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Dear Alex and Gemma

Hydrogeological Studies Groundwater Modelling -Coolgardie Feasibility Tasks (2021)-Focus Minerals

1. Focus Minerals Requirements

Focus Minerals (FML) is currently exploring across its Coolgardie tenement package and has identified several potential resources which it is intending to bring to feasibility stage. As part of this feasibility work, groundwater studies will be required. Two previous work packages from AquaGeo detailed the Frequency Domain Electromagnetics geophysical traverses above GreenField's Pit and a provided a Scope of Work for Construction and Position of Monitoring Bores for the CGO Project.

2. Background

Focus Minerals Ltd (FML) owns the Coolgardie Gold Operations (CGO), which includes over 210 square km of leases and includes the Three Mile Hill (TMH) gold treatment plant in the Coolgardie region of Western Australia (Figure 1).

FML suspended mining at the CGO, placing it into Care and Maintenance on 31 August 2013. The CGO remains in Care and Maintenance to date.

3. Coolgardie Climate

The climate of the Coolgardie region is described as arid non-seasonal to semi-arid Mediterranean. This is characterised as an arid climate with cool winters and hot, dry summers.



The long-term mean maximum and minimum temperatures recorded at the Kalgoorlie-Boulder Airport Station for January are 36.6°C and 29.9°C respectively and for July are 20.2°C and 13.9°C respectively. The records also indicate that rainfalls are irregular and most rain falls during summer and early winter months (January to March and May to June). In the summer months, heavy falls are generally associated with the passage of the remnants of cyclones, or thunderstorms.

The average annual rainfall of 264.9 mm is exceeded by the average annual evaporation rate of approximately 2,640 mm by a factor of almost 10 to 1.

Evaporation exceeds rainfall in all months of the year, with June having the lowest daily evaporation and January having the highest daily evaporation.

Groundwater Recharge from rainfall into the fractured rock aquifers that make up the deposits of CGO is expected to be very low due to the high evaporation rate.

4. Hydrogeology

The greenstone rocks in the Kalgoorlie 1:250,000 sheet area, which includes Coolgardie area are described as generally hosting local aquifers containing saline to hypersaline groundwater (Kern, 1995). Groundwater storage is limited to secondary porosity present in discrete, local-scale fractures. The identification of aquifer boundaries during test pumping in adjacent deposits demonstrates the limited areal extent of the aquifers. Based on the limited interconnectivity of the aquifer zone (Kern, 1995), aquifer recharge is likely to be local.

The fractured bedrock is characterized by secondary permeability resulting from tectonic and decompression fracturing enhanced by chemical dissolution along fracture lines. Fractured-bedrock aquifers occur more commonly in mafic, ultramafic, and granitic rocks than in sedimentary or felsic volcanic and volcanoclastic rocks. Open fractures occur up to a depth of 125 m along major faults and shear zones (Kern, 1995)

4.1 CGO Hydrogeology Data Availability

The hydrogeology of CGO operations is well described for the Bonnie Vale palaeochannel aquifer borefields (Nine Mile Dam Borefield and Roger Springs Borefield). For the mining area the aquifers are mainly fractured rock and generally poorly described.

Some hydrogeological information exists on previously mined areas such as Bayleys Mine, Tindal's Mine and Greenfields Pit. This is mainly related to dewatering operations at Bayley's Mine, Tindal's Mine and the Greenfields Pit.

Groundwater at Bayley's, Tindals and Greenfields is contained in fractured and deeply-weathered-bedrock aquifers. Bedrock in this area generally comprises mafic and ultramafic rocks of Archaean age.



4.3 Greenfields Mine Area

The Greenfields Pit is located to the northeast of the TMH treatment plant. There are production and monitoring bores in the vicinity of the Greenfields Pit. The monitoring bores are for the adjacent Tailings Storage Facility (currently under Care and Maintenance), managed under a separate DWER (former 'Department of Environment Regulation (DER)') license (Environmental Licence L8249/2008/2).

Greenfields Pit was historically used to store water from Bayley's Mine. The pit water previously comprised a mixture of surface run-off and groundwater seepage. In 1995, groundwater inflow to the Greenfields Pit was estimated to be about 190 kL/d (Rockwater, 2010). Rockwater 2010 reported the pit floor extends to a depth of between 100 to 106 m and the total pit volume is estimated to be about 2,300,000 kL. This figure is excessive and definitely wrong and will need to be recalculated once the elevation of the pit water level is known. At this stage there is no access to measure the level due to slope failures.

Upon recommissioning of the processing plant in December 2009, water was abstracted from the Greenfields Pit for use as process water at a rate of approximately 100 kL/day. After this water abstraction ceased in April 2010, survey levels showed there to be 9,900 kL of water remaining. Based on this our calculation is that dewatering occurred for approximately 244 days at 100kl/day gives a volume of 24,400kl abstracted would mean that the abstraction rate was below the recorded potential inflow rate of 190kL/day during mining in 1995 so the water level should remain constant with 9900kL of water in the pit.

As of October 2012, the water abstracted (recorded as approximately 4,000 kL) had emptied the stored water in the Greenfields Pit (CGO Groundwater Monitoring Report 2019).

Water has accumulated in the Greenfields Pit through rainfall and surface runoff since the CGO was put under care and maintenance in August 2013. Due to instability issues no water abstraction or water monitoring has occurred at the Greenfields Pit. For modelling purposes it is assumed that there is 9900kL of water stored in the pit as the higher figure.

4.4 Tindal's Mine and Brilliant Open Pit - GWL 160936 (3)

Water from the Tindal's underground operations was primarily used underground. Excess water from the operations was discharged into Brilliant open pit via HDPE piping in a V- drain. There are no monitoring bores at Tindal's mine or Brilliant open pit.

The underground Tindals and Cyanide mines which formed part of the Tindals' Complex had very low yields associated with their underground mining. Tindals was recorded as having a groundwater elevation of 190mbgl with an inflow of 6-8l/s and Cyanide Underground was recorded as having a water level of 120mbgl with an inflow of 6-8l/s. This is relatively negligible seepage and mean that Alicia and Dreadnought Deposits possibly will have little water infiltration associated with them depending on what depth they are mined.

4.4 General Aquifer Parameters

There is no record of aquifer parameters for any of the CGO Feasibility deposits. This may be due to the low volumes of water encountered and the simple dewatering. Data has been extrapolated from aquifer



studies done to the MacPhersons Reward Deposits (Rockwater, 2017) adjacent to CGO to the southeast and utilized in the groundwater model.

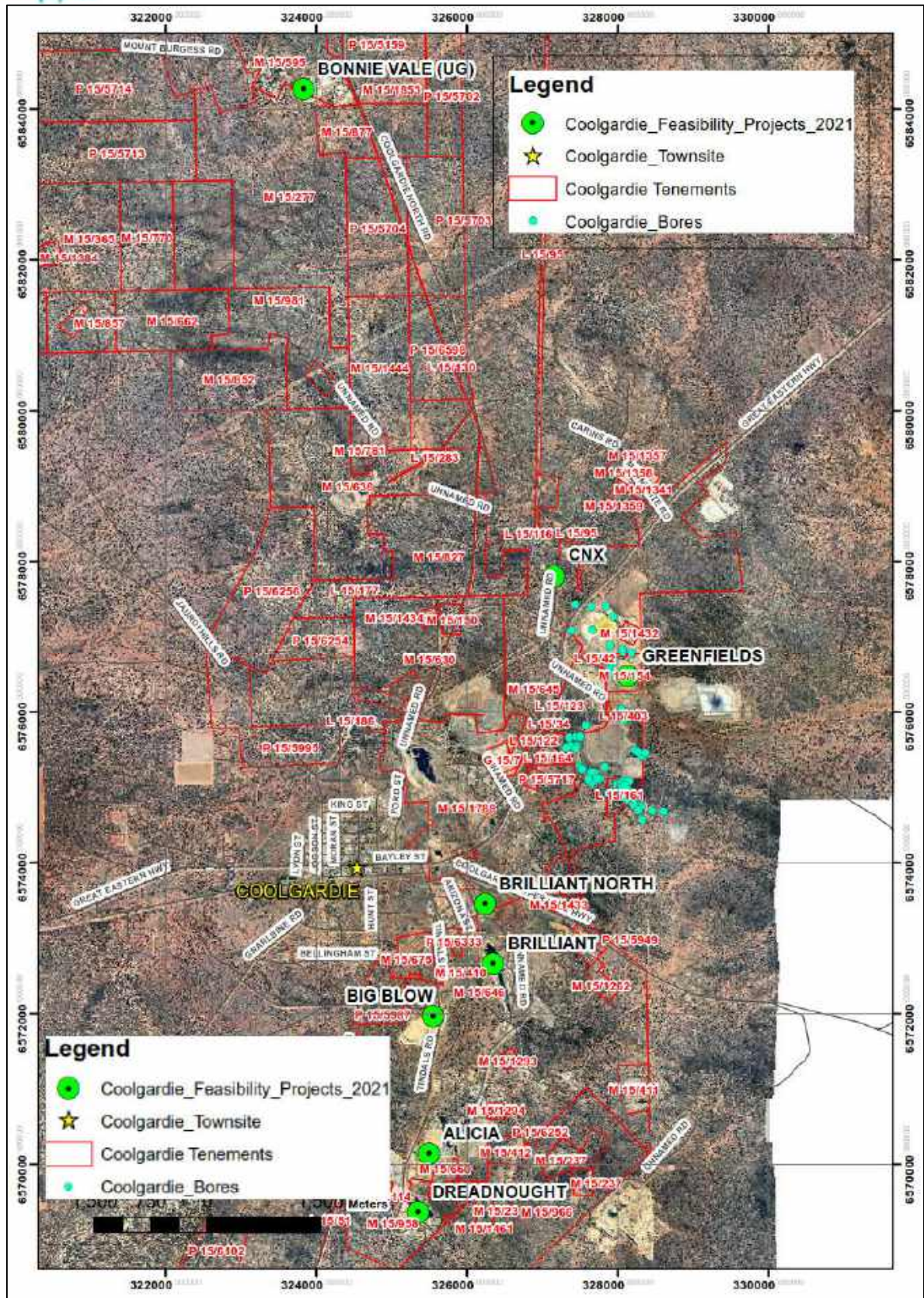
5 Coolgardie Feasibility Projects Modeling

The general objective for Hydrogeological studies across the Coolgardie Project is to bring the project to feasibility level to aid future mining design and approval applications.

The following projects are detailed as needing feasibility studies. The following hydrogeological information has been provided for the projects.

- 1) Greenfields Project -This has existing groundwater monitoring from bores in the vicinity which mainly monitor Three Mile Hill TSF however no monitoring of the pit water level has been done since 2013. There is some information on the previous dewatering and infiltration rates. A pit shell has been provided as a dxf file. A groundwater model has been completed. Groundwater Levels for the Three Mile Hill TSF area are available.
- 2) Bonnievale Project – No Hydrogeological Information is available. A dxf of the proposed underground mine has been provided. There is no access to the existing shafts due to instability and no water levels are available. No groundwater model has been completed as there is a lack of parameters and water levels.
- 3) CNX Project – No Hydrogeological Information is available. There is access to the existing pit water levels and to exploration bores surrounding the pit. From this a groundwater evaluation has been calculated. CNX dxf files for the pit have been provided along with a preliminary mining schedule. A groundwater model has been completed.
- 4) Brilliant Project – No Hydrogeological Information is available. Access is available to the pit which is dry. Adjacent exploration bores have been drilled and local water levels estimated. A DXF of the proposed pit has been provided. A groundwater model has been completed.
- 5) Alicia Project – Limited hydrogeological information relating to the old Tindals (Empress and Tindals underground) has been located. No DXF for the mine pit has been provided
- 6) Big Blow / Happy Jack Project – No Hydrogeological Information. No DXF for the mine pit has been provided.
- 7) Dreadnought Project – No Hydrogeological Information. No DXF for the mine pit has been provided.

Assumptions have been made on the aquifer parameters for all pits as there is no detailed hydrogeological parameters and, in some cases, no recorded water levels. More detailed drilling and aquifer testing will be required to firm up parameters for each deposit.



5.1 CNX Pit Modeling

The CNX Deposit (formerly Caledonia North Extended) is immediately north-west along strike and contiguous with the Three Mile Hill open-cut mine. The deposit was last mined in 1992 as a shallow 30-35m deep and 270m long north-west striking pit. There are no records of water flows during mining.



Figure CNX Existing Pit with Shallow Water

Assumptions have been made on the aquifer parameters for this pit as there is no detailed hydrogeological parameters. More detailed drilling and aquifer testing will be required to firm up parameters for each deposit.

Measurement of an inclined bore near the CNX pit shows the water level is at approximately 399m AHD. Measurement of the pit water level is at 397m AHD which is probably drawn down due to evaporation.

AquaGeo was supplied a mine timeline that mining will take two years and extract down to a depth of 90mbgl.

A simple groundwater model was constructed for the CNX Pit.

The model shows for Year 1 dewatering will start slowly through sump pumping and then occur at an increasing rate of up to 150kL/day to draw the pit down below 373m AHD. Approximately 32000kL of water will be dewatered over this period. At the end of Year 1 the excavated base of pit is anticipated to be around 373m AHD.

As depth increases the flow of water into the pit will increase. At the end of Year 2 the base of the pit is anticipated to be below 328mAHD. Approximately 135050kL (370kL/day) will have to be dewatered in the second year to get to base of pit.

It is estimated that CNX can be dewatered by pumping relatively small volumes of water from in-pit sumps. The dewatering pumping rates will, however, be dependent on if fractures are intersected and the extent of these fractures.

Recent drilling has encountered a fault zone with larger volumes of water (Pers.Comm. Alex Aaltonen) but the extent of the fault zone and the transmissivity of the aquifer is not known. Further investigations will be required. A monitoring bore is planned for CNX pit and a production bore should be drilled in the high yielding fault zone to determine if there will be a more significant volume of water.

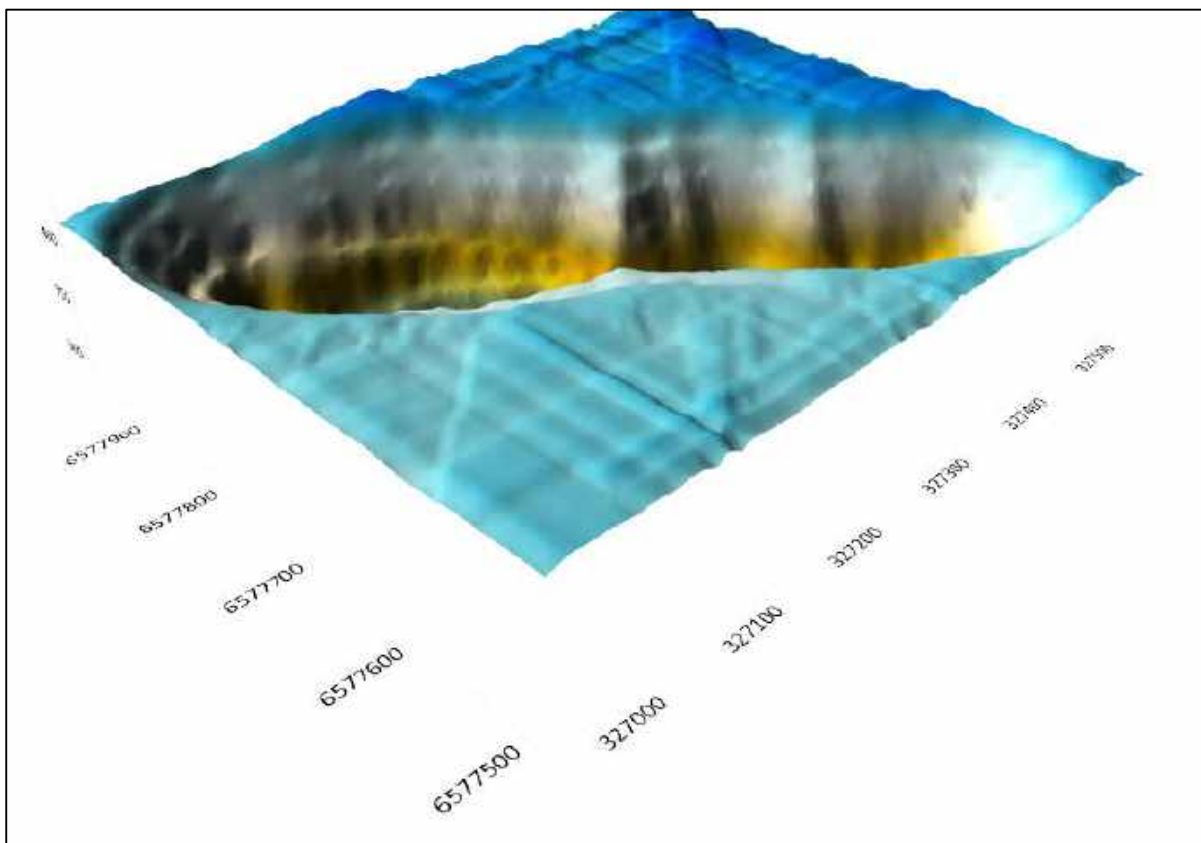


Figure 2 CNX Pit Topography for Groundwater Model

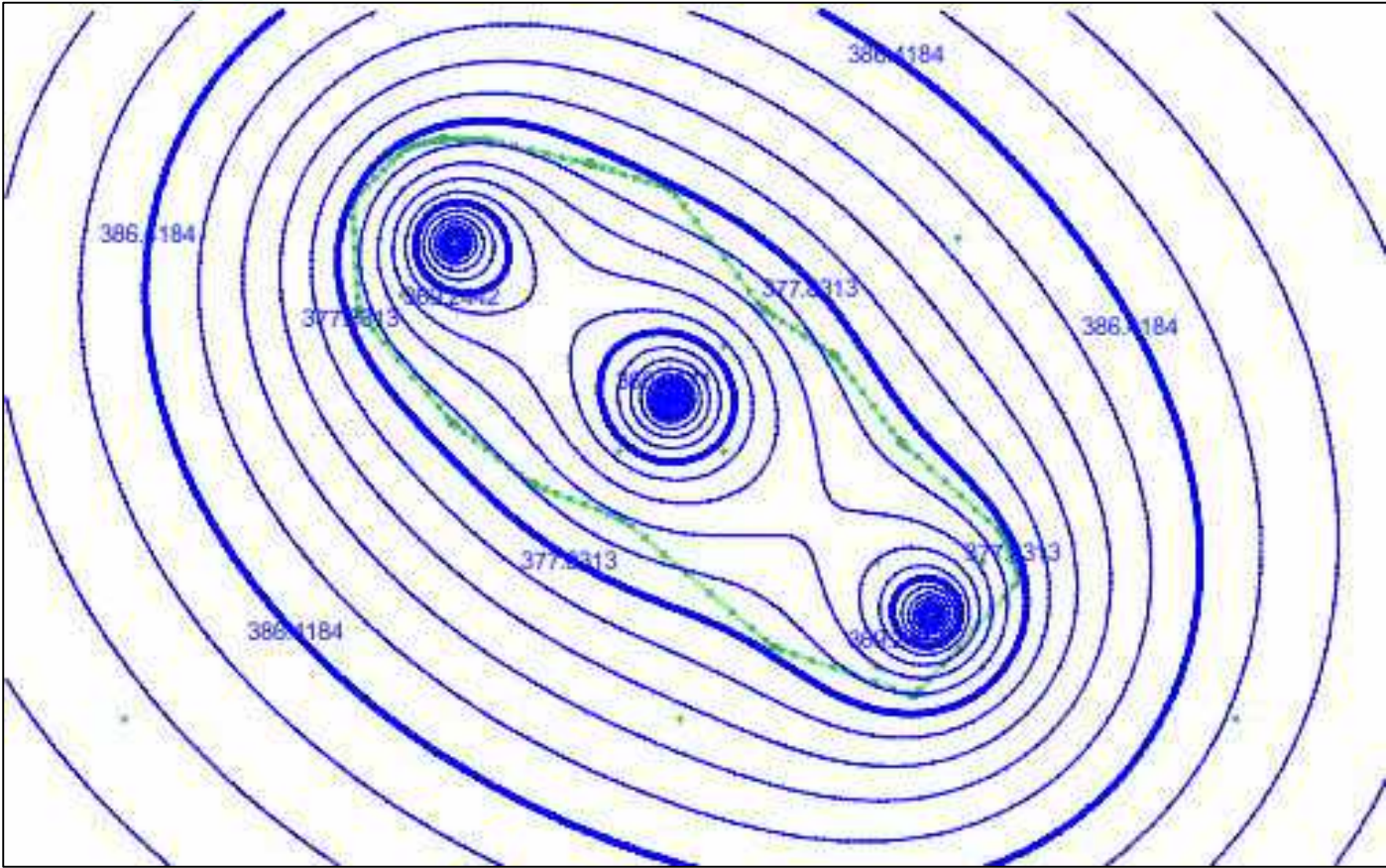


Figure 3 CNX Pit Drawdown Contours at end of Year 1

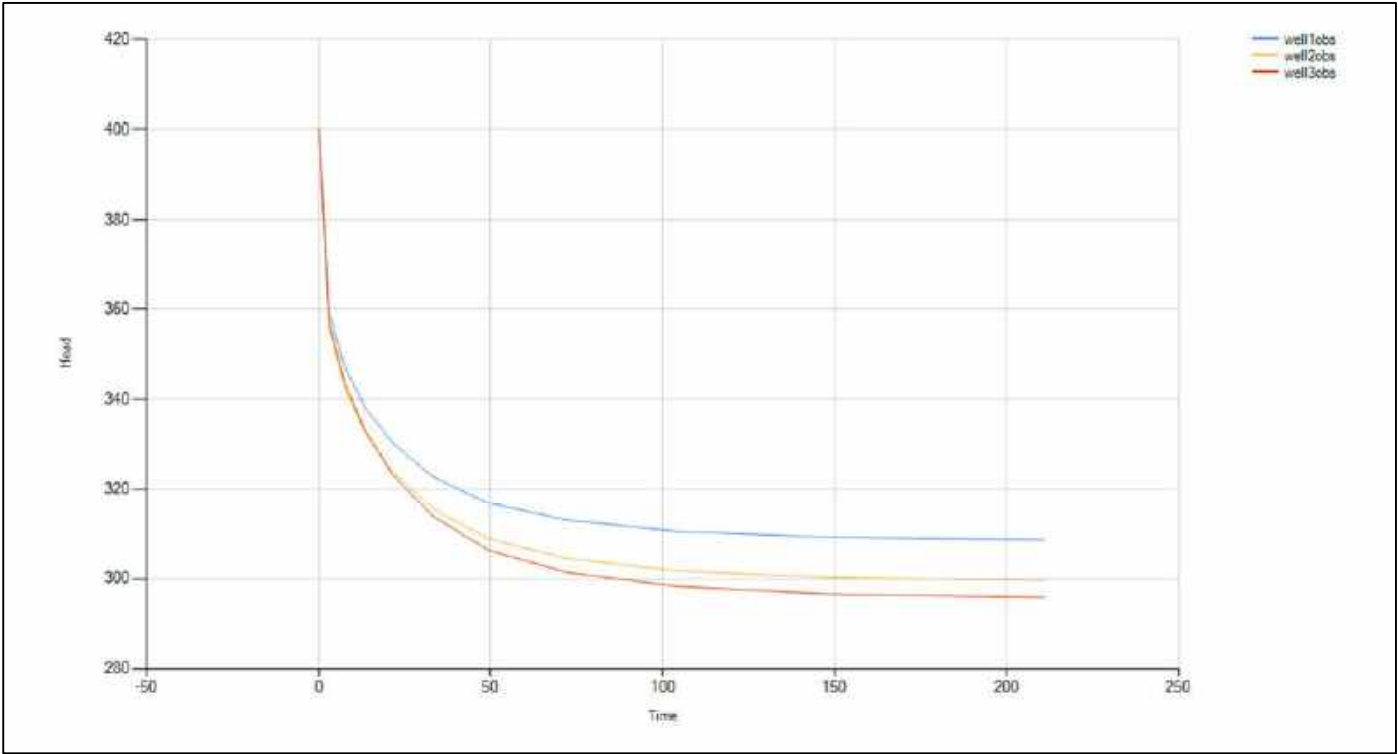


Figure 4 CNX In-Pit Dewatering Observation Points showing Drawdown (Year 1)

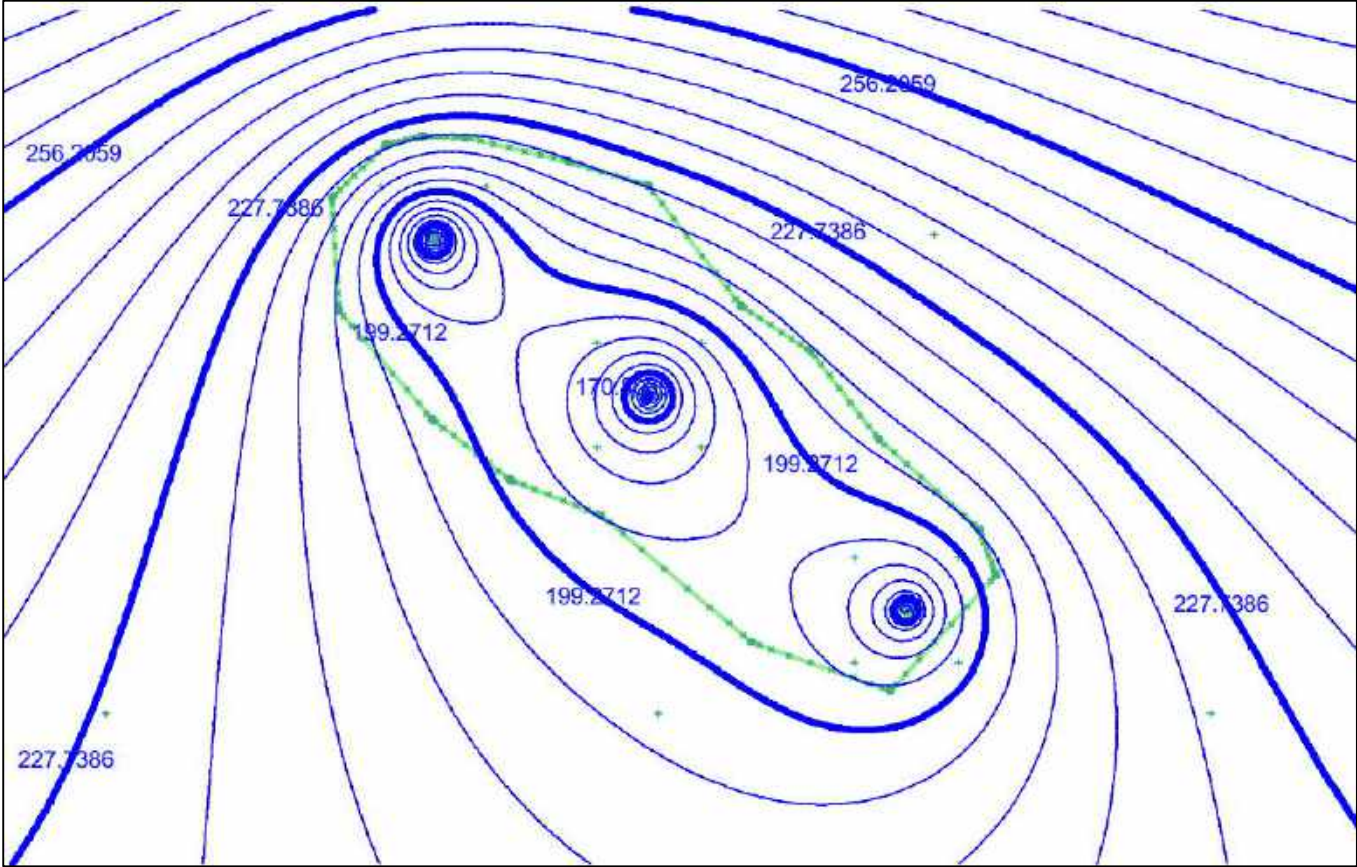


Figure 5 CNX Pit Contour drawdown Plot end of Year 2 Mining

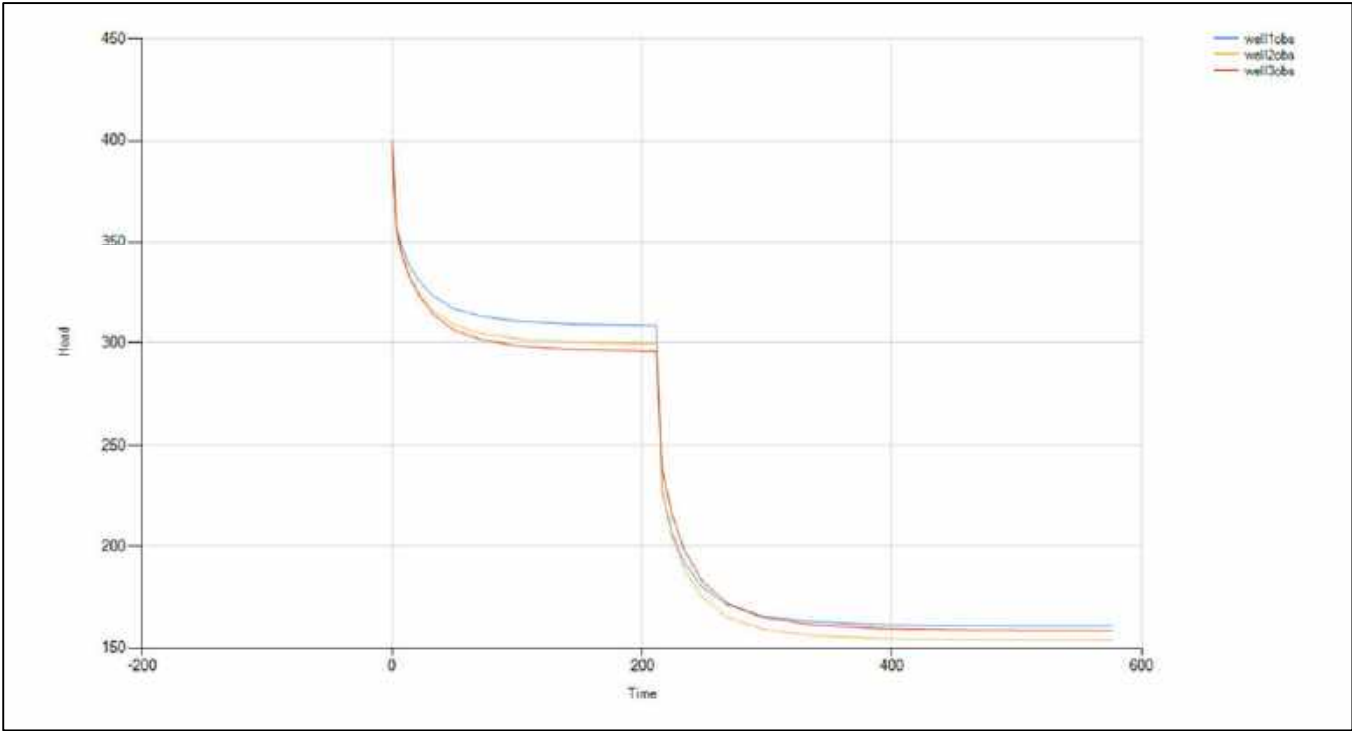


Figure 6 CNX In Pit Observation Points showing Drawdown (Year 1 and Year 2)

5.2 Brilliant Open Pit Modeling

Brilliant Open Pit geology consists of vertically inclined Mafic Greenmount sill adjacent to Feldspar Porphyry and Brilliant Komatiite (Figure 7).

Aquifer parameters have been estimated from hydrogeological studies on adjacent mine sites and volumes and drawdowns must be seen as estimates. The geology appears to be intersected by a structure (possibly a fault) cutting through the centre of the deposit. This could alter the hydrogeological properties of the pit significantly changing the necessary abstraction volumes and should be investigated at a later stage through drilling and testing a targeted abstraction bore. The volumes calculated below are not significant and can probably be managed by in pit-sump pumping.

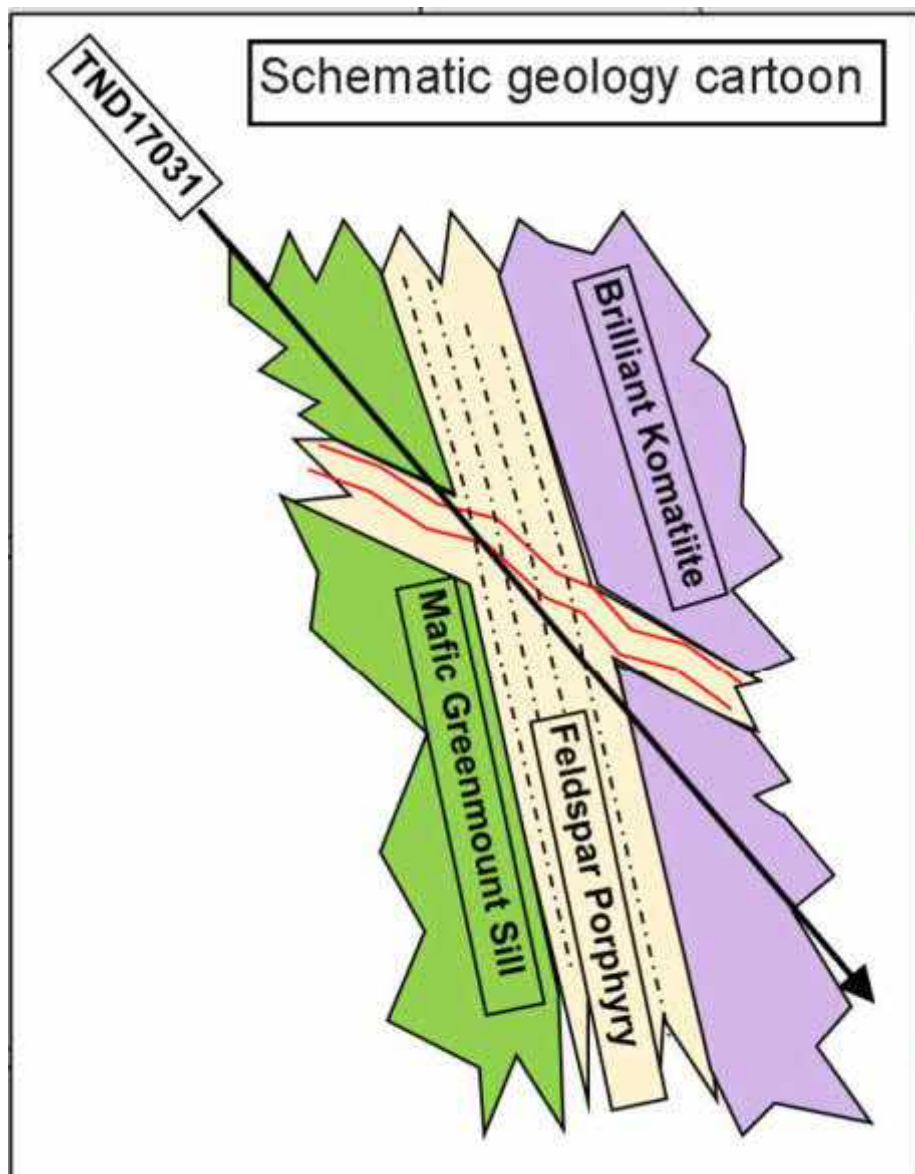


Figure 7 Schematic Geology Cartoon -Brilliant Pit(2020 Coolgardie PFS)



Figure 8 Brilliant Open Pit

The PFS for Brilliant Open Pit shows the mining will take place over 60 months (3 years). The current mine pit has a top elevation around 470mAHD and a base elevation at approximately 395mAHD.

The static water level measured around Brilliant Pit in inclined bores shows that the water level is around 372mAHD. This appears to be approximately 10m below the lowest elevation of Brilliant Pit at present.

A model was constructed using aquifer parameters which have been estimated from hydrogeological studies on adjacent mine sites and volumes and drawdowns must be seen as estimates. Based on 60 Production Months to Mine Brilliant (2020 Coolgardie PFS) an assumption has been made that Year 1 of production (assuming approximately 54m depth advance per year) would be mainly cutbacks and dry mining above 372m (water level) with limited dewatering mainly aimed at surface runoff and minor seepage.

As mining progresses in Year 2 down to a depth of 317m the dewatering volumes are estimated to be 180kl/day (65700kl/annum).

For Year 2 of production (Year 1 of dewatering) the drawdown at the pit will be 317m (Figure 9).

A higher rate will be required as the pit becomes deeper. For Year 3 of production, the modeling shows that for a rate of 360kL/day (131,400kL/annum) there is drawdown to the base of Brilliant Pit based on the mine plan (Figure 11, 12 and 13).

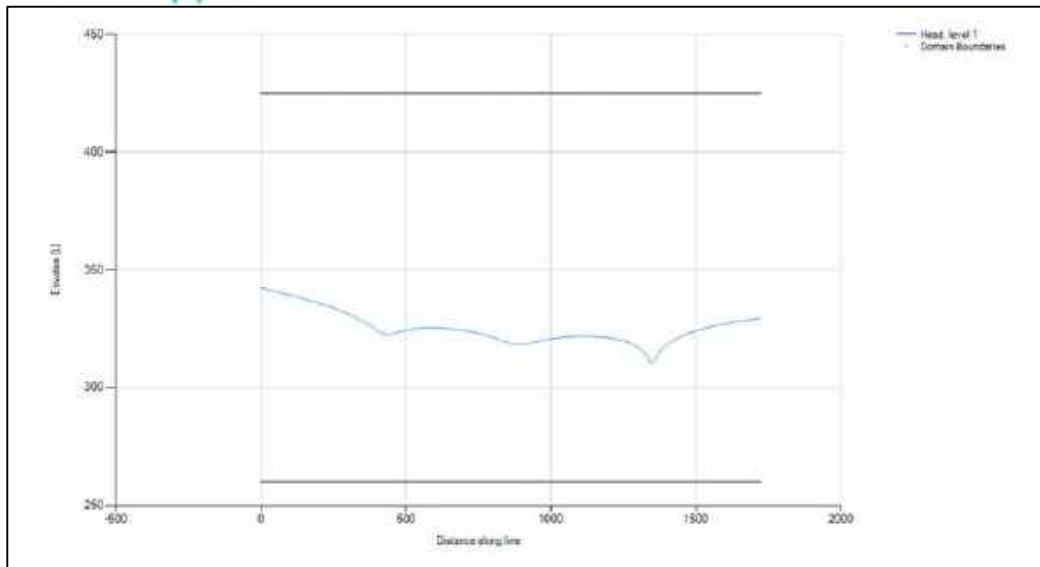


Figure 9 Transect across Brilliant Open Pit plot of drawdown end of Year 2 (year 1 dewatering) at 180kl/day (65700kl/annum)

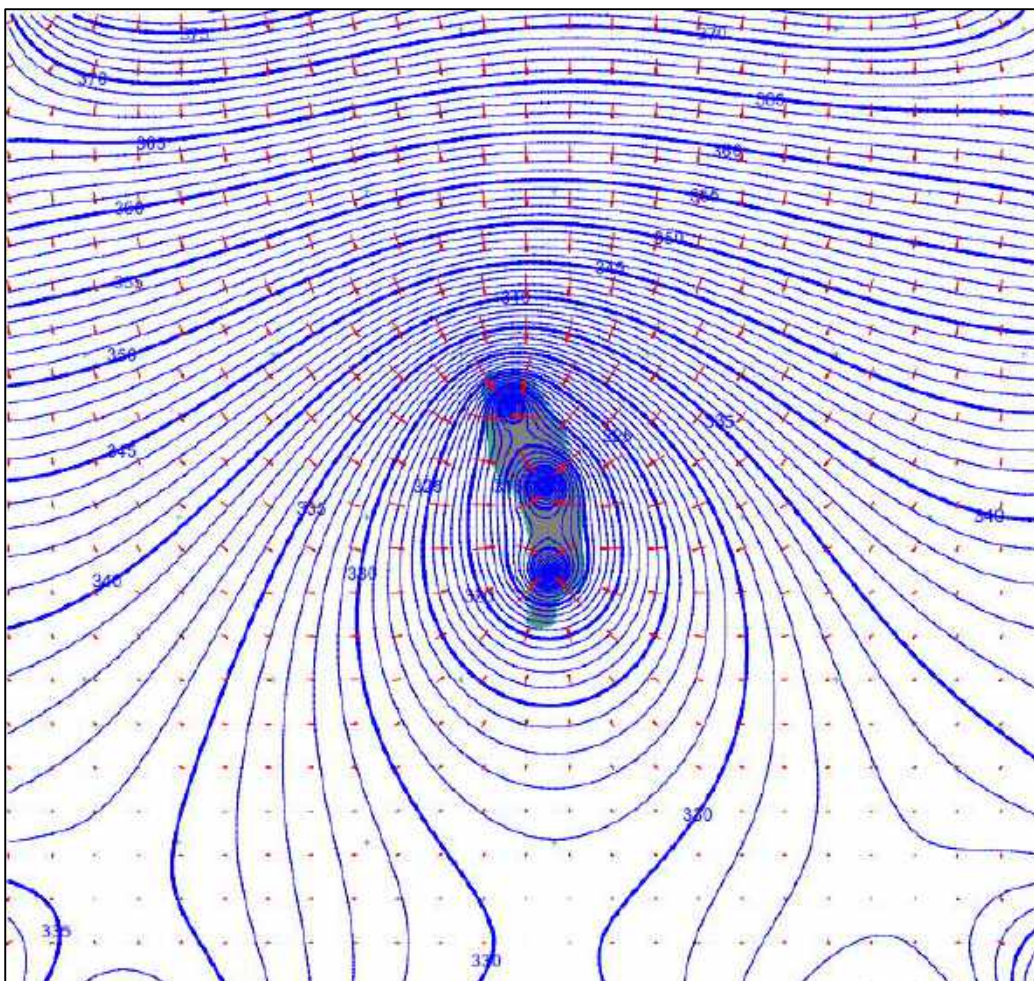


Figure 10 Contour plot showing drawdown to 317m at end of year 2 (year 1 dewatering) at 180kl/day (65700kl/annum).

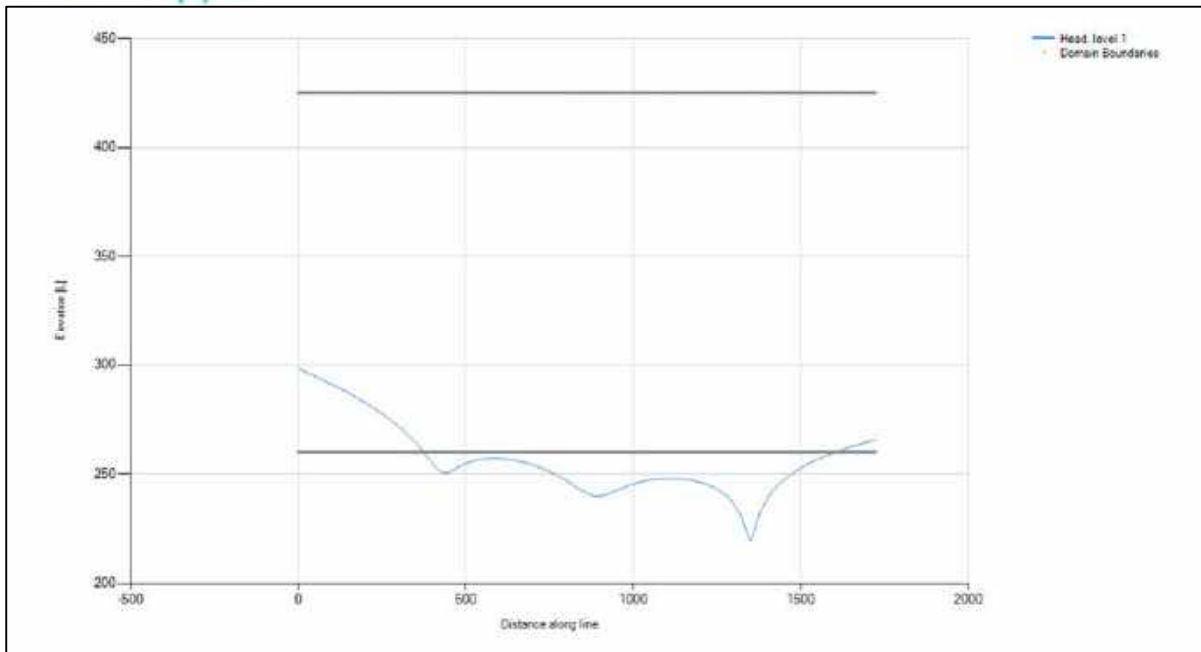


Figure 11 Transect across Brilliant Open Pit plot of drawdown at end of year 3 (year 2 dewatering) at 360kL/day (131,400kL/annum). Base of pit is at lower black line elevation.

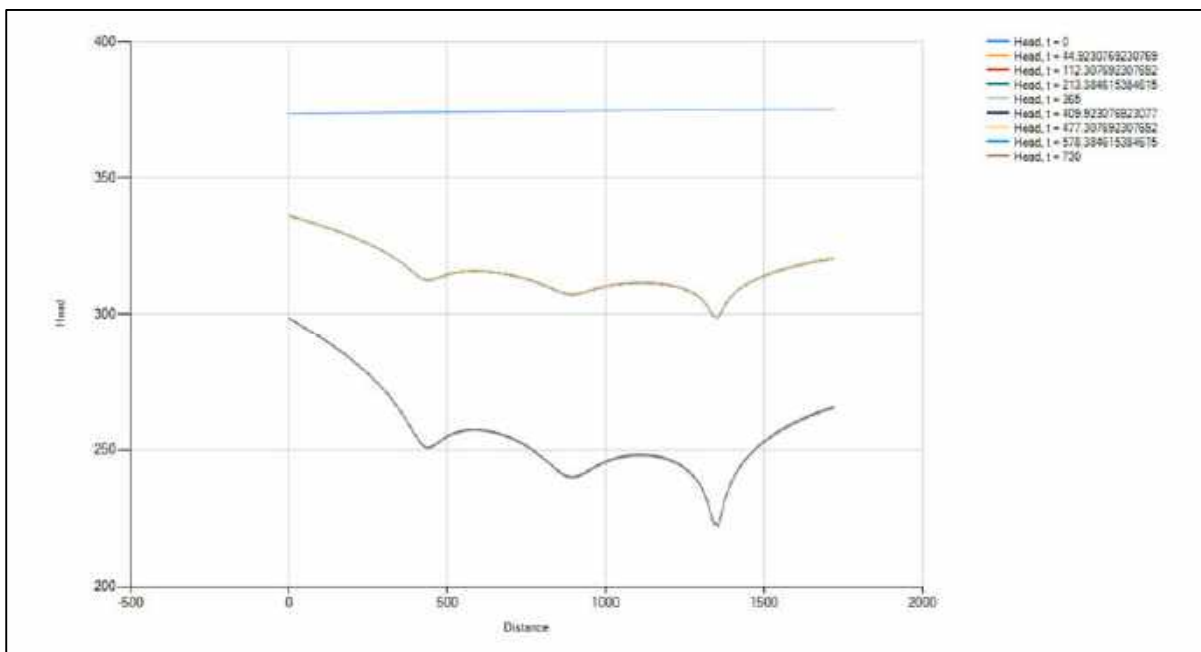


Figure 12 Transect across Brilliant Open Pit plot of drawdown at end of year 1 mining (blue line), year 2 mining (brown line) (year 1 dewatering) and Year 3 mining (year 2 dewatering)

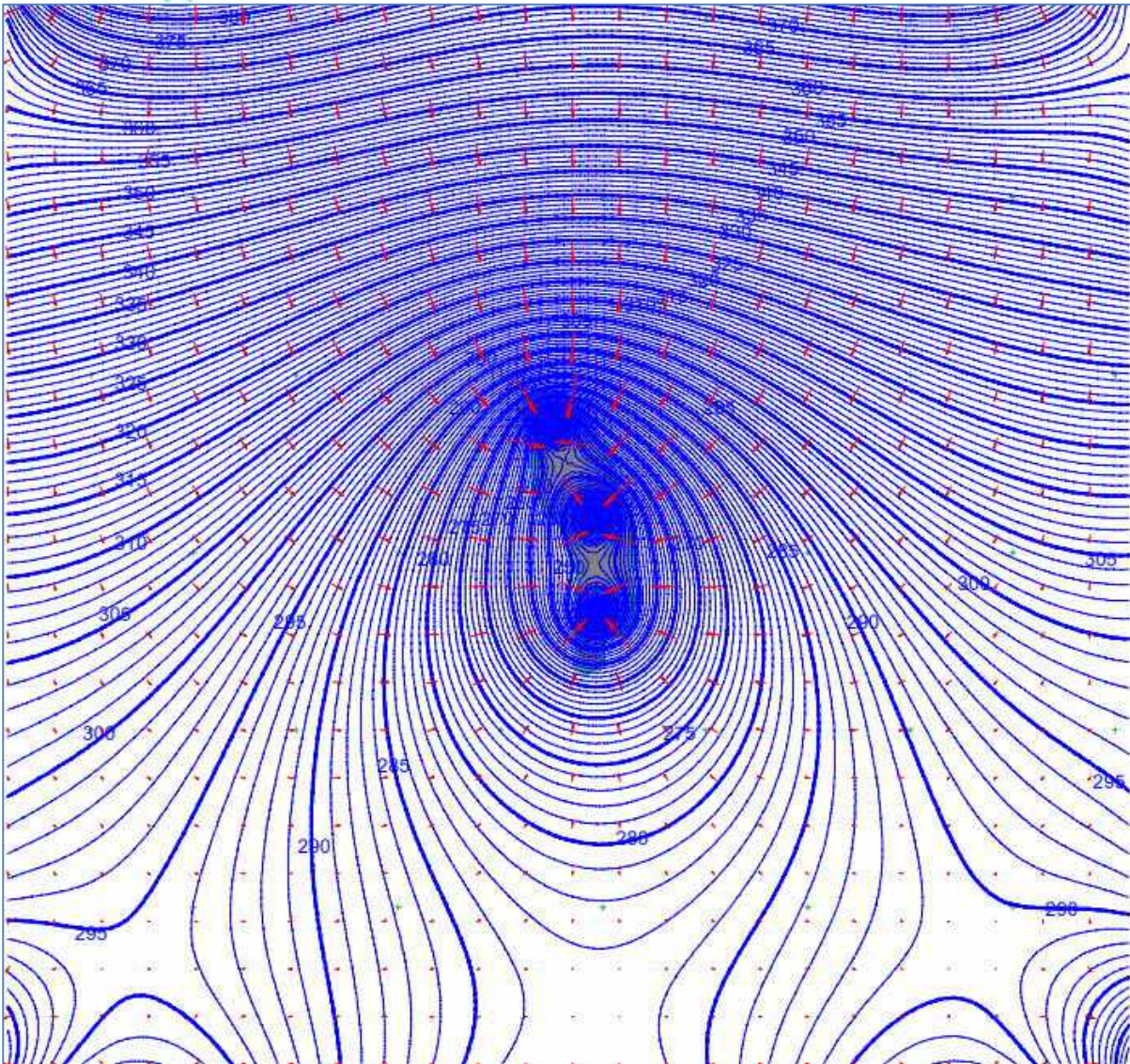


Figure 13 Contour plot of drawdown at Brilliant Open Pit at end of year 3 (year 2 dewatering) at 360kL/day (131,400kL/annum)

5.3 Greenfields Open Pit Modeling

The Greenfields Open Pit (OP) Gold Deposit is located 3.8km north-east of the Coolgardie township and 400m east of Focus' Three Mile Hill processing plant (Figure 1).

Greenfields was mined by Focus for a short period in 2013. However, mining indicated major reconciliation variance between resource and mined/milled production and mining was stopped.

Historically dewatering was licensed for a maximum of 200,000kL/annum for abstraction from Greenfields Pit.



Figure 14 Greenfields Pit showing water in pit and slumping of Pit Wall on Northern Side

No recent water levels have been taken for Greenfields Pit as there is no access to the pit. The deeper aquifer is not monitored around Greenfields Pit by any of the monitoring bores which were installed mainly to monitor the shallower TSF water levels.

Water levels around Greenfields Pit have been strongly influenced by mounding due to tailings discharge at Three Mile Hill TSF. In 2013 during operations, the static water level was recorded at 416m which is believed to be caused by mounding. There has also been a recorded increase in water level up 58m at the adjacent Three Mile Hill monitoring Bores during 2010.

Recent dipping of the Three Mile Hill monitoring bores shows an elevated groundwater level in monitoring bores from between 390-400mAHD. This water is assumed to form a fairly shallow water body which is leaking into Greenfields Pit and has caused slope instability. From a dewatering perspective this could be managed through interception bores, cut-off trenches, horizontal drains or cut off walls specifically to ensure the North Wall stability.



Our assessment is that the present water level is probably around 385m depth naturally in the aquifer surrounding the pit and may be drawn down in the pit slightly due to evaporation.

Greenfields Pit was historically used to store water from Bayley's Mine. The pit water previously comprised a mixture of surface run-off and groundwater seepage. In 1995, groundwater inflow to the Greenfields Pit was estimated to be about 190 kL/d (Rockwater, 2010). Rockwater, 2010 reported the pit floor extends to a depth of between 100 to 106 m and the total pit volume is estimated to be about 2,300,000 kL. This figure is excessive and will need to be recalculated once the elevation of the pit is known.

Upon recommissioning of the processing plant in December 2009, water was abstracted from the Greenfields Pit for use as process water at a rate of approximately 100 kL/day. After this water abstraction ceased in April 2010, survey levels showed there to be 9,900 kL of water remaining. Based on this our calculation is that dewatering occurred for approximately 244 days at 100kL/day gives a volume of 24,400kL abstracted would mean that the abstraction rate was below the recorded potential inflow rate of 190kL/day during mining in 1995 so the water level should remain constant with 9900kL of water in the pit.

As of October 2012, the water abstracted (recorded as approximately 4,000 kL) had emptied the stored water in the Greenfields Pit (CGO Groundwater Monitoring Report 2019).

Water has accumulated in the Greenfields Pit through rainfall and surface runoff since the CGO was put under care and maintenance in August 2013. Due to instability issues no water abstraction or water monitoring has occurred at the Greenfields Pit.

For modelling purposes it is assumed that there is 9900kL of water stored in the pit as the higher figure.

Assumptions for the pit for the preliminary groundwater model are as follows based on the information provided. The starter pit has a maximum depth elevation of 285mAHD. On completion the final pit depth elevation will be 245mAHD.

The model was calibrated to abstract 190kL/day (69350kL/annum) as per previous mining records for the Year 1. The pit and surrounding water drew down to the base of starter pit 285mAHD and the abstraction level remained there. This model was then used to calculate the drawdown to 245mAHD (final pit depth) over the second year. To achieve this the abstraction had to increase to 310kL/day (113150 kL/annum).

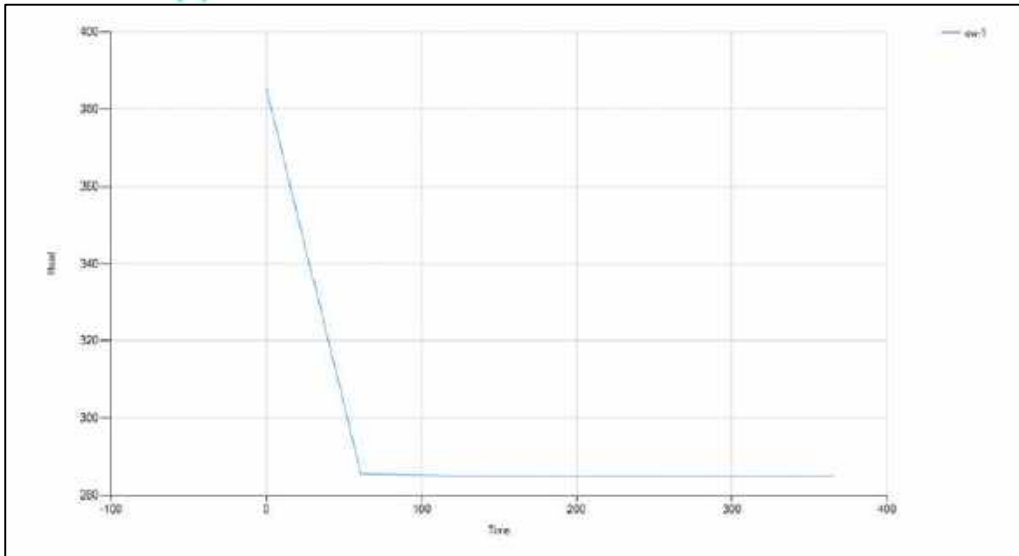
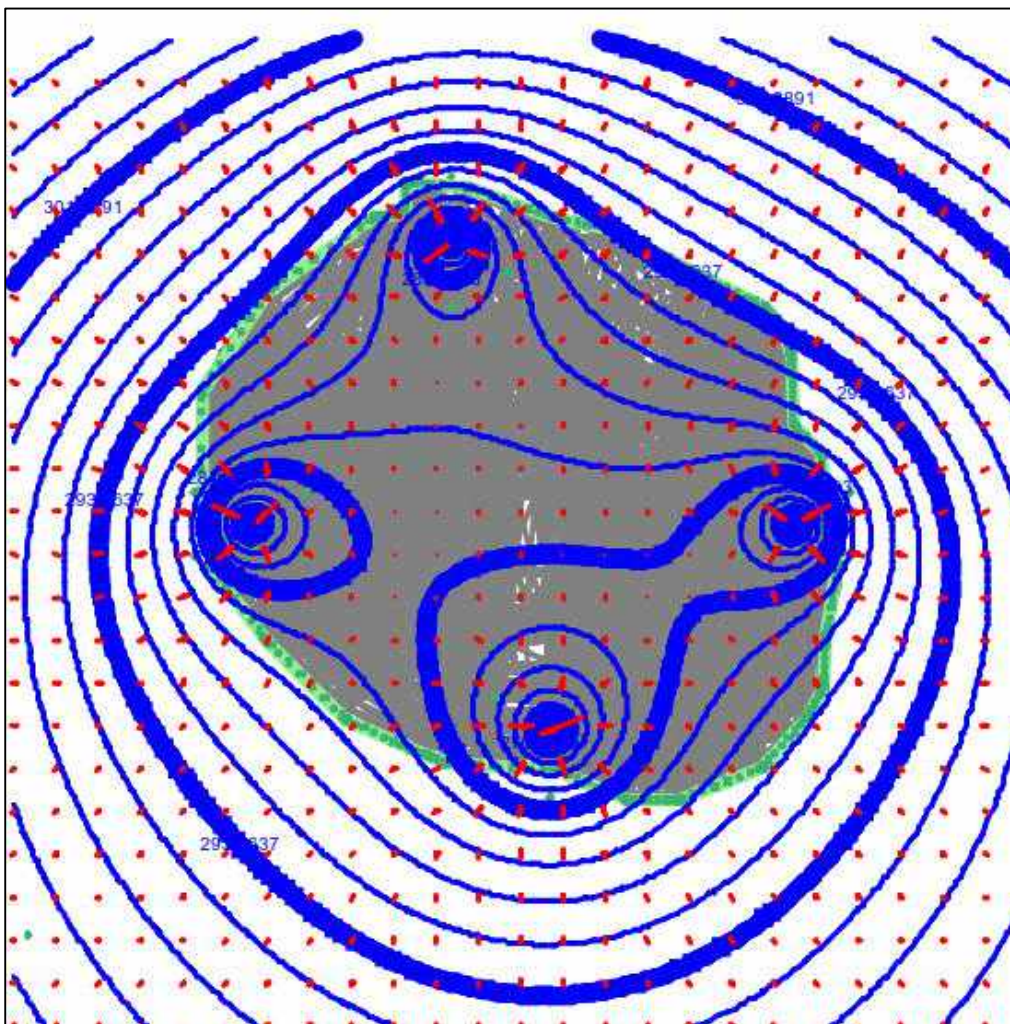


Figure 15 Greenfields Open Pit water level draws down in 60 days at 190kl/day and then remains constant for first year (69350kL/annum)



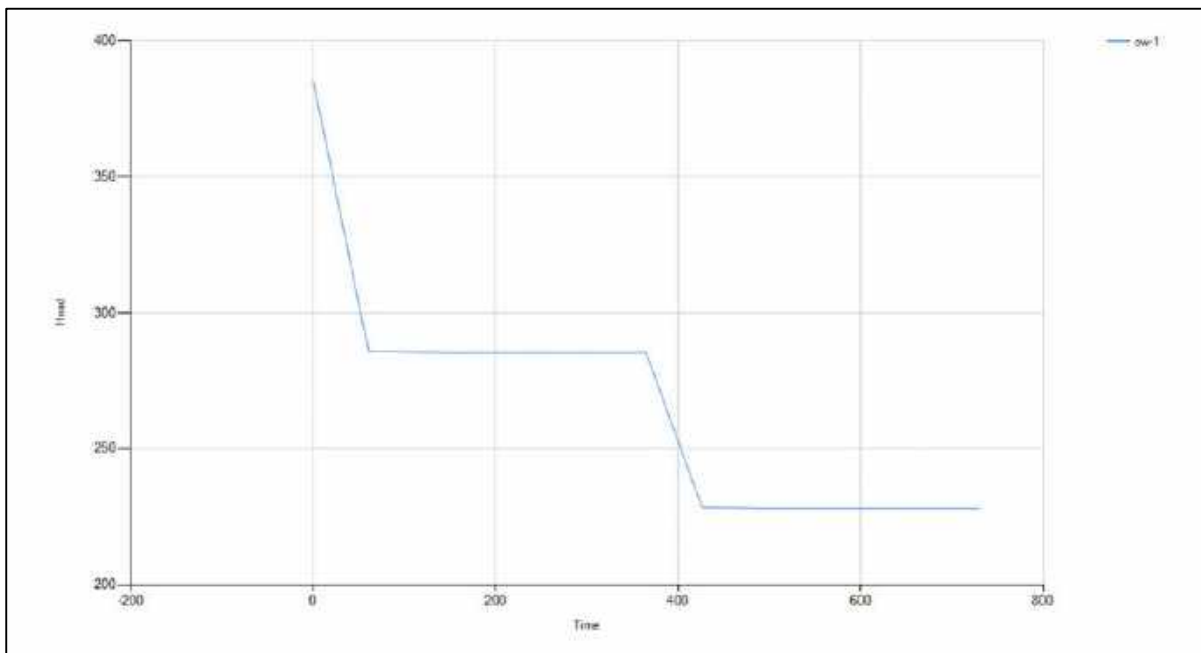


Figure 17 Greenfields Open Pit water level draws down in two years at 190kl/day (Year 1) and 310kL/day (Year 2)

5.4 Bonnievale Project

No hydrogeological Information is available. A dxf shaft design of the proposed underground mine has been provided. There is no access to the existing shafts due to instability and no water levels were able to be taken. No groundwater model has been completed as there is a lack of parameters and water levels. A monitoring bore is being drilled at Bonnievale. This has been discussed as being angled to intersect the shaft and establish the shaft water level.

If the existing shaft can be accessed, it is proposed a pump test inside the shaft is undertaken to establish the drawdown and the hydrogeological parameters of Bonnievale. Bonnievale is well known as a historical flooding underground mine and requires a specific more detailed field groundwater investigation to understand the hydrogeology and dewatering of the underground mine.

The closest underground mine for which there is groundwater data is available is the Bayley's Mine to the south of Bonnievale. Historical dewatering at Bayley's mine suggest a relatively low abstraction of 8l/s.

5.5 Alicia, Big Blow Deposit, Dreadnought Deposits

The open pit Alicia deposit is located south of Tindal's and immediately east and subparallel to the Empress deposit. No significant mining has occurred at Alicia to date. Big Blow occurs to the North of Alicia deposit and Dreadnought to the south. Big Blow was mined by Focus Minerals in 2013 to a depth of around 375mAHD.



Figure 18 Big Blow Mine Pit showing no indication of water

No dxf pit design was provided for Alicia, Big Blow or Dreadnought. Groundwater Levels in the vicinity of these deposits range from 375-345mAHD. Based on the depth of recent exploration drilling bores the Alicia Pit is estimated to be around a maximum of 76m depth which would only require approximately 20m of dewatering. The existing Big Blow Mine in the Exploration Update Kalgoorlie Gold Project shows a base elevation of the pit around 375m and no sign of any groundwater.

The underground Tindal's and Cyanide mines which formed part of the Tindals' Complex had very low yields associated with their underground mining. Tindal's was recorded as having a groundwater elevation of 190mbgl with an inflow of 6-8l/s and Cyanide Underground was recorded as having a water level of 120mbgl with an inflow of 6-8l/s. This is relatively negligible seepage and mean that Alicia, Big Blow and Dreadnought Deposits possibly will have little water infiltration associated with them depending on what depth they are mined.

Based on these relatively low abstraction rates recorded in the vicinity, if water is encountered in the Alicia, Big Blow or Dreadnought open pits, dewatering should occur easily at relatively low volumes with in-pit sumps.



6 Impact of Dewatering on Other Groundwater Users and Groundwater Dependant Ecosystems (GDE's)

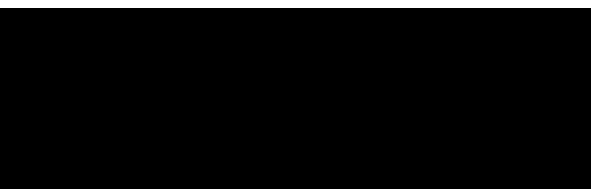
Dewatering of the CGO deposits is very unlikely to adversely impact any other groundwater user. The fractured rock aquifers of the CGO project appear to have low hydraulic conductivities, consequently the cone of depression resulting from dewatering is likely to be steep-sided and to be limited to a few hundred metres from the dewatering operations.

The depth to water ranges from at least 30 m (bgl) to 45 m (bgl) and aquifer are generally saline. It is therefore, very unlikely that the aquifer supports any groundwater dependant ecosystems (GDE) near the dewatering operations.

7. Conclusions and Recommendations

- 1) A program of monitoring bore installation will be done in June 2021 which will provide information on groundwater levels and airlift yields.
- 2) Final Pit designs for Alicia, Big Blow and Dreadnought will need to be assessed to determine if they are above the water table.
- 3) Bonnievale will require additional hydrogeological investigation to determine dewatering rates.
- 4) There is no hydrogeological testing undertaken for any of the deposits at CGO. The assessment has been done on hydrogeological parameters derived from adjacent mines and using historical dewatering data. This means the modelling is an indication of possible dewatering and drawdown rates. Where particular faults/fractures have been identified from mineral exploration drilling that have potential to be preferential flow paths for significant groundwater, these will require further drilling and aquifer testing and remodeling of the data before mining occurs.

If you have any questions or require additional clarification in the please contact me.



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As discussed throughout the project only surface geophysical surveys were run. All data requires drilling/excavation to confirm results.

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