Technical Memorandum

Date: 28 August 2023 Project No.: J2320M01

To: Rebekah Geagea

Cc:

From: Peter Mayers Email: pmayers@g-r-m.com.au

CALIDUS RESOURCES LIMITED:- FIELDINGS GULLY DEWATERING ASSESSMENT AND PIT LAKE CLOSURE WATER BALANCE

INTRODUCTION

Calidus Resources Limited (Calidus) own the Warrawoona Gold Project (Warrawoona), located approximately 25 km southeast of Marble Bar in the Pilbara Region of Western Australia. The project comprises the Klondyke, Copenhagen and Fieldings Gully Prospects, with gold production having commenced at the main Klondyke mine in May 2022. The global gold resource is still currently around 1.7 million ounces across the combined project deposits due to successive exploration and resource upgrades. Calidus have secured groundwater licensing for Warrawoona under GWL204411 with an annual entitlement of 2,100,000 kL, which authorises abstraction from several local and regional borefields including dewatering at the Klondyke open pit mine, and regional water supply borefields at Big Schist, Narri, and Moolyella.

Calidus are now wanting to develop the Fieldings Gully gold mine which is located around 15 km west of Klondyke and has a JORC compliant gold resource of around 36,000 oz. Mining is proposed to be undertaken via a modest sized shallow open pit operation, with a nominal 6 month mine life. The Fieldings Gully open pit will develop to a depth of about 55 m which will be around 30 m below the ambient groundwater table. A map showing the location of the Fieldings Gully development within Calidus's wider Warrawoona project is shown in Figure 1.

Groundwater Resource Management Pty Ltd (GRM) have been assisting Calidus with various hydrogeological studies and investigations for Warrawoona since 2018, including the Klondyke mine dewatering and regional water supply assessments. Calidus have now engaged GRM to undertake a dewatering assessment and pit lake closure water balance for mining of the Fieldings Gully deposit to assist with the relevant mining approvals.

BACKGROUND

CLIMATE

Climate and rainfall data are collated and discussed in detail in GRM's initial 2019 hydro-meteorological and surface water management study[1], as well as in subsequent GRM groundwater reports[2]

GEOLOGY

The Warrawoona Greenstone Belt is situated around 150 km southeast of Port Hedland and 25 km southeast of Marble Bar respectively in the East Pilbara district of Western Australia, and falls within the Marble Bar Goldfield. The principal deposit within the belt is Klondyke with satellite resources found at Copenhagen, Coronation and Fieldings Gully.

The following is an extract from a PorterGeo[3] geological consultants online report. Fieldings Gully is located on the east-trending Fieldings Find Shear. It lies within a sequence of sheared and hydrothermally altered volcanic and sedimentary rocks. The dominant topographical feature in the deposit area is a 30 m high ironstone ridge composed of sulphide-rich chert and iron carbonate that developed along the contact of felsic sedimentary rocks to the north and highly altered ultramafic rocks to the south. Gold mineralisation is interpreted to be hosted within a sedimentary horizon containing quartz lenses concordant with the overall strike of the unit. The sedimentary rocks comprise highly altered pyritic-fuchsitic-quartzite; mica-rich chloritic schist; quartz-carbonate; and quartz-feldspar-mica schists. The mineralised zone strikes at 100° and dips steeply south.

HYDROGEOLOGY

The northwest striking Warrawoona Range forms a local surface water and groundwater divide in the Fieldings Gully area. Surface runoff south of the range reports to the Camel Creek catchment which discharges to the north flowing Coongan River to the west.

Fractured rock aquifers are the most significant aquifers to develop in the Fieldings Gully area, with smaller alluvial aquifers developing to varying degrees along the base of the Camel Creek drainage. The alluvial aquifers may develop to more significant sizes lower down the catchment towards the Coongan River, although their nature and distributions remain untested. Alluvial aquifers can provide significant recharge to underlying fractured rock systems where the two are in hydraulic connection. In the Fieldings Gully area, fractured rock aquifers may develop around structural features such as faults and shears, especially if they intersect notable crosscutting structures and induce zones of fracture dilation. However in and around ultramafic units, they are likely to be less well developed as the deformation tends to be more ductile.

These aquifers can have moderate to high permeability, although storage can be variable depending on the size of the fault systems and the degree of hydraulic connection between them. Extensive groundwater exploration drilling undertaken by Calidus and others to the north and east of Fieldings Gully has shown that fractured rock aquifer development is probably more restricted than previously thought. This may be due to

[1] GRM, 2019: Hydro-Meteorological & Surface Water Management Study Warrawoona Gold Project PFS. Unpublished surface water report for Calidus Resources Ltd.

[2] GRM, 2022: Warrawoona Gold Project Updated H3 Level Hydrogeological Investigations Report January 2022. Unpublished groundwater study report for Calidus Resources Ltd

[3] Porter Geo, 2021: Warrawoona -Klondyke, Copenhagen, Coronation, Fieldings Gully; Online Database geological summary paper, Porter GeoConsultancy Pty Ltd Linden Park South Australia. 5065.

limited post metamorphic faulting, as well as a shallow weathering profile in the higher topography. Drilling data indicates that water quality is generally fresh to slightly brackish in both alluvial and fractured rock systems.

Dolerite dykes of various sizes intrude the project area, generally striking north-north-easterly, with the larger, regionally extensive dykes tending to form barriers to groundwater flow. The smaller dolerite intrusives potentially divert groundwater flow locally. Aquifer recharge is potentially significant but episodic, and mostly as a result of summer storms or cyclonic events. Recharge likely occurs by direct infiltration through exposed outcrop, with secondary infiltration through the base of the local creek systems during runoff events. In higher elevations away from creek and river drainages, aquifers will be more reliant on recharge from direct infiltration and large cyclonic events, making their sustainability as water supplies less certain. A hydrogeological map of the Fieldings Gully area is shown in Figure 2.

Other Groundwater Users

A search was previously undertaken of the Department of Water and Environment Regulation (DWER) Water Information Reporting (WIR) database for other groundwater users within a 40 km radius of the main Klondyke mine area in 2021[2] and reviewed again in 2023 for this study. The nearest registered other user bore to Fieldings Gully is at Big Schist, which is located around 10 km to the north, and supplied a small nearby gold mine (Four Mile) in the 1980s near the Marble Bar township . This site now hosts a single production bore (PB7) which supplies Calidus's Klondyke mining operation.

Groundwater Investigations

No previous groundwater investigations are known to have taken place at Fieldings Gully, and no aquifer test data is known to exist. The lack of this data makes it difficult to confirm what the likely inflow rates may be during mining. Therefore the pit dewatering rates will need to be approximated using permeability and storage values derived from anecdotal evidence.

Since 2018, around 50 groundwater exploration and investigation bores have been drilled along the Warrawoona Range by Calidus to assess both, regional water supply potential, as well as mine dewatering requirements for the Copenhagen and Klondyke mines [2 4]. A majority of these bores have been drilled to depths of between 120 and 150 m. The results of the groundwater exploration drilling were generally disappointing, which suggests that overall, the bedrock permeabilities outside of major fracture zones are low, and that the distribution of fractured rock aquifers is potentially minor. A geological base map showing the locations of exploration bores, with airlift yield results that were drilled closest to the proposed Fieldings Gully pit area is provided in Figure 3. The Figure shows that overall, the airlift yield results are low, suggesting that the Fieldings Gully deposit may also have generally low permeability conditions associated with it, if no permeable fracture zones are found to pass through the deposit area.

Static Water Level (SWL) measurements were taken for five historic angled RC resource drill holes (17FGRC007, 17FGRC010,21FGRC019, 21FGRC020 and 21FGRC021) in July 2023. Summary results are

[4] GRM, 2019: Warrawoona Gold Project Pre-Feasibility Hydrogeological Investigations Report. Unpublished GRM report J1827R02 for Calidus Resources Ltd.

provided in Table 1, with a map showing the five hole locations in relation to the proposed Fieldings Gully Pit shown in Figure 4.

Table 1:- Water Level Measurement Summary

RC Hole ID	Coordinates MGA94Zn50		Azimuth	Dip	Depth	Measured WL Depth	Calculated Water Level
	Easting (m)	Northing (m)	(deg)	(deg)	(m)	(mbgl)	(mRL)
17FGRC007	786,554.34	7,641,479.79	20	-60	64	19.36	213.06
17FGRC010	786,821.83	7,641,447.08	20	-60	70	22.02	213.46
21FGRC019	787,099.53	7,641,568.12	NA	NA	NA	23.03	215.16
21FGRC020	787,096.48	7,641,517.74	NA	NA	NA	27.19	214.35
21FGRC021	787,090.65	7,641,721.22	NA	NA	NA	19.68	214.17

NA = No Data

The results indicate that the groundwater level in the Fieldings Gully area averages about 18.86m below Ground Level (BGL), or 214.04m RL, with the pit groundwater level averaging 213.26 mRL.

WATER QUALITY ANALYSES

Groundwater samples were collected by Calidus from four (17FGRC007, 17FGRC010, 21FGRC020 and 21FGRC021) of the five exploration RC holes that were measured for SWL, with the results to form a baseline for future water quality monitoring . Samples were submitted for laboratory analysis for major cations and anions and a suite of dissolved low level metals to Envirolab Services in Perth. Samples were also analysed for nitrate. The laboratory analyses results are compiled in Table 2.

The results show that the groundwater at Fieldings Gully is fresh, neutral to slightly alkaline and of the sodium chloride type with a high hardness. All dissolved metals results were within the ADWG[5] limits for potable water quality except for arsenic. The arsenic concentration in the four groundwater samples ranged from 17 to 60ug/L, which exceeded the potable limit guideline for arsenic (10 ug/L). Background concentrations of arsenic in the groundwater around Warrawoona has been found in previous investigations at Copenhagen and Klondyke[4].

[5] ADWG, 2011: Australian Drinking Water Guidelines 6; National Health and Medical Research Council, Canberra. ACT.

Table 2:- Water Quality Analyses Results

Analyte	Reporting Units	Limit of Detection	21FGRC021 (4/7/23)	21FGRC020 (4/7/23)	17FGRC010 (4/7/23)	17FGRC007 (4/7/23)
pH	pH units		7.3	7.9	7.4	7.6
Electrical Conductivity	µS/cm	2	1,300	1,200	1,000	1,500
Total Dissolved Solids	mg/L	5	780	700	580	880
Bicarbonate Alkalinity as CaCO3	mg/L	5	510	390	430	480
Total Alkalinity as CaCO3	mg/L	5	510	390	430	480
Chloride	mg/L	1	160	170	89	190
Sulfate	mg/L	1	38	44	26	65
Calcium	mg/L	0.5	61	17	38	31
Magnesium	mg/L	0.5	67	49	72	62
Potassium	mg/L	0.5	<0.50	0.8	5.7	2.6
Sodium	mg/L	0.5	120	160	100	190
Hardness as CaCO3	mg/L	3	430	240	390	330
Dissolved Metals						
Silica	mg/L	0.2	62	46	62	31
Aluminium	µg/L	10	<10	<10	<10	<10
Arsenic	µg/L	1	18	42	17	60
Cadmium	µg/L	0.1	<0.10	<0.10	<0.10	<0.10
Chromium	µg/L	1	<1.0	6.4	3	18
Cobalt	µg/L	1	<1.0	<1.0	<1.0	<1.0
Copper	µg/L	1	<1.0	2.8	1.1	19
Iron	µg/L	10	<10	<10	<10	<10
Lead	µg/L	1	<1.0	<1.0	<1.0	<1.0
Manganese	µg/L	1	1.1	<1.0	5.9	<1.0
Mercury	µg/L	0.05	<0.050	<0.050	<0.050	<0.050
Nickel	µg/L	1	<1.0	<1.0	<1.0	7.1
Silver	µg/L	1	<1.0	<1.0	<1.0	<1.0
Zinc	µg/L	1	15	<1.0	3.5	3.5
Nitrogen						
Nitrate as N	mg/L	0.005	1.1	0.86	0.87	10
Nitrate as NO3 by calculation	mg/L	0.02	4.9	3.8	3.9	45
Ionic Balance	%		-6.6	-6.2	3.2	-4.8

GROUNDWATER MODELLING

Groundwater inflows during mining have been estimated using a simplified *Excel* spreadsheet-based analytical model that calculates staged inflows to a pit or excavation based on the DuPuit- Forchheimer and Thiem equations for flow to a large diameter well. Aquifer parameters are "bulked" using single values for permeability and storage to estimate groundwater inflows. The main disadvantage with this method compared to a numerical modelling approach, is that it risks oversimplifying what could be a more complex hydrogeological setting. However, for the Fieldings Gully assessment it is considered a reasonable approach given the lack of available hydrogeological data in the mine area.

The approach to the modelling is to assume the aquifer parameters will be broadly similar to those found previously at Copenhagen, with low permeability and storage[4]. This is supported by sump pumping data from Calidus that only minor inflows (<3L/s) occurred during Copenhagen mining in 2022-2023, and believed to have been mostly surface runoff (Paul Brennan, personal communication, 21 August 2023). Inflow estimates are undertaken using an expected base case with a sensitivity analysis.

The model was set up using the 6 month mine schedule and pit shell provided by Calidus. The base case uses a bulk permeability (K) of 0.01m/d with a specific yield (Sy) of 1% and an equivalent well radius of 70 m. The results of the simulation are shown in Figure 5, and predict peak inflows of around 1.5 L/s at the end of mining.

SENSITIVITY ANALYSIS

A sensitivity analysis was undertaken to better understand risks of higher groundwater inflows, should the base case parameters found to be an underestimate of the actual aquifer conditions during mining. Two analyses were run for the sensitivity which were:

- increasing permeability from 0.01 to 0.05 m/d while maintaining the storage value (Sy) at 1%, and
- maintaining the permeability at 0.01 m/d and increasing the storage value (Sy) from 1 to 2%.

Summary results of the sensitivity analysis with the base case are provided in Table 3, with the simulation spreadsheet results plotted in Figures 6 and 7 for the higher permeability case and higher storage case respectively.

Table 3:- Sensitivity Analysis Summary

Simulation	Hydraulic Conductivity (K)	Specific Storage (Sy)	Peak Groundwater Inflow
	(m/d)	(%)	(L/s)
Base Case	0.01	1	1.5
Sensitivity - Higher K	0.05	1	3
Sensitivity - Higher K & Sy	0.01	2	2

The results of the sensitivity analysis indicate that pit inflows during mining could range up to around 3 L/s if moderately higher permeabilities are encountered. However, this assumes that no single, high permeability fault or shear is encountered.

DRAWDOWN IMPACT

Dewatering of the Fieldings Gully pit will result in a cone of depression forming in the local aquifer system which will propagate out over time until the end of pit dewatering. The results of the groundwater inflow modelling were used to predict the extent of the drawdown cone using a forward-solution model within *Aqtesolv* (version 4.5) analytical software. The model used the Neuman (1974) solution for an unconfined aquifer with a Transmissivity (T) of 0.5 m^2/d, a Storativity (S) of 0.05 and a Sy of 1% with a pumping rate of 3 L/s. The aquifer was set with no flow boundary conditions.

The results for the 0.5 m drawdown contour at the end of mining are plotted in Figure 8 and show that drawdown in the local aquifer may extend to around 200 m from the pit perimeter.

PIT LAKE CLOSURE WATER BALANCE

A pit lake closure water balance model has also been developed for Fieldings Gully using the generic systems modelling package GoldSim, which is ideally suited to pit lake closure modelling. The model has been constructed around the hydrogeological understanding of the Fieldings Gully area described above and the pit shell and abandonment bund designs provided by Calidus.

WATER BALANCE SETUP

The water balance model comprises the following elements:

- Pit lake storage volume, which is estimated during each time step based upon the total inflows and outflows, and the volume at the previous time step.
- Inflows to the pit comprising:
  - groundwater inflows, which occur when the pit lake water level lies below the ambient groundwater level;
  - direct (incidental) rainfall onto the pit lake, where there is no interaction with the pit wall rocks;
  - rainfall runoff from the internal and external pit catchments.
- Outflows from the pit comprising:
  - evaporation from the pit lake;
  - groundwater outflows, which occur should the pit lake water level exceed the ambient groundwater level;

These elements are shown schematically in Figure 9 and described in more detail below.

Pit Lake Storage Volume

The volume stored in the pit lake is estimated by the model based upon the total inflows and outflows to the lake over the time step, and the volume of the lake at the previous time step. The water balance equation used to calculate the stored volume is presented below.

$$Storage_i = (Inflow - Outflow) + Storage_{i-1}$$

Where *Storage* = the pit lake volume at the current time step

Inflow = the total inflow to the pit lake

Outflow = the total outflow from the pit lake

$Storage_{i-1}$ = the pit lake volume at the previous time step.

At the start of the model run (time zero) the pit is assumed to be dry, which is consistent with the condition at completion of mining.

Groundwater Inflows and Outflows

Groundwater interaction with the pit void lake is modelled using the estimated groundwater inflows during mining which are calculated from the analytical groundwater modelling. The estimates were based on the following:

- An expected base case with a separate higher permeability case as described in the sensitivity analysis.
- An average groundwater level of 213.26 mAHD in the pit area which is derived from measurements taken by Calidus (Figure 4).

The adopted groundwater inflow rates used for the water balance model runs are summarised in below Table 4.

Rainfall and Rainfall Runoff Inflows

Direct rainfall represents rain falling onto the pit void lake. As such there are no losses and a runoff factor of 1 has been used (i.e. the total rainfall depth is applied to the pit lake). The inflows from runoff, however, are affected by evaporation losses prior to their entering the pit lake. For these inflows a runoff factor of 0.9 has been applied for both the inpit (pit wall) and external catchments within the closure bund. The rainfall data used in the model were sourced from the Bureau of Meteorology (BoM) historical records for the Marble Bar area and comprised a review of the combined 117 year record of daily rainfall[1]. The 10-year rainfall data for what were found to be "average conditions" were used , and comprised the data for the 1946-1955 period. This data was then set to loop every 10 years throughout the model simulation.

The area of the pit lake is estimated by the model during each time step, based upon the simulated volume for the lake and the relationship between volume and surface area.

The external catchment area is fixed and has been estimated by GRM using the area within the pit closure bund provided in a layout from by Calidus (Figure 4).

The equations used to calculate rainfall and rainfall runoff are presented below.

$$Rainfall\ inflow = Rainfall \times Pit\ lake\ area$$

$$Rainfall\ runoff\ inflow = (Pit\ catchment - Pit\ lake\ area) \times Rainfall \times Runoff\ factor$$

Evaporation Outflows

Evaporation losses are calculated by the model using the estimated mean monthly pan evaporation rate data available for Marble Bar and the simulated area of the pit lake. The monthly data is adjusted for pan to lake effects using a coefficient of 0.7 and for salinity using a factor of 0.98, which aligns with a brackish to seawater range (up to around 33,000 mg/L TDS) based on studies by Turk (1970)[6].

The evaporation outflow is calculated by the model at each time step using the pit lake area, estimated from the relationship between pit volume and area.

Model Runs and Sensitivity Analysis

A model run time of 500 years post-closure was adopted for the water balance model simulations, starting nominally at the scheduled end of mining (1 January 2024) and using a one-day time step. The selected run time was based upon the mine closure guidelines (DMP,2015). Two runs were completed, comprising a base case run with the expected condition, and the higher permeability inflow case for the sensitivity run from pit inflow rates as predicted by the groundwater model.

The parameter values adopted in the model are compiled in Attachment A and a summary of the groundwater inflow rates used for each of the two model runs is presented in Table 4.

Table 4:- Summary of Water Balance Model Runs

RL(m)	GW Inflow Rate (L/s)	
	Base Case	Higher Permeability Case
175*	1.2	2.7
185	1.1	2.4
195	0.86	1.8
202	0.63	1.3
210	0.2	0.4
213.26ƕ	0	0

Notes: ƕ ambient groundwater level; * = base of pit.

Solute Balance Set-Up

A solute balance model was also developed using the GoldSim software to simulate the increase in salinity of the pit lake after closure. The assumptions used in the solute model are as follows:

- An initial TDS concentration of 735 mg/L based on the average water quality analysis results from the field investigation sampling.
- A groundwater salinity of 735 mg/L (again based on the field investigation results).
- Zero salt inflows from rainfall.
- Zero salt losses from evaporation.
- Complete mixing within the pit lake (i.e. no allowance was made for stratification).

The model simulated the gradual change in the TDS concentrations in the pit lake from groundwater inflows and evaporation.

[6] Turk. L.J., 1970 "Evaporation of Brine: A Field Study of the Bonneville Salt Flats, Utah", Water Resource Research, vol 6, no. 4, pp 1209-1215.

Predicted Pit Lake Level

The predicted post closure pit lake water levels for the two model runs are graphed in Figure 10.

The plots show the following:

- The pit lake level remains below the ambient groundwater level, which is consistent with the predicted interaction between the pit and groundwater system. This indicates the pit lake will form a long-term local groundwater sink.
- The base case run predicts the pit lake level to range between 209 and 212 mRL (18 mbgl), which equates to a slight long-term drawdown (compared to ambient groundwater level) of about 1 to 4 m. The higher permeability case run predicts a pit lake level to range between 210 and 213 mRL, which equates to a long-term drawdown of about 0.5 to 3 m.

Pit Lake Water Quality Changes

The predicted changes in pit lake salinity for the two 500 year post closure model runs is shown as time series graphs in Figure 11.

The plots show the following:

- Salinity in the pit lake is predicted to rise from an initial concentration of 735 mg/L Total Dissolved Solids (TDS) to around 1,600 to 2,000 mg/L TDS after 10 years post closure.
- At around 100 years post closure the pit lake salinity is predicted to have risen to between 3,000 and 4,200 mg/L TDS.
- After 500 years post closure, the pit lake water quality is predicted to range from about 10,000 mg/L TDS for the base case case to 14,000 mg/L TDS for the higher permeability case.

Summary and Conclusions

Calidus engaged GRM to undertake a dewatering assessment and pit lake closure water balance for mining of the Fieldings Gully gold deposit to assist with the relevant mining approvals. Fieldings Gully is located around 15 km west of Klondyke and has a JORC compliant gold resource of around 36,000 oz. Mining is proposed to be undertaken via a modest sized shallow open pit operation, with a nominal 6 month mine life.

The results of the pit dewatering modelling indicate that pit inflows during mining will probably be around 3 L/s or less, similar to those encountered at the Copenhagen mine. This is mainly due to due to the shallow pit depth and low permeability bedrock. However, this inflow estimate assumes that no single, high permeability fault or shear is encountered during mining.

The pit lake water balance modelling indicates that the pit lake will form a long-term local groundwater sink with a pit lake level ranging between 0.5 and 4 m below the ambient groundwater level. Salinity in the pit lake is expected to rise to around 1,600 mg/L TDS after 10 years and to be between 3,000 and 4,200 mg/L TDS after 100 years post closure.

It is understood that Calidus are also investigating the feasibility of backfilling the Fieldings Gully pit with waste rock after completion of the pit. Should this occur, then a pit lake may not develop, depending on the backfilled level of the waste rock.

Peter Mayers
PRINCIPAL HYDROGEOLOGIST

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Attachments:

FIGURE 1:- Location Plan

FIGURE 2:- Fieldings Gully Hydrogeology

FIGURE 3:- Regional Groundwater Exploration Results

FIGURE 4:-Fieldings Gully Water Level Monitoring

FIGURE5:- Modelled Dewatering– Base Case

FIGURE6:- Modelled Dewatering – Higher Permeability Case

FIGURE 7:- Modelled Dewatering – Higher Storage Case

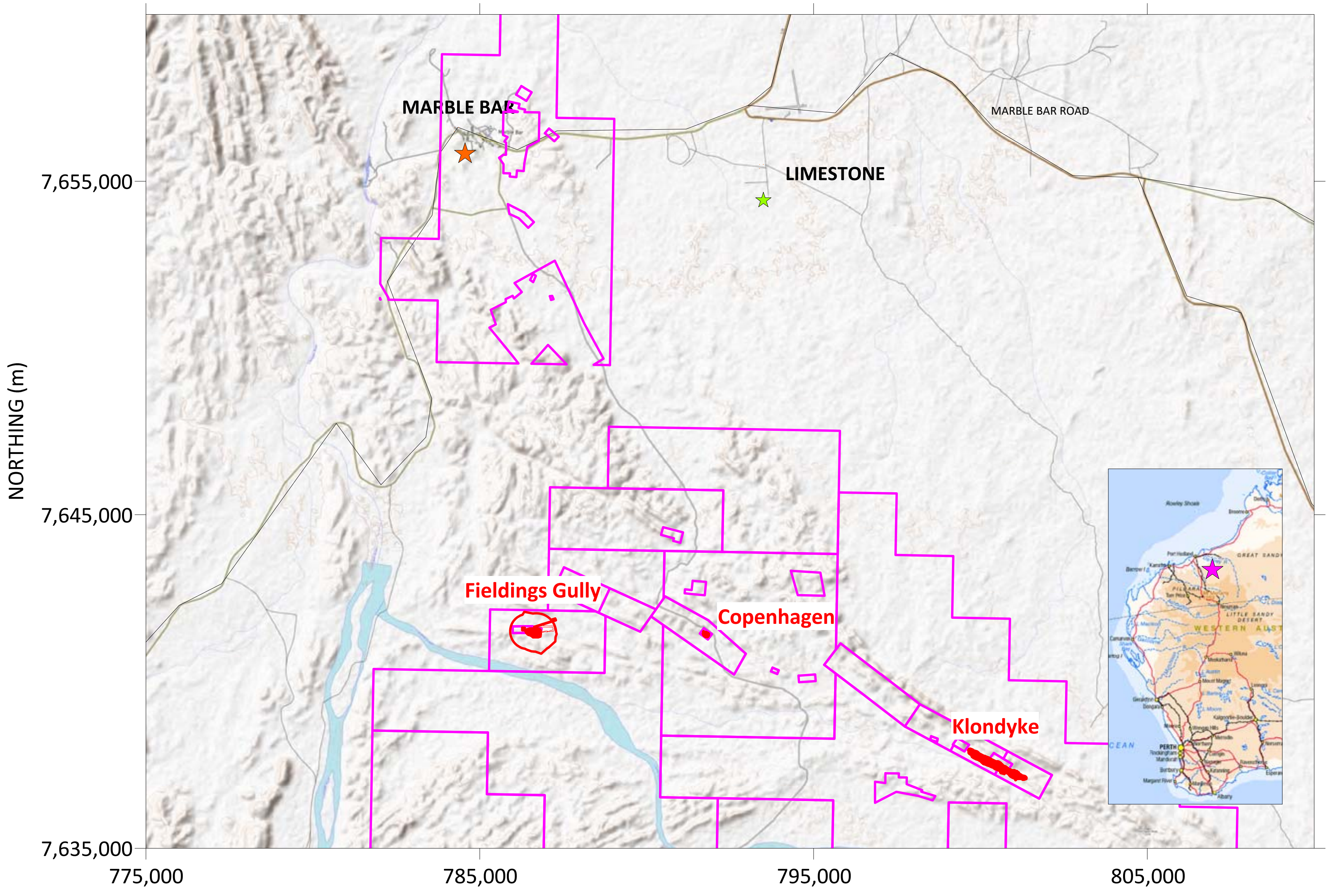
FIGURE 8:- Dewatering Impact

FIGURE 9:- Water Balance Schematic

FIGURE 10:- Post Closure Pit Lake Level

FIGURE 11:- Post Closure Pit Lake Salinity

ATTACHMENT A:- GoldSim Model Adopted Parameter Values



GROUNDWATER RESOURCE MANAGEMENT

FIGURE 1
FIELDINGS GULLY LOCATION PLAN

Date Aug 23
Client Calidus Resources
Project Fieldings Gully Dewatering
Document J2320M01

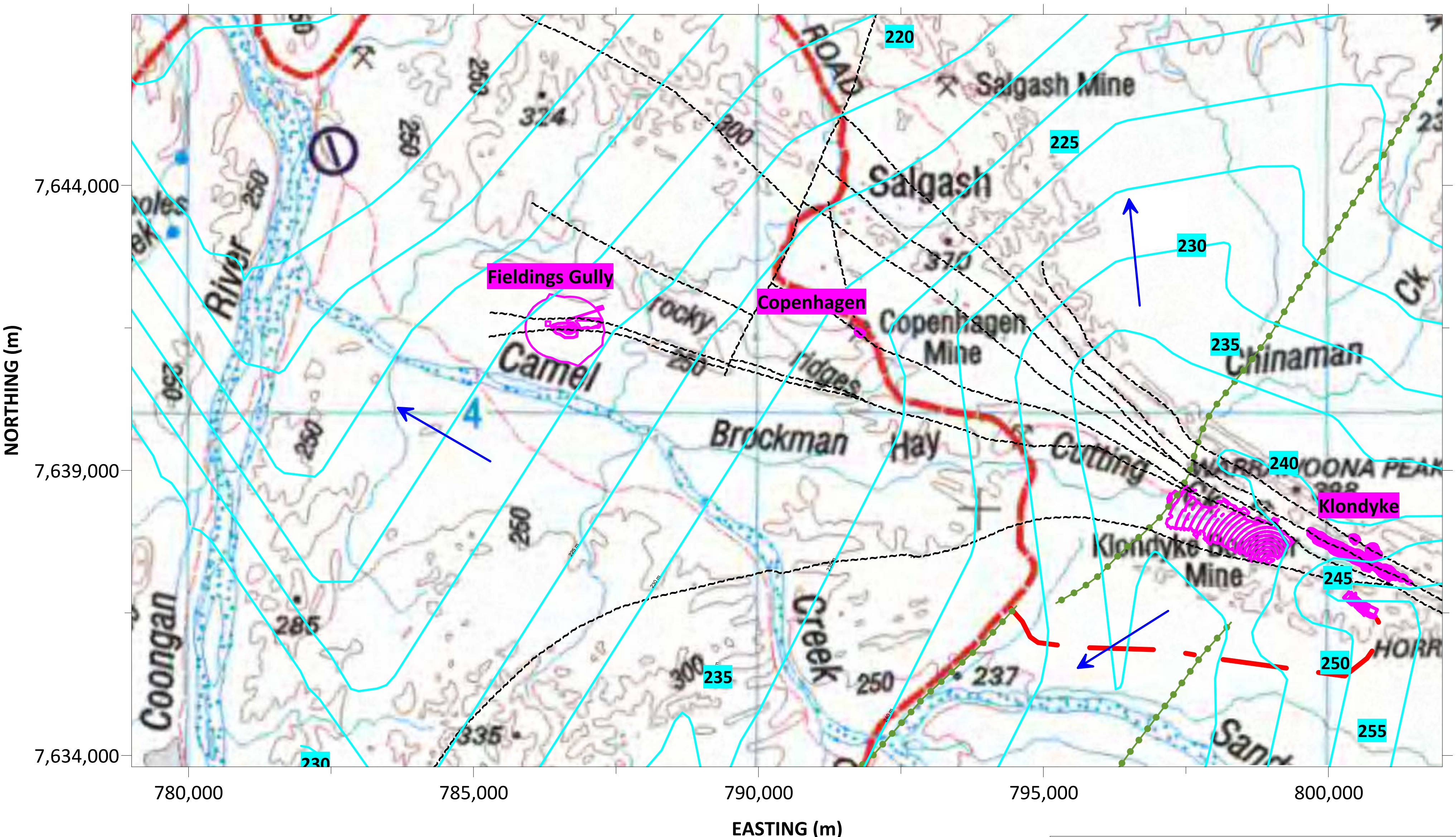
Coordinate System GDA94 Zone 50

Data Sources Global Mapper-Open Topo

SCALE 1:175,000
0m 5,000m 10,000m

Legend
Calidus tenements

FILE:/Jobs 2023/J2320/Figures/SurferFig 1 Location



GROUNDWATER RESOURCE MANAGEMENT

FIGURE 2
FIELDINGS GULLY HYDROGEOLOGY

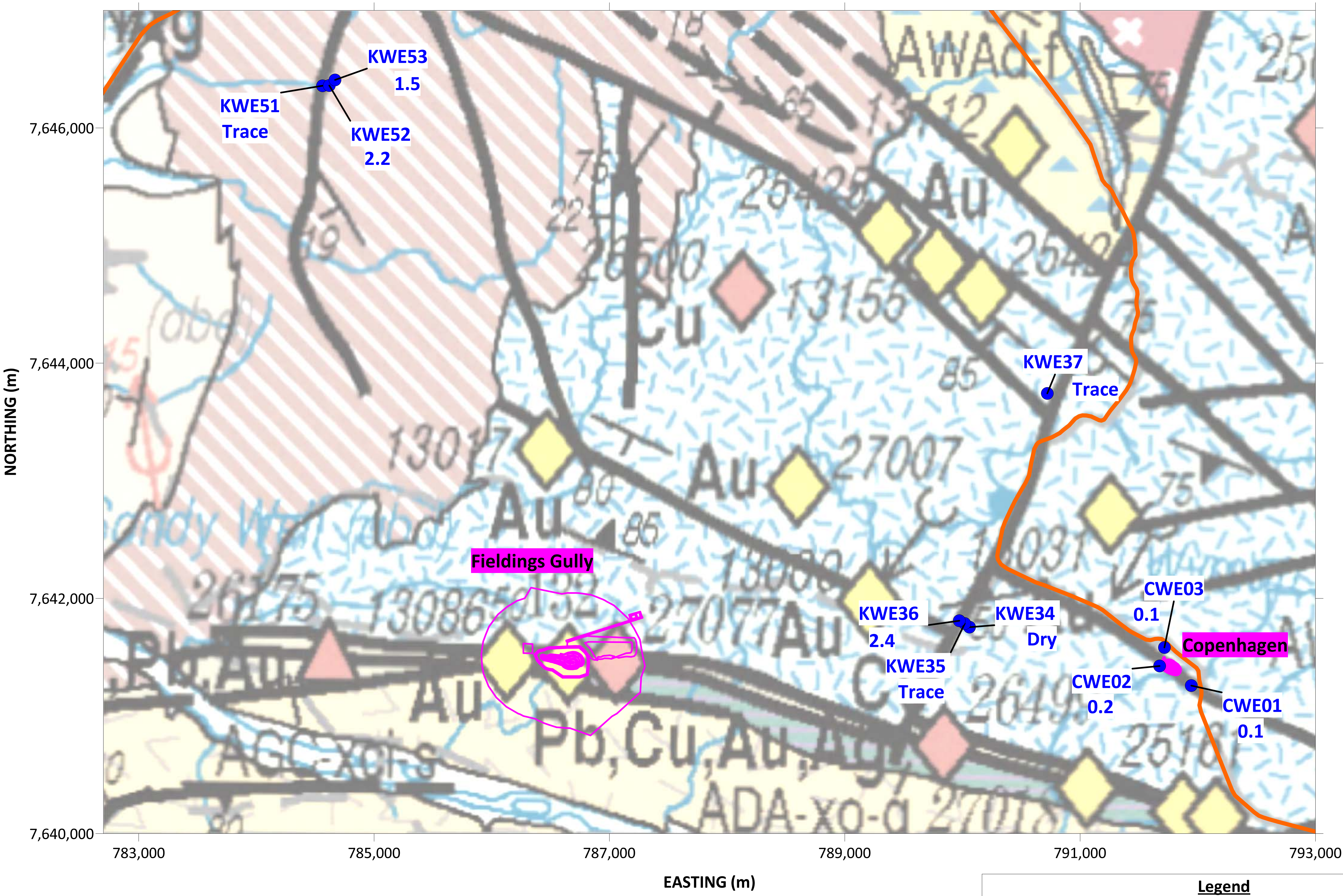
Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Coordinate System
GDA94 Zone 50

SCALE 1:95,000
0m 5,000m

Legend
- Dolerite dyke
- Regional shears
- Groundwater flow direction
- Groundwater level mAHD (2021)

FILE:/Jobs 2023/J2320/Figures/Surfer/Fig 2 Hydrogeology A4 Landscape



Legend

	Planned Infrastructure		Granite
	Local Road		Basalt
	Old Workings		Mixed:- felsic volcanics, volcanoclastics, basalt, chert and schist
KWE36 2.4	Exploration bore with airlift yield (L/s)		Main faults and shears

GROUNDWATER RESOURCE MANAGEMENT

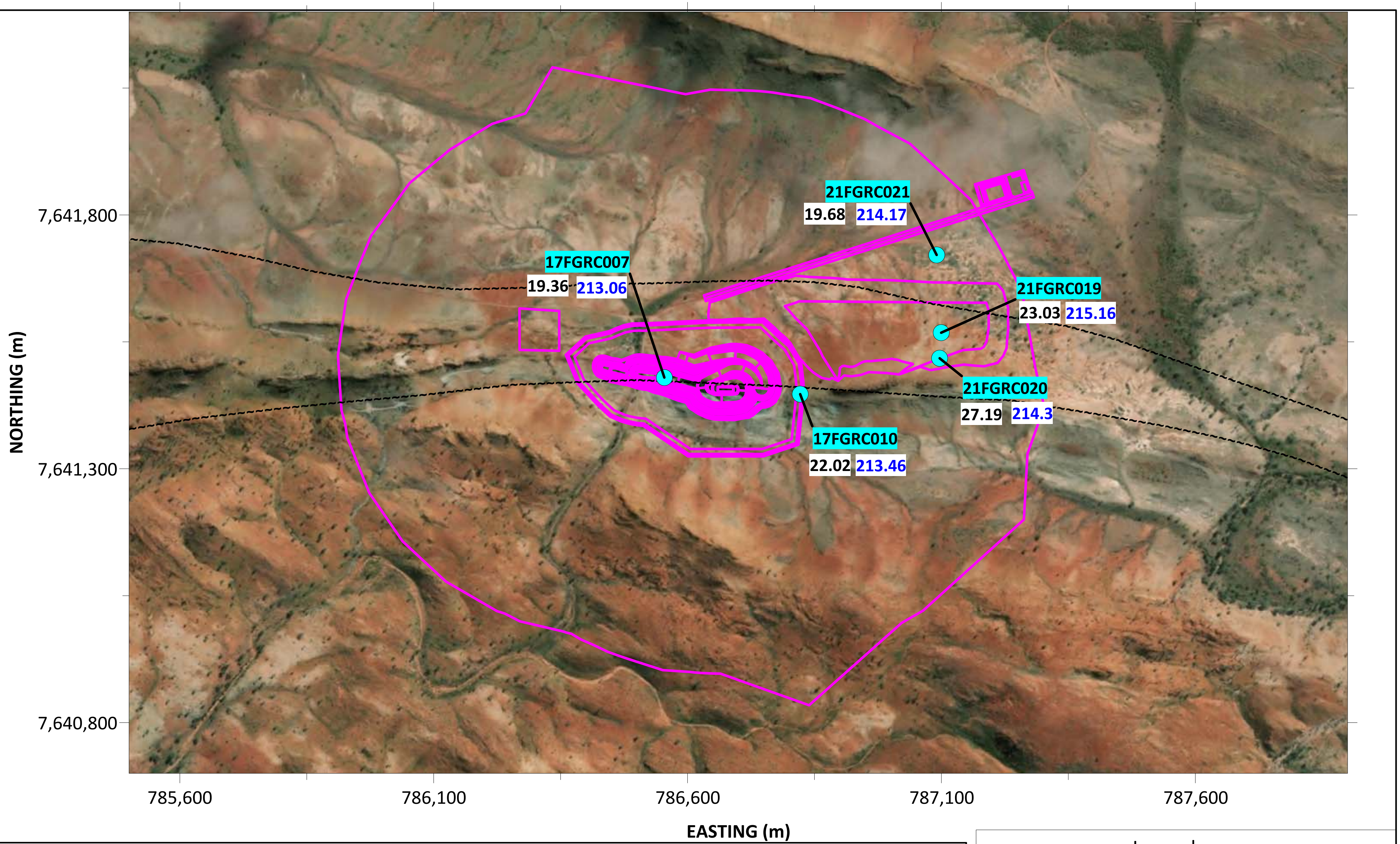
FIGURE 3
REGIONAL GROUNDWATER EXPLORATION RESULTS

Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Coordinate System
GDA94 Zone 50

SCALE 1:35,000
0m 1,000m 2,000m

FILE:/Jobs 2023/J2320/Figures/Surfer/Fig 3_Regional WS exploration results.srf



GROUNDWATER RESOURCE MANAGEMENT

FIGURE 4
FIELDINGS GULLY WATER LEVEL MONITORING

Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Coordinate System
GDA94 Zone 50

SCALE 1:10,000
0m 500m

Legend
- Shear zone
- Proposed pit & infrastructure
- RC resource hole with
- 27.19 Water level mbgl
- 214.3 Water Level mRL

FILE:/Jobs 2023/J2320/Figures/Surfer/Fig 4 Fieldings Gully monitoring.srf

Client:	Calidus Resources Limited
Project:	Feildings Gully Dewatering

MINE INFLOW OR OUTFLOW ESTIMATE USING DUPUIT-THIEM EQUATION APPLIED FOR AN EQUILIVENT LARGE DIAMETER WELL

UNCONFINED AQUIFER CONDITIONS

Q=pi.k.(ho^2-hw^2)/ln(ro/rw)

where:-

Q =inflow or outflow from large diameter well or pit (kL/d)

k =hydraulic conductivity (m/d)

ho =height of SWL above base of aquifer (m)

hw =height of depressed water level in bore or pit (m)

rw =radius of well or equivalent radius of pit (m)

ro =radius of max extent of cone of drawdown (m)=SQRT(2.25.k.ho.t/Sy)

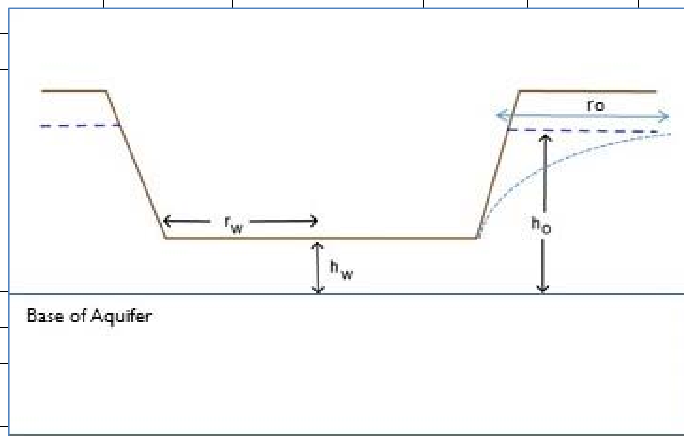
t =time since pumping or inflow started (days)

Sy =specific yield

1. Transient Inflows:- to final pit void

(variable t with calculated ro using Cooper-Jacob)

k (m/d) =	0.01		
ho (m) =	48		
hw (m) =	10		
rw (m) =	70		
t (days) =	180		
Sy=	0.01		
ro (m) =	139		
Q (kL/d) =	101	1	**(L/s)**



2. Steady State Inflows:- to final pit void

(assumed ro) ***note:- ro must be > rw***

ro (m) =	250		
Q (kL/d) =	54	1	**(L/s)**

3. Progressive Pit Development Inflows

Mine rate per time step(m)= 7

	Step	Time	hw - end of step	ro-end of step	Inflow-end of step	Inflow-end of step
	(days)	(days)	(m)	(m)	(kL/d)	(L/s)
Time Step 1	90	90	55	99	-66	-1
Time Step 2	15	105	50	106	-15	0
Time Step 3	15	120	45	114	18	0
Time Step 4	15	135	37	121	54	1
Time Step 5	15	150	30	127	74	1
Time Step 6	15	165	20	133	93	1
Time Step 7	15	180	10	139	101	1
Time Step 8				0	#NUM!	#NUM!
Time Step 9				0	#NUM!	#NUM!
Time Step 10				0	#NUM!	#NUM!

Figure 5	Fieldings Gully DW Base Case	J2320M01	Aug-23

GROUNDWATER RESOURCE MANAGEMENT

Client:	**Calidus Resources Limited**
Project:	**Feildings Gully Dewatering**

MINE INFLOW OR OUTFLOW ESTIMATE USING DUPUIT-THIEM EQUATION APPLIED FOR AN EQUILIVENT LARGE DIAMETER WELL

UNCONFINED AQUIFER CONDITIONS

Q=pi.k.(ho^2-hw^2)/ln(ro/rw)

where:-

Q =inflow or outflow from large diameter well or pit (kL/d)

k =hydraulic conductivity (m/d)

ho =height of SWL above base of aquifer (m)

hw =height of depressed water level in bore or pit (m)

rw =radius of well or equivalent radius of pit (m)

ro =radius of max extent of cone of drawdown (m)=SQRT(2.25.k.ho.t/Sy)

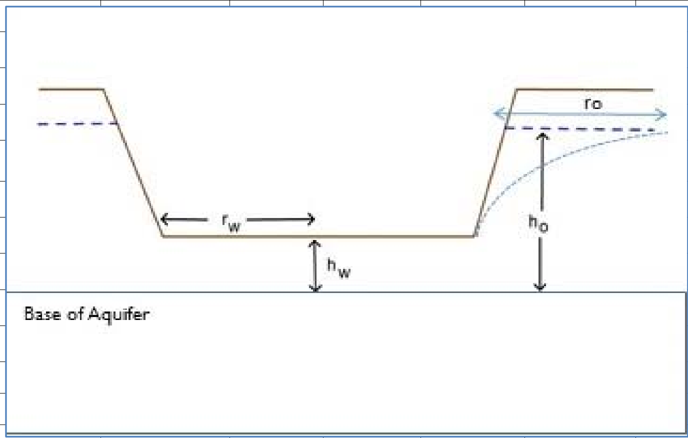
t =time since pumping or inflow started (days)

Sy =specific yield

1. Transient Inflows:- to final pit void

(variable t with calculated ro using Cooper-Jacob)

k (m/d) =	0.05	
ho (m) =	48	
hw (m) =	10	
rw (m) =	70	
t (days) =	180	
Sy=	0.01	
ro (m) =	312	
Q (kL/d) =	232	3 **(L/s)**



2. Steady State Inflows:- to final pit void

(assumed ro) ***note:- ro must be > rw***

ro (m) =	250	
Q (kL/d) =	272	3 **(L/s)**

3. Progressive Pit Development Inflows

Mine rate per time step(m)= 7

	Step	Time	hw - end of step	ro-end of step	Inflow-end of step	Inflow-end of step
	(days)	(days)	(m)	(m)	(kL/d)	(L/s)
Time Step 1	90	90	55	220	-99	-1
Time Step 2	15	105	50	238	-25	0
Time Step 3	15	120	45	255	34	0
Time Step 4	15	135	37	270	109	1
Time Step 5	15	150	30	285	157	2
Time Step 6	15	165	20	298	206	2
Time Step 7	15	180	10	312	232	3
Time Step 8				0	#NUM!	#NUM!
Time Step 9				0	#NUM!	#NUM!
Time Step 10				0	#NUM!	#NUM!

Figure 6	Fieldings Gully Sensitivity Analysis- Higher Permeability Case	J2320M01	Aug-23

GROUNDWATER RESOURCE MANAGEMENT

Client:	**Calidus Resources Limited**
Project:	**Feildings Gully Dewatering**

MINE INFLOW OR OUTFLOW ESTIMATE USING DUPUIT-THIEM EQUATION APPLIED FOR AN EQUILIVENT LARGE DIAMETER WELL

UNCONFINED AQUIFER CONDITIONS

Q=pi.k.(ho^2-hw^2)/ln(ro/rw)

where:-

Q =inflow or outflow from large diameter well or pit (kL/d)

k =hydraulic conductivity (m/d)

ho =height of SWL above base of aquifer (m)

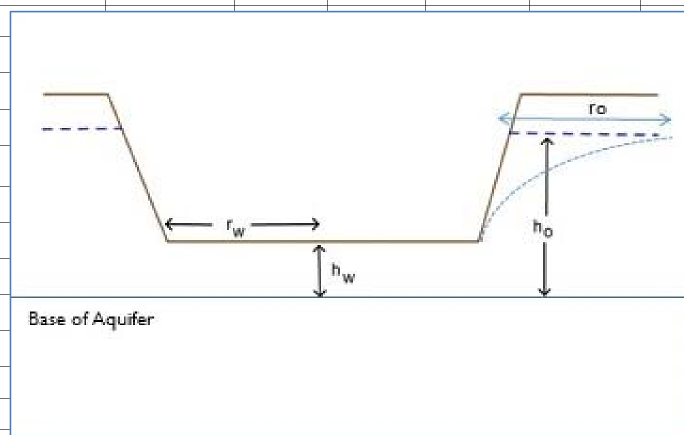
hw =height of depressed water level in bore or pit (m)

rw =radius of well or equivalent radius of pit (m)

ro =radius of max extent of cone of drawdown (m)=SQRT(2.25.k.ho.t/Sy)

t =time since pumping or inflow started (days)

Sy =specific yield



1. Transient Inflows:- to final pit void

(variable t with calculated ro using Cooper-Jacob)

k (m/d) =	0.01		
ho (m) =	48		
hw (m) =	10		
rw (m) =	70		
t (days) =	180		
Sy=	0.02		
ro (m) =	99		
Q (kL/d) =	202	2	**(L/s)**

2. Steady State Inflows:- to final pit void

(assumed ro) ***note:- ro must be > rw***

ro (m) =	250		
Q (kL/d) =	54	1	**(L/s)**

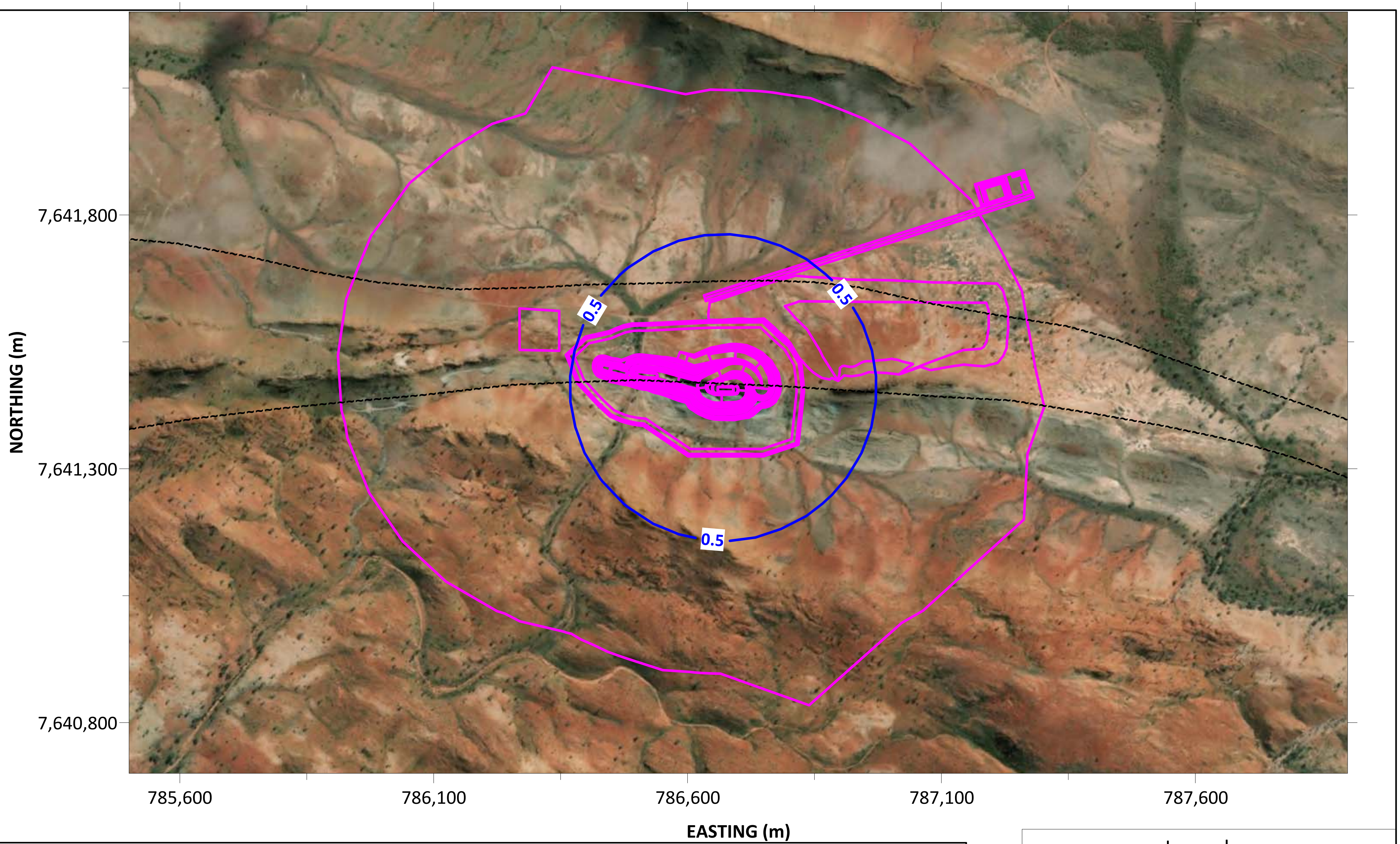
3. Progressive Pit Development Inflows

Mine rate per time step(m)= 7

	Step	**Time**	**hw - end of step**	**ro-end of step**	**Inflow-end of step**	**Inflow-end of step**
	(days)	**(days)**	**(m)**	**(m)**	**(kL/d)**	**(L/s)**
Time Step 1	90	90	55	71	-1597	-18
Time Step 2	15	105	50	75	-84	-1
Time Step 3	15	120	45	80	63	1
Time Step 4	15	135	37	85	148	2
Time Step 5	15	150	30	90	176	2
Time Step 6	15	165	20	94	200	2
Time Step 7	15	180	10	99	202	2
Time Step 8				0	#NUM!	#NUM!
Time Step 9				0	#NUM!	#NUM!
Time Step 10				0	#NUM!	#NUM!

Figure 7	Fieldings Gully Sensitivity Analysis- Higher Storage Case	J2320M01	Aug-23

GROUNDWATER RESOURCE MANAGEMENT



GROUNDWATER RESOURCE MANAGEMENT

FIGURE 8
MINE DEWATERING DRAWDOWN EXTENTS

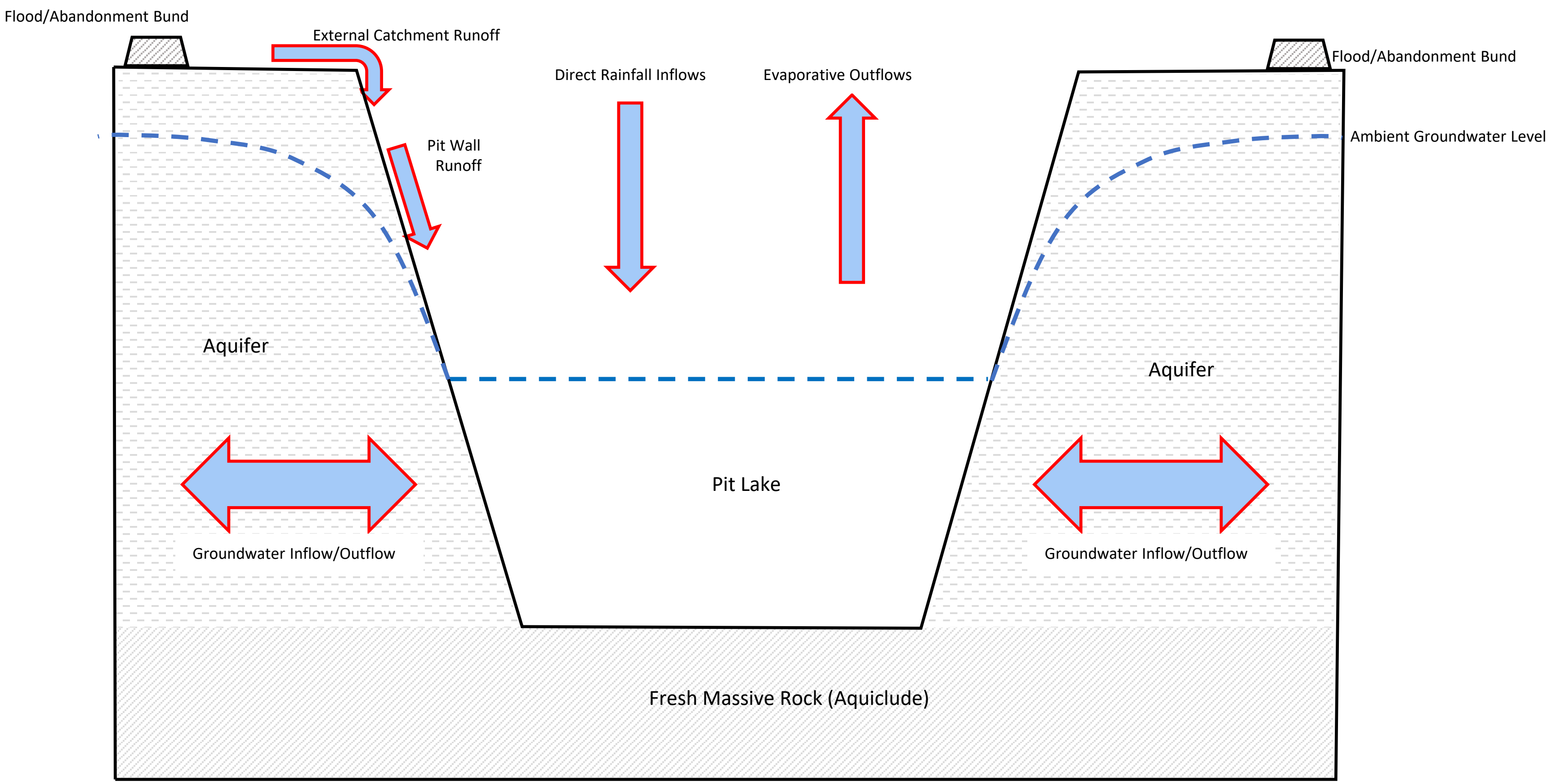
Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Coordinate System
GDA94 Zone 50

SCALE 1:10,000
0m 500m

Legend
Shear zone
drawdown contour (m)
Proposed pit & infrastructure

FILE:/Jobs 2023/J2320/Figures/Surfer/Fig 4 Fieldings Gully drawdown extents.srf



GROUNDWATER RESOURCE MANAGEMENT

FIGURE 9
FIELDINGS GULLY WATER BALANCE SCHEMATIC

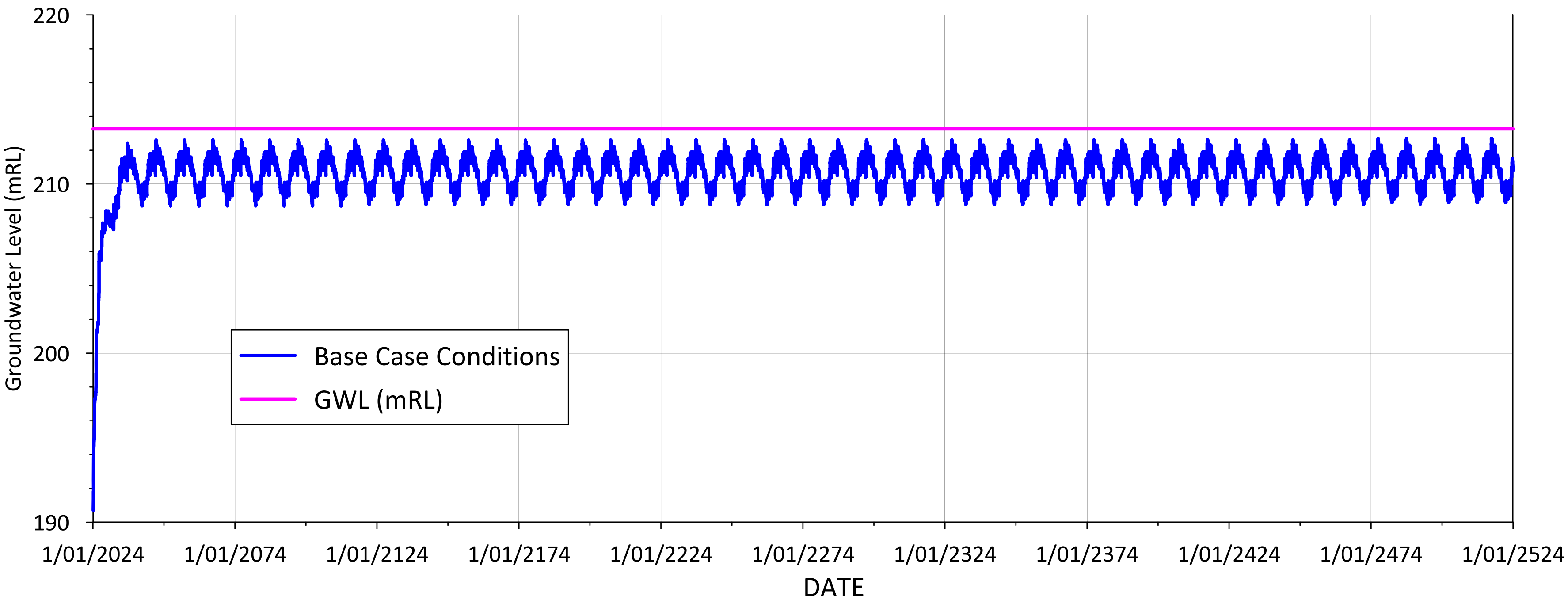
Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

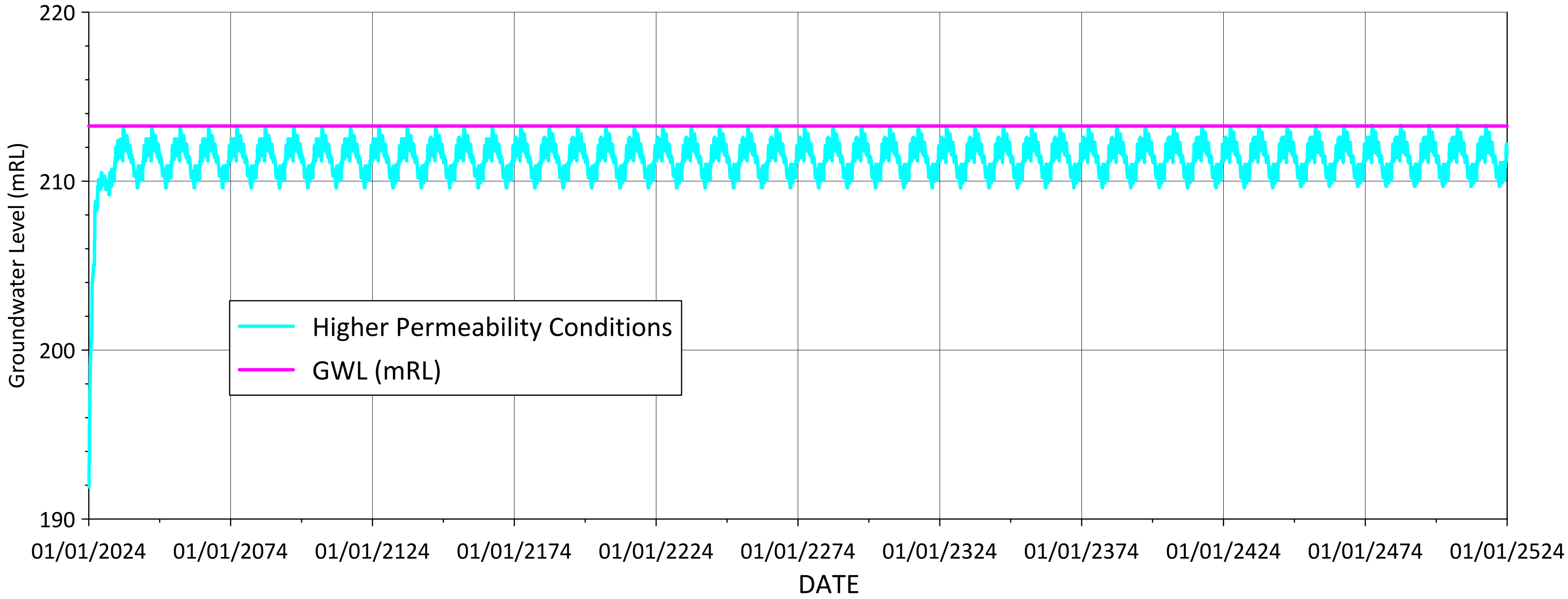
Notes
Not to scale

FIGURE 10
FIELDINGS GULLY
POST CLOSURE
PIT LAKE LEVEL

Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Notes:





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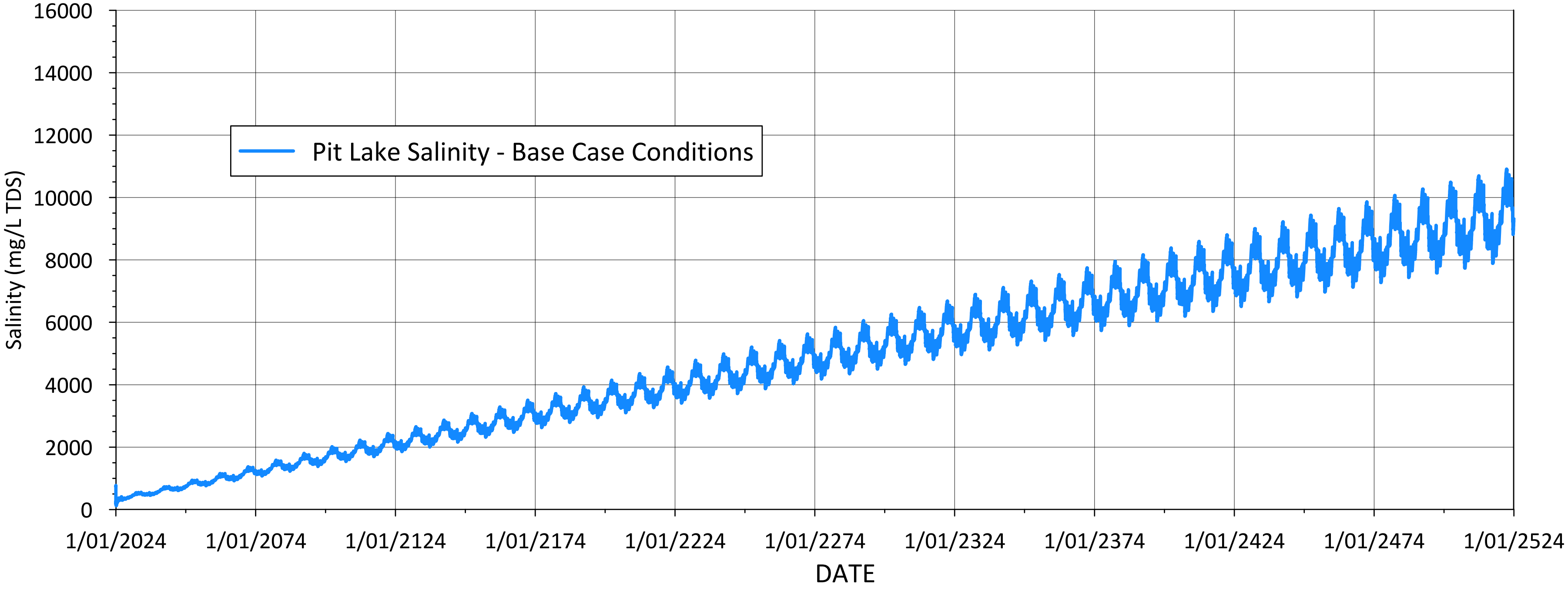
D:\GRM Dropbox\GRM Team Folder\Jobs 2023\J2320 Fieldings Gully dewatering\figures\grapher\Pit Lake Closure Salinity_500 year.grf

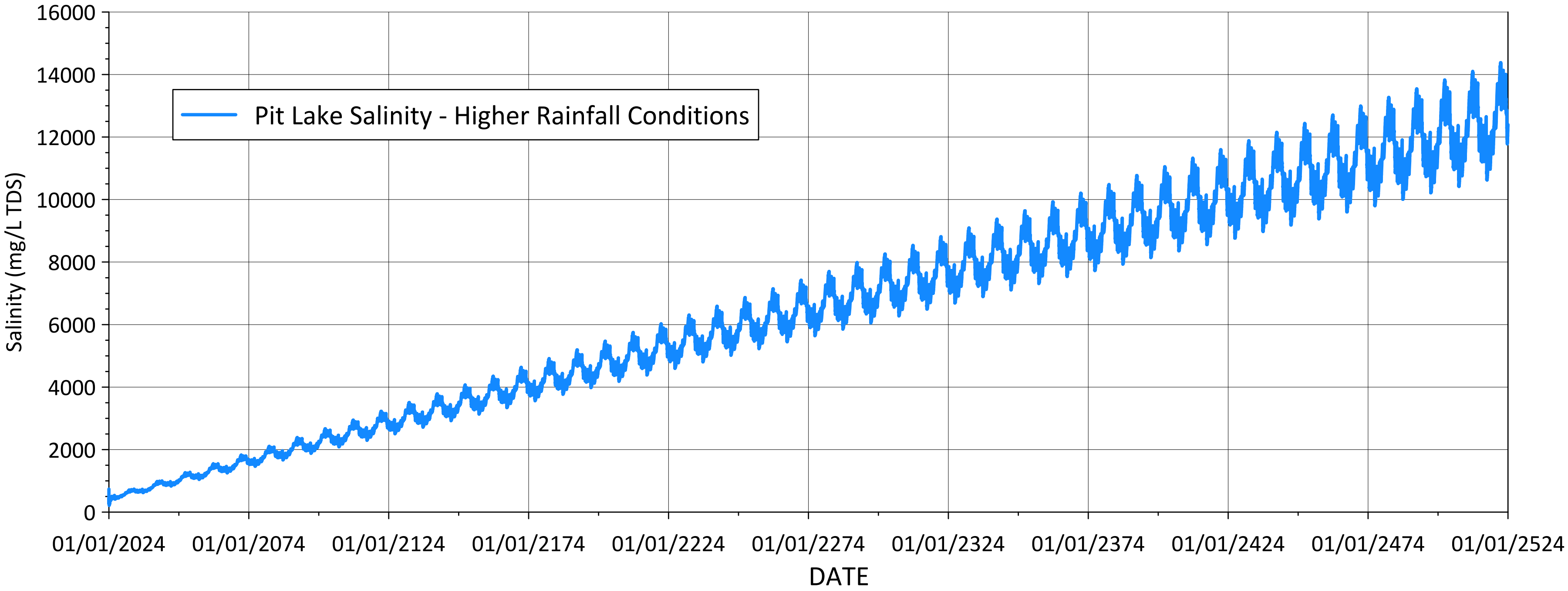
GROUNDWATER
RESOURCE MANAGEMENT

FIGURE 11
FIELDINGS GULLY
POST CLOSURE
PIT LAKE SALINITY

Date Aug 23
Client Calidus Resources
Project Fieldings Gully DW
Document J2320M01

Notes:





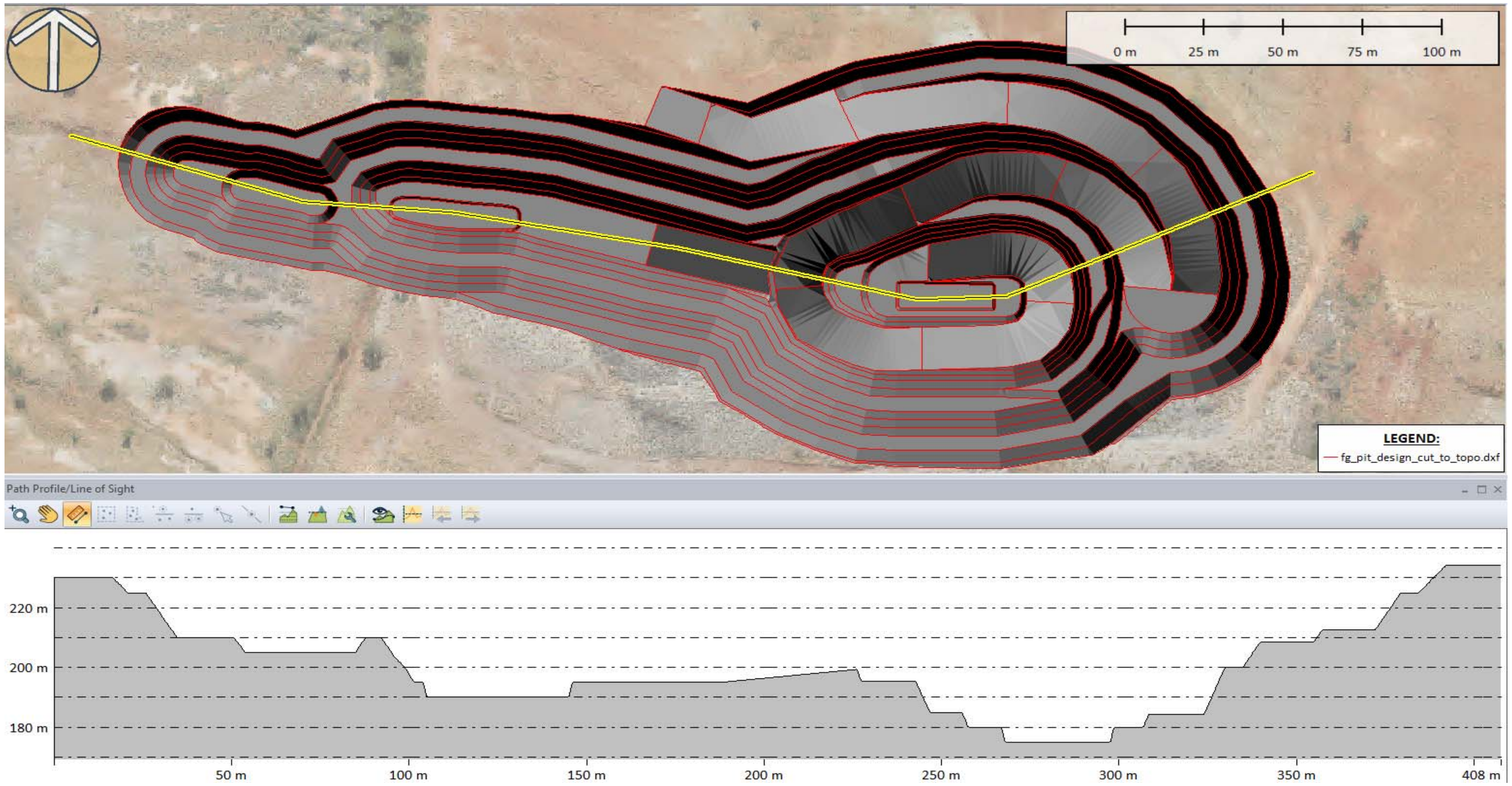
Attachment A

Fildings Gully Elev-Storage-Area Realtionship

A. Lowry Aug-23

Elev (mAHD)	Volume (m3)	Area (m2)
175	0	0
177	524	274
179	1,087	308
181	2,245	930
183	4,512	1,323
185	7,566	1,737
187	11,705	2,297
189	16,739	2,725
191	22,979	3,506
193	30,476	4,018
195	38,972	4,473
197	50,618	6,258
199	64,067	7,205
201	79,712	8,456
203	97,524	9,367
205	117,191	10,304
207	139,626	11,739
209	164,176	12,826
211	193,692	16,730
213	228,299	17,881
215	265,251	19,065
217	304,571	20,270
219	346,291	21,459
221	390,433	22,660
223	437,026	23,919
225	486,096	25,191
227	545,857	30,390

Spills at 227 mAHD



RL	Slice Volume (m3)	Cum Volume (m3)	RL (m)	Volume (m3)	Surface Area (m2)	RL	Runoff SA (m2)
29	0	0	175	0	0	175	95500
28	524	524	177	524	274	177	95226
27	564	1087	179	1087	308	179	95192
26	1157	2245	181	2245	930	181	94570
25	2268	4512	183	4512	1323	183	94177
24	3054	7566	185	7566	1737	185	93763
23	4139	11705	187	11705	2297	187	93203
22	5034	16739	189	16739	2725	189	92775
21	6240	22979	191	22979	3506	191	91994
20	7497	30476	193	30476	4018	193	91482
19	8496	38972	195	38972	4473	195	91027
18	11646	50618	197	50618	6258	197	89242
17	13450	64067	199	64067	7205	199	88295
16	15645	79712	201	79712	8456	201	87044
15	17812	97524	203	97524	9367	203	86133
14	19666	117191	205	117191	10304	205	85196
13	22436	139626	207	139626	11739	207	83761
12	24550	164176	209	164176	12826	209	82674
11	29516	193692	211	193692	16730	211	78770
10	34608	228299	213	228299	17881	213	77619
9	36951	265251	215	265251	19065	215	76435
8	39320	304571	217	304571	20270	217	75230
7	41720	346291	219	346291	21459	219	74041
6	44143	390433	221	390433	22660	221	72840
5	46593	437026	223	437026	23919	223	71581
4	49069	486096	225	486096	25191	225	70309
3	59761	545857	227	545857	30390	227	65110