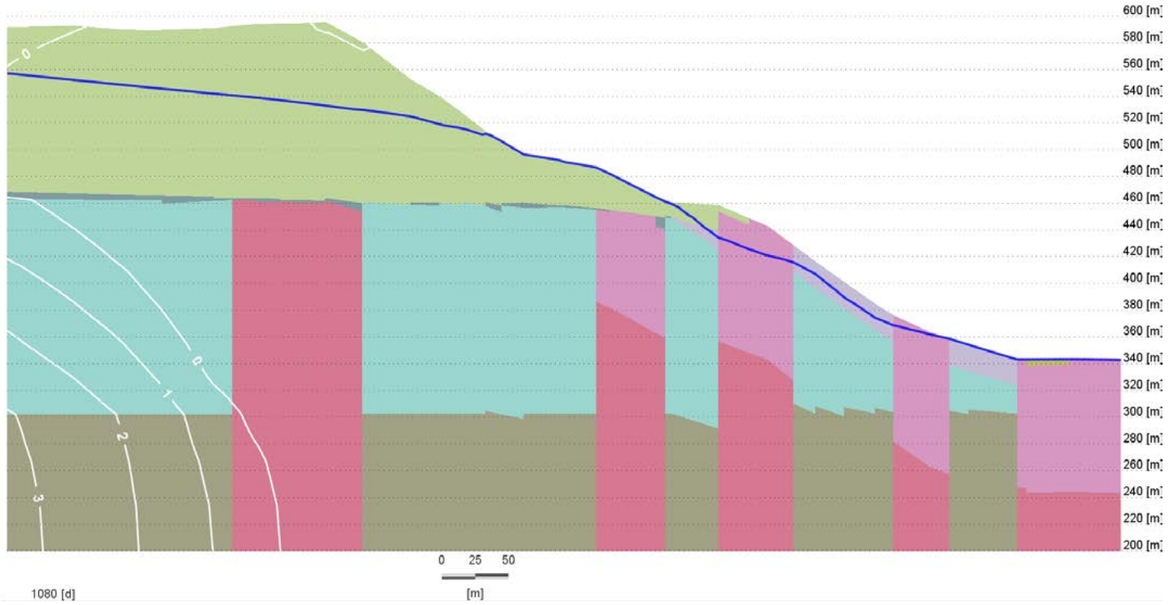
PSM4346-115R | Figure K6-4(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K6-4(b) Penstock Section Transient Hydraulic Head Change P90 Schedule - Grouting (Lower Bound).mxd

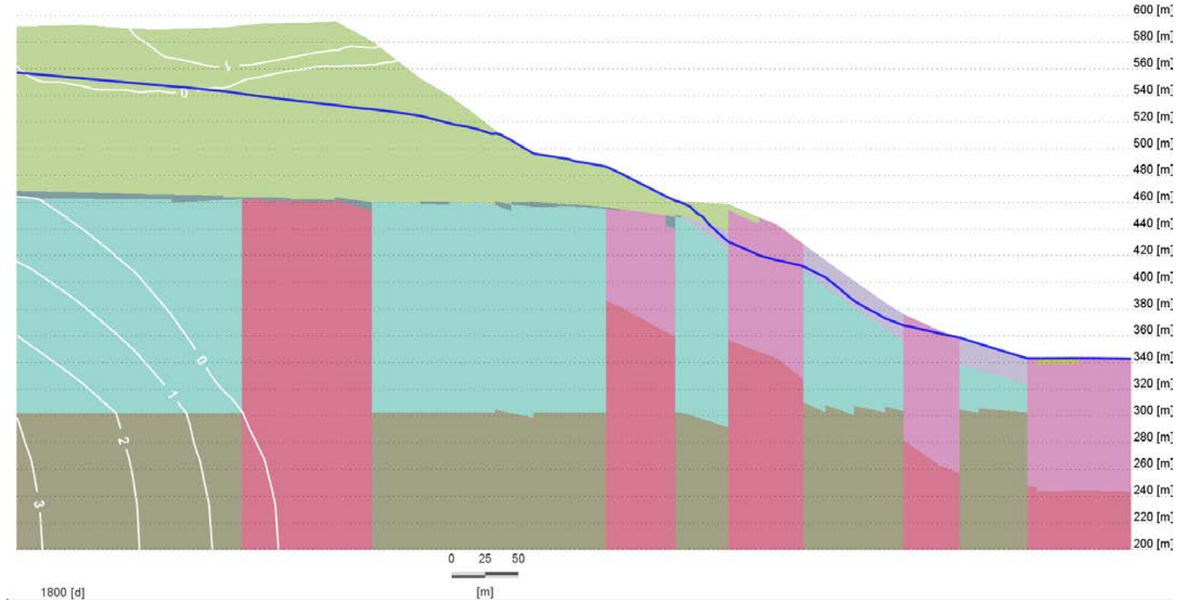
1 Year



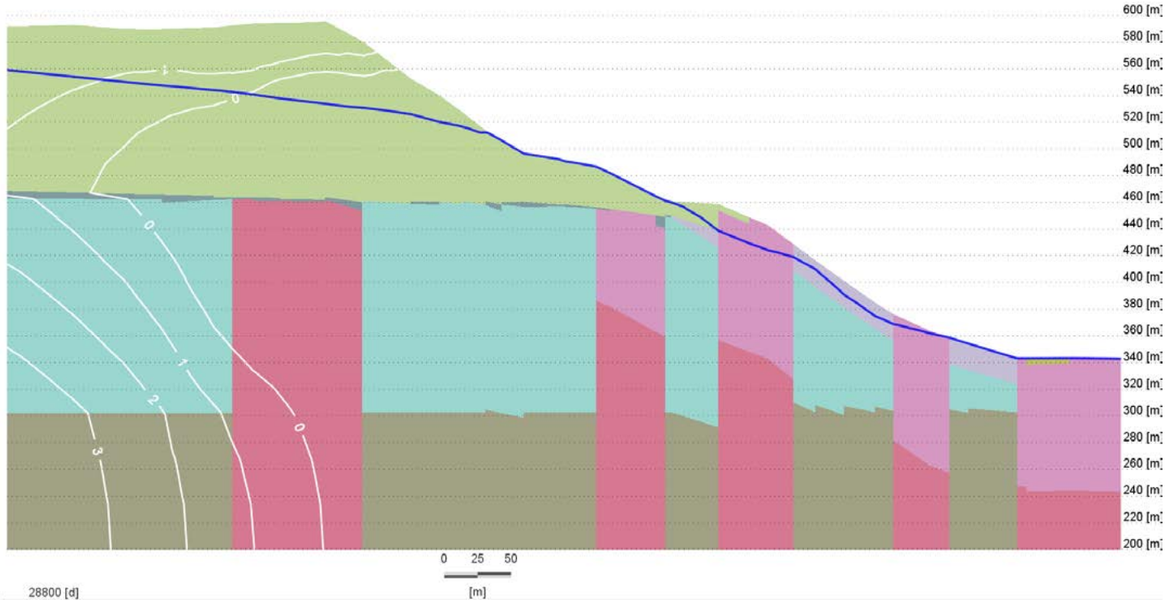
3 Years



5 Years

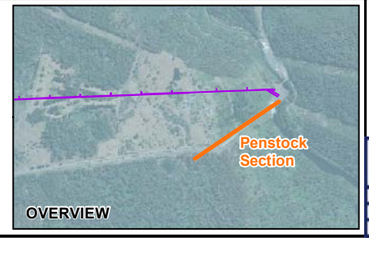


80 Years



Legend

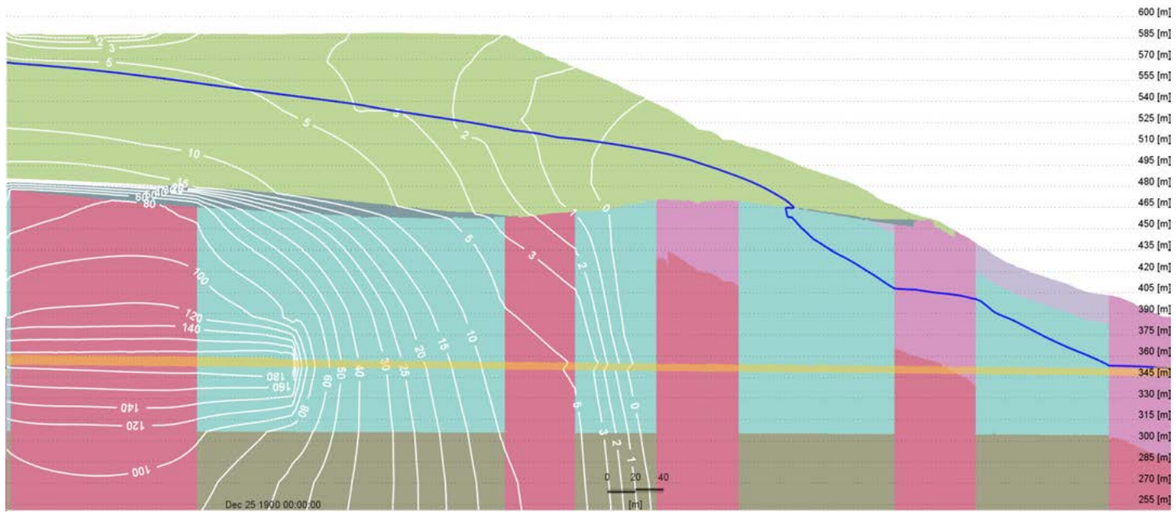
- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



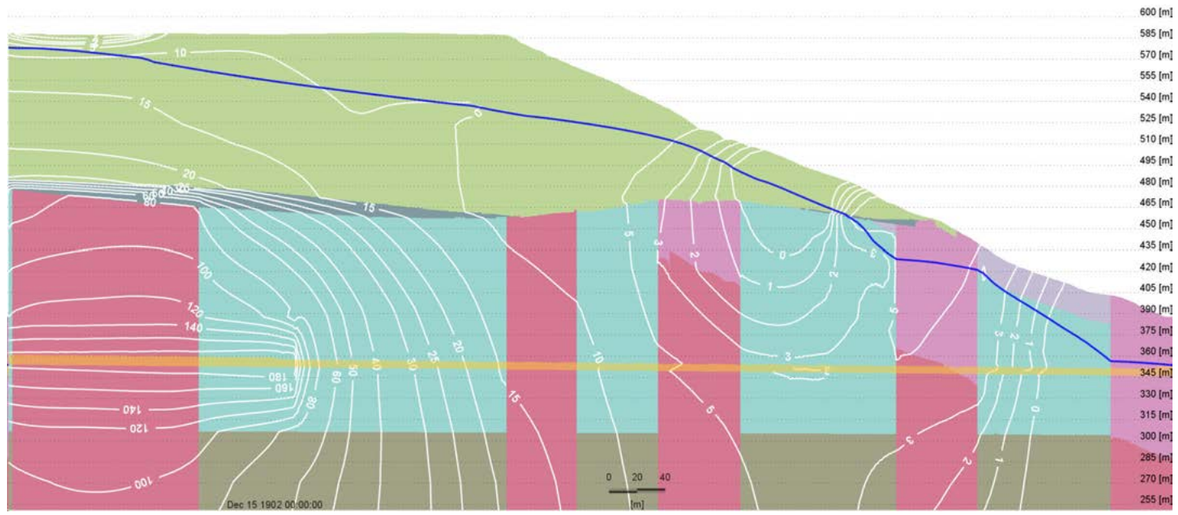
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Date: 27 Feb 2025	Paper Size: A3	PSM4346-115R	Figure K6-4(c)

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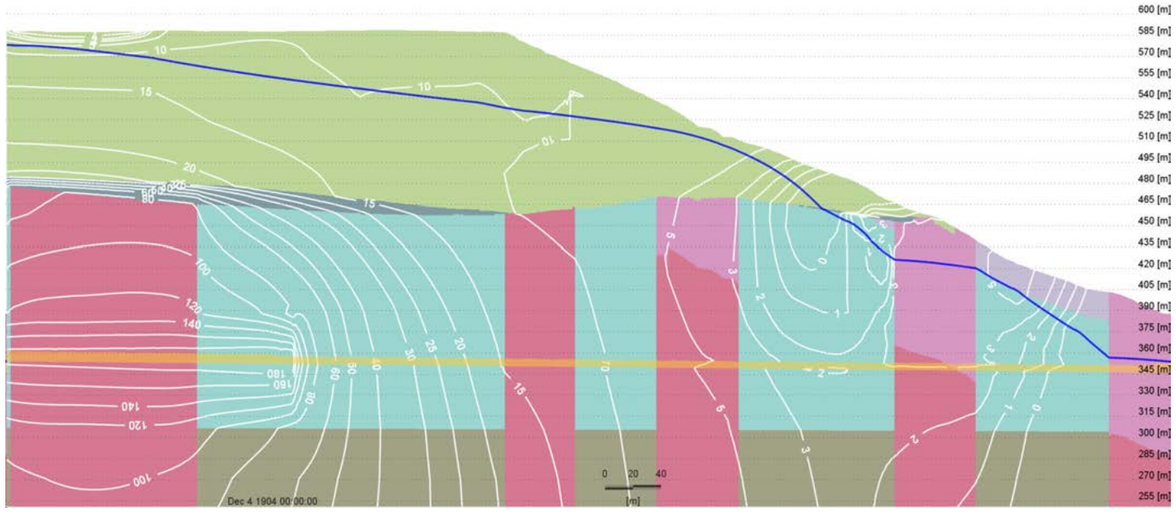
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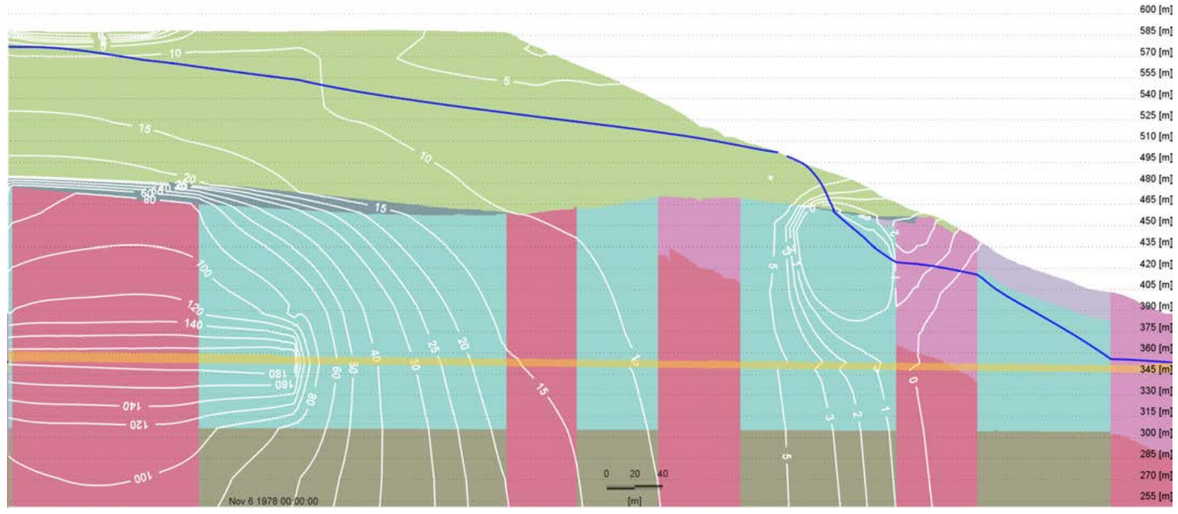
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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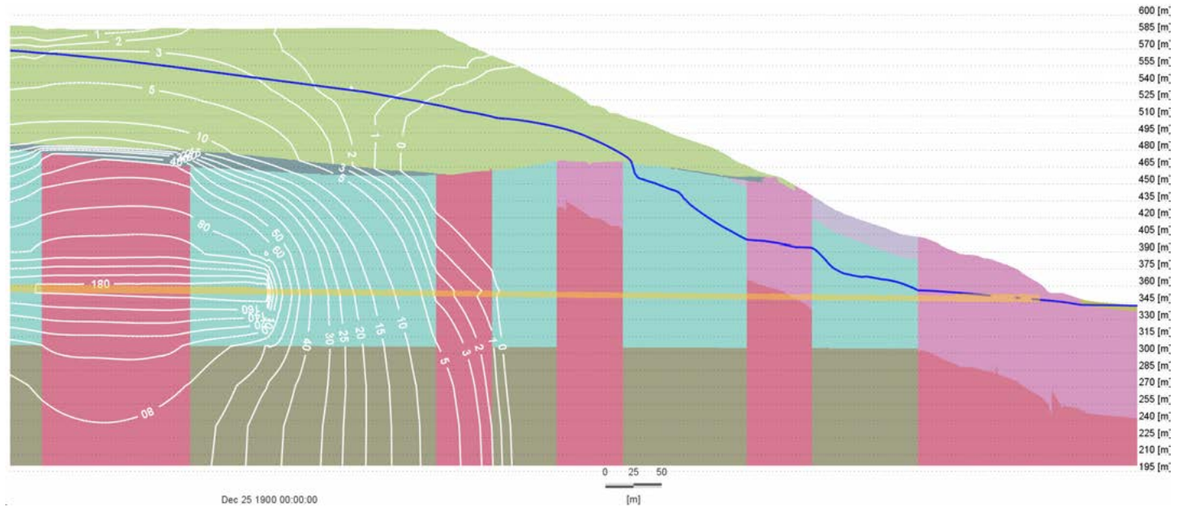
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE (BASE CASE)

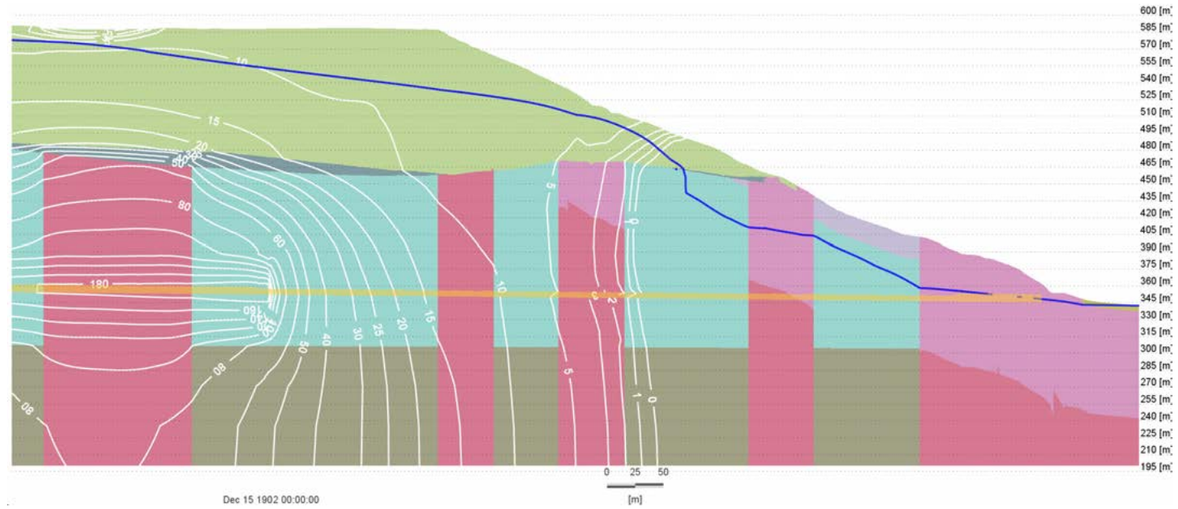
PSM4346-115R | Figure K7-1(a)

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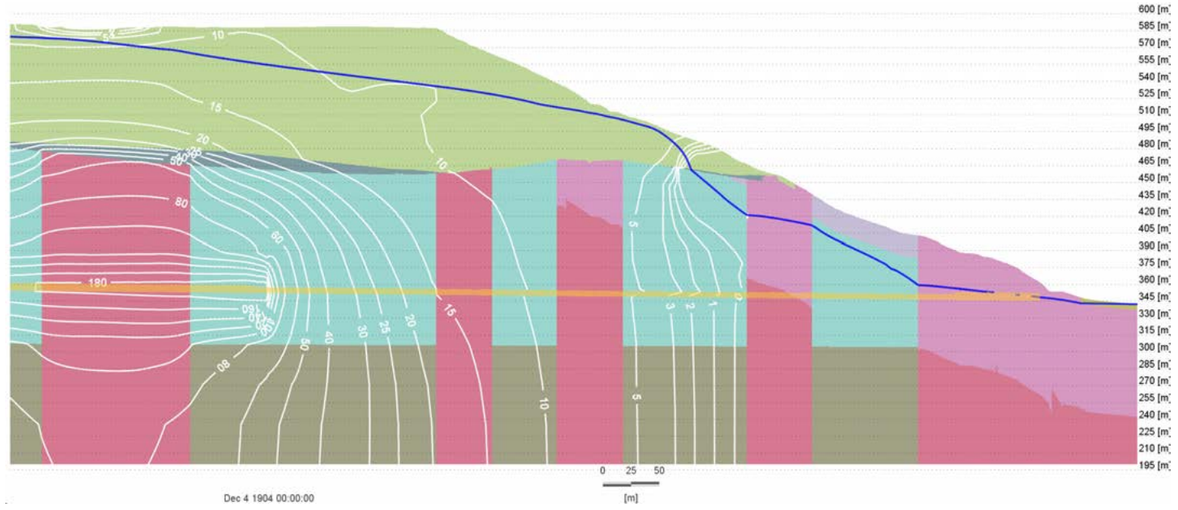
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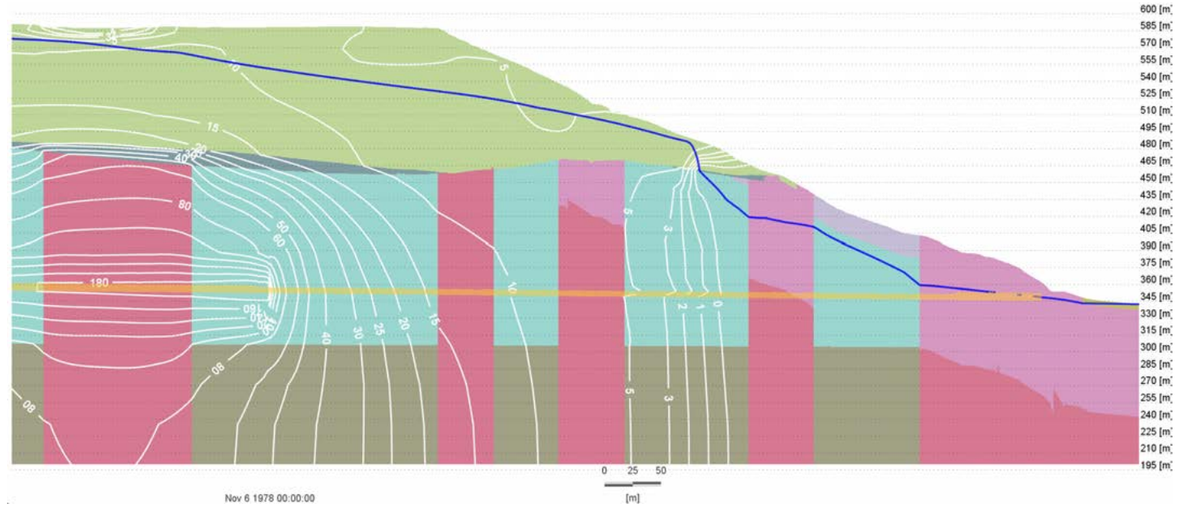
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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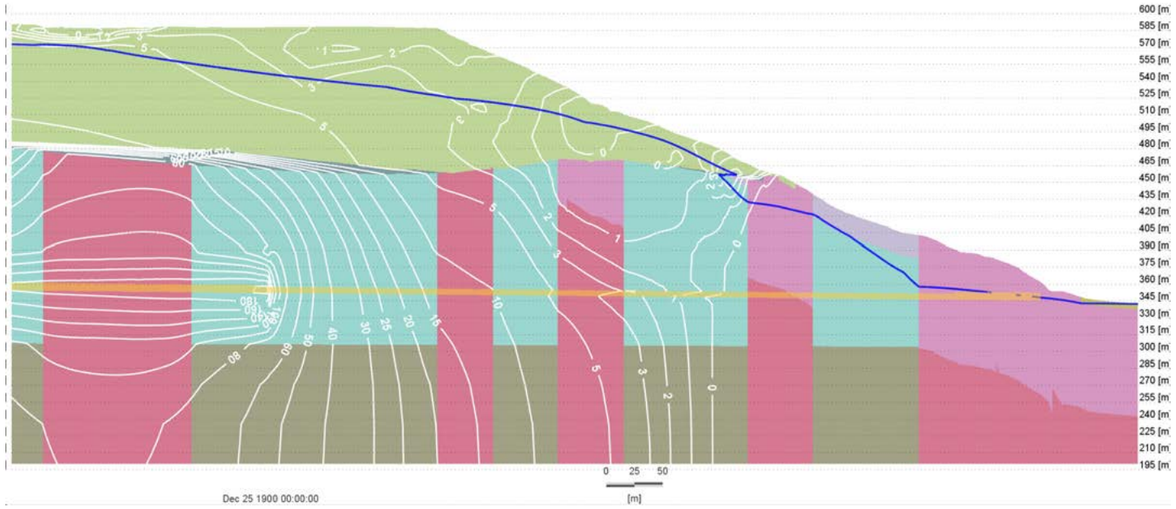
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE (LOWER BOUND)

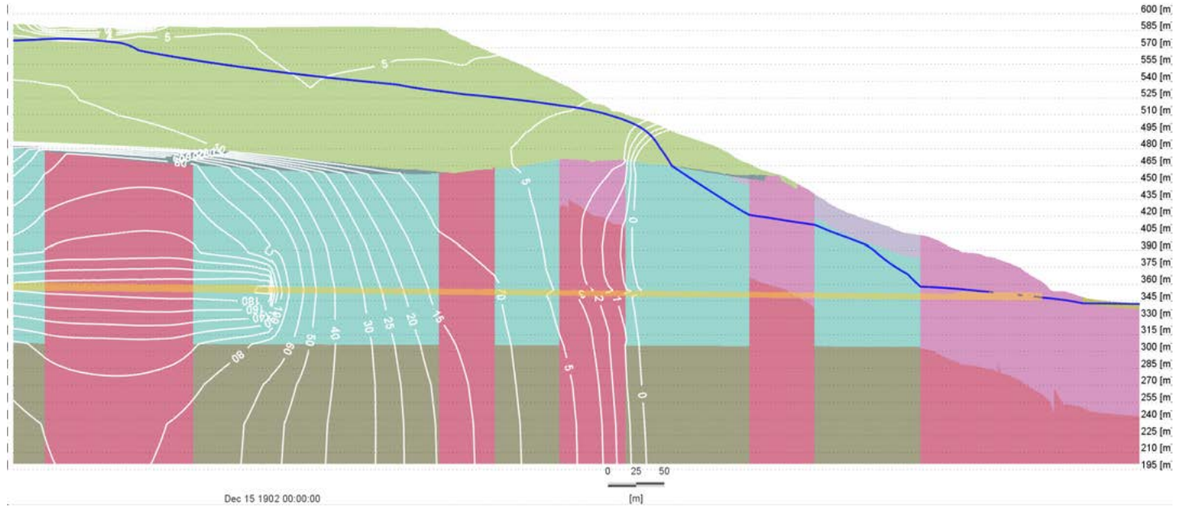
PSM4346-115R | Figure K7-1(b)

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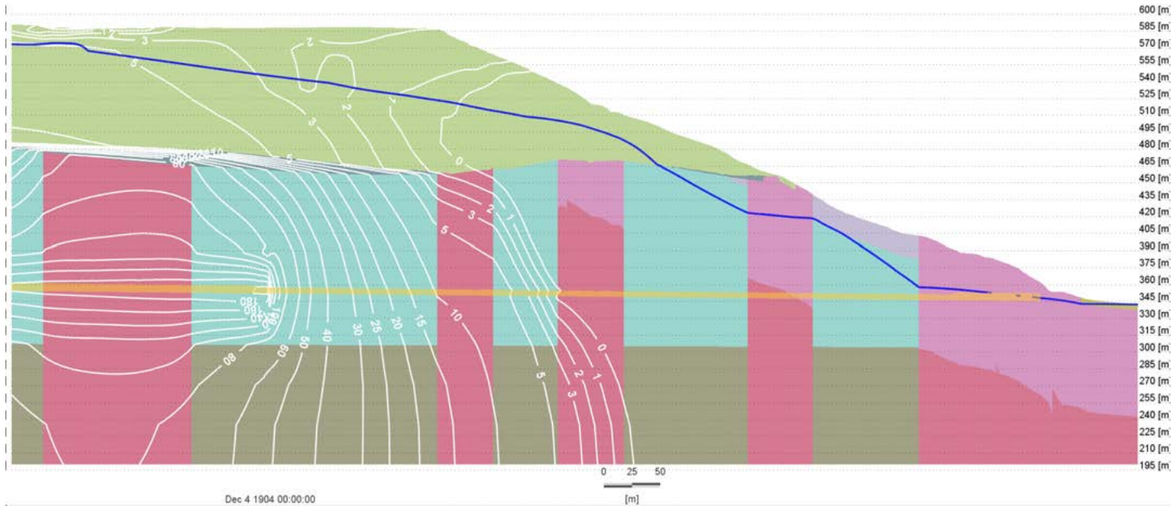
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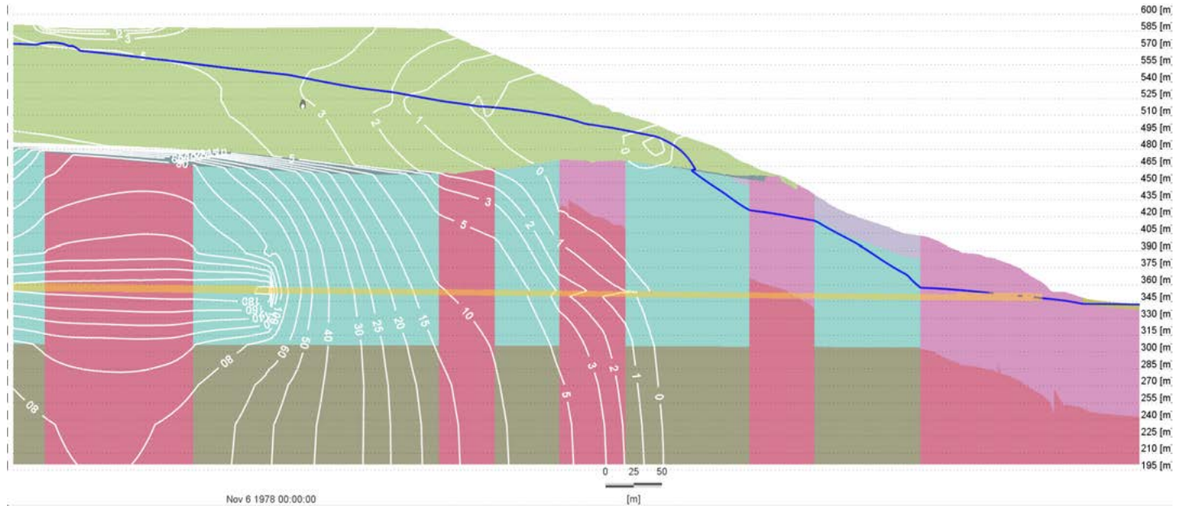
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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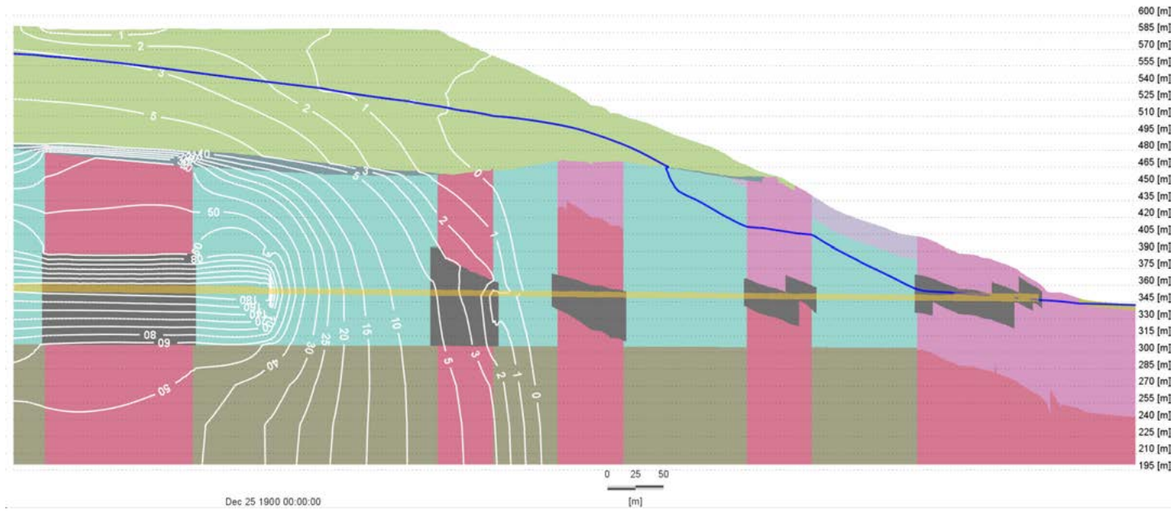
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE (UPPER BOUND)

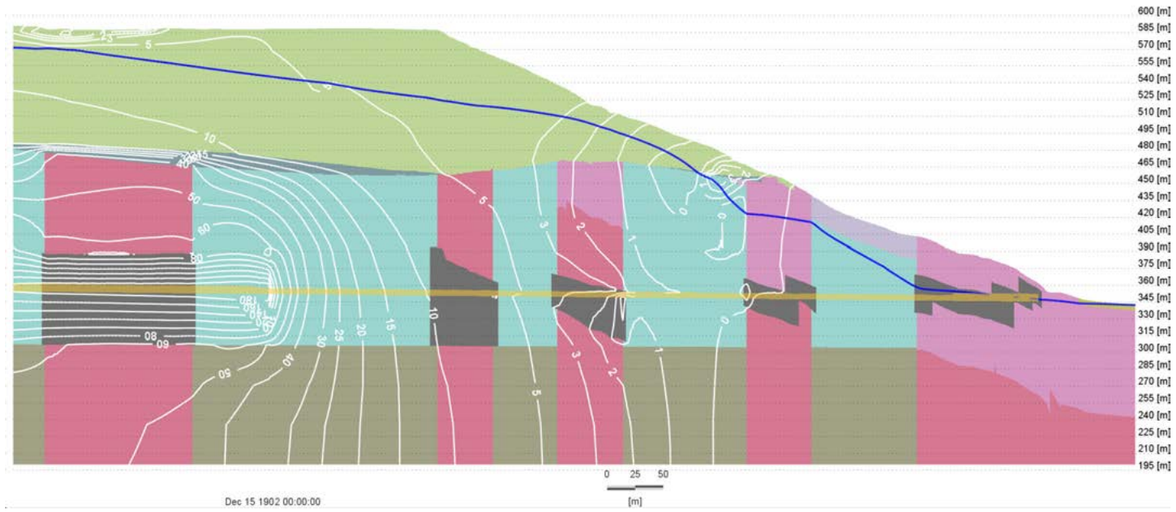
PSM4346-115R | Figure K7-1(c)

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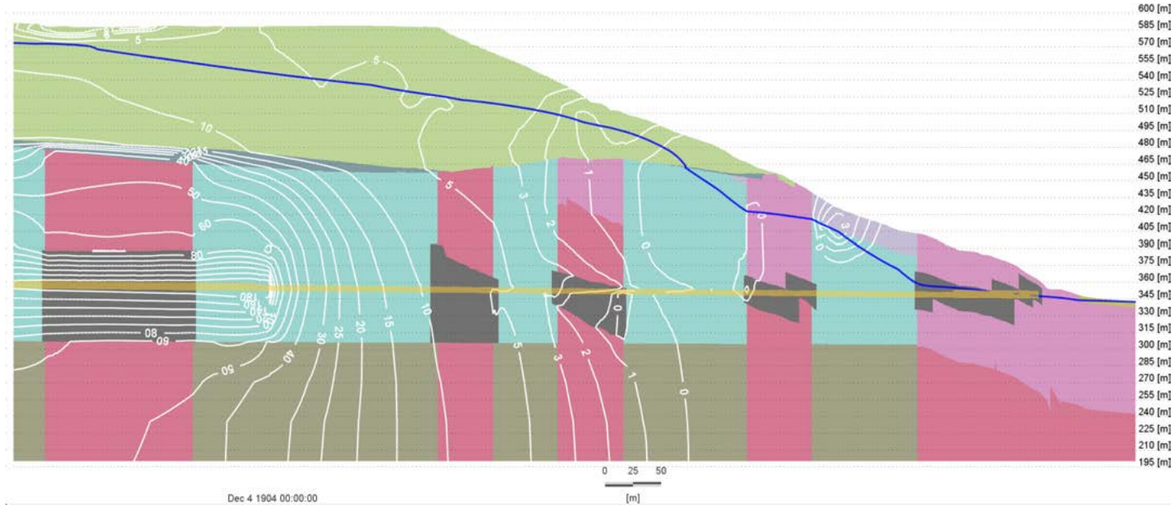
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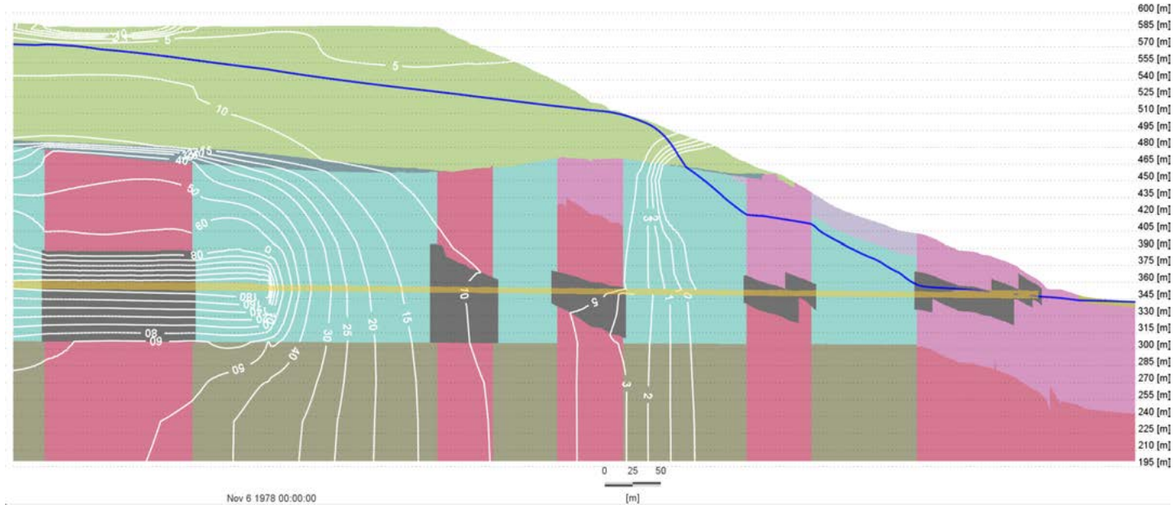
3 Years



5 Years

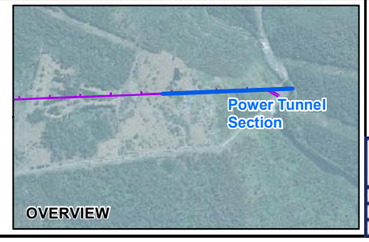


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

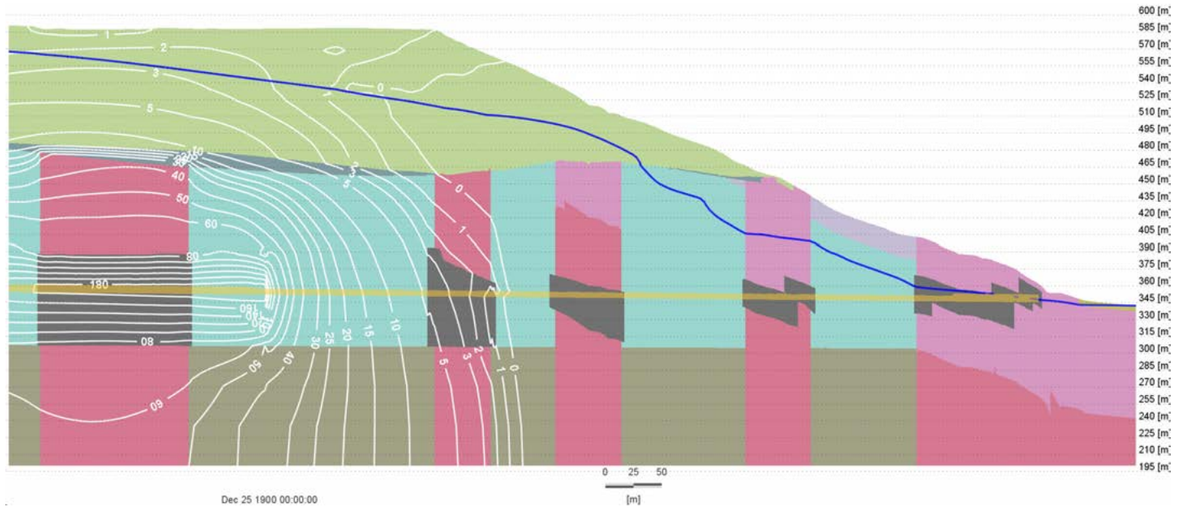
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(BASE CASE)

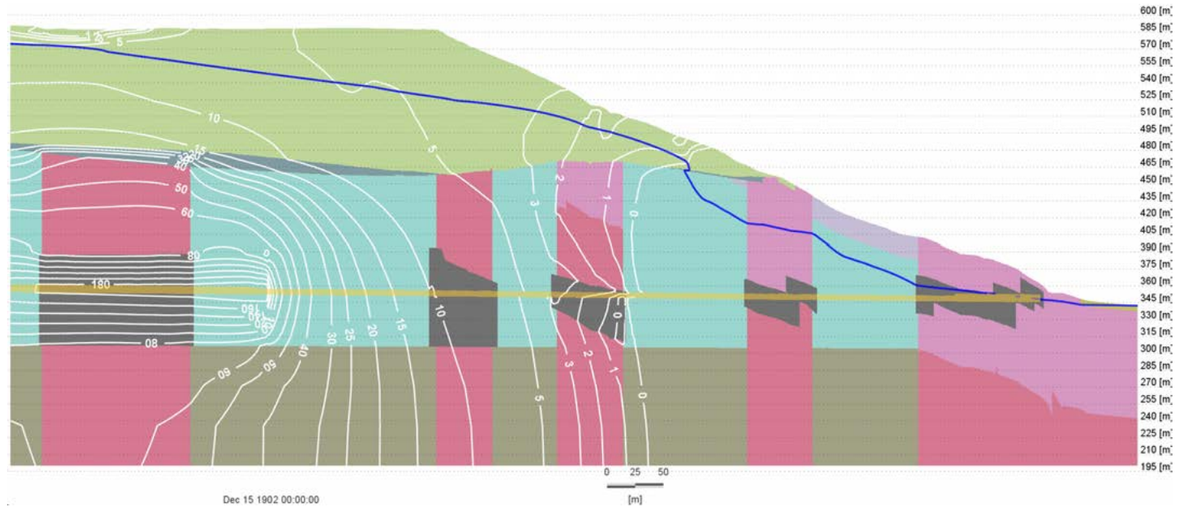
PSM4346-115R | Figure K7-2(a)

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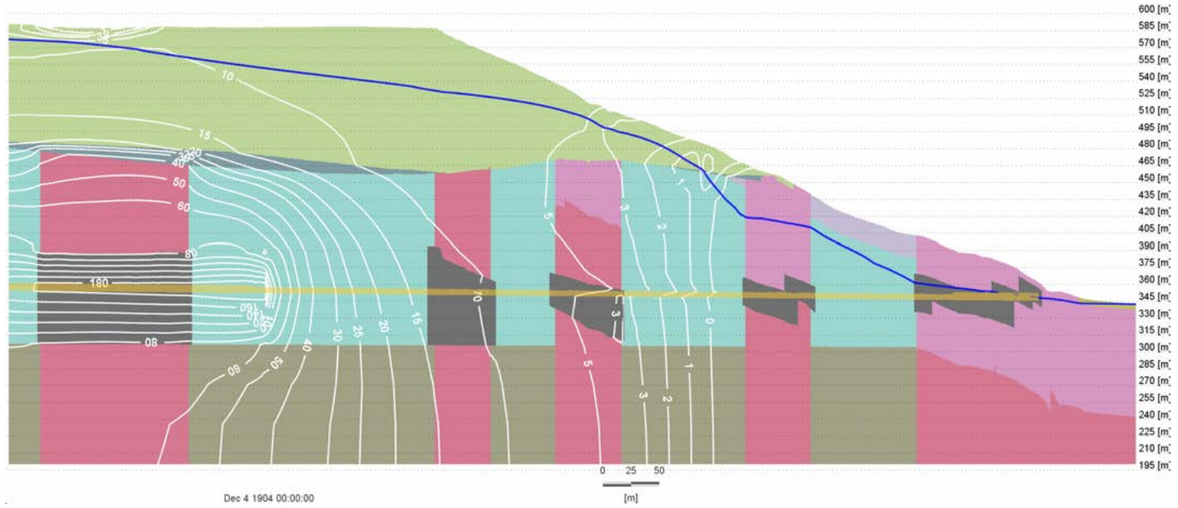
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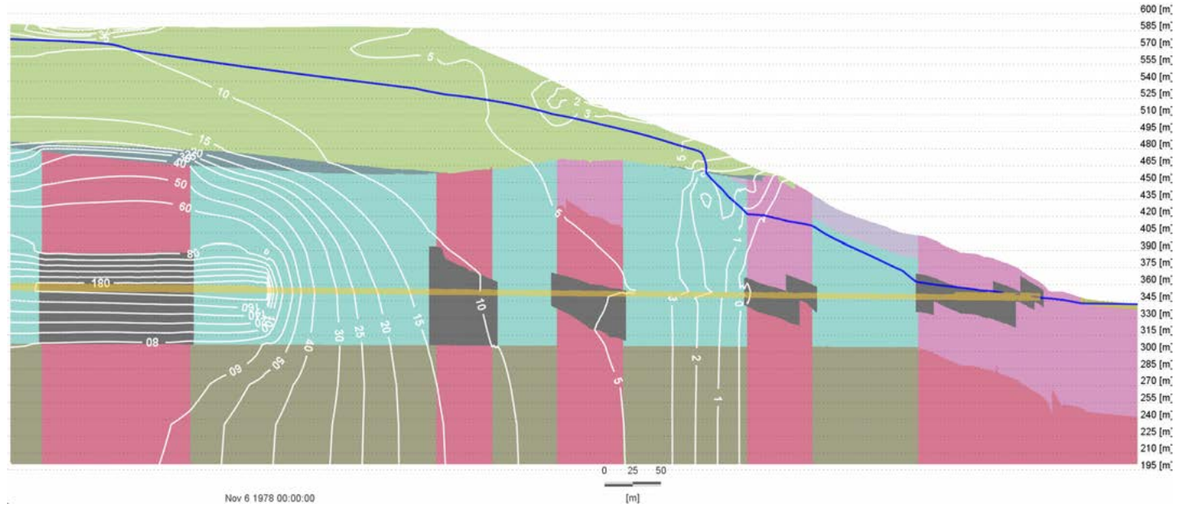
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

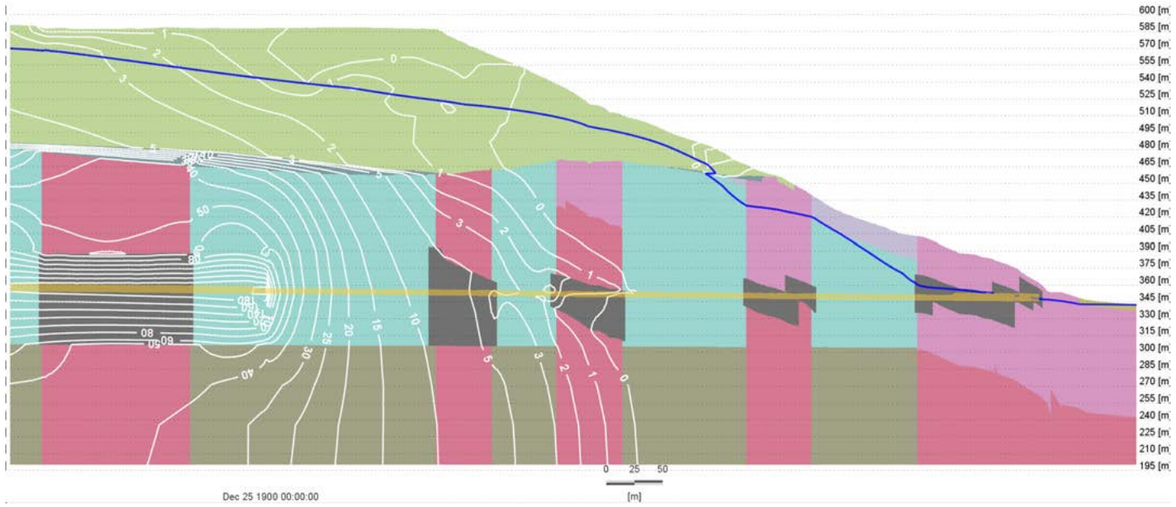
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(LOWER BOUND)

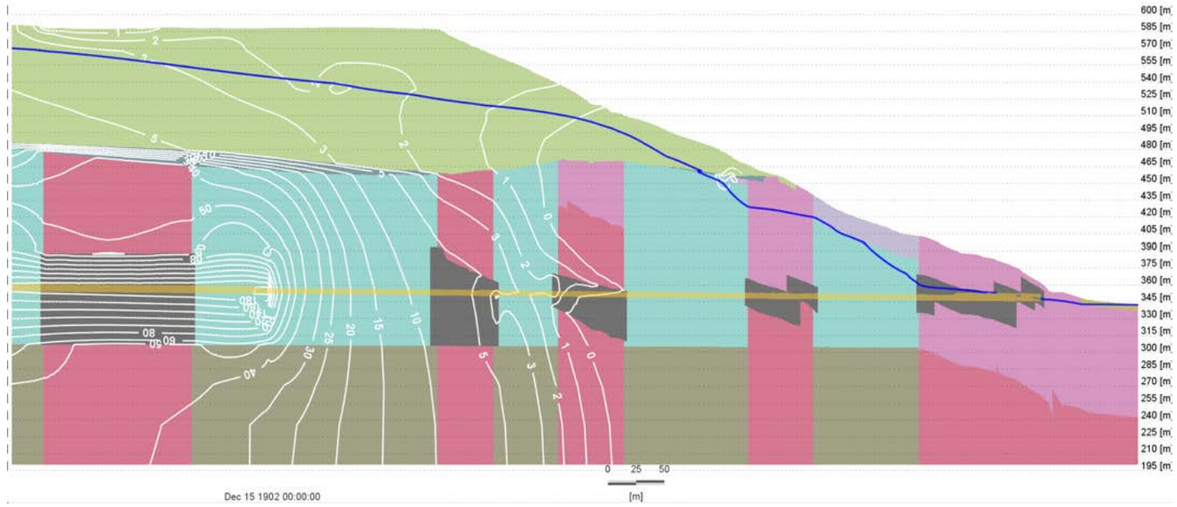
PSM4346-115R | Figure K7-2(b)

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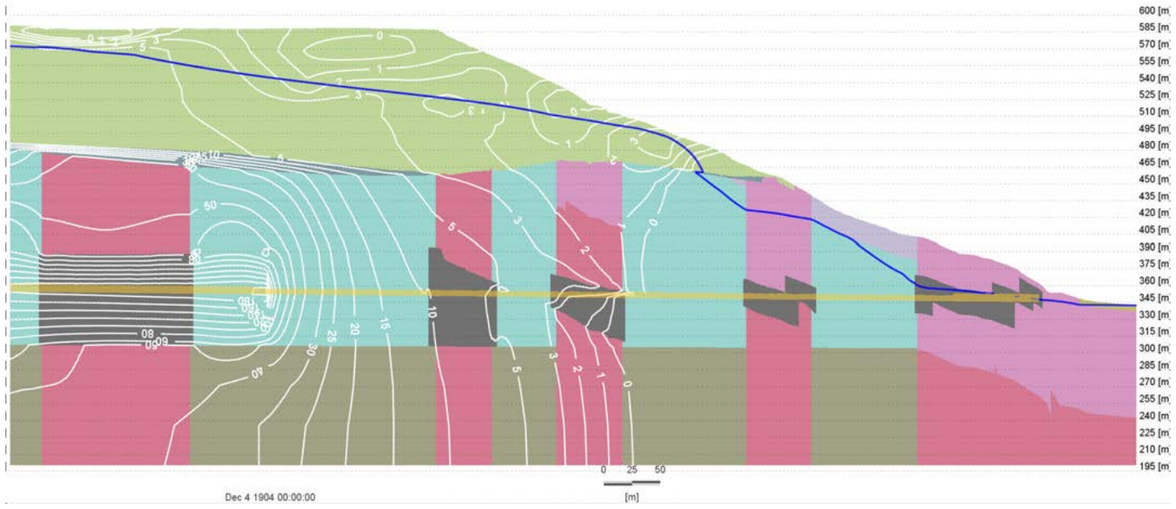
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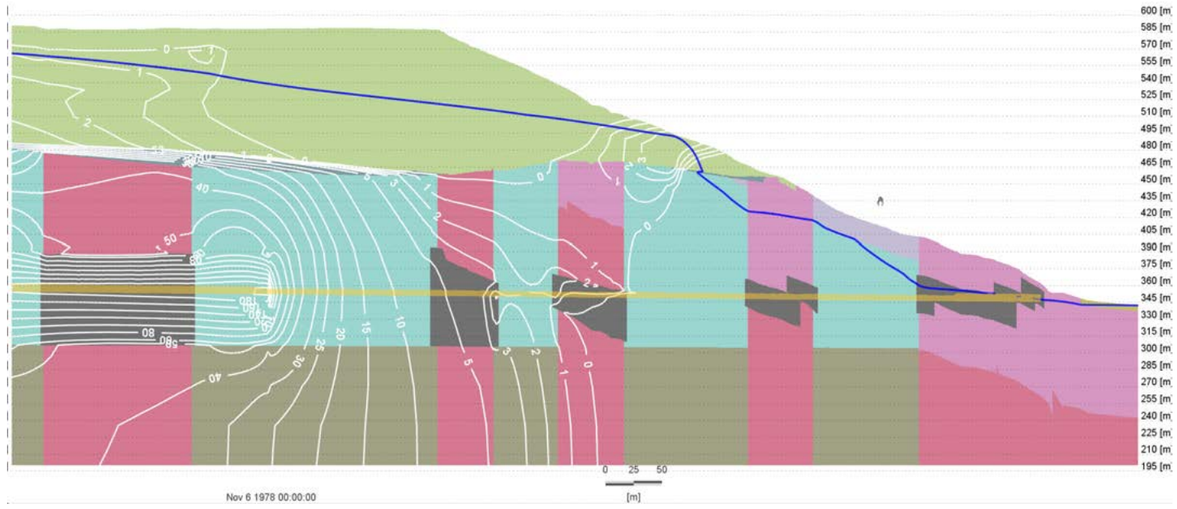
3 Years



5 Years

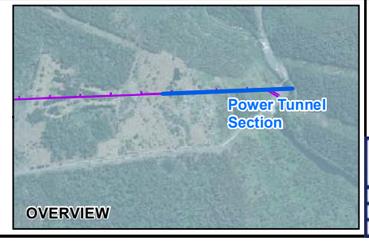


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

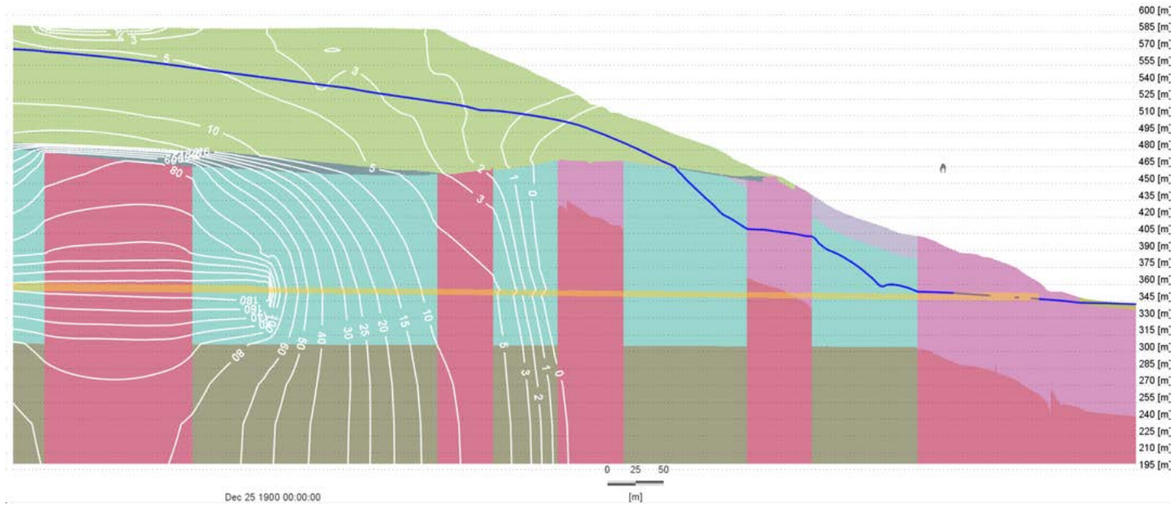
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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
BASE SCHEDULE - GROUTING
(UPPER BOUND)

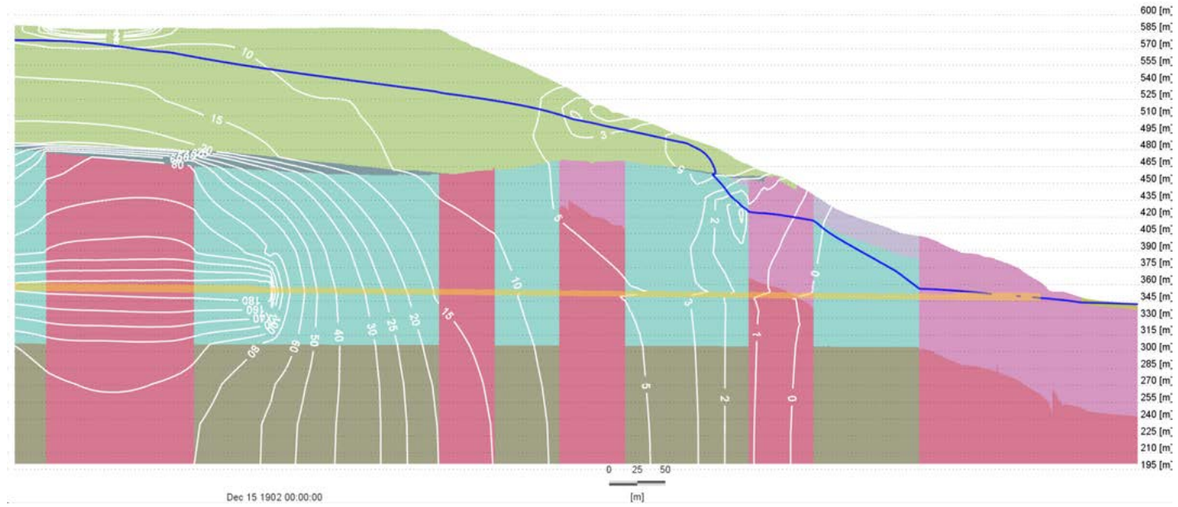
PSM4346-115R | Figure K7-2(c)

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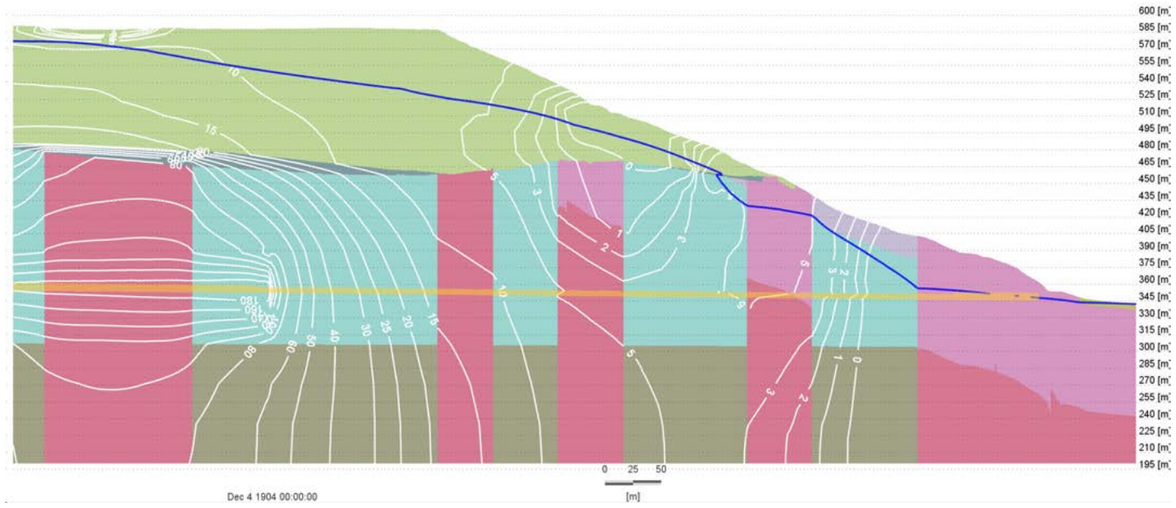
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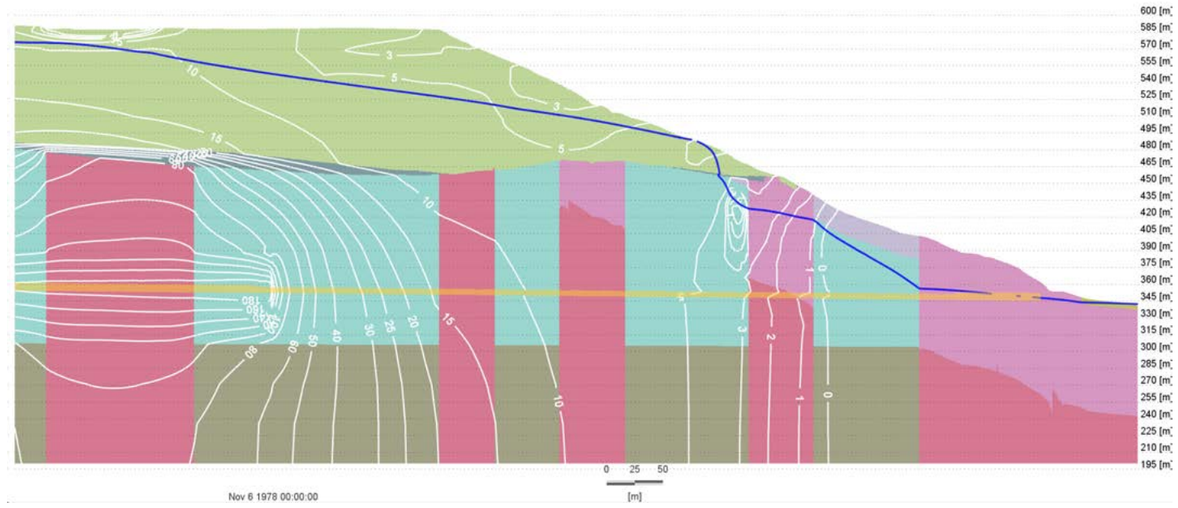
3 Years



5 Years

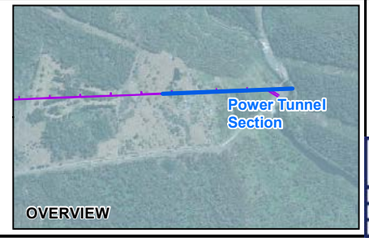


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



P S M

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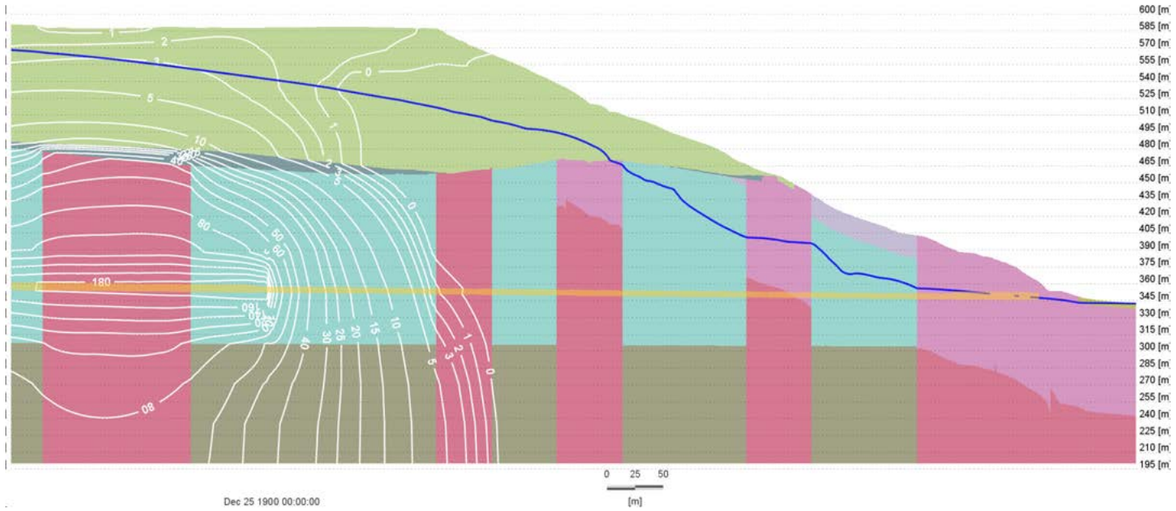
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE (BASE CASE)

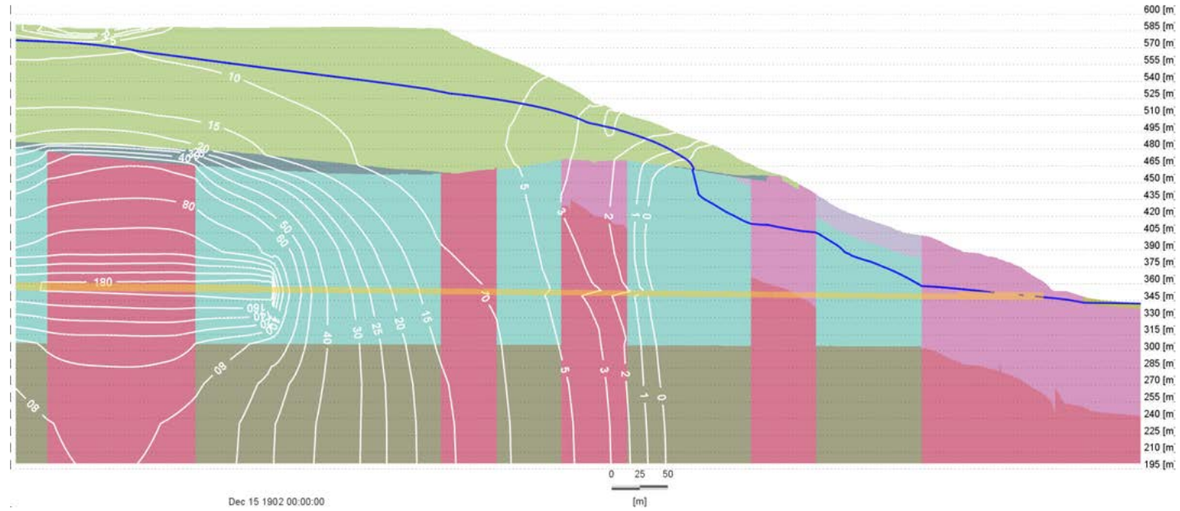
PSM4346-115R | Figure K7-3(a)

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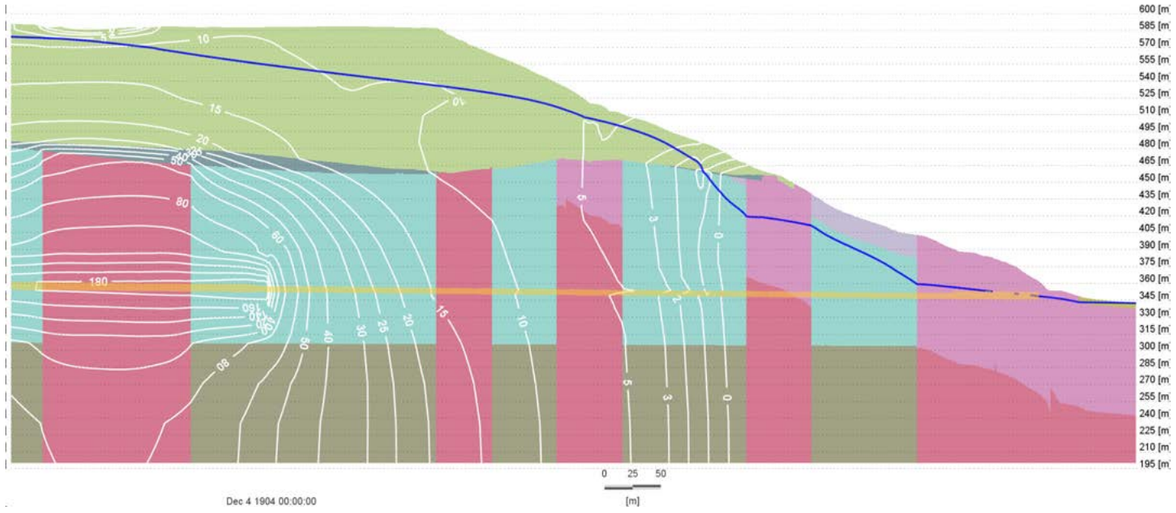
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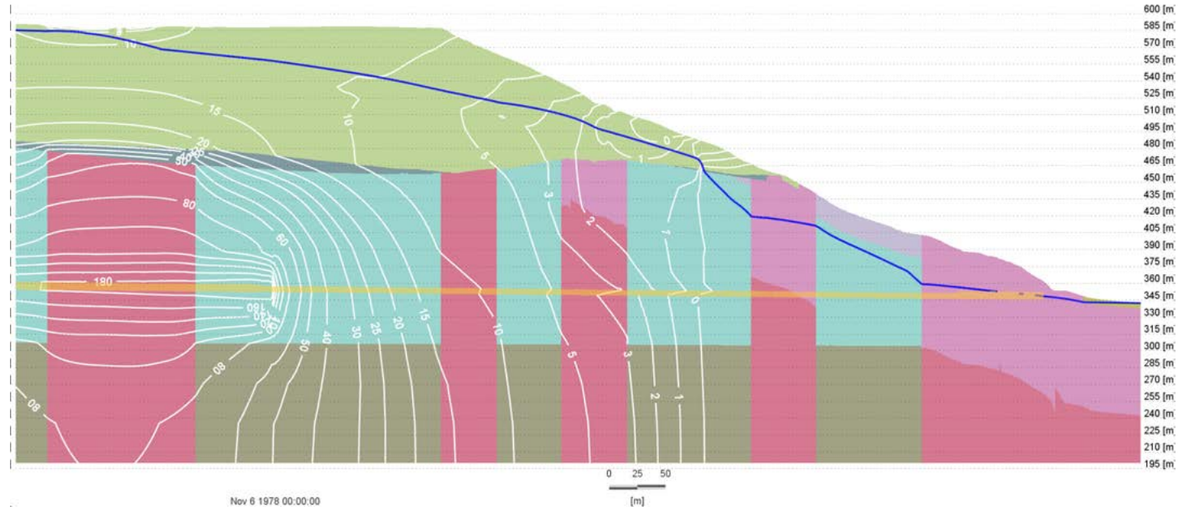
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



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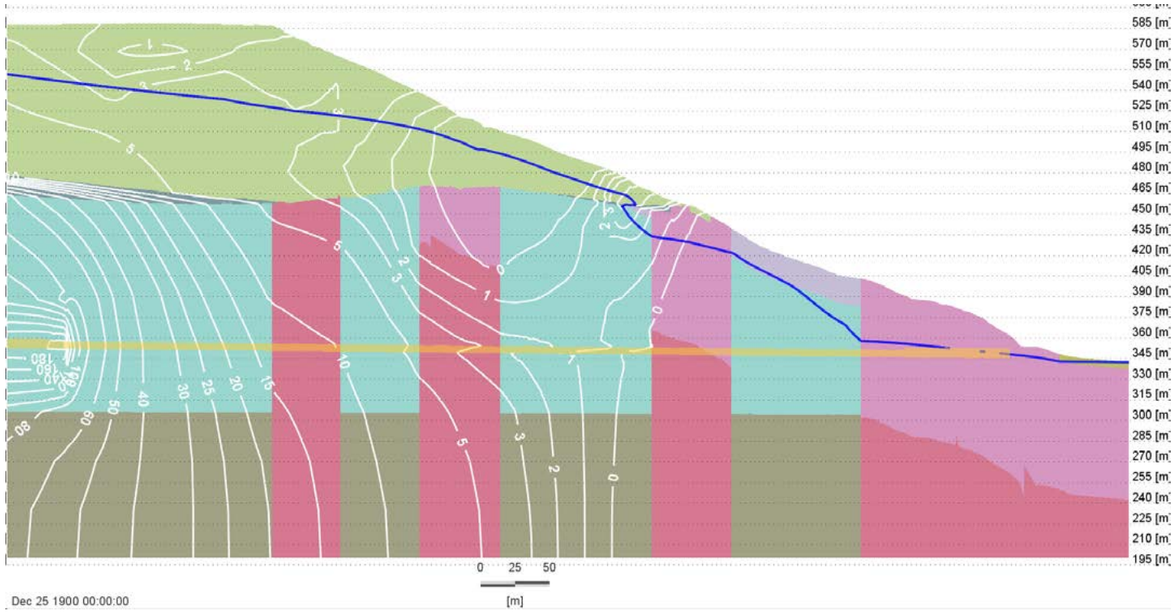
Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE (LOWER BOUND)

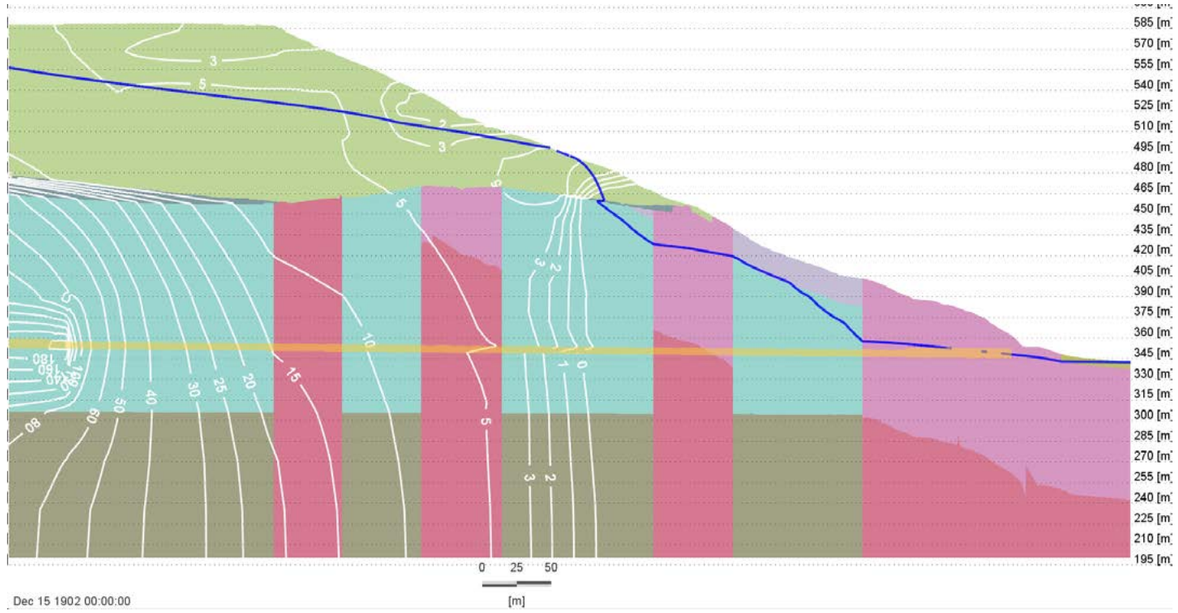
PSM4346-115R | Figure K7-3(b)

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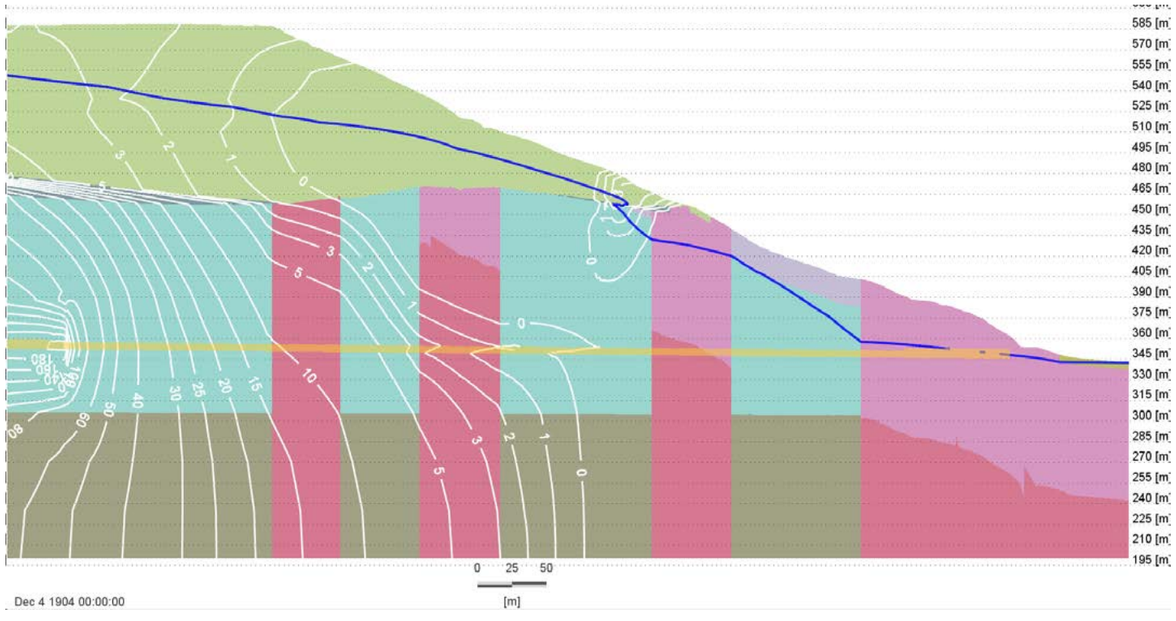
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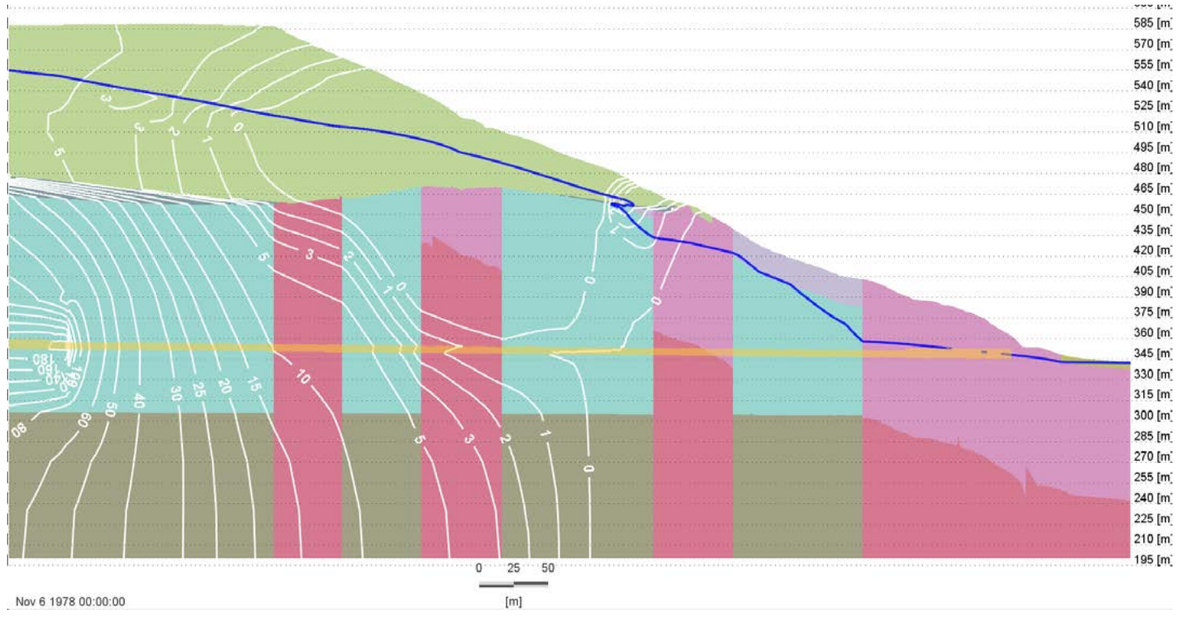
3 Years



5 Years

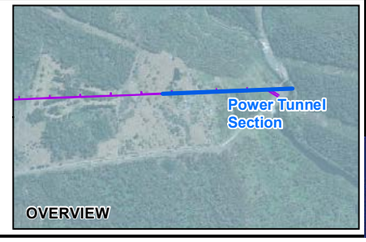


80 Years



Legend

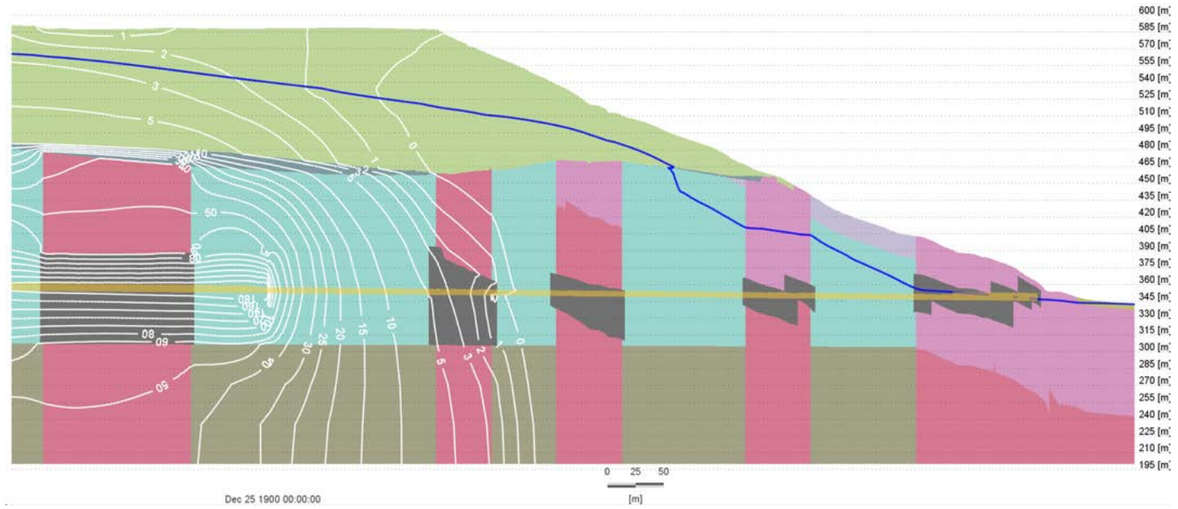
- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)



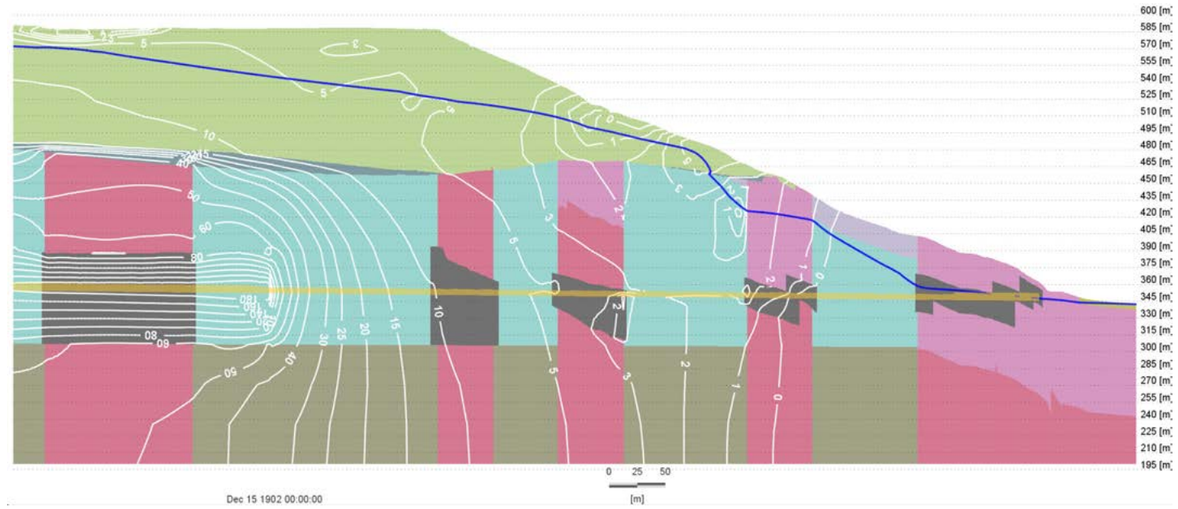
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	Date: 27 Feb 2025	Paper Size: A3	PSM4346-115R | Figure K7-3(c)

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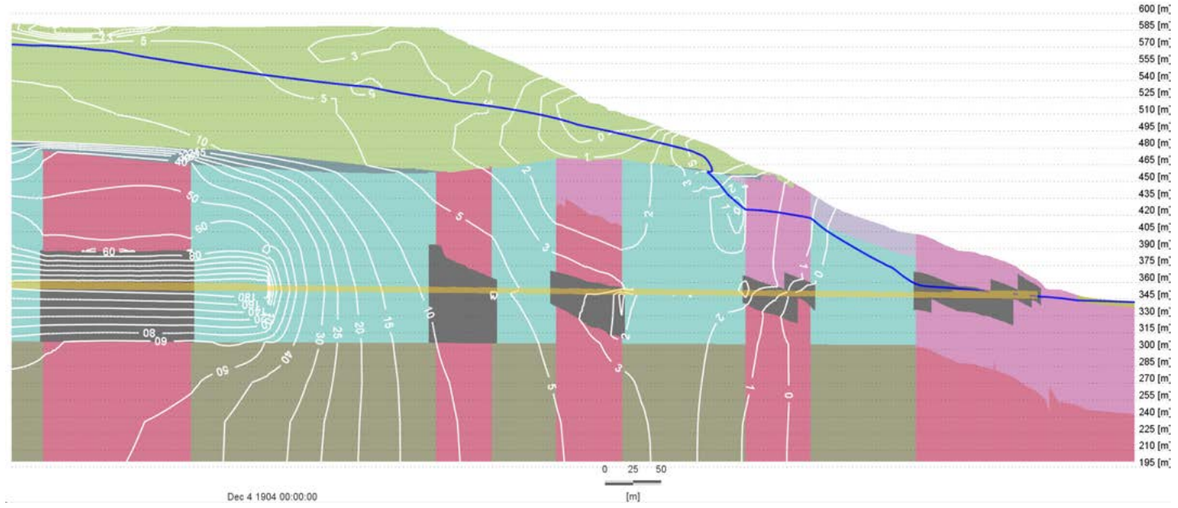
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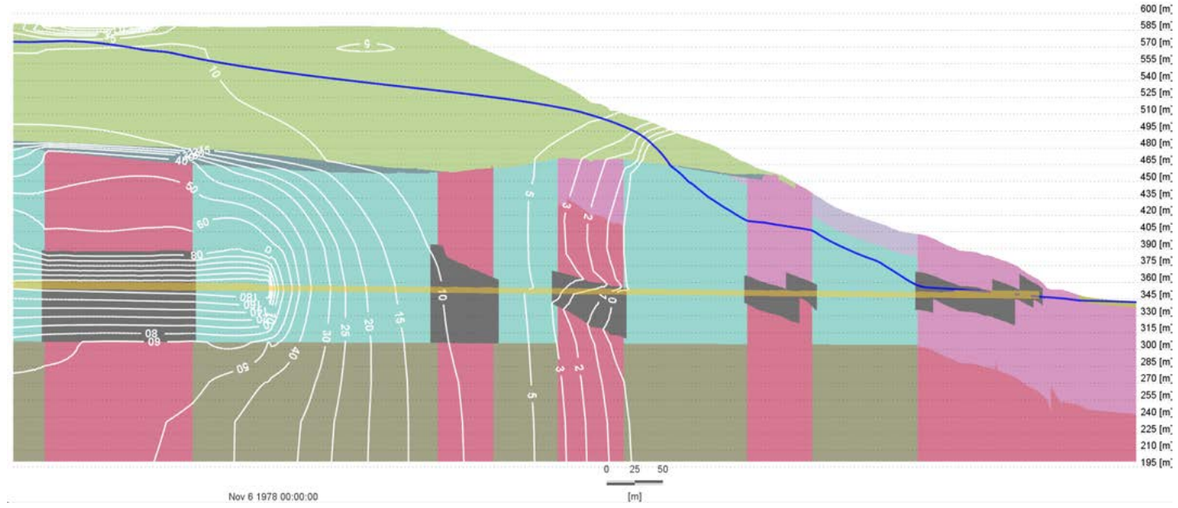
3 Years



5 Years



80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

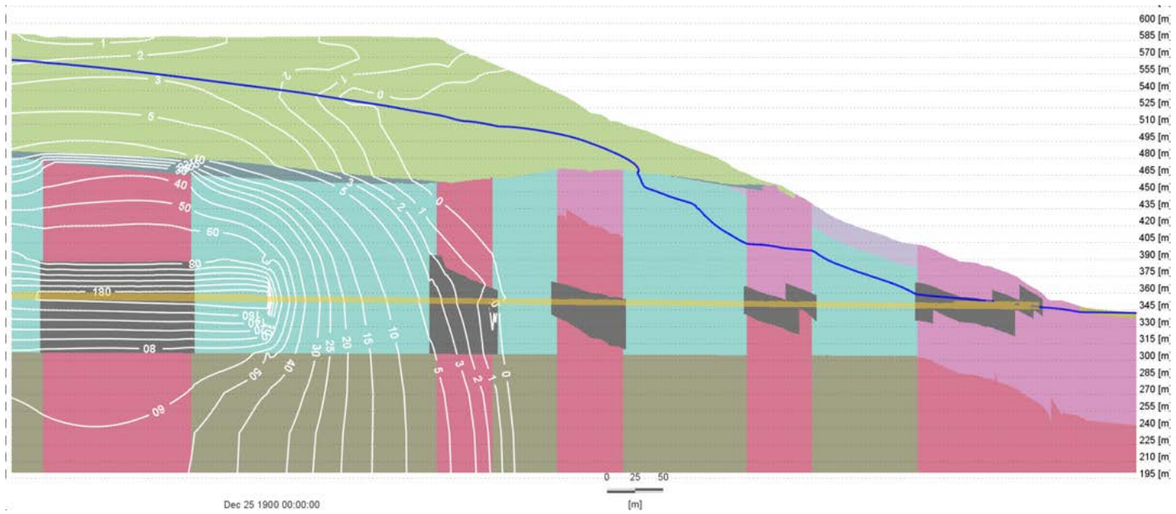
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Date: 27 Feb 2025	Paper Size: A3

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE - GROUTING
(BASE CASE)

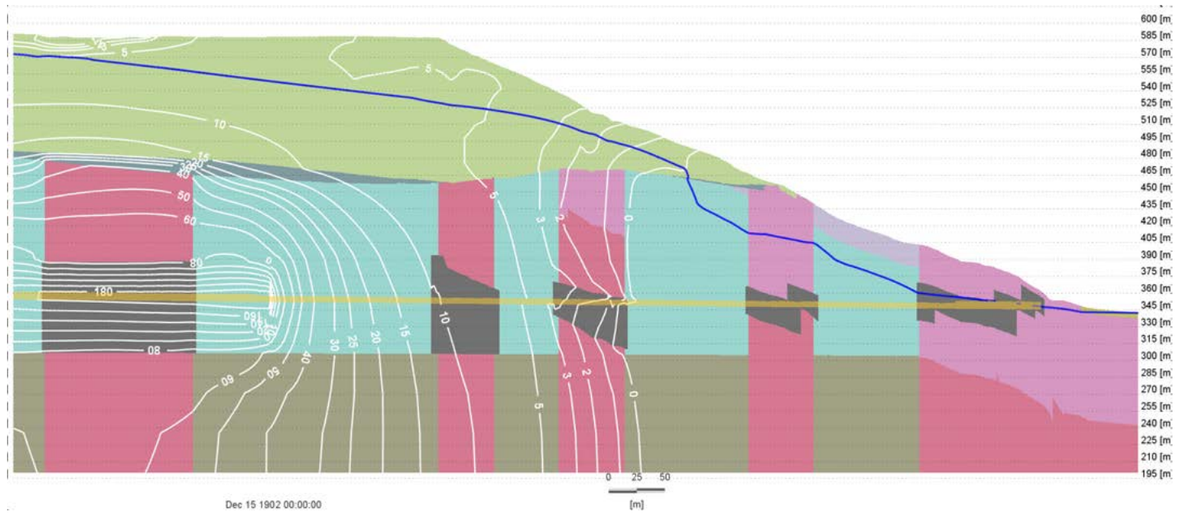
PSM4346-115R | Figure K7-4(a)

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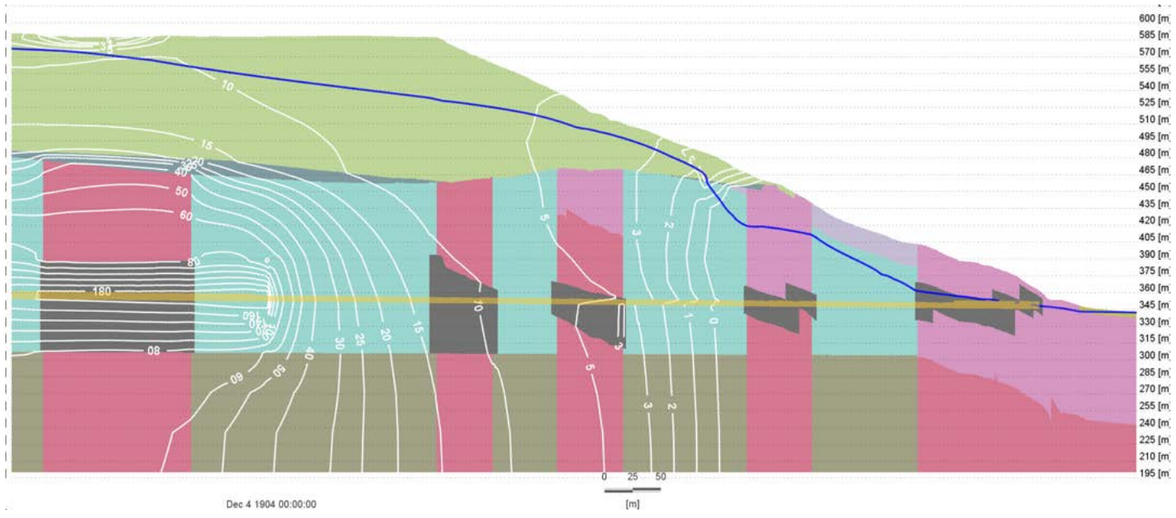
1 Year



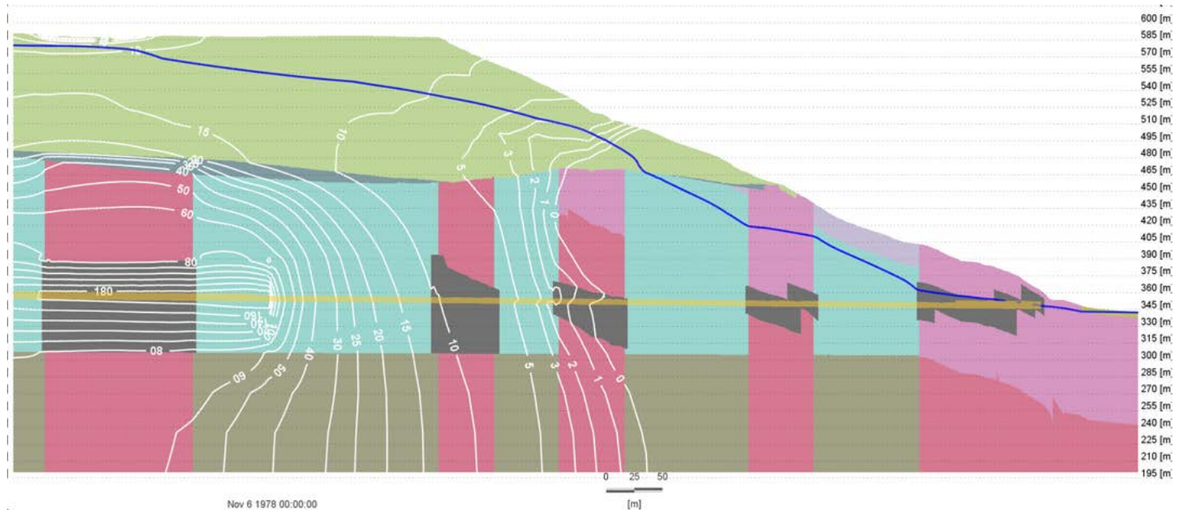
3 Years



5 Years

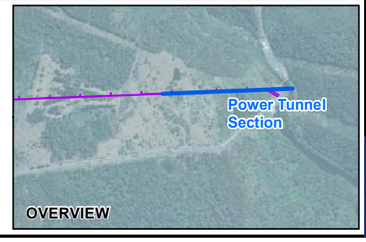


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



P S M

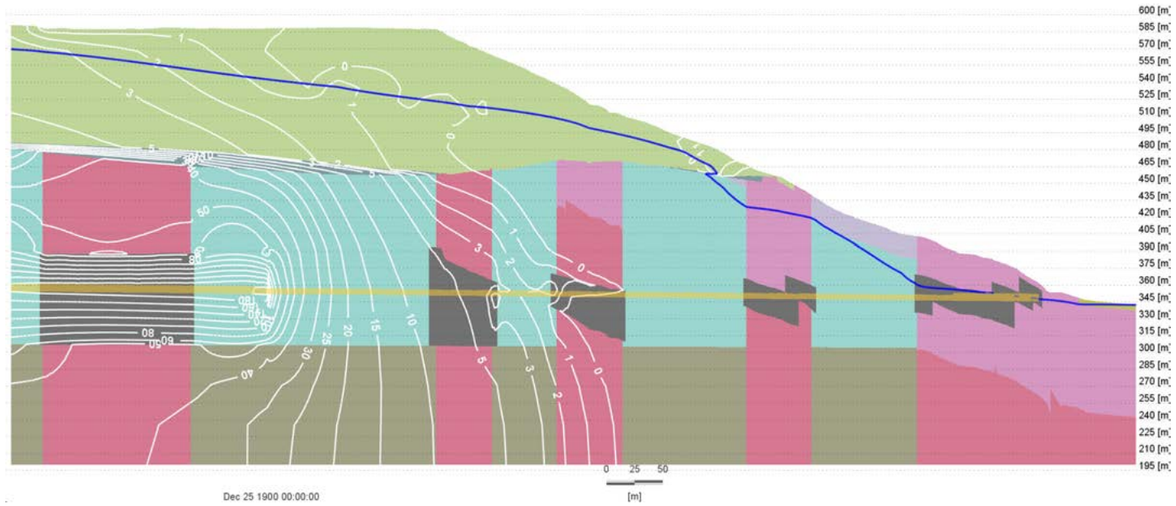
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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE - GROUTING
(LOWER BOUND)

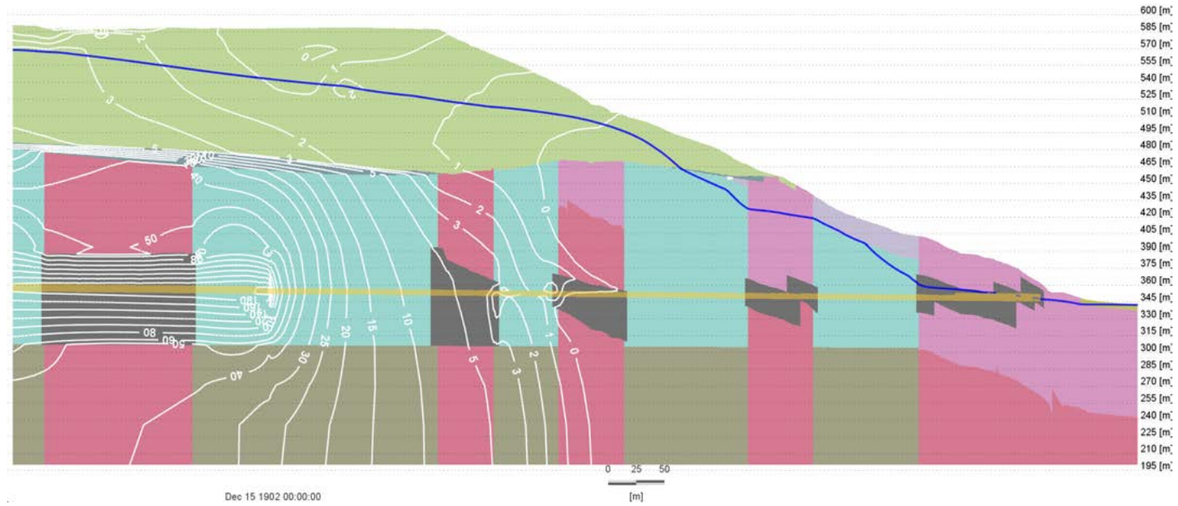
PSM4346-115R | Figure K7-4(b)

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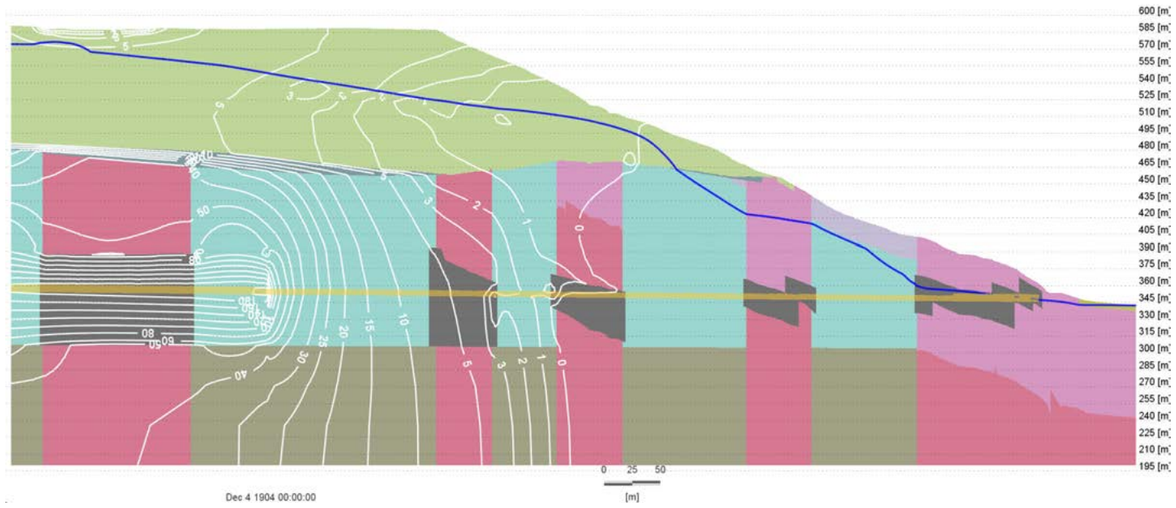
1 Year



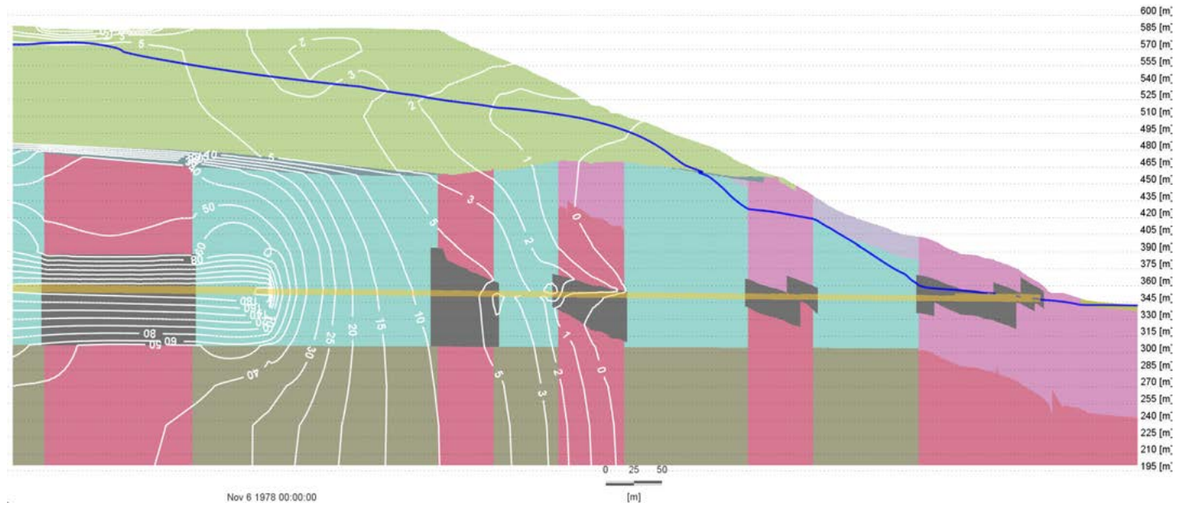
3 Years



5 Years

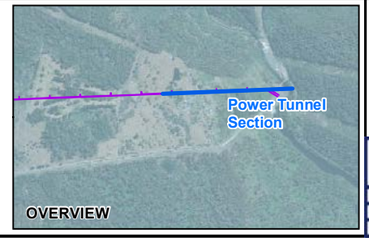


80 Years



Legend

- Alluvium / Colluvium (Scol)
- Blocky Dolerite (H-D1)
- Near-surface Dolerite (H-D6)
- Shallow Fracture Zone (H-D3/H-D4/H-D5)
- Deep Fracture Zone (H-D3/H-D4/H-D5)
- Tertiary Sediment (H-IS1)
- Tertiary Basalt (H-B1/H-B3/H-B5)
- Triassic Sandstone (H-TS)
- Grouting



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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report
POWER TUNNEL SECTION
TRANSIENT HYDRAULIC HEAD CHANGE
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure K7-4(c)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R Rev 1\Appendix K\Figure K7-4(c) Power Tunnel Section Transient Hydraulic Head Change P90 Schedule - Grouting (Upper Bound).mxd

Appendix L
Operation Stage – Forwards Particle Tracking

- Figure L1 Simulated Forward Pathlines - Base Schedule
- Figure L2 Simulated Forward Pathlines - Base Schedule and Grouting
- Figure L3 Simulated Forward Pathlines - P90 Schedule
- Figure L4 Simulated Forward Pathlines - P90 Schedule and Grouting

444000 446000 448000 450000 452000 454000

5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED FORWARD PATHLINES BASE SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure L1(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L1(a) Simulated Forward Pathlines Base Schedule (Lower Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)
  - 3 - 5
  - 5 - 10
  - 10 - 20
  - 20 - 40
  - 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

Particle Pathlines (Years)

- 0 - 1
- 1 - 3

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Date: 28 Jan 2025	Paper Size: A3	SIMULATED FORWARD PATHLINES BASE SCHEDULE (UPPER BOUND)	
PSM4346-115R	Figure L1(b)		

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L1(b) Simulated Forward Pathlines Base Schedule (Upper Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

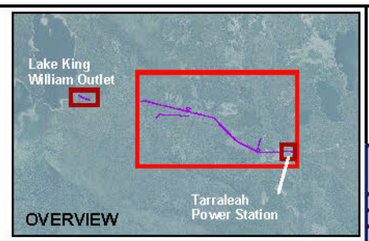
SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

Created By: VC	Revision: B	Hydro Tasmania Tarraleah Redevelopment Project Hydrogeological Interpretative Report	
Date: 28 Jan 2025	Paper Size: A3	SIMULATED FORWARD PATHLINES BASE SCHEDULE - GROUTING (LOWER BOUND)	
		PSM4346-115R	Figure L2(a)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L2(a) Simulated Forward Pathlines Base Schedule - Grouting (Lower Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

SEE INSET Tarraleah Power Station

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Date: 28 Jan 2025	Paper Size: A3	SIMULATED FORWARD PATHLINES BASE SCHEDULE - GROUTING (UPPER BOUND)	
		PSM4346-115R	Figure L2(b)

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L2(b) Simulated Forward Pathlines Base Schedule - Grouting(Upper Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

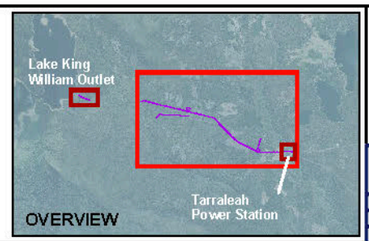
SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC



N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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	Date: 28 Jan 2025	Paper Size: A3	

Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED FORWARD PATHLINES
P90 SCHEDULE (LOWER BOUND)

PSM4346-115R | Figure L3(a)

C:\Arcgis\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L3(a) Simulated Forward Pathlines P90 Schedule (Lower Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED FORWARD PATHLINES
P90 SCHEDULE (UPPER BOUND)

PSM4346-115R | Figure L3(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L3(b) Simulated Forward Pathlines P90 Schedule (Upper Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

SEE INSET Tarraleah Power Station

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Hydro Tasmania
Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED FORWARD PATHLINES
P90 SCHEDULE - GROUTING
(LOWER BOUND)

PSM4346-115R | Figure L4(a)

C:\Arc\GIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L4(a) Simulated Forward Pathlines P90 Schedule - Grouting (Lower Bound).mxd

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5322000 5320000 5318000 5316000

Horne's Dam
Mossy Marsh
Mossy Marsh Pond
No.2 Pond
No.1 Pond

INSET - Tarraleah Power Station

Scale 1:7,500
0 50 100 200 300 m

INSET - Lake King William Outlet

Scale 1:15,000
0 100 200 400 600 m

SEE INSET Tarraleah Power Station

Legend

- Tarraleah Redevelopment Alignment
- Simulated Water Table for 80 Years (mAHD)

Particle Pathlines (Years)

- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 40
- 40 - 80
- Model Domain
- Mossy Marsh Tunnel
- Waterbodies
- Wetland
- Sphagnum Peatland TEC

OVERVIEW
Lake King William Outlet
Tarraleah Power Station

N

Scale 1:30,000
0 0.25 0.5 1 1.5 Km

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 55

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Tarraleah Redevelopment Project
Hydrogeological Interpretative Report

SIMULATED FORWARD PATHLINES
P90 SCHEDULE - GROUTING
(UPPER BOUND)

PSM4346-115R | Figure L4(b)

C:\ArcGIS\PSM4346\03_Figures\PSM4346-115R\Appendix L\Figure L4(b) Simulated Forward Pathlines P90 Schedule - Grouting (Upper Bound).mxd