2023 WATER AND SALT BALANCE REPORT

SERITI COAL (PTY) LTD
NEW LARGO COLLIERY

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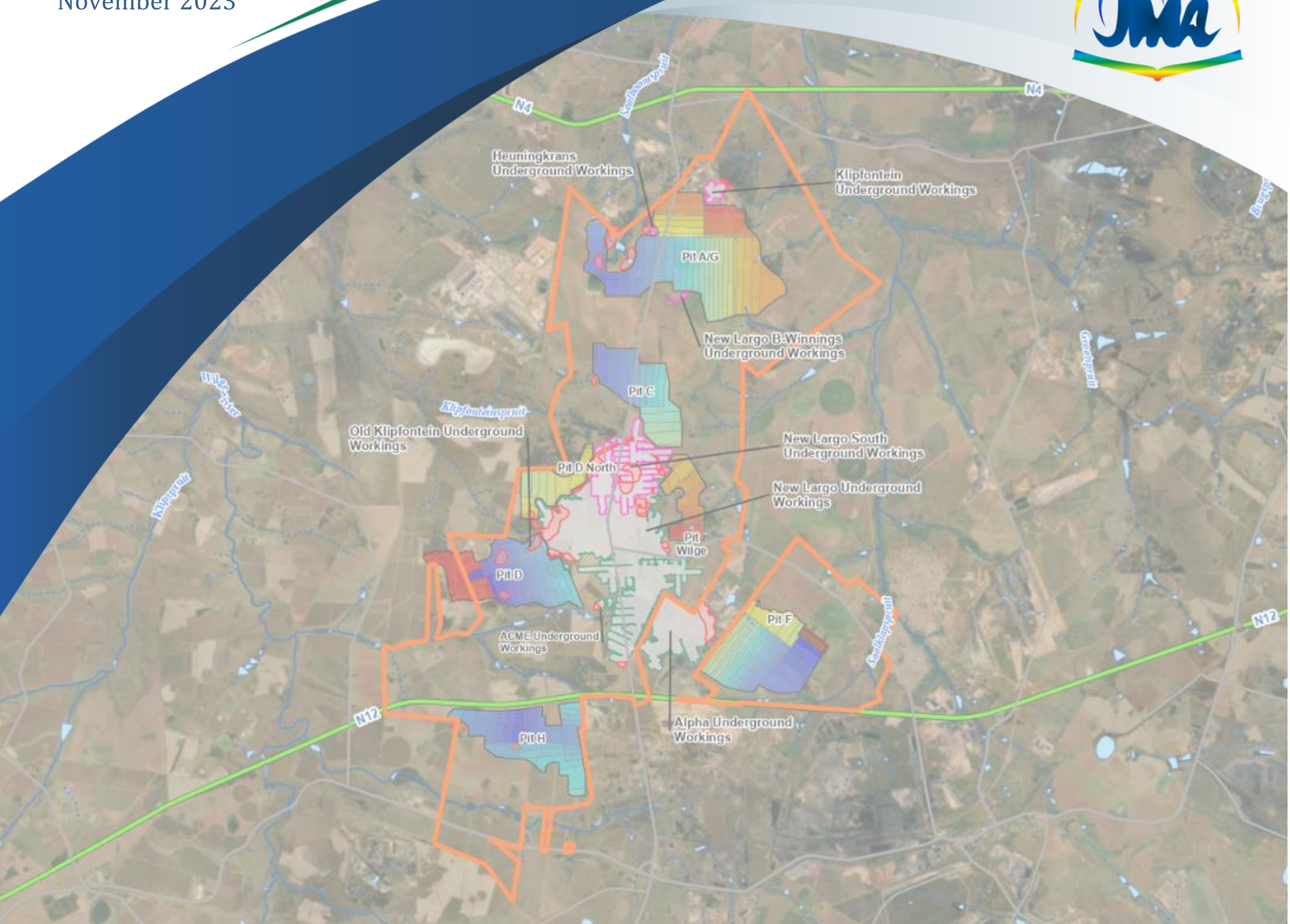

PURPOSE OF REPORT

JMA Consulting (Pty) Ltd was appointed by Seriti Coal (Pty) Ltd to update the operational and post closure phase water and salt balances for New Largo Colliery, a coal mining operation situated to the south-west of Emalahleni, within the Mpumalanga Province of South Africa.

This Water and Salt Balance Report consolidates and documents the information and input datasets used, assumptions, modelling results and recommendations made regarding the 2023 water and salt balances for New Largo Colliery. This Report is compiled as a standalone report and has been compiled with reference to the 2006 Best Practice Guideline for Water and Salt Balances namely: BPG G2: Water and Salt Balances, published by the then Department of Water Affairs and Forestry.

Compiled for

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF ABBREVIATIONS

BPG	:	Best Practice Guidelines
DMS	:	Dense Media Separation
DWAF	:	Department of Water Affairs and Forestry
DWS	:	Department of Water and Sanitation
FY	:	Financial Year
LOM	:	Life of Mine
MAE	:	Mean Annual Evaporation
MAMSL	:	Meters Above Mean Sea Level
MAP	:	Mean Annual Precipitation
MBGL	:	Meters Below Ground Level
PCD	:	Pollution Control Dam
PFD	:	Process Flow Diagram
PWTD	:	Pit Water Transfer Dam
ROM	:	Run of Mine
SACNASP	:	South African Council for Natural Scientific Professions
SAWS	:	South African Weather Service
TDS	:	Total Dissolved Solids
WUL	:	Water Use Licence

DEFINITIONS

Closed Water Circuit[1]: Water circuits which are not exposed to the natural environment, e.g. pipes and covered tanks.

Conservative Salt[1]: A salt that will not undergo any changes such as geochemical generation, biological metabolism, chemical precipitation or dissolution.

Decant[1]: Re-stabilisation of groundwater during and after mining that will result in artificial discharge into surface water systems as well as groundwater systems.

Direct Decant[2]

Mine water flow from the mine workings as hydraulic pipe flow (or open channel flow) through open conduits such as man and material shafts, ventilation shafts, exploration boreholes, rescue boreholes, mine monitoring boreholes and open fractures between the mine workings and the surface. Depending on the mechanism which causes the impact, decant can be either continuous (over the long term) or else single event (over the short term).

Continuous direct decant manifests as a result of a hydraulic driver. The main causal factors that enable continuous direct decant relate to the mine void geometry and its setting in relation to the surface topography, as well as the presence of open voids connecting the mine workings and the surface, including shafts, boreholes and open cracks in the overlying rock strata.

Single event direct decant manifests as a result of a pressure surge causing water displacement, primarily due to roof collapse and strata subsidence. The main causal factors that enable single event direct decant relate to roof failure and collapse in flooded high extraction as well as in certain flooded bord and pillar mined panels, as well as the presence of open voids connecting the mine workings and the surface, including shafts, boreholes and open cracks in the overlying rock strata.

Indirect Decant[2]

Mine water flow from the mine workings as groundwater flow (porous or fracture flow) along preferential groundwater flow zones such as natural geological features (faults and dykes) or along mining induced preferential groundwater flow features (fractures and cracks) caused by roof collapse, pillar failure and crown failure, between the mine workings and the shallow weathered zone aquifers, from which it can manifest as groundwater base flow into streams or as seepage onto surface (wetland seepages, fountains and springs). This type of decant is continuous (over the long term).

Continuous indirect decant manifests as a result of a hydraulic driver. The main causal factors that enable continuous indirect decant relate to the achievement of full saturation (flooding) conditions within the mine workings as well as the re-instatement of full saturation conditions in the aquifers between the mine workings and the surface, as well as the presence of permeable groundwater flow paths between the mine workings and the surface. This will enable the hydraulic flux of mine water as groundwater towards points/zones of natural (seepage/stream base flow) and induced (abstraction from boreholes) piezometric pressure release on surface.

[1] Department of Water Affairs and Forestry, 2006. Best Practice Guideline G2: Water and Salt Balances.
[2] JMA Consulting. (2019)

Electrical Conductivity[1]: Ions in a water solution conduct electrical currents. The more ions present in the water, the higher the electrical conductance and vice versa. The electrical conductance of a solution is thus an indication of the amount of ions present in the solution.

Environmental Circuit[1]: Natural water systems that are present within the boundaries of the mine are defined as environmental circuits, like natural dams, wetlands, rivers and aquifers.

Iterative Process[1]: A mathematical iterative process can be described as a cyclical process. A value is estimated and used in the equations to determine an answer. The answer is evaluated and if the accuracy is not acceptable a new value is used in the equations to determine a new answer. This process continues until an answer with an acceptable accuracy is obtained.

Non-Conservative Salt[1]: A salt which will undergo changes such as geochemical generation, biological metabolism, chemical precipitation or dissolution.

Open Water Circuit[1]: Water circuits that are open to the natural environment, e.g. rivers, dams and channels.

Runoff[1]: Surface runoff is defined as the precipitation that finds its way into the stream channel without infiltration into the soil.

Seepage[1]: The act or process involving the slow movement of water or another fluid through a porous material such as soil.

Stream[1]: A flow of water from one facility or natural feature to another with clear boundaries is referred to as a stream. A stream will for example refer to water flowing in a pipe from a dam to a river or water flowing in a channel from a tailings dam to an evaporation dam or the flow in a watercourse.

Total Dissolved Solids[1]: A concentration term used to express the total amount of dissolved solids in a solution (normally expressed in mg/l).

EXECUTIVE SUMMARY

New Largo Colliery is an opencast coal mining operation situated approximately 25 km to the south west of Emalahleni, within the Mpumalanga Province of South Africa. Coal has historically been mined within the area by means of underground mining methods and is currently being mined through opencast mining methods from the No.4 and the No.2 Coal Seams of the Witbank Coal Field. The coal at New Largo will be mined using a series of opencast pits (Pits D, F, H, A/G, C, D North and Wilge), which includes the continuation and extension of the Klipfontein Colliery Pit situated to the West of the New Largo Mining Right Boundary. The New Largo opencast coal mining operations will include the reopening of some of the smaller, historic underground mine workings, which were mined as early as 1890.

The opencast mining operations at New Largo commenced in 2020, with the extension of the neighbouring Klipfontein Colliery into Pit D, and are planned to continue up until 2056. Due to the nature of the mining operations and geohydrological environment within which the mining takes place, groundwater and rainfall recharge will accrue to the workings during both the operational and post closure phases. Any water which accrues to the mine workings is deemed to be dirty and can as a result simply not be discharged into the adjacent surface water resources unless it is treated to the specified resource quality objectives.

In order to allow New Largo to plan for and manage the current and future mine water makes, a detailed water balance, coupled with a salt balance was calculated for the current and future opencast mining sections at New Largo Colliery. It is indicated that the historic New Largo No.2 Seam, New Largo No.4 Seam and Vlakfontein Underground Workings, are not and will not be intersected by the New Largo Colliery opencast workings and are therefore not included in this assessment.

The 2022 GoldSim Water and Salt Balance Model which was developed for New Largo Colliery was used as a basis from which the updated water and salt balances were calculated. The 2022 GoldSim Model was reviewed, refined and was updated to include the following:

- Daily rainfall data received from Klipfontein Colliery until June 2023.
- Fixed monthly evaporation rates according to the latest recorded data obtained from the DWS Bronkhorstspruit Dam Weather Monitoring Station.
- Updated mining floor elevations, and surface areas of the current extent of mining, as well as the proposed yearly areas of the future LOM workings until 2056, for each of the pits.
- The calculated footprint areas and stage-storage capacity curves of the individual workings and mine water compartments of the historic underground workings (i.e. Red Zones).
- Preliminary details of a closure water management strategy for the rehabilitated pits as communicated by New Largo Colliery.
- Updated flow meter data, dam levels (Office Void and Klipfontein PCD), water chemistry and water level data obtained from Klipfontein Colliery and New Largo Colliery.
- Updates and changes made to the process water reticulation and operational philosophy, and linkages between the various sections (Figure I).

Once updated with the abovementioned information, the water balance was calibrated using the rainfall and monitoring data provided for the period between January 2021 and June 2023. This was required to verify if actual recorded rainfall would result in expected dewatering rates from Pit D and water levels in the Office Void, subject to the current operational philosophy at New Largo Colliery. Water levels for the Office Void were calibrated for the same period.

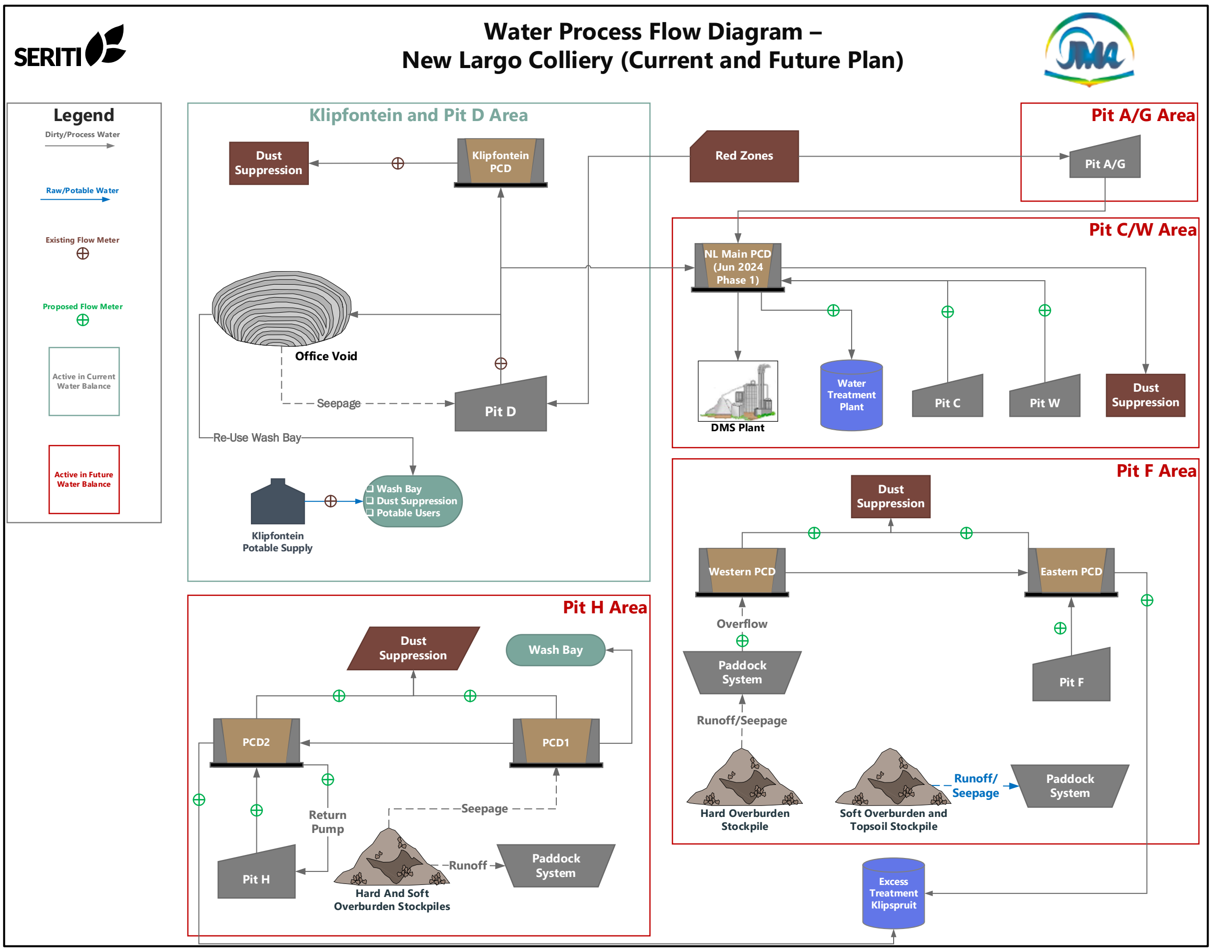

Figure I: Water Process Flow Diagram – Current (2023) and Future

The current operational philosophy at New Largo Colliery is as follows: Water abstracted from the two active cuts in Pit D ('North Pit' and 'South Pit') is pumped to two surface facilities at Klipfontein Colliery, namely the Office Void and the Klipfontein Pollution Control Dam (PCD). The Office Void, situated within the footprint of the backfilled opencast pit is the main storage facility for the water abstracted from Pit D. Water is only pumped to the PCD when additional water is required for dust suppression. The water contained within the Office Void is naturally allowed to evaporate, with water also infiltrating through the footprint, back into the backfilled pit. Dirty surface water runoff from the Klipfontein office area is routed via stormwater canals towards the Klipfontein PCD, where it is used for dust suppression or allowed to evaporate.

It is evident that the recorded pumping and simulated (dewatering) rates from Pit D to the Office Void or Klipfontein PCD, correlate well with recorded flow rates. Recorded pump rates were used as input into the model to verify if all pit water was pumped out and if simulated water levels in the Office Void correlate well with the recorded water levels by modelling estimated seepage rates from the Office Void. Both the simulated and recorded water levels, within the Office Void, showed relatively good correlation and a relative stable and quasi-steady water level. Higher rainfall and runoff during 2021/2022 resulted in increased dewatering rates as well as decreasing water levels simulated in the Office Void between July 2022 and June 2023 due to average rainfall and lower pumped volumes to the Office Void.

It is probable that seepage inflows emanate from Office Void though the upstream spoils into the pit workings and recirculation of water occurs. It is also expected that total flow rates will increase in the future due to expanding mining activities and subsequently larger footprint areas. The seepage outflow from this backfilled spoil void is relatively large and the bulk of the seepage flows towards the Pit D workings. A portion of seepage flows via subsurface flow towards the northern located watercourse. Potential seepage outflow is significant and requires (detailed) ongoing flow monitoring.

Most of the dewatering took place from Pit D into the Office Void during 2022, and during 2023 most of the dewatering was pumped to Klipfontein PCD. A seasonal increase of pump rates was recorded owing to extreme high rainfall during the wet season of 2021/2022 (1 081 mm). Fluctuating pump rates from Pit D since June 2022 onwards were recorded, varying between 300 m^3/day and 1 500 m^3/day. However, total recorded pumping rates from the Klipfontein PCD used for dust suppression showed increasing volumes pumped during the calibration period peaking at 900 m^3/day. Recorded pumping rates were therefore used as simulated input when recordings were available. There was not sufficient water in the Klipfontein PCD between July 2021 – September 2021 and from July 2022 until October 2022 to sustain recorded dust suppression rates despite of some additional inflow coming from Pit D dewatering.

In addition, relatively constant water levels recorded in the Klipfontein PCD from November 2022 onwards and increasing volumes pumped for dust suppression suggest that the total water make at Klipfontein is steadily increasing. It is recommended to continue monitoring this trend, maintain dust suppression volumes within licensed volumes and verify this for the next water balance update.

The future LOM water balances (October 2022 to March 2056) were simulated using the annual projected LOM areas for the opencast pits, which were built into the water balance model for each of the mining sections up until the end of mining. Water that will be dewatered from the proposed Pit F and Pit H will be pumped to different PCDs for evaporation, re-use (dust suppression) or to be pumped for treatment. This forms part of the proposed water management strategy as explained in Golder (2020 and 2021) and confirmed by New Largo Colliery. It was indicated and requested by New Largo Colliery that for the proposed Main Mine, which includes Pit D, Pit D North, Pit A/G and Pit C/W, all excess water will be pumped to sufficiently large PCD(s) to handle the total water make from the opencast workings. From the PCDs, dirty water will be pumped to the proposed DMS plant, road dust suppression and a proposed water treatment plant (in case of excess) in the same order of priority.

Overall mean peak dewatering rates from the opencast pits can be expected at mean dewatering rates between 3 000 m^3/day and 9 000 m^3/day (Figure II). The highest mean dewatering rates can be expected from Pit A/G with mean dewatering rates exceeding 6 000 m^3/day during the wet season towards the end of LOM in 2056. The variability or seasonality of the water makes to the proposed opencast pits is evident and will need to be catered for accordingly when pumping to the PCD's. Total probabilistic dewatering rates for the opencast pits over the LOM were simulated for each pit separately. Maximum pumping rates during the LOM, using the 99th percentile, will vary between 10 000 m^3/day (2041) and 27 000 m^3/day (2031) (Figure III). It will require around 684 423 m^3 to dewater the red zone from the Pit D and Pit A/G mining area.

It was calculated that the storage capacity within the rehabilitated footprint areas at Pit D is limited and that that decant may be expected towards the end of LOM. This is owing to a low elevation of the decant point and therefore limited storage capacity in the spoils. This will result in gradually increasing dewatering rates. Peak dewatering rates (99^{th} percentile) were calculated between 9 000 and 10 000 m^3/day. Pit D North will be a separate opencast pit from Pit D and peak dewatering rates for Pit D North (99^{th} percentile) were simulated at 5 000 m^3/day around 2045. Dewatering of Red Zones during mining of Pit D can be noticed in 2030 when the Old Klipfontein underground workings is scheduled to be mined. It is recommended to investigate final storage volumes to be dewatered around the Old Klipfontein underground workings.

Peak dewatering rates for Pit F were simulated at 10 000 m^3/day between 2043 and 2045. After 2027, a portion of the total water make can be stored in the rehabilitated spoils and it was calculated that the total spoil storage capacity of 4.2 Mm^3 within the rehabilitated footprint areas, will be sufficient to contain recharge through the rehabilitated spoils. A similar approach can be followed for dewatering Pit H. When rehabilitation commences two (2) years after the mining has started, sufficient storage capacity will be available to maintain the total water make at a relative low rate. Peak dewatering rates that were simulated, using the 99th percentile, were calculated at 2 500 m³/day.

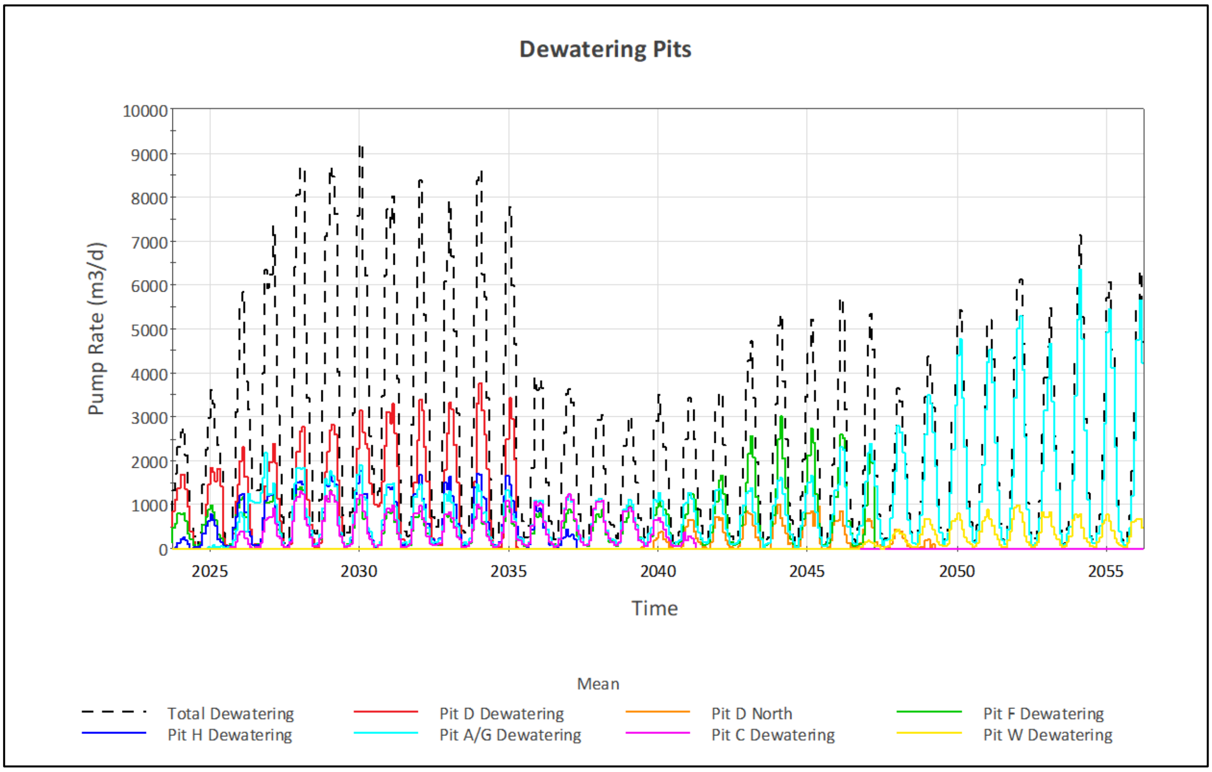

Figure II: Simulated Mean Dewatering Rates from each Pit over the LOM

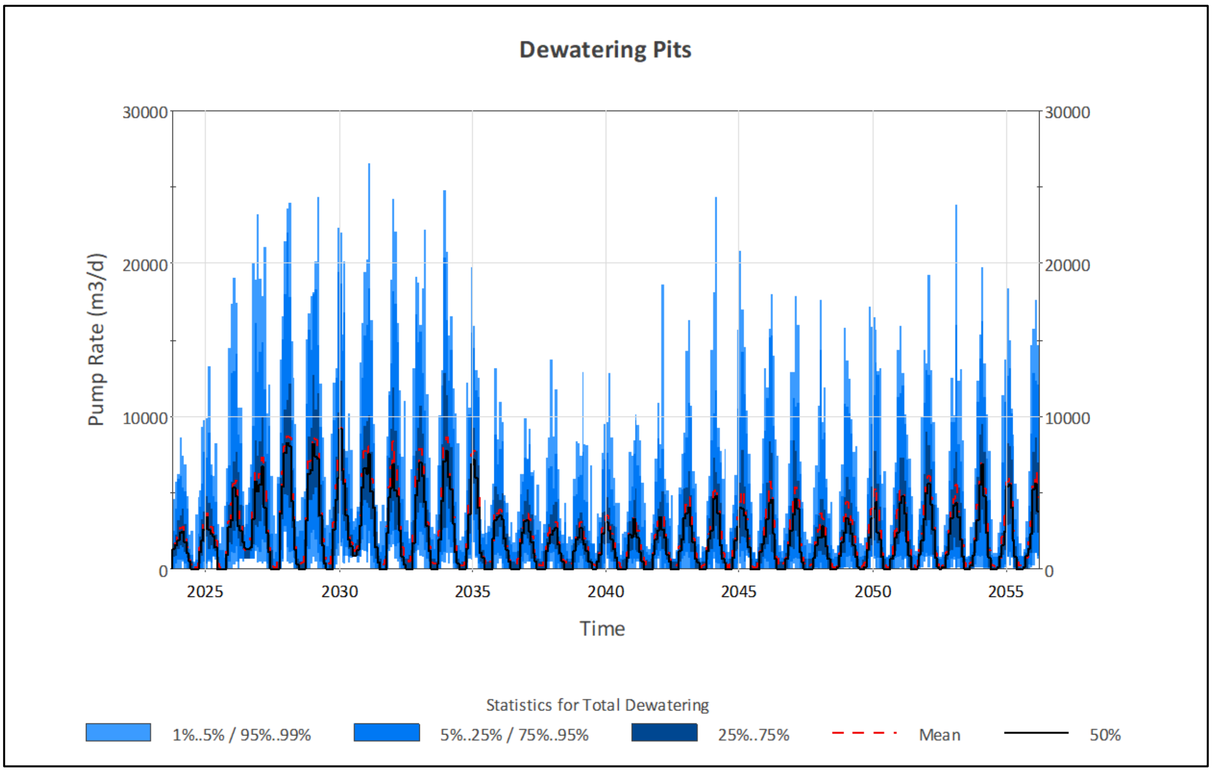

Figure III: Simulated Probabilistic Dewatering Rates from all Opencast Pits over the Life of Mine

Simulated dewatering rates of Pit A/G showed that peak dewatering rates were simulated towards the end of LOM from 2050 onwards. A single red zone to be mined include the former underground workings of Hartebeest 2 and it is expected that around 243 600 m³ will be required to be dewatered from Pit A/G around 2026. Furthermore, due to limited storage within the rehabilitated spoils, increased dewatering rates can be expected from 2044 onwards and simulated peak dewatering rates at the end of mining were calculated at 19 500 m^3/day. Also due to limited storage available within rehabilitated spoils, gradually increasing dewatering rates can be expected for Pit C during mining. Simulated probabilistic peak dewatering rates, using the 99th percentile, indicated a maximum pump rate of 5 300 m^3/day. Early surface decant can therefore be expected.

Calculated water makes from each of the Main Mine related opencast pits will be dewatered to four (4) proposed PCD's depending on the total volume of water make emanating from the Main Mine area. Designed and licensed storage volumes for each PCD are as follows:

- Phase 1 – 256 Ml (256 000 m^3).
- Phase 2 – 256 Ml (256 000 m^3).
- Phase 3 – 343.8 Ml (343 800 m^3).
- Phase 4 – 343.8 Ml (343 800 m^3).

This will imply that, if all PCDs will be required, a total storage capacity of 1 200 Ml (1.2 million m^3) is available to store dirty water at the Main Mine.

Simulated storage volumes of the Main Mine PCD during the LOM calculated the 98th percentile (1: 50-year storage volume) at 852 313 m^3. As per designed PCD's, a total capacity of 855.8 Ml (855 800 m^3) will be required (i.e. Phase 1 to Phase 3) and constructed. Most water will need to be handled around 2030 (Figure IV).

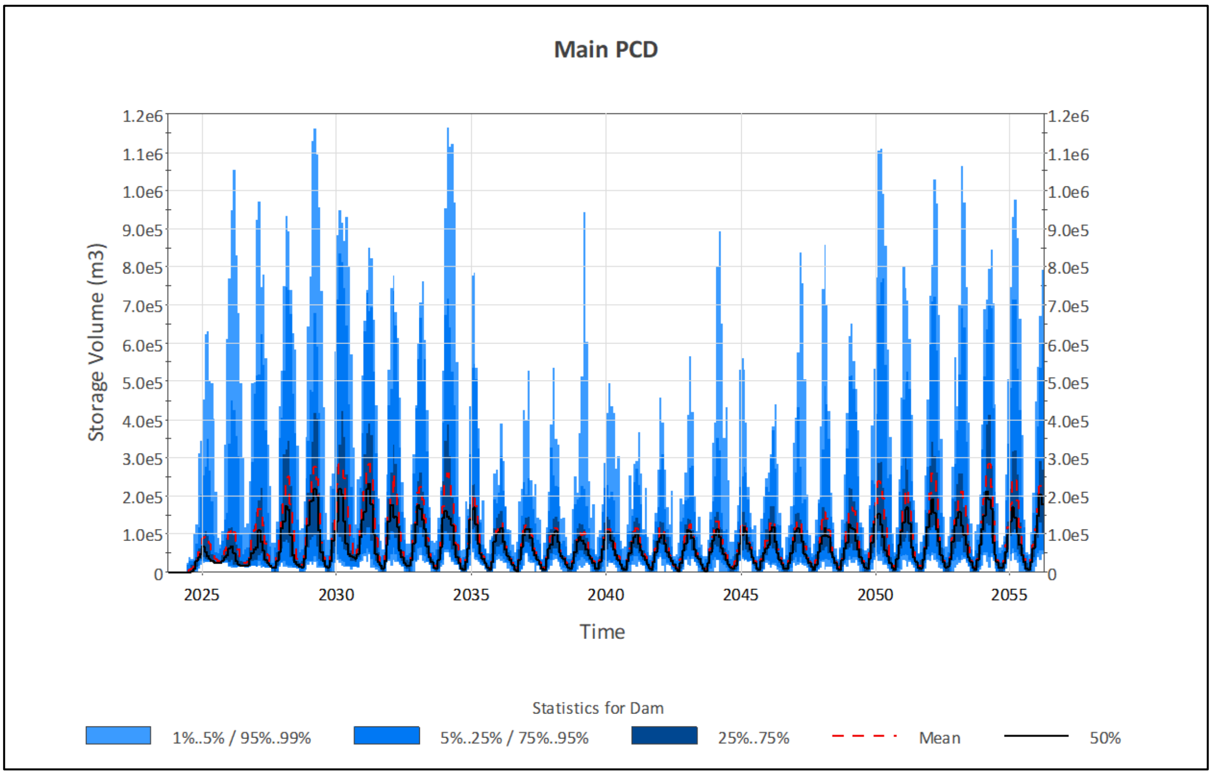

Figure IV: Simulated Probabilistic Storage Volumes in Main PCD over the Life of Mine

Almost no overflow is expected from the Eastern PCD and Western PCD, and both PCD's will handle the water make from the Pit F area. A proposed storage capacity between 150 000 m^3 and 160 000 m^3 for the Eastern PCD will be sufficient to adhere to GNR704 requirements to prevent spillage of less than once in 50 years on average. The proposed Western PCD could be slightly reduced to 18 000 m^3. Some treatment will be required for Pit F at this stage, and as initially proposed can to be sent to Seriti's Klipspruit Colliery as communicated by New Largo.

The Pit H PCD1 and PCD2 were sized at 45 000 m³ and 65 000 m³ respectively. Due to potentially available storage in the rehabilitated spoils after 2025, simulated storage volumes for both PCD's show that the proposed storage capacities of PCD1 and PCD2 can remain. Both PCD's are in adherence with GNR704 requirements. Dirty water contained before 2025 in PCD2 will need to be pumped to Klipspruit for treatment.

Expected treatment rates at Main Mine were simulated based on proposed treatment of 4 Ml/day (from 2024 onwards) and 6 Ml/day (from 2032 onwards) (Figure V). If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 4 Ml/day and 6 Ml/day during various wet seasons. It appears that most water on the Main Mine needs to be handled between 2027 and 2031 and between 2049 and 2056. It can therefore be beneficial to move the 6 Ml/day treatment capacity forward (or higher) between 2027 and 2031 and lower the treatment capacity from 2032 to 2048 if actual water make volumes from Main Mine will allow this. If New Largo Colliery considers modular treatment plants, this can potentially be achieved, provided that water balances are updated annually based on actual flow rates from Main Mine.

The combined volumes that will need to be pumped to the Klipspruit treatment plant will fluctuate seasonally and will be dependent on the depth of rainfall occurring and the operational philosophy regarding the management of dewatering of the opencast pits and final infrastructure for Pit F and H areas that will need to be catered for.

If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 1 800 m³/day (1.8 Ml/day) and 3 900 m³/day (3.9 Ml/day) between 2043 and 2047 (Figure VI). It should be noted that this calculation is preliminary and that large uncertainties still exists at this stage. More accurate treatment can be determined for the 2024 water and salt balance update when more information is available and updated mine schedules and formalised infrastructure plans have been provided.

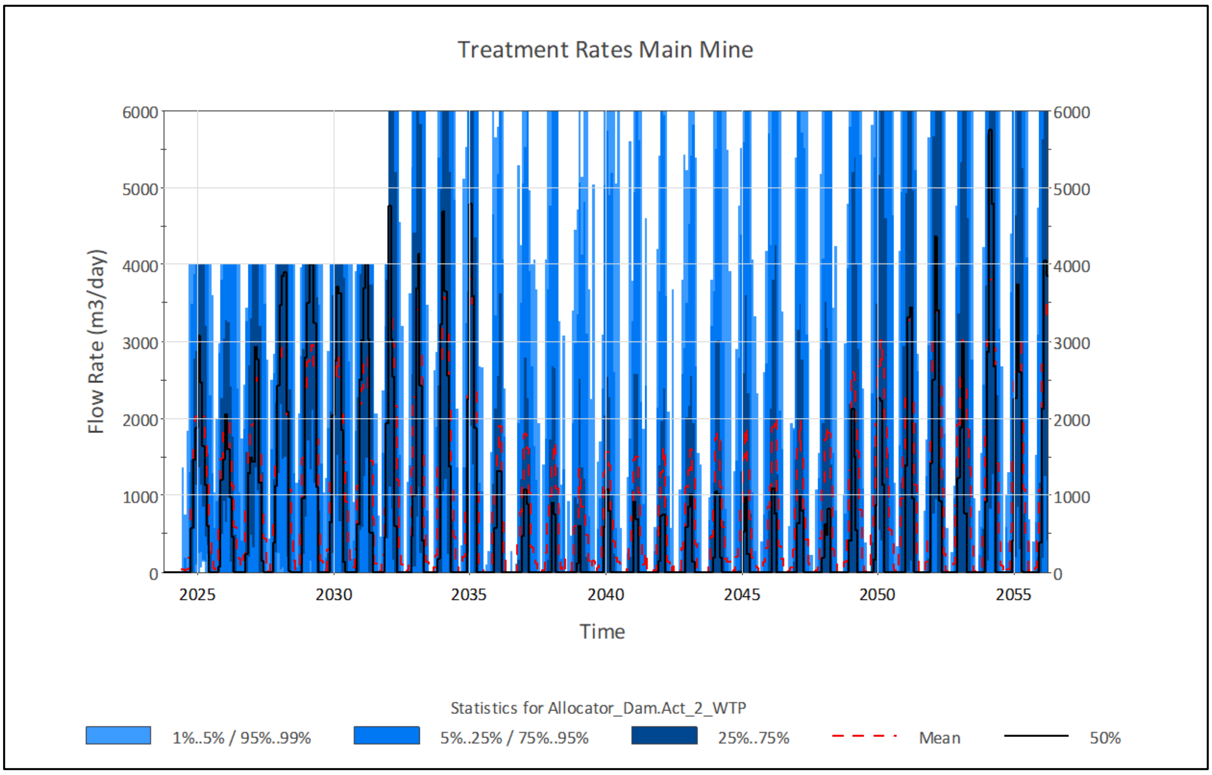

Figure V: Simulated Probabilistic Treatment Rates required for Maine Mine at New Largo Colliery over the LOM

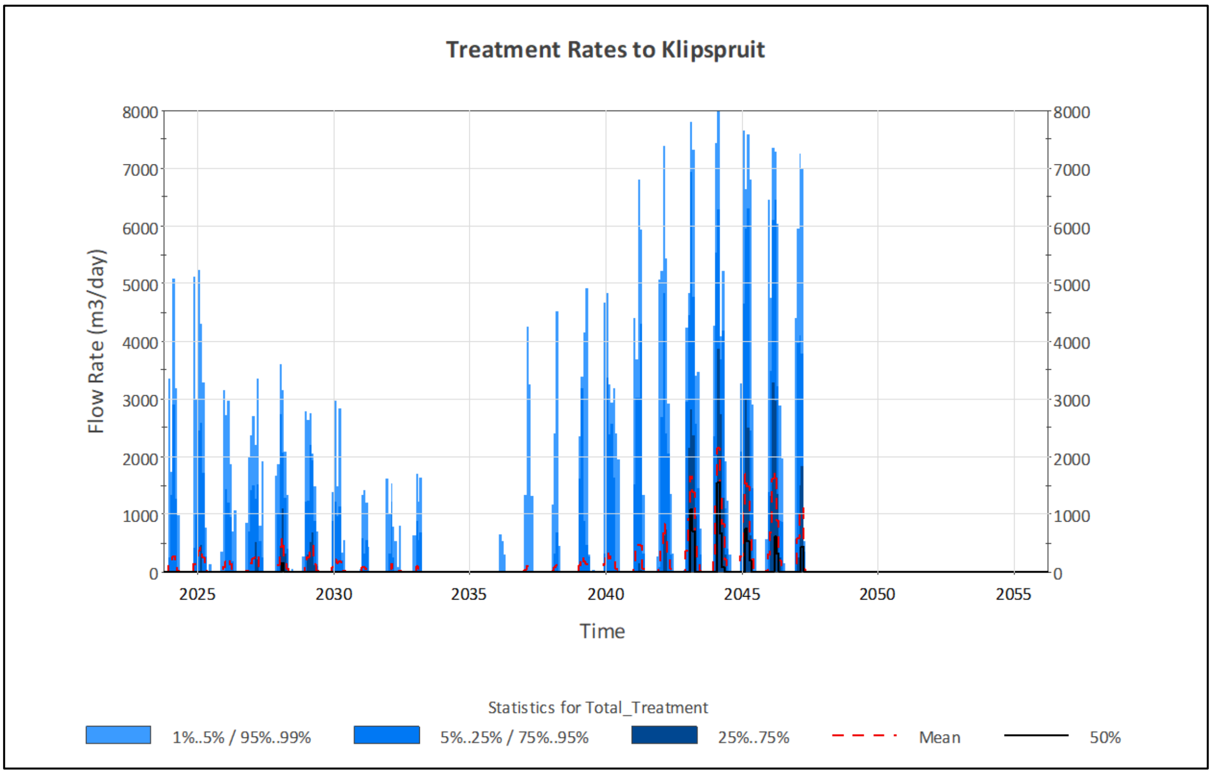

Figure VI: Simulated Probabilistic Treatment Rates required for New Largo Colliery to Klipspruit (Pit F and Pit H areas, respectively) over the LOM

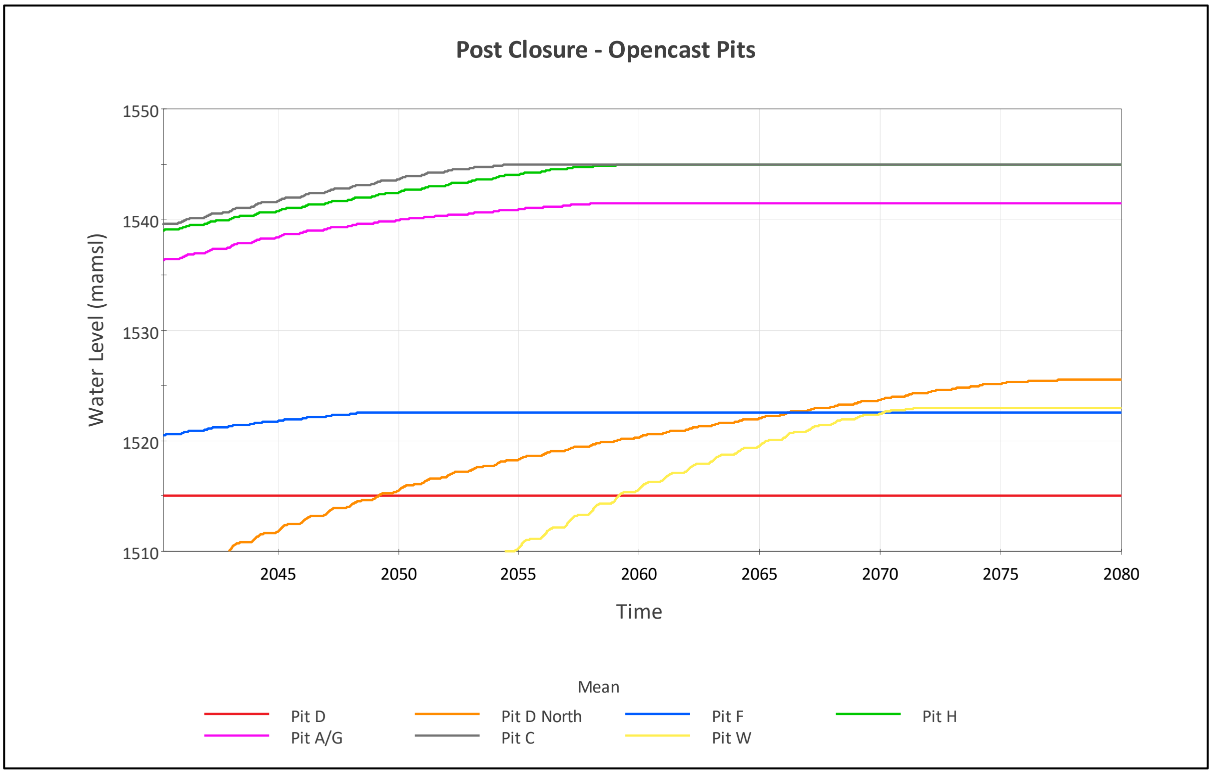

Figure VII: Simulated Mean Water Levels all Opencast Pits Post-Closure

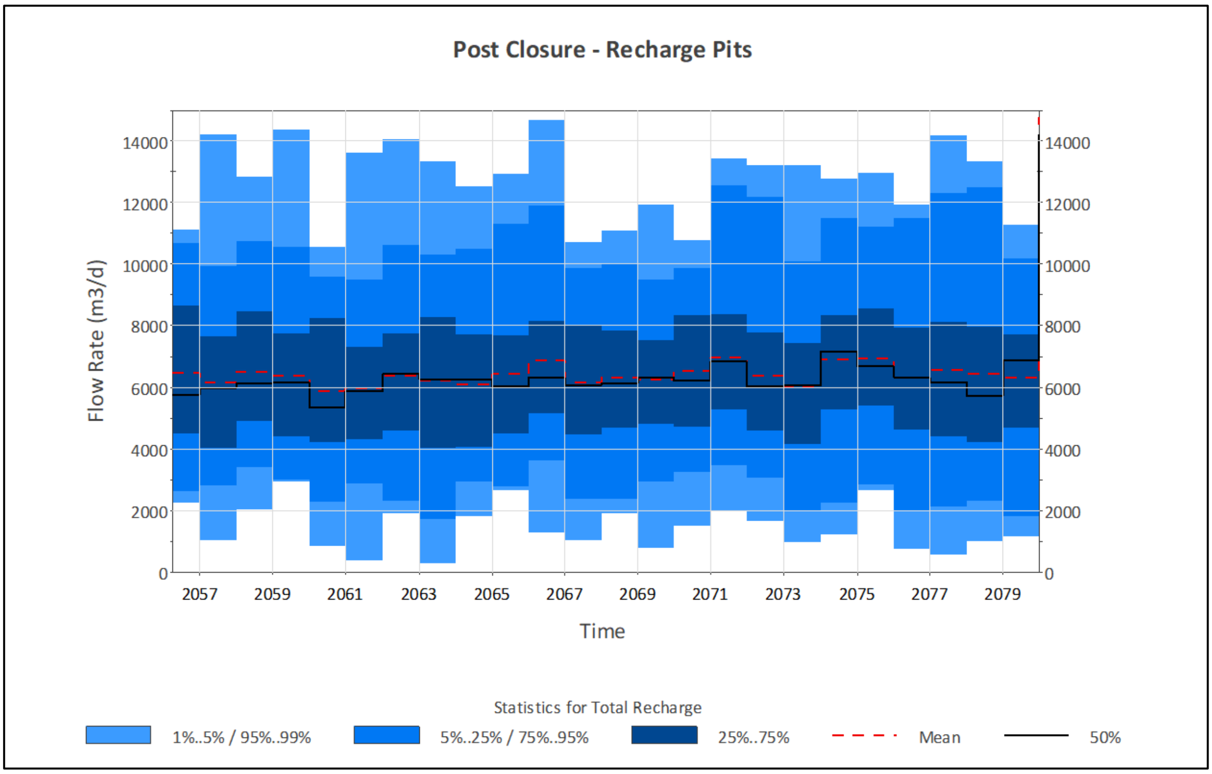

Figure VIII: Total Simulated Probabilistic Recharge Rates for all Opencast Pits Post-Closure

According to the provided post-closure water management strategy for New Largo Colliery, all opencast pits will be backfilled entirely and rehabilitated without final voids. Post-closure flooding levels for all opencast pits were calculated (Figure VII). Pit D, Pit C and Pit F will flood to its decant elevation during LOM. Pit H and A/G and C will flood to their decant elevations between 2055 and 2060. Pit D North and Pit W will flood to decant elevation at around 2077 and 2073, respectively. In case of post-closure decant, excess water will need to be managed to prevent spillage into the environment. The largest mean decant rates can be expected from Pit A/G at approximately 2 300 m^3/day, as presented in Figure 7.5(b), due to the largest footprint area. Total probabilistic post-closure decant was calculated and expected flow rates are between 4 500 m^3/day and 8 500 m^3/day using the 25th and 75th percentile (Figure VIII). Post closure abstraction and treatment of these water makes will be required to prevent the decant of mine water into the adjacent water resources.

With reference to the data provided and model simulations, the following is recommended in order to further validate and verify the predicted water and salt balances:

- Recalibrate and Install Flow Meters:

  The cumulative recorded dust suppression rates from the Klipfontein PCD exceeded the total cumulative dewatering rates at Pit D and inflows into the PCD, which includes the Pit D dewatering (recorded) and simulated runoff from the plant area. Relatively constant water levels recorded in the Klipfontein PCD suggest that there is always water available in the Klipfontein PCD, indicating possible additional or unaccounted inflows into the Klipfontein PCD may be applicable and/ or that the recorded dust suppression rates are overestimated. It is recommended to verify this for the next water balance update through accurate monitoring of the water flows to and from the Klipfontein PCD.

  New Largo should furthermore begin with regular checks and recalibration of the existing flow meters that monitor the volumes of water pumped to and from each of the surface water storage facilities (Office Void, Klipfontein PCD). These monitored flow volumes are required for the calibration and validation of the annual water balances, together with the recorded water level elevations. As indicated in the WUL's the flows should be metered or gauged and reported on a daily basis.

Additional flow meters should be installed at the key localities indicated in the process flow diagrams (Section 4) and should be monitored for the future New Largo Colliery when infrastructure plans have been confirmed. Dedicated flow meters should be installed in each of the Pit D 'North Pit' and 'South Pit' dewatering systems, as well as all off-take points on surface at Klipfontein Colliery.

- Update and formalise infrastructure layouts, SWMP at Pit F area:

  A recent site visit undertaken on the 13th of September 2023 confirmed that the Ukwazi (2022) SWMP has not been formalised and that current infrastructure layout plans deviate from the 2022 SWMP. No DMS plant forms part of the future operations and the Western PCD was subsequently taken out of the future infrastructure plans. It is also unclear whether the Eastern PCD is sufficiently large to handle rainfall/runoff from newly planned dirty water area catchments. For the next water and salt balance update it is essential to formalise an updated SWMP including possible re-designs of the Eastern PCD and confirm compliance of the updated SWMP.

- Update the Post Closure Water Management Strategy:

  Detailed closure landforms and closure water management strategies will need to be developed and provided for each of the opencast pits, along with updated strategies for the historic undergrounds at New Largo Colliery. It is therefore proposed that an updated strategy be developed which addresses each of the existing and proposed opencast pits at New Largo Colliery. This will support and will be required to accurately quantify the long-term post closure water balances and associated water treatment requirements.

- Assess suitability of the Water Monitoring System for future water and salt balance updates:

  It is of utmost importance that New Largo install at least 5 rain gauges within the New Largo Mining Right Boundary. There should be one rain gauge for each Pit area which includes Pit D, Pit F, Pit H, Pits W/C and Pit A/G. Use can be made of either automatic or manual rain gauges. Site specific rainfall data is critically important as rainfall is the main source of water make to opencast workings both directly and indirectly as groundwater seepage. The rain gauges should be monitored daily and reported as daily rainfall depths.

  The surface dams should continue to have their water level elevations monitored on a weekly basis and their qualities on a monthly basis. Any opencast void should be monitored on the same basis as the surface dams. The opencast spoils boreholes should be monitored on a monthly basis for water levels and on a quarterly basis for qualities.

  It is recommended that additional mine water monitoring boreholes be drilled into the backfilled sections of the opencast workings as mining progress. This is currently applicable for the Pit D / Klipfontein Colliery Pit and Pit F. This is important to manage and assess the operational and post closure water quality and quantity management of the opencast workings.

  It is further recommended that the boreholes mentioned in the Hodgson (2007) report be redrilled and/or reopened into the mine workings. The monitoring data from the underground workings will be critical when modelling the inflows from the underground workings towards the opencast workings.

When drilling new mine water monitoring boreholes, it is critically important to ensure that they are correctly constructed (fully cased and perforated at the mining horizon) to make sure that monitoring is done correctly.

When taking water quality samples from the mine water monitoring boreholes, it is very important that the sample is taken at the correct depth. Stratified sampling is critical and an EC profile of the borehole can be undertaken at least annually to determine the stratification beforehand. Underground mine workings should be sampled at a depth below the roof of the mining.

Water levels within the underground working should be monitored monthly and the water qualities quarterly.

It is critically important that all boreholes be surveyed for accurate coordinates, surface and collar elevations. The surface water level plates or pole markers should also be calibrated by surveying the elevations on the markers.

- Update Numerical Water Modelling:

  The hydraulic interaction between and within the respective workings will need to be simulated through means of a numerical groundwater flow model. Due to the changes which have been made to the current operational plan at New Largo Colliery and expected seepages, it is highly recommended that numerical groundwater flow and mass transport models, as well as the surface water runoff model be updated. It is, however, critical that these models only be updated once the water management strategies for the opencast pits have been developed. The monitoring system should also be updated and implemented prior to undertaking the numerical modelling to allow for calibration.

A copy of the 2023 GoldSim Water and Salt Balance Model is provided to New Largo along with this report. The water and salt balance model is flexible and has been set up in such a way so that it can easily accommodate updated monitoring information, future changes to the reticulation systems as well as changes to the planned LOM schedules or extent of mining.

The way in which the model has been set-up furthermore also allows for both the overall integrated balance, or separate balances for smaller units, to be refined and updated as required for future changes and as additional monitoring data becomes available. This should assist with future updates that will be required to be made to the water and salt balances and for additional management scenarios to be considered for New Largo Colliery.

Respectfully submitted,

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Prj6578

1. INTRODUCTION AND STUDY OBJECTIVES

1.1 INTRODUCTION

New Largo Colliery is an opencast coal mining operation situated approximately 25 km to the south west of Emalahleni, within the Mpumalanga Province of South Africa. The opencast mining operations at New Largo commenced in 2020, with the extension of the neighbouring Klipfontein Colliery into Pit D, and are planned to continue up until 2056.

Due to the nature of the mining operations and geohydrological environment within which the mining takes place, groundwater and rainfall recharge will accrue to the workings during both the operational and post closure phases. Any water which accrues to the mine workings is deemed to be dirty and can as a result simply not be discharged into the adjacent surface water resources unless it is treated to the specified resource quality objectives.

In order to allow New Largo to plan for and manage the current and future mine water makes, a detailed water balance, coupled with a salt balance was calculated for the current and future opencast mining sections at New Largo Colliery. It is indicated that the historic New Largo No.2 Seam, New Largo No.4 Seam and Vlakfontein Underground Workings, are not and will not be intersected by the New Largo Colliery opencast workings and are therefore not included in this assessment.

The 2022 GoldSim Water and Salt Balance Model which was developed for New Largo Colliery was used as a basis from which the updated water and salt balances were calculated. This Water and Salt Balance Report consolidates and documents the information and input data sets used, assumptions, modelling results and recommendations made regarding the updated water and salt balances for New Largo Colliery.

1.2 STUDY OBJECTIVES

The objective or purpose of the study is to update the mine wide water and salt balance for New Largo Colliery, addressing each of the opencast pits, namely Pit A/G, Pit C, Pit D which includes the extension of the Klipfontein Colliery Opencast Pit, Pit D North, Pit F, Pit H and Pit Wilge. The outcomes of the study are documented in this Water and Salt Balance Report and will be used for further water management planning purposes.

Use was made of the standalone computer based GoldSim Modelling Software to achieve the study objective.

2. ACTIVITY BACKGROUND AND REGIONAL SETTING

2.1 ACTIVITY BACKGROUND

New Largo Colliery is an operational opencast coal mine, mining both the No.4 and the No.2 Coal Seams within the Witbank Coal field of South Africa. Coal has historically been mined within the area by means of underground mining methods and is currently being mined by means of opencast mining methods from the No.4 and the No.2 Coal Seams of the Witbank Coal Field.

The coal at New Largo will be mined through a series of opencast pits (Pits D, F, H, A/G, C, D North and Wilge), which includes the continuation and extension of the neighbouring Klipfontein Colliery Pit (Pit D), situated to the West of the New Largo Mining Right Boundary. The opencast coal mining will also include the reopening of some of the smaller, historic underground mine workings, which were mined as early as 1890. The opencast mining activities at New Largo started in 2020 and are planned to continue up until 2056.

The layout and extent of the known historic underground workings as well as the extent of the current and proposed opencast workings within the New Largo Mining Right Boundary are delineated on Figure 2.1(a)

2.2 REGIONAL SETTING

The coal mining operations at New Largo Colliery are all located within the New Largo Mining Right Boundary, which covers an area of 12 141 hectares (ha). The New Largo Mining Right Boundary is situated: 15 km to the north-west of Ogies, 25 km to the south-west of Emalahleni, 25 km to the south-east of Bronkhorstspruit and 30 km to the north-east of Delmas. The New Largo Mining Right Boundary is located across the boundary between the northern regions of the Victor Khanye Local Municipality and the western regions of the Emalahleni Local Municipality, both of which are located within the Nkangala District Municipality of the Mpumalanga Province of South Africa (Figure 2.2(a)).

The New Largo Mining Right Boundary is situated on a topographical high which runs from the north-west towards the south-east. The surface topography generally gets lower towards the Saalklapspruit and associated tributaries in the north-east, and the Wilge River in the south-west. The surface elevation within the New Largo Mining Right Boundary ranges from 1 460 mamsl in the north up to 1 585 mamsl in the central regions (Figure 2.2(b)).

The New Largo Mining Right Boundary extends primarily over two (2) quaternary catchments, namely the B20F in the south-west, and the B20G in the north-east. Both quaternary catchments are situated within the Olifants River Primary Catchment (Figure 2.2(c)).

The western extent of the study area, located within the B20F quaternary catchment, drains into the Wilge River and its tributaries. The eastern extent of the study area, located within the B20G quaternary catchment, drains into the Saalklapspruit and its tributaries (Figure 2.2(c)). The Saalklapspruit drains into the Wilge River to the north-east of the study area, which in turn drains into the Olifants River. The Olifants River flows into the Loskop Dam and then through the central parts of the Kruger National Park and into Mozambique. The Olifants River eventually drains into the Limpopo River which discharges into the Indian Ocean along the east African coastline.

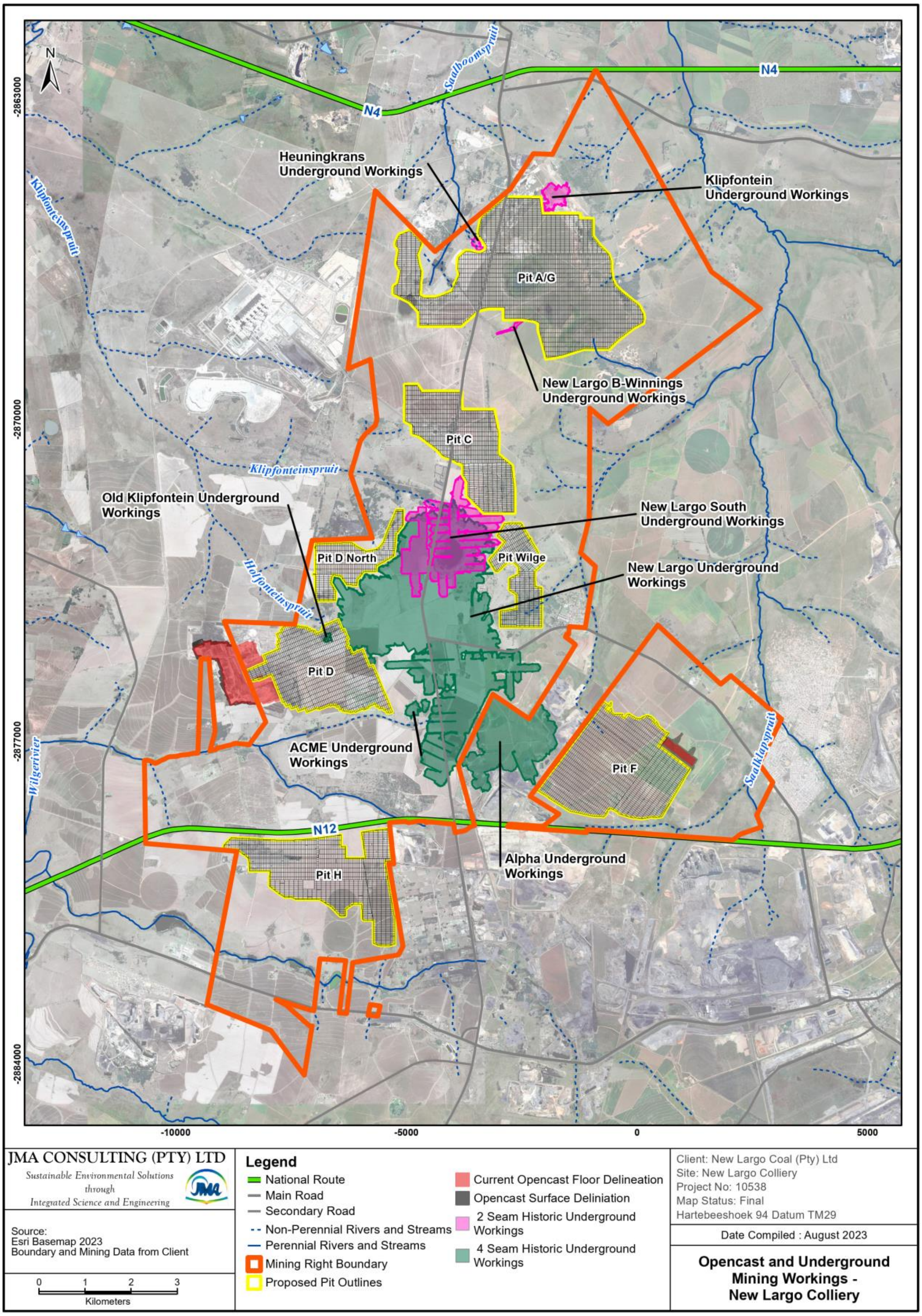


Figure 2.1(a): Opencast and Underground Mine Workings – New Largo Colliery

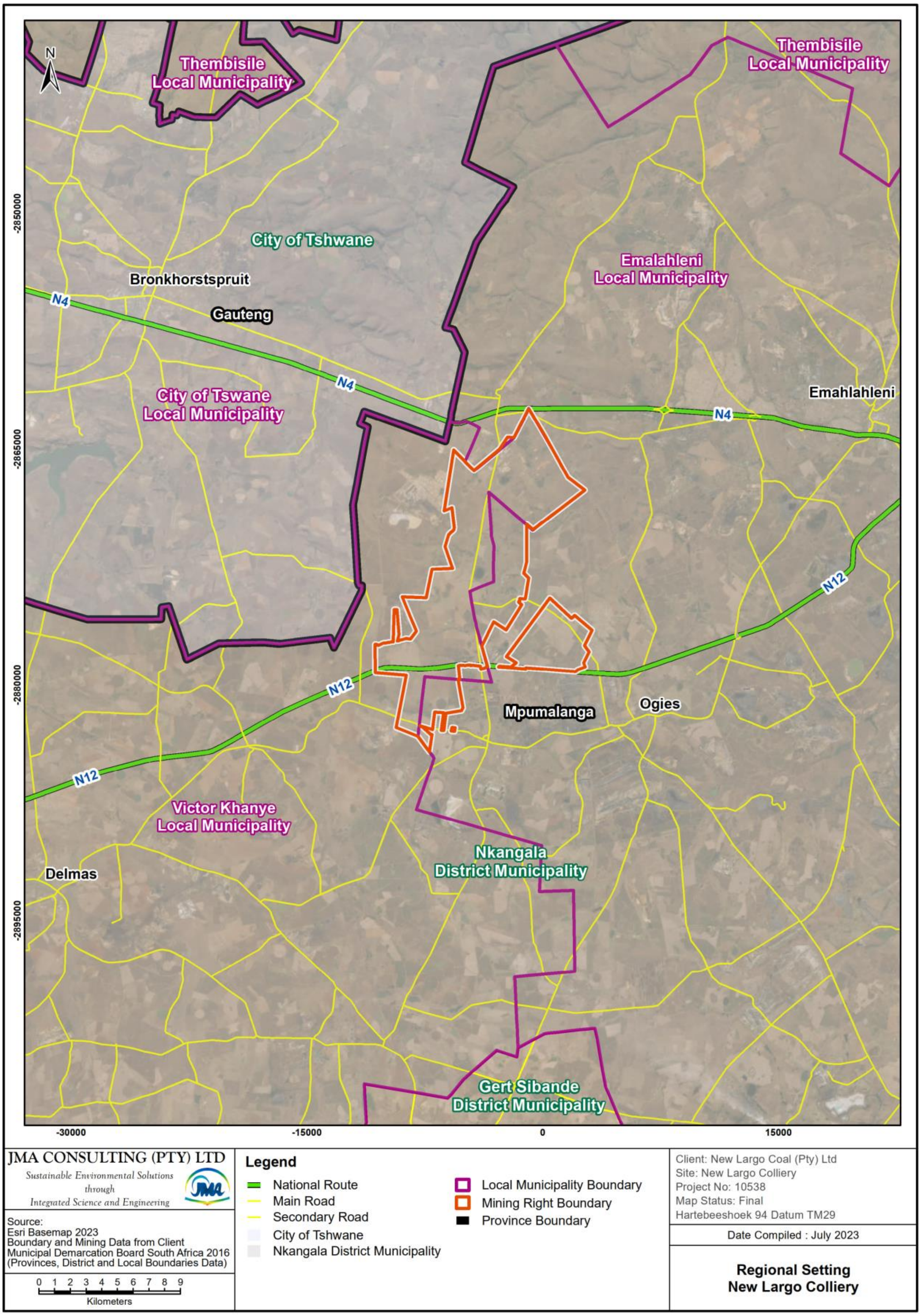


Figure 2.2(a): Regional Setting – New Largo Colliery

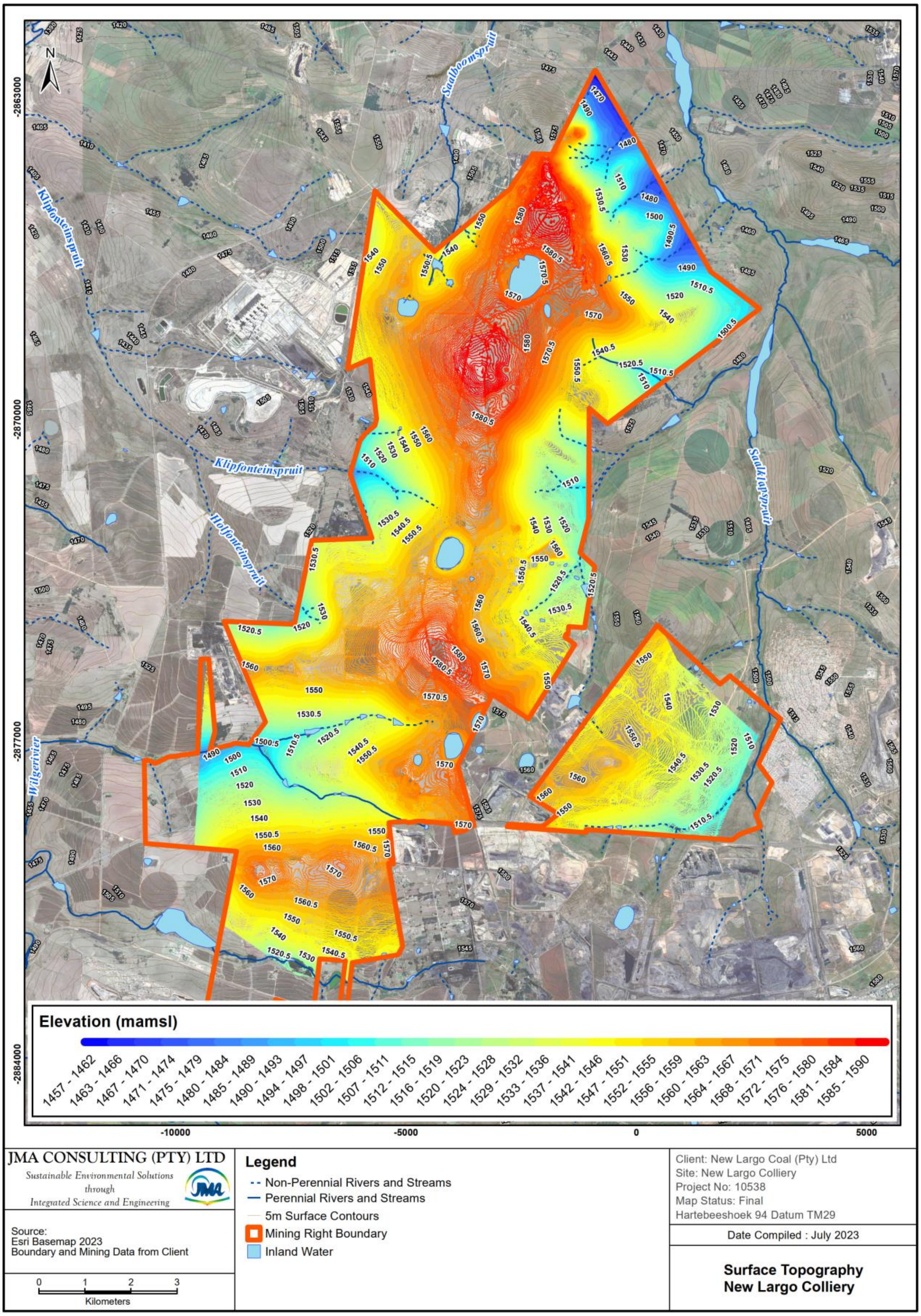


Figure 2.2(b): Surface Topography – New Largo Colliery

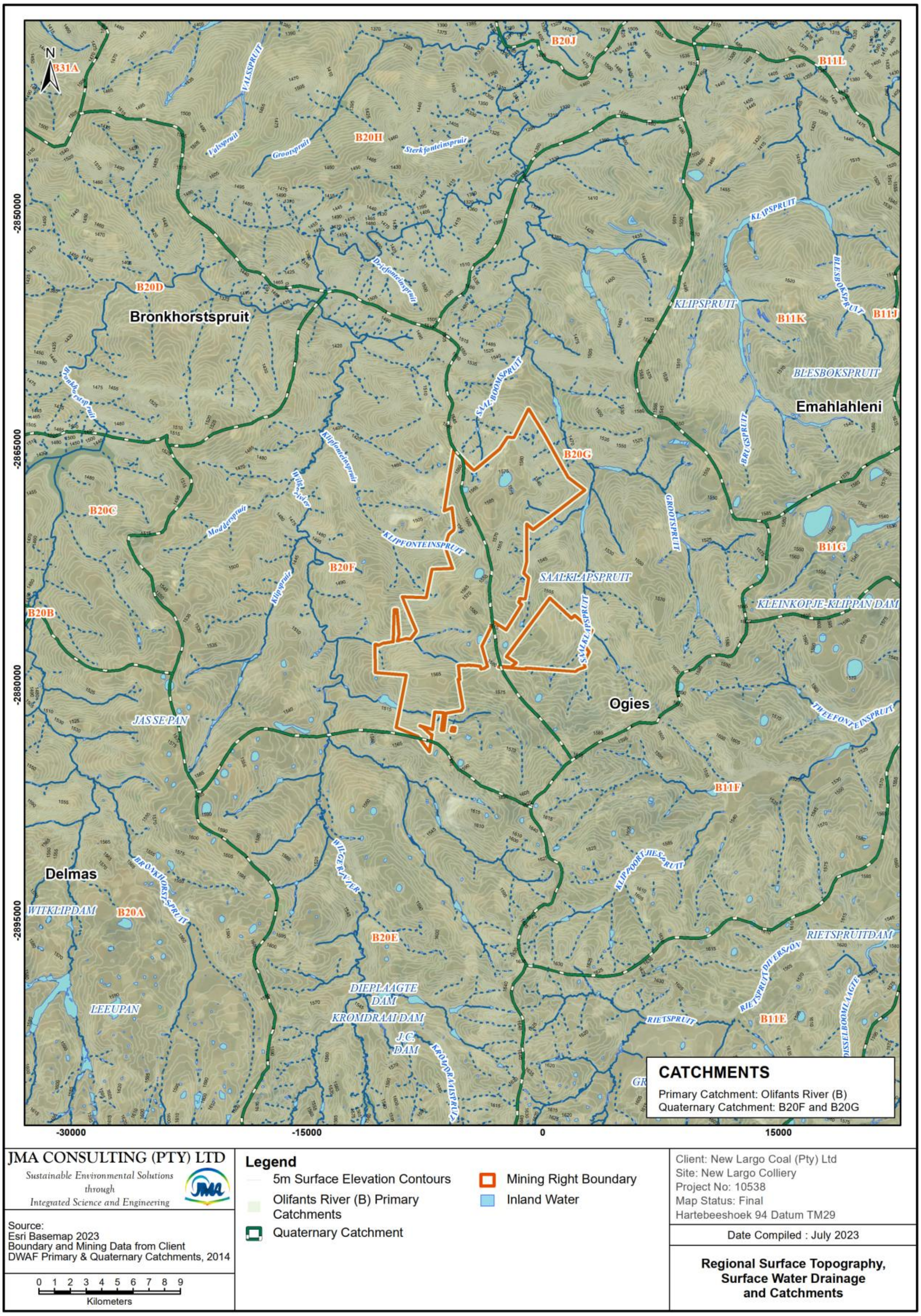


Figure 2.2(c): Regional Surface Topography, Surface Water Drainage and Catchments

The surface geology underlying the New Largo Mining Right Boundary is highly diverse and ranges from sedimentary lithologies of the Ecca (Pe) and Dwyka Groups (Pd) (Karoo Supergroup), sedimentary and meta-sedimentary lithologies of the Waterberg Group (Mw) (Transvaal Supergroup), sedimentary and igneous lithologies of the Loskop Formation (Vls) (Transvaal Supergroup) as well as sedimentary and meta-sedimentary lithologies of the Pretoria Group, namely the Silverton (Vsi), Daspoort (Vdq) and Strubenkop (Vst) Formations (Transvaal Supergroup). There are also various aged intrusives within the New Largo Mining Right Boundary, ranging from Dolerite and Diabase (di), both in the form of dykes and sills. The extent of mining and proposed mining are confined to the coal bearing sedimentary lithologies of the Ecca Group (Figure 2.2(d)) (1:250 000 Geological Map Series of South Africa – Sheets 2528 PRETORIA (1978) and 2628 EAST RAND (1986)).

The Ecca Group lithological units lie unconformably on top of the tillites of the late Carboniferous to early Permian Dwyka Group, which forms the base of the Karoo Supergroup. The Dwyka tillites outcrop extensively at the surface to the east and west of the New Largo Mining Right Boundary.

The study area is located within the Witbank Coalfield, which typically contains five coal seams, namely (from the base upwards) the No.1, 2, 3, 4 and 5 Coal Seams. New Largo is situated within the north-western regions of the Witbank Coalfield where the No.2 and the No.4 Coal Seams are economically the most important coal seams and are the coal seams which have historically been mined, are currently being mined and which will continue to be mined by the proposed opencast mining operations at New Largo.

Based on the geological grids received, the bottom elevations of the No.2 Coal Seam at New Largo ranges between 1 500 mamsl and 1 579 mamsl, whilst the elevations of the No.4 Coal Seam ranges between 1 522 mamsl and 1 582 mamsl. The layout of the No.2 and the No.4 Coal Seams at New Largo along with the bottom elevations are depicted as Figure 2.2(e) and Figure 2.2(f). The depth to the top of the No.2 Coal Seam ranges between 0 m (outcrop) and 64 m, with an average depth of 27 m, whilst the depth to the top of the No.4 Coal Seam ranges between 0 m (outcrop) and 48 m, with an average depth of 17 m. The thickness of the No.2 Coal Seam ranges between 0 m (pinched out) and 12 m, with an average thickness of 6 m, whilst the thickness of the No.4 Coal Seam ranges between 0 m (pinched out) and 9 m, with an average thickness of 4 m.

The predominant aquifer type present within the study area is the laterally extensive shallow weathered zone aquifer which occurs within the weathered and weathering related fractured zone, within the Ecca Group host rock matrices. This aquifer extends across the entire extent of the study area and has an average vertical thickness of 20.77 m. This aquifer zone will store and transport the bulk of the groundwater in the study area, and will display unconfined to semi-unconfined piezometric conditions. Due to the unconfined nature of the aquifer zone, it is as a result, highly susceptible to surface induced activities and impacts (JMA, 2011). The shallow weathered zone aquifer is primary recharged by rainfall and according to recent studies, the recharge was calculated as approximately 5% (GPT, 2019 & 2021).

The localized fractured aquifers present within the study area are restricted to the contact zones between the intrusive diabase bodies and the host rock. Although these semi-confined fractured aquifers may be high yielding, they will have limited storage capacities and recharge characteristics. The bulk of the water supplied by these aquifers will be drained laterally from storage within the shallow weathered zone aquifers neighbouring onto them (JMA, 2011).

With regards to the two aquifer types present within the study area, and subject to the site specific host matrix physical properties, it is assumed that the bulk of the groundwater zone within the study area will display porous groundwater flow conditions with a hydraulic conductivity of 0.015 m/day (GPT, 2019 & 2021). The "fractured conditions" encountered, may, due to their scale and interconnectivity, also be regarded as porous groundwater flow zones from a modelling perspective (JMA, 2011).

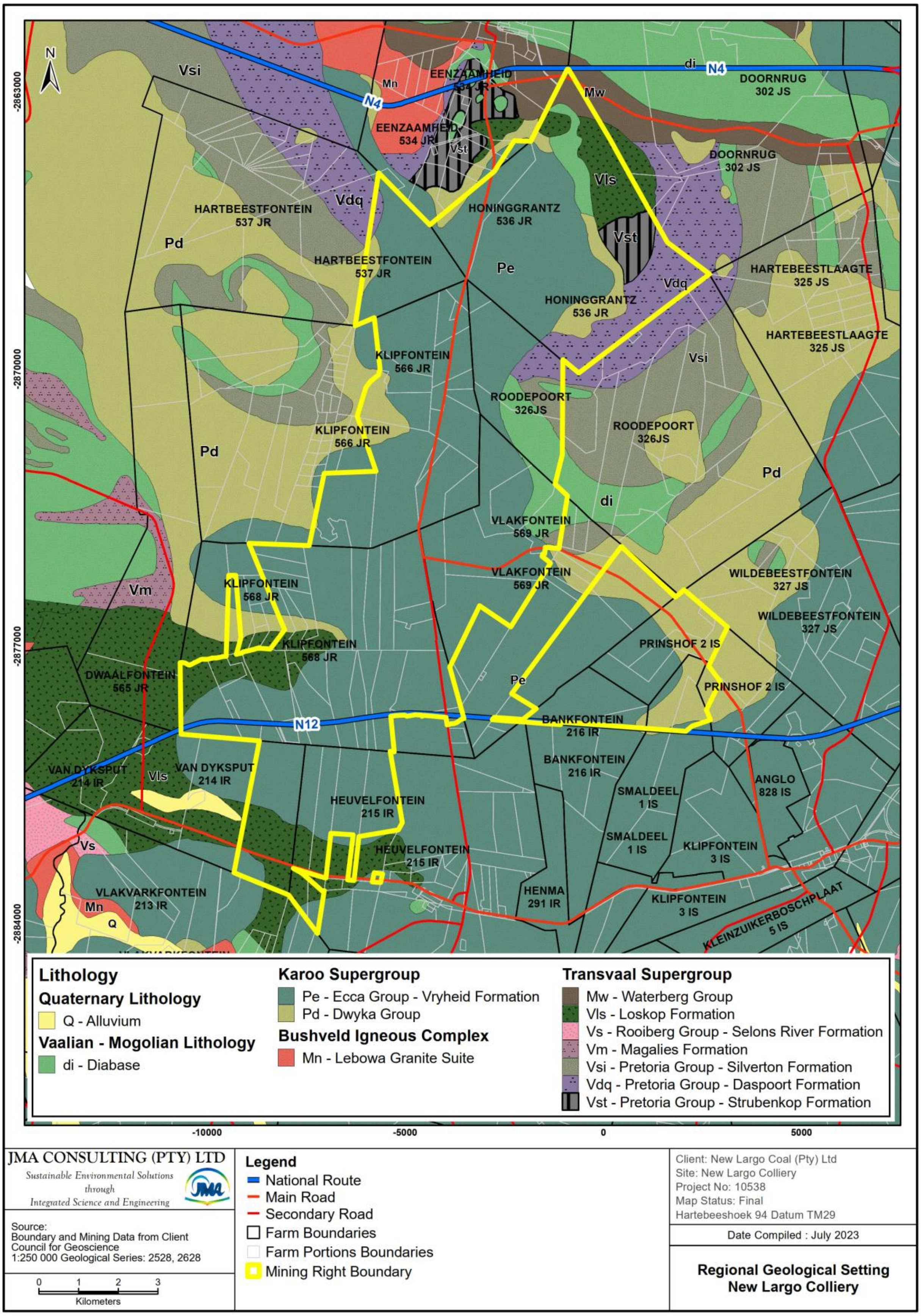


Figure 2.2(c): Regional Surface Topography, Surface Water Drainage and Catchments

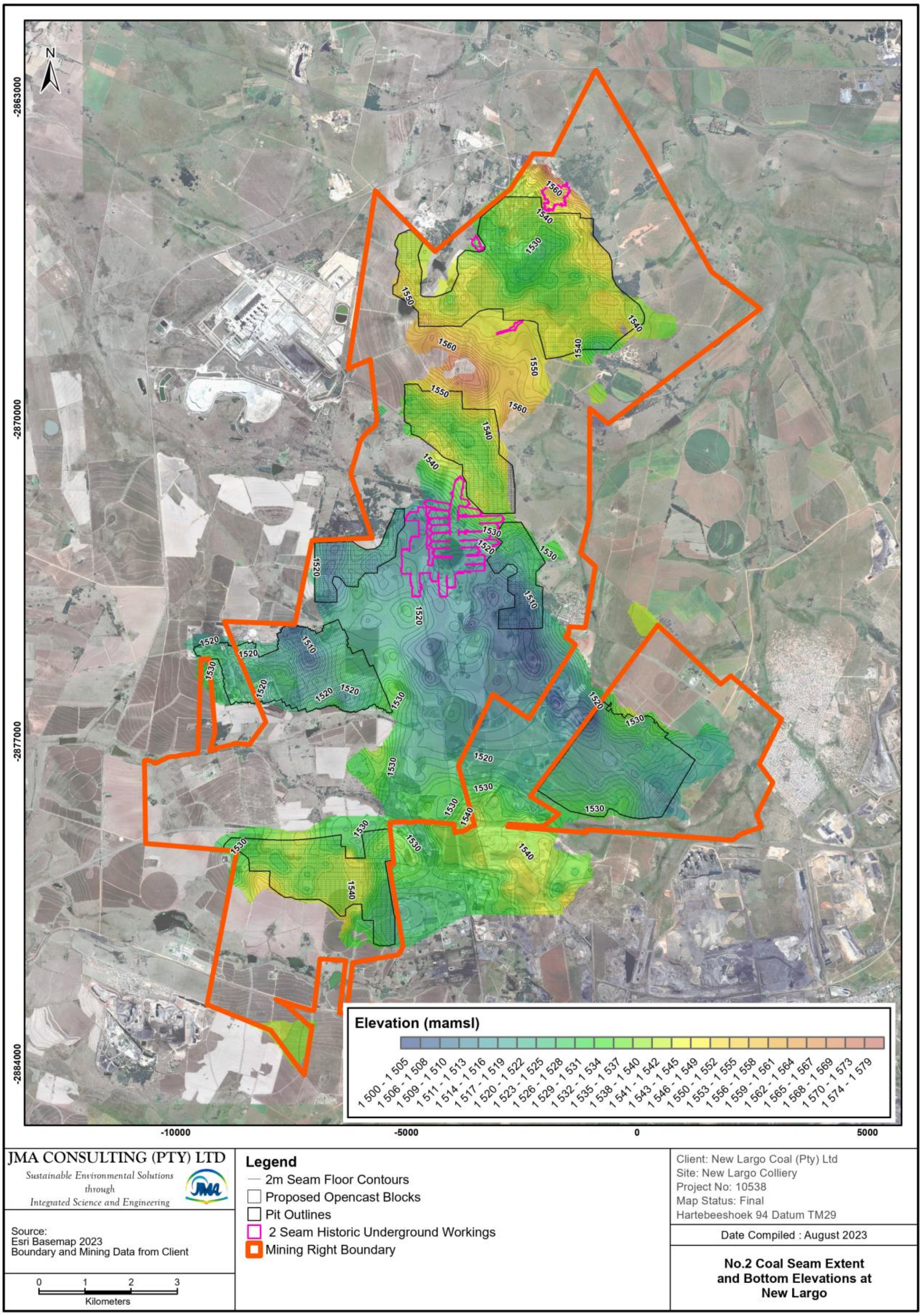


Figure 2.2(e): No.2 Coal Seam Extent and Bottom Elevations at New Largo

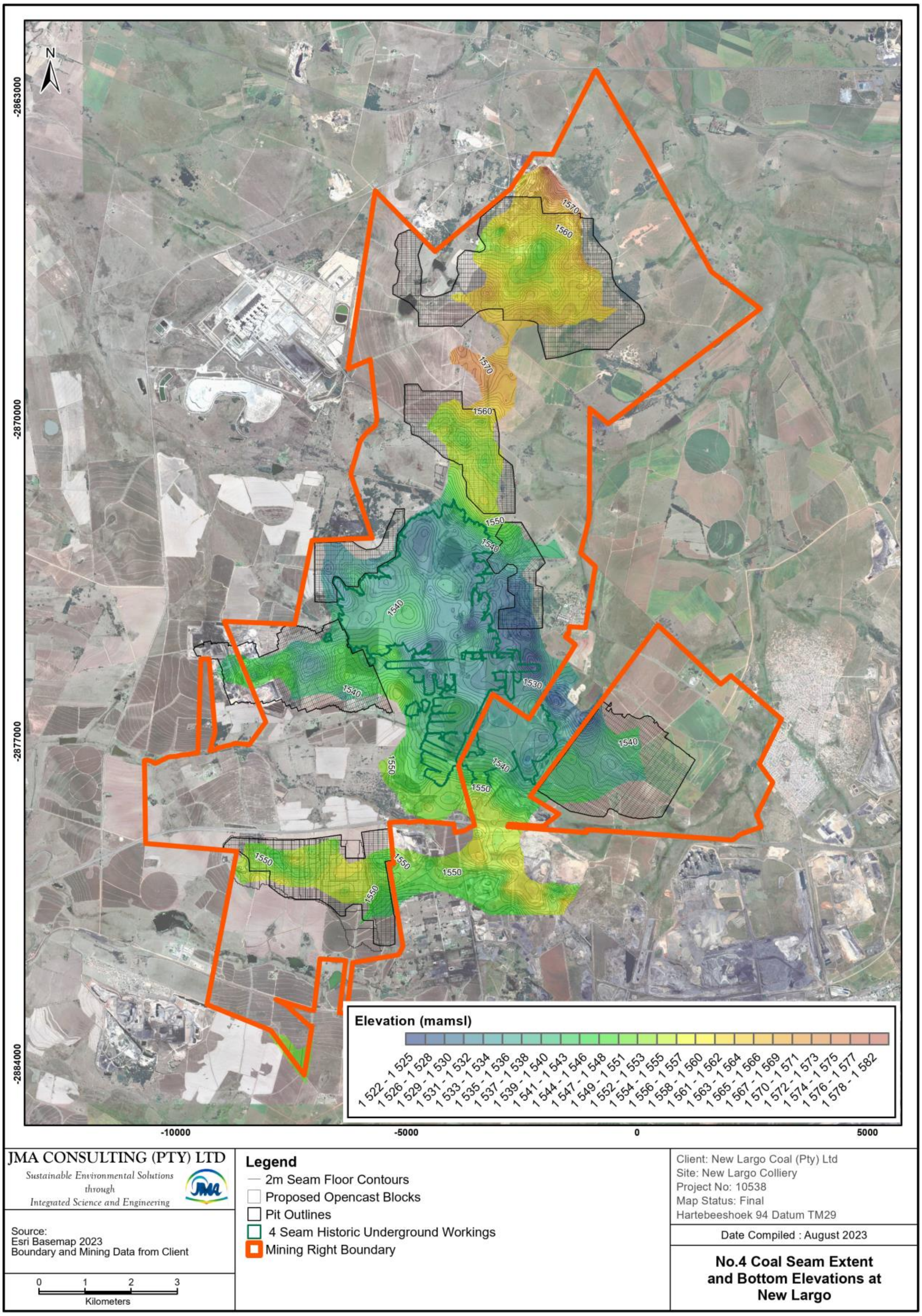


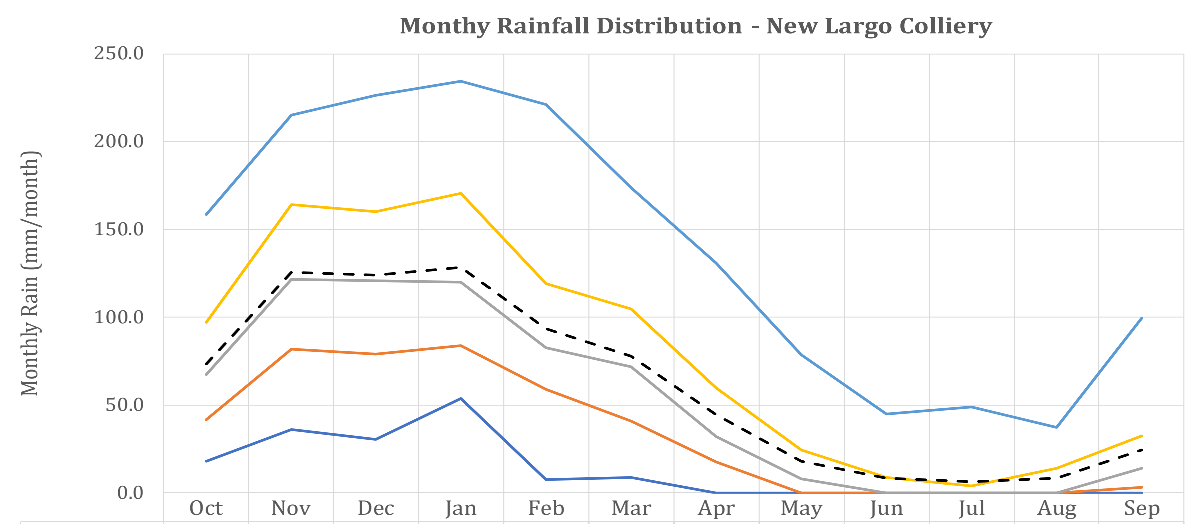
Figure 2.2(f): No.4 Coal Seam Extent and Bottom Elevations at New Largo

2.3 REGIONAL CLIMATE

New Largo Colliery is located in the summer rainfall region of Southern Africa and is characterised by a typical Highveld climate, with warm summers and cold, dry winters. Precipitation occurs in the form of rainfall showers and thunderstorms, mainly from October to March with maximum events occurring in November, December and January.

The daily rainfall data obtained from the closest South African Weather Service (SAWS) Station, namely the Ogies Weather Station (No. 0478093W) over a period of 86 years from 1914 to 2000, together with daily rainfall data received from Klipspruit Colliery (bordering Ogies approximately 14 km southeast of New Largo Colliery) over a period of 8 years (2014 to 2022) and local Klipfontein (April 2022 to June 2023) were patched and used for the study area. Daily recorded rainfall from the Ogies Weather Station was sourced using the Daily Rainfall Data Extraction Utility (Kunz, 2004).

A summary of the calculated monthly distribution of rainfall data for the period 1914 to 2023 is depicted as Figure 2.3(c). It is evident from the results and rainfall data provided that the annual rainfall varies from year to year, with a mean annual precipitation (MAP) of 732.2 mm/annum (Table 2.3(a)).



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
5th Perc	17.8	36.1	30.4	53.7	7.6	8.8	0.0	0.0	0.0	0.0	0.0	0.0
25th Perc	41.7	82.0	78.9	83.6	58.8	40.7	17.8	0.0	0.0	0.0	0.0	3.3
50th Perc	67.4	121.5	120.8	120.0	82.7	71.8	32.1	8.0	0.0	0.0	0.0	13.9
75th Perc	97.0	164.3	160.0	170.5	119.3	104.7	59.8	24.4	8.9	4.0	14.0	32.4
95th Perc	158.6	215.1	226.5	234.2	221.2	173.8	130.7	78.7	45.1	49.0	37.2	99.4
Average	73.3	125.6	124.1	128.3	93.5	77.6	44.6	18.2	8.2	6.3	8.3	24.2

Figure 2.3(c): Calculated Monthly Rainfall Distribution for New Largo (1914 – 2023)

For future rainfall and historic periods with missing site-specific data, artificial daily rainfall was generated using a stochastic rainfall simulator in GoldSim. The simulator was calibrated to ensure that the rainfall sequences generated are statistically equivalent to the long-term rainfall record selected from the Ogies Weather Station. A cumulative distribution function of the annual rainfall (recorded and simulated) is shown in Figure 2.3(d).

Table 2.3(a): Average Monthly Rainfall

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Total
Rainfall (mm)	73.3	125.6	124.1	128.3	93.5	77.6	44.6	18.2	8.2	6.3	8.3	24.2	**732.2**

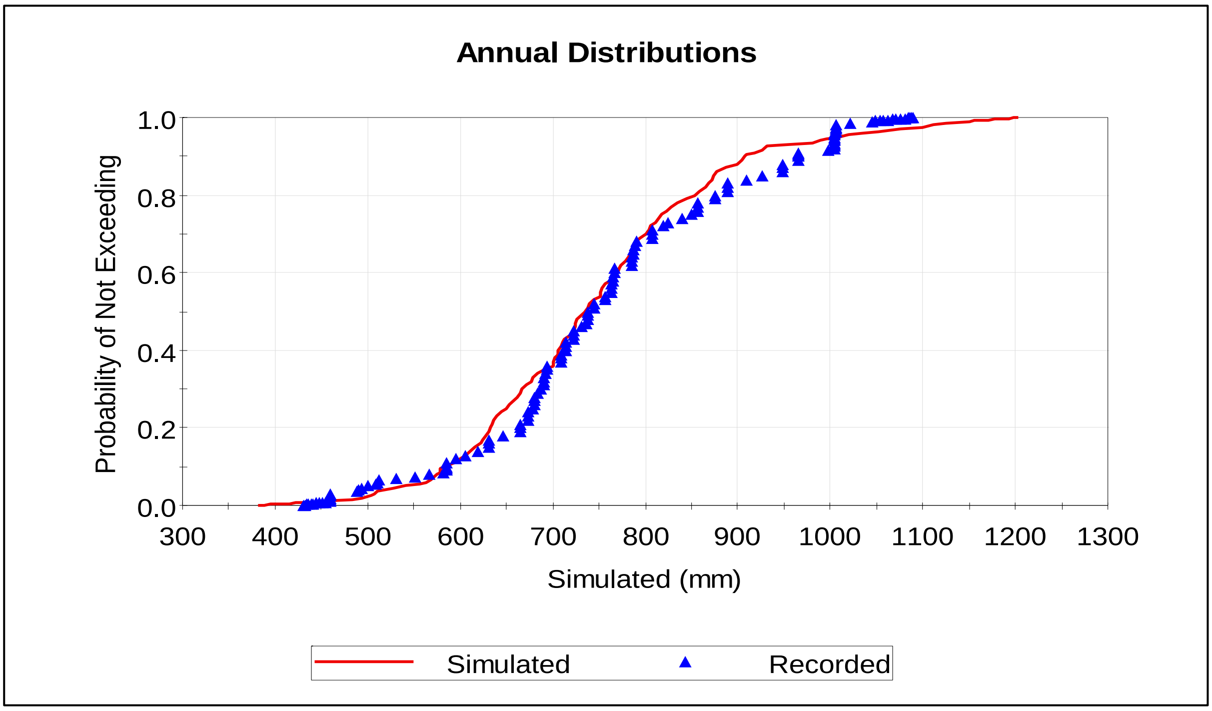


Figure 2.3(d): Annual Rainfall Cumulative Distribution

Recorded annual rainfall of the two sourced records varies between 338.9 mm/annum and 1 182 mm/annum. A very dry year (defined by the 5th percentile) will receive 525 mm/annum, with a very wet year (defined by the 95th percentile) receiving 986 mm/annum.

Mean monthly evaporation data (Symons Pan or S-Pan) was taken from Bronkhorstspruit Dam Monitoring Station (B2E001) (DWS, 2023) and analysed for a monitoring period between 1967-2023. The Mean Annual Evaporation (MAE) recorded and thus assigned to the study area is 1 517.6 mm/annum, with the monthly distribution indicated in Table 2.3(b) and on Figure 2.3(e).

Table 2.3(b): Average Monthly S-Pan Evaporation Recorded at Rietfontein (1967 – 2023)

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Total
Evap. (mm)	163.5	159.4	174.4	165.1	143.3	135.1	105.3	86.5	68.4	75.1	103	138.7	**1 517.6**

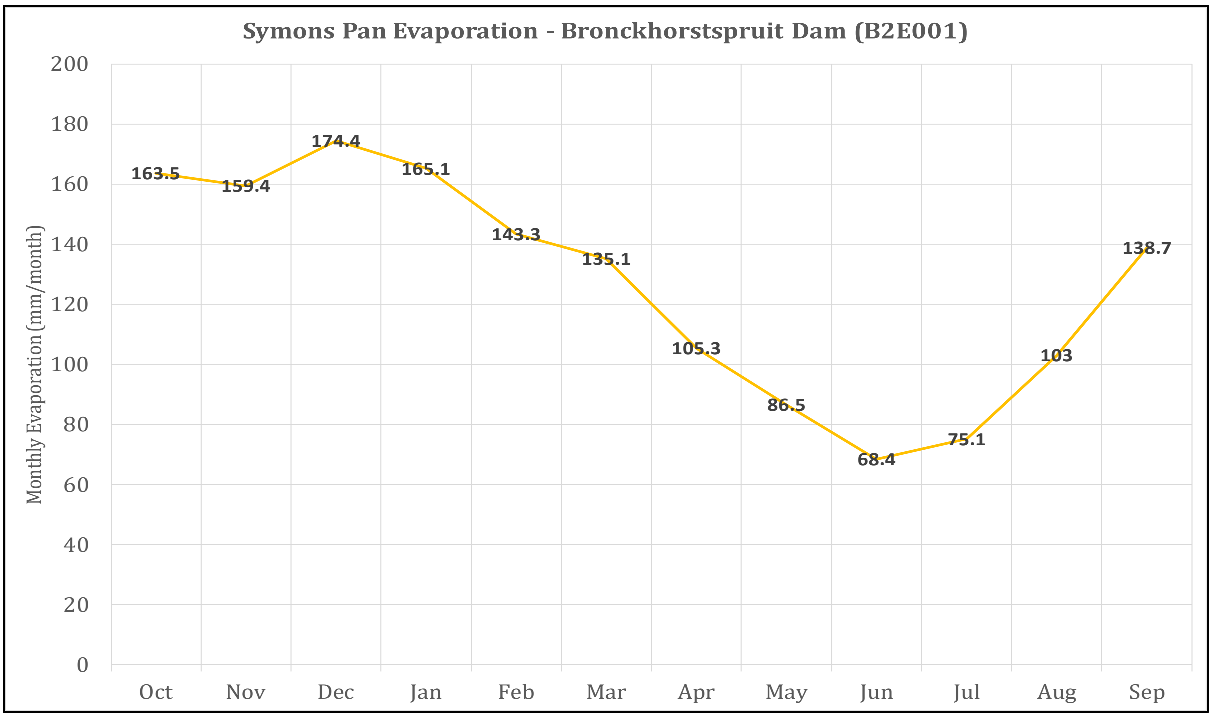


Figure 2.3(e): Average Monthly S-Pan Evaporation Recorded at Bronkhorstspruit Dam (1967 2023)

Based on a MAP of 732 mm/annum and a MAE of 1 517 mm/annum, the study has a negative climatic water balance (MAP – MAE) of –786 mm/annum.

3. DESCRIPTION OF ACTIVITY

For the purposes of providing context to the opencast mining environment at New Largo Colliery, reference is firstly made to the historic underground mining, before providing the details of the current and future opencast mining operations.

3.1 DEFUNCT UNDERGROUND MINING

There are several historic underground workings located within the New Largo Mining Right Boundary, some of which were mined as far back as the 1890's. These workings were mined by various owners in the past, and it has been indicated that the mining of coal from the New Largo underground workings ceased in 1989 (Vermeulen and Usher, 2006).

3.1.1 Defined Previously Mined Areas

The defined defunct underground workings within the New Largo Mining Right Boundary include the Klipfontein, Old Klipfontein, New Largo, Alpha and ACME Underground Workings for which there are detailed mined out layouts. Mining within these underground workings took place on the No.2 Coal Seam (Figure 3.1.1(a)) and the No.4 Coal Seam (Figure 3.1.1(b)).

Using the current extent of mining, together with the areas of the remaining coal pillars, it is calculated that the percentage of coal mined (combination of Bord and Pillar and high extraction Methods) on the No.2 Coal Seam ranges between 51% and 72%, with an average extraction percentage of 64%. The percentage of coal mined on the No.4 Coal Seam ranges between 72% and 77%, with an average extraction percentage of 75%. A summary of the calculated coal extraction percentages for each of the mining sections is provided in Table 3.1.1(a).

Table 3.1.1(a): Summary of Coal Extraction Percentages for Historic Underground Mining

Underground Workings	Total Extent of Mining (m^2)	Area of Remaining Pillars (m^2)	Area of Coal Extracted (m^2)	Total Coal Extraction %
No.2 Seam Underground Workings				
New Largo South	2 738 472.16	841 338.20	1 897 133.96	69%
New Largo B-Winnings	24 338.18	11 920.77	12 417.41	51%
Klipfontein	220 371.44	61 764.63	158 606.81	72%
Heuningkrans	37 280.14	Not Provided	-	-
No.4 Seam Underground Workings				
New Largo	11 129 536.96	3 079 396.24	8 050 140.72	72%
ACME	100 814.40	22 888.12	77 926.28	77%
Alpha	2 306 313.46	614 135.07	1 692 178.39	73%
Old Klipfontein	19 248.45	4 412.09	14 836.36	77%

According to (Hodgson, 2007) the average mining height for the No.2 Coal Seam Underground Mining is 2 m and 2.78 m for the No.4 seam underground workings. Based on the information provided (New Largo, 2019), the average height for the No.4 Coal Seam is 2.9 m with secondary extraction in some places resulting in a mining height of up to 5 m.

Stage-storage capacity tables have been calculated for each of the defined previously mined areas using the base of the No.2 Coal Seam and the No.4 Coal Seam as the floor of the mine. A summary is provided in Table 3.1.1(b) indicating the storage capacity at both the decant elevation and the maximum roof elevation for each of the underground workings. The minimum and maximum floor elevations along with the decant elevations for each underground workings is also provided. Scenarios have been calculated for a 3 m and a 5 m mining height within the No.2 seam and the No.4 seam underground workings.

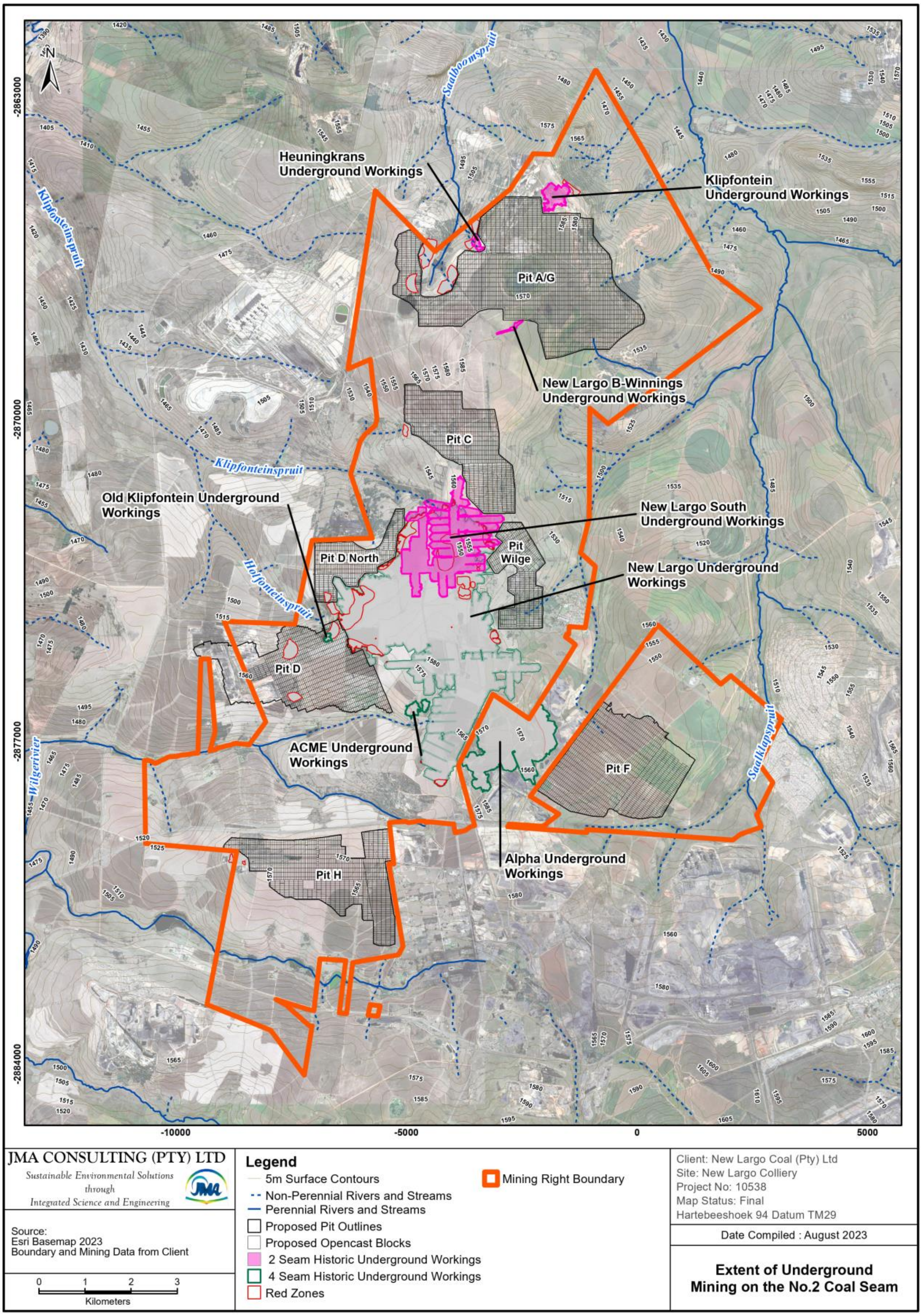


Figure 3.1.1(a): Extent of Underground Mining on the No.2 Coal Seam

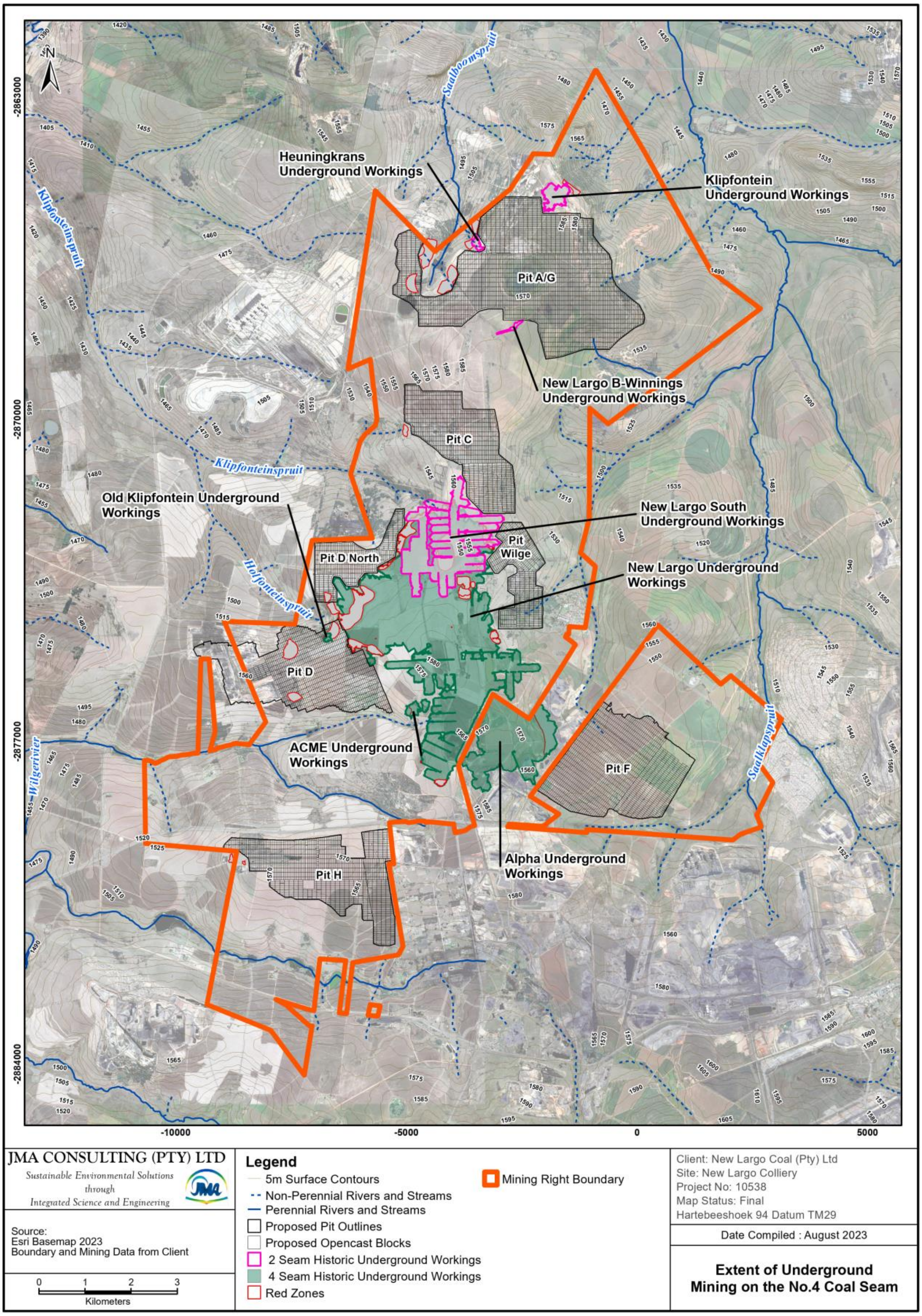


Figure 3.1.1(b): Extent of Underground Mining on the No.4 Coal Seam

Table 3.1.1(b): Summary Of The Storage Capacities Within the Underground Workings

Underground Workings	Bottom Coal Seam Floor Minimum Elevation (mamsl)	Bottom Coal Seam Floor Maximum Elevation (mamsl)	Theoretical Decant Elevation (mamsl)	Decant Storage Capacity (m³)	Decant Storage Capacity (m³)	Maximum Storage Capacity (m³)*	Maximum Storage Capacity (m³)*
				Mining Height: 3m	Mining Height: 5m	Mining Height: 3m	Mining Height: 5m
No.2 Seam Underground Workings							
New Largo South	1 511	1 539	1 531	5 664 555	9 440 925	5 664 555	9 440 925
New Largo B-Winnings	1 544	1 547	1 581	38 097	63 495	38 097	63 495
Klipfontein	1 542	1 566	1 566	468 425	760 725	468 425	760 725
Heuningkrans	1 533	1 534	1 540	68 160	113 600	68 160	113 600
No.4 Seam Underground Workings							
New Largo	1 522	1 550	1 540	18 453 332	27 876 854	24 037 776	40 062 462
ACME East	1 539	1 540	1 563	71 610	119 350	71 610	119 350
ACME West	1 540	1 554	1 554	153 615	256 025	153 615	256 025
Alpha	1 532	1 551	1 547	4 834 938	7 975 954	5 052 330	8 420 550
Old Klipfontein	1 538	1 540	1 545	44 121	73 259	44 121	73 259

* Maximum storage calculated to the maximum roof height irrespective of the decant elevation.

The extent of the underground workings together with the bottom elevation contours of the mined out coal seam is indicated as follows:

- Figure 3.1.1(c): No.2 Underground Workings Layout Plans & Extents
- Figure 3.1.1(d): No.4 Underground Workings Layout Plans & Extents

With the exception of the water level that was measured at borehole M5 in the new Largo No.4 Seam Underground Workings (GPT,2022), the water levels within the above tabulated historic underground workings are not accurately known and the degree of interconnectivity between these workings are also not known. Additional work is required and is being undertaken by the mining operations in this regard, but was not available at the time of compiling this report. It has however been reported that the Alpha Underground Workings were used as an oil storage facility in the past, with traces of oil observed in the adjacent New Largo Underground Workings (Figure 3.1.1(d)), suggesting that these underground workings are interconnected. It is stated that the oil within the Alpha Underground Workings has mostly been removed, with the remaining oil, predominantly in the form of a sludge, still expected to be removed from the underground workings by Vlakfontein Colliery.

Due to the potential risk posed to the proposed opencast mining operations during the operational phase and post closure water management, it is strongly recommended that dedicated underground mine water monitoring boreholes be drilled into each of the abovementioned underground workings to quantify the flooding statuses of the various underground mine workings and to assess the degree of interconnectivity between the workings.

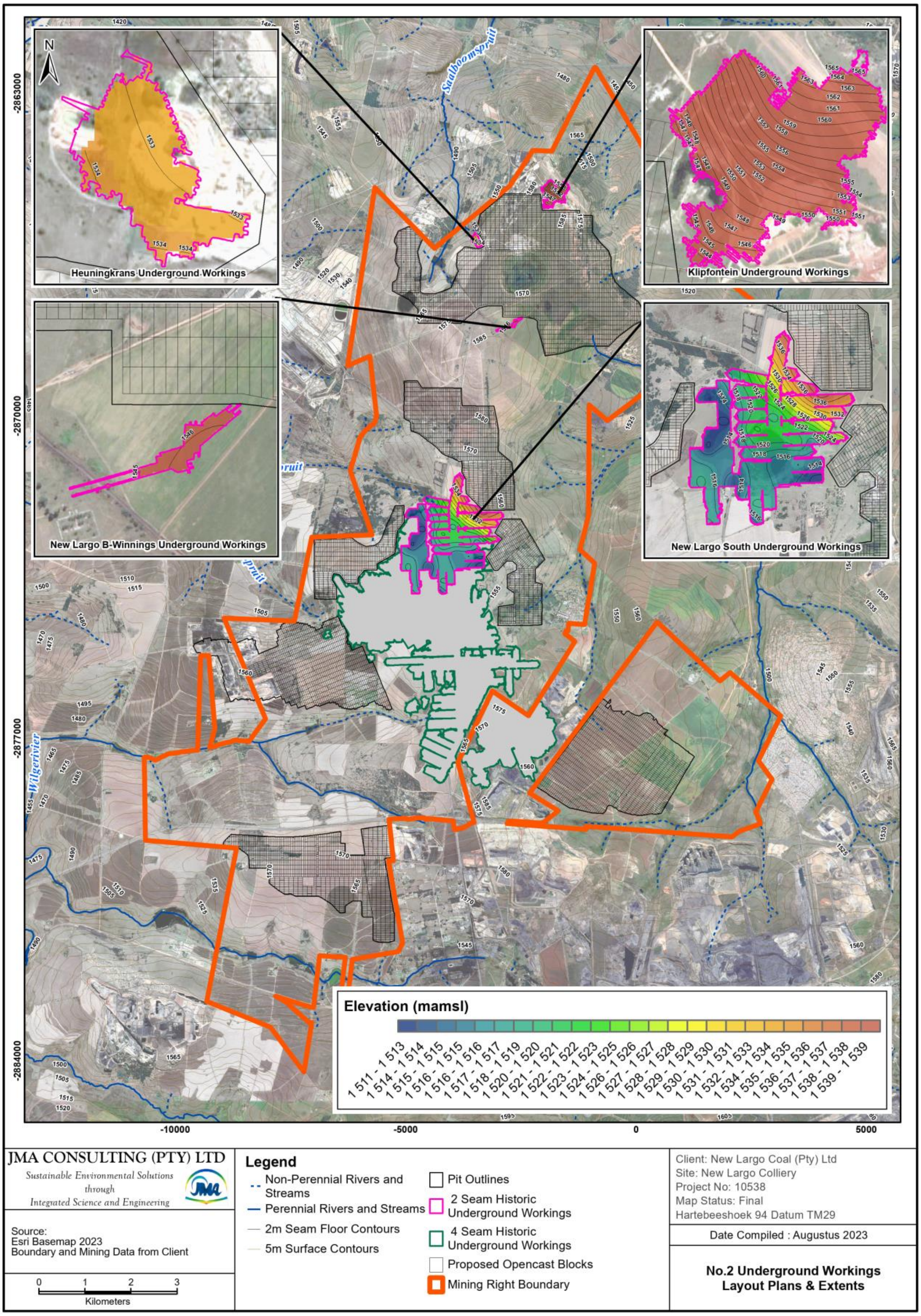


Figure 3.1.1(c): No.2 Underground Workings Layout Plans & Extents

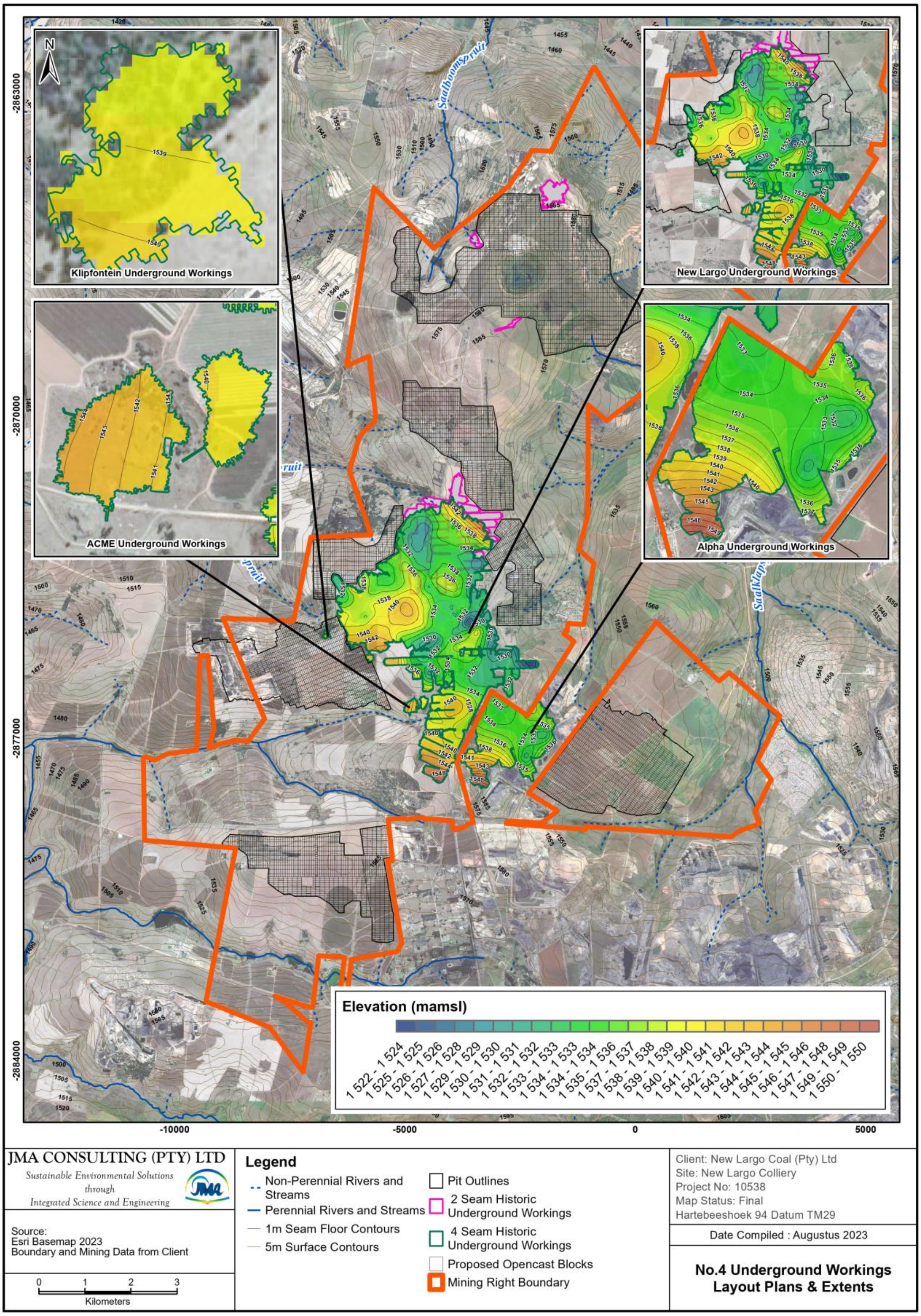


Figure 3.1.1(d): No.4 Underground Workings Layout Plans & Extents

3.1.2 Non-Defined Previously Mined Areas

Various adit positions have been located within the New Largo Mining Right Boundary for which the exact areas and mining details are not available. A 200 m radius were assumed from the adit position (New Largo, 2019) and defined as 'Non-Defined Previously Mined Areas' (Red Zones). These red zones are delineated on Figure 3.1.2(a).

A summary is provided in Table 3.1.2(a) indicating the storage capacities at both the decant elevation and the maximum roof elevation for each of the red zones which will be mined out by the opencast workings. The minimum and maximum floor elevations along with the decant elevations for each red zone are also provided. Scenarios have been calculated for a 3 m and a 5 m mining height within the No.2 seam and the No.4 seam red zones using an extraction percentage of 70%.

Table 3.1.2(a): Summary Of The Storage Capacities Within the Red Zone Areas

Red Zone	Bottom Coal Seam Floor Minimum Elevation (mamsl)	Bottom Coal Seam Floor Maximum Elevation (mamsl)	Theoretical Decant Elevation (mamsl)	Decant Storage Capacity (m^3)	Decant Storage Capacity (m^3)	Maximum Storage Capacity (m^3)*	Maximum Storage Capacity (m^3)*
				Mining Height: 3m	Mining Height: 5m	Mining Height: 3m	Mining Height: 5m
No.2 Seam Red Zones							
Hartebeest 1	1 540	1 543	1 547	211 680	345 377	211 680	345 377
Hartebeest 2	1 544	1 550	1 555	146 160	243 600	146 160	243 600
Hartebeest 3	1 541	1 545	1 578	266 910	444 850	266 910	444 850
Balmoral	1 533	1 536	1 537	85 563	101 294	85 563	101 294
No.4 Seam Red Zones							
Pit D No. 1	1 535	1 544	1 540	53 708	63 806	173 040	221 493
Pit D No. 2	1 537	1 541	1 542	57 737	71 894	57 737	71 894
Old Klipfontein	1 538	1 540	1 544	161 070	263 423	161 070	263 423
Good Year North	1 533	1 535	1 538	43 680	54 771	43 680	54 771
Good Year South	1 534	1 540	1 541	72 587	98 404	72 587	98 404

*Maximum storage calculated to the maximum roof height irrespective of the decant elevation.

Note: It has been communicated by New Largo that the mining height for the Pit D No. 2 Red Zone has an average roof height of 1.5m. New Largo also provided average bord, pillar and intersection dimensions within the red zone area from which an extraction percentage of 82% was calculated. The Pit D No. 2 Red Zone therefore has a maximum storage capacity of 83 059 m^3 and a storage capacity of 58 823 m^3 at its decant elevation of 1 542 mamsl. Water levels were measured at 23 probing holes, one old monitoring borehole and a ventilation shaft within the Pit D No. 2 Red Zone. The water level elevations ranged between 1 540.61 mamsl and 1 544.47 mamsl with an average water level elevation of 1 543.23 mamsl. The storage capacity within the Pit D No. 2 Red Zone is thus flooded up to the maximum storage capacity of 83 059 m^3.

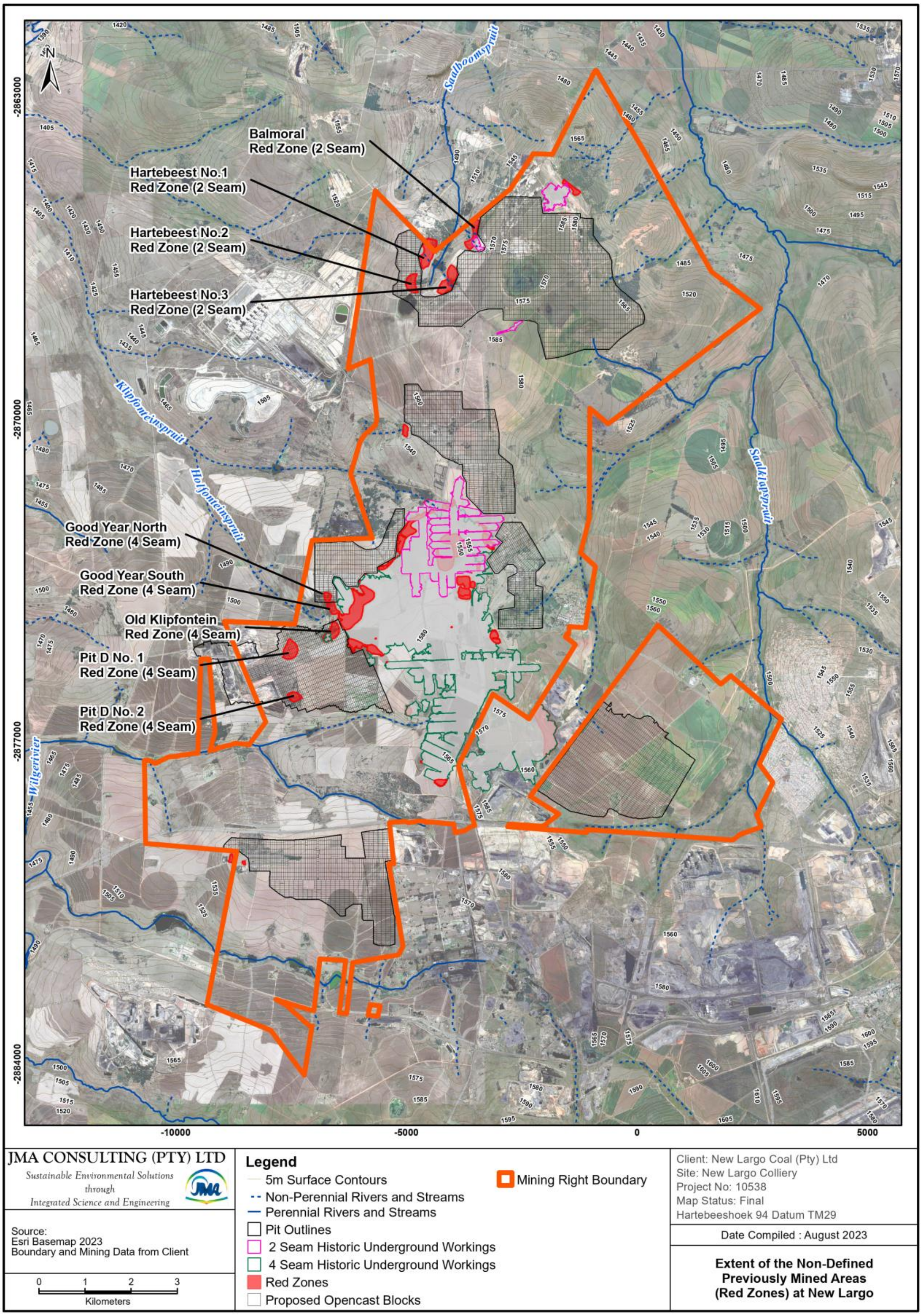


Figure 3.1.2(a): Extent of the Underground Mining Red Zones at New Largo

3.1.3 Opencast Mining Interaction with Historic Underground Workings

It has been indicted by New Largo that only the Klipfontein Underground Workings on the No.4 Coal Seam will be reopened and mined out by the proposed opencast mining at New Largo. In addition to the Klipfontein Underground Workings some of the non-defined previously mined areas (red zones) will also be reopened and mined out. A summary is provided in Table 3.1.3(a) indicating the financial year in which each of the non-defined underground workings will mined into. For the purpose of the water and salt balance calculations and due to the small nature of the red zones, it is assumed that the entire red zone will be dewatered in the first financial year in which the workings are penetrated.

Table 3.1.3(a): Opencast Mining and Red Zone Interaction Timeline summary

Area	Pit	Financial Mining Year
Non-Defined Previously Mined Areas (Red Zones)		
Hartebeest 2	**Pit A/G**	FY27
Pit D 1	**Pit D**	FY26
Pit D 2	**Pit D**	FY24
Old Klipfontein	**Pit D**	FY31
Good Year North	**Pit D North**	FY46

It has been confirmed with field investigations that the Klipfontein Underground Workings are decanting from the adit at a flow rate that was too low to measure (GPT, 2022). The ponding decant from the Heuningkrans Underground Workings adit is visible from the 2019 LiDAR Image with a water level elevation of 1 543 mamsl. It has been communicated by New Largo that a number of the adits are in fact decanting which means that they are fully flooded at least up to the decant elevation. Some of the other workings that are not decanting might be fully flooded up to the highest roof elevation.

It has been indicated that all of the other known historic underground workings within the New Largo Mining Rights Boundary will be left intact and will not be opened up with opencast mining. If the other underground workings are punctured or opened up as part of the proposed opencast workings it may result in significantly higher water makes than expected, depending on the flooding status and flooded areas within the underground workings. The water level within the New Largo No.4 Seam Underground Workings has been confirmed (GPT, 2022) using one borehole (M5). The water level were found to be similar to that which was reported by Hodgson in 2007. This is discussed in greater detail in Section 5. The water levels within the other underground workings are not known and the water makes from these workings will therefore not be incorporated into the Water and Salt Balances.

It has been reported that Alpha Colliery was used as an oil storage facility in the past. It is believed that the oil has been removed, but it is uncertain to what extent (New Largo, 2019). It is recommended that dedicated underground mine water monitoring boreholes be drilled into each of the underground workings in order to quantify water storage within the workings.

Although the majority of the underground workings will be left intact, there will still be a gradient from the underground mine water towards the opencast pits. The resulting water make from the underground workings will depend on the elevations of the water levels within the underground workings as well as the thickness of the barrier pillar and the permeability of the barrier pillar. The water makes from these adjacent underground working will need to be quantified with groundwater modelling.

3.2 OPENCAST MINING OPERATIONS

The New Largo opencast mining operations commenced during 2020 with Pit D as an extension from the Klipfontein Opencast Workings to the West of the New Largo Mining Right Boundary, by means of standard roll over opencast mining. The New Largo opencast mining operations will extract coal from all the coal seams using standard Truck and Shovel methods. This includes the mining of the No.5 and No.4 Coal Seams in certain areas and the No. 2 Coal Seam in all areas for coal export. New Largo has an expected Life of Mine (LOM) up to Financial Year (FY) 2056 ending end of March 2056.

The New Largo opencast workings are currently divided into seven separate opencast pits which includes Pit A/G, Pit C, Pit D, Pit D North Pit F, Pit H and Pit Wilge (Figure 3.2(a)). Pit A/G, Pit C, Pit D North and Pit Wilge forms part of the Main Mine.

New Largo provided JMA with modelled pit shells for the Main Mine pits which were used to calculate the stage-storage capacities. LOM and mined-out delineations were also provided for Pit D, Pit F and Pit H which together with the provided No.2 Coal Seam floor elevation grid were used to calculate the stage-storage capacities for the three pits.

The detailed stage-storage capacity tables for each of the seven pits are attached as APPENDIX I. The capacities were calculated using a backfilled porosity of 25% and a porosity of 100% in areas where a final void (i.e. Office Void) have elevations below the theoretical decant elevation. The decant elevations were obtained using the final mining extent and 2019 LiDAR surface elevation survey. The decant elevations may change during the LOM if the pit extent changes, and should therefore be reassessed once the final extent of mining has been achieved. It has been indicated by New Largo that all of the opencast pits will be fully backfilled, reshaped to be free-draining and revegetated, with no final voids left at any of the pits post closure.

The current surface extent as well as the projected LOM extents of the opencast workings were provided by New Largo and were used to calculate surface areas for the current and proposed opencast workings. The current surface and floor extent of the opencast mining at New Largo together with the projected LOM areas are portrayed on Figure 3.2(a), with the current and projected LOM areas summarised in Table 3.2(b).

A breakdown of the recharge percentage from rainfall for different contributing sources towards opencast mining (Hodgson, 1998) is provided in Table 3.2(a).

Table 3.2(a): Recharge from Rainfall for Opencast Mining (Hodgson, 1998)

Contributing Sources	Average Values
Rain onto ramps and voids	70% of rainfall
Rain onto un-rehabilitated spoils (run-off and seepage)	60% of rainfall
Rain onto levelled spoils (run-off)	5% of rainfall
Rain onto levelled spoils (seepage)	20% of rainfall
Rain onto rehabilitated spoils (run-off)	10% of rainfall
Rain onto rehabilitated spoils (seepage)	8% of rainfall
Surface run-off from pit surroundings into pits	6% of total pit water
Groundwater seepage	10% of total pit water

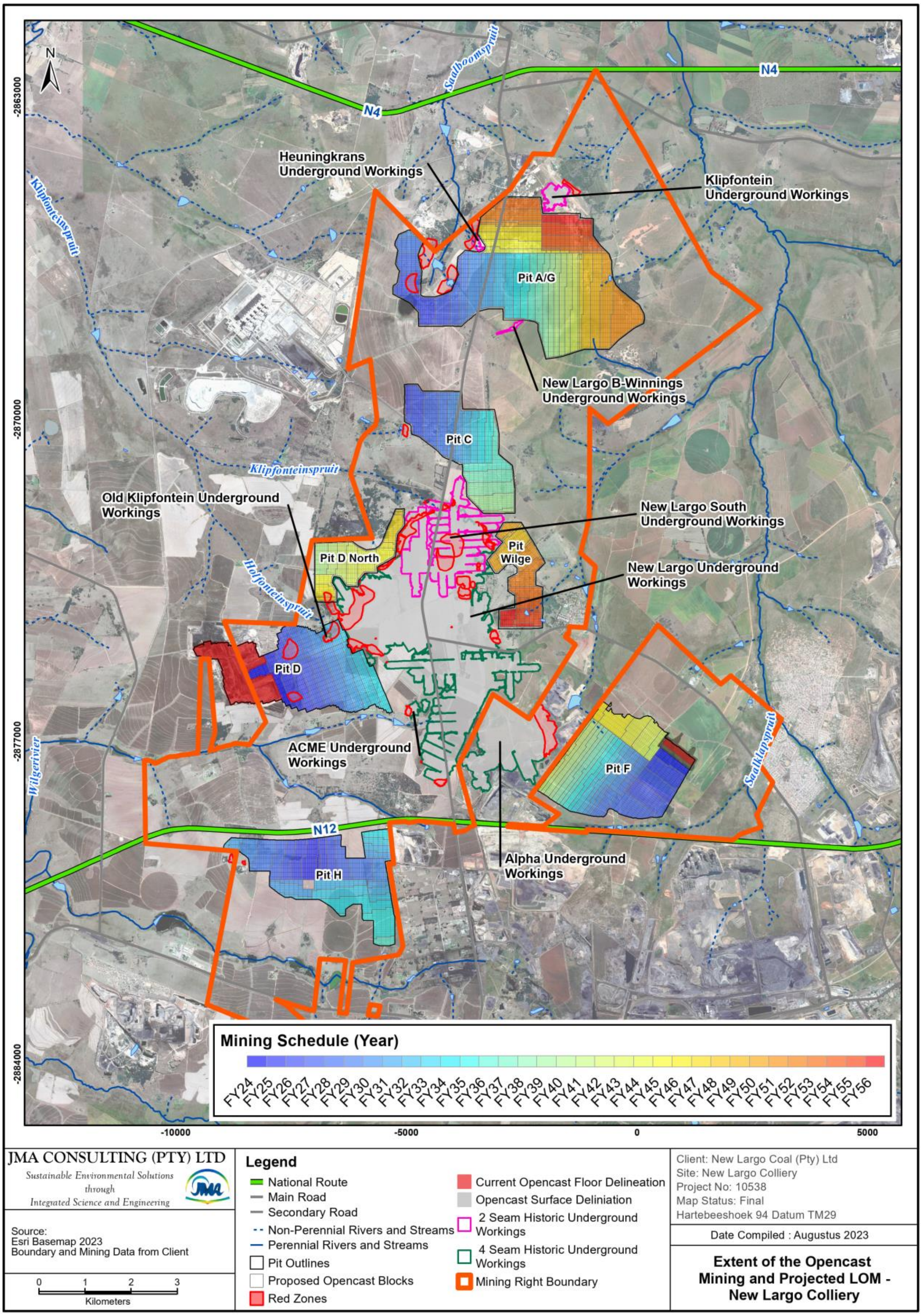


Figure 3.2(a): Extent of the Opencast Mining and Projected LOM – New Largo Colliery

Table 3.2(b): Current and Proposed LOM Areas for the Opencast Workings – New Largo Colliery

Mining Areas	Pit D (m²)	Pit F (m²)	Pit H (m²)	Pit A/G (m²)	Pit C (m²)	Pit D North (m²)	Pit Wilge (m²)	Total Area (m²)
Current Extent	1 418 483	260 343	-	-	-	-	-	1 678 826
Future Extent - FY24	1 685 673	424 774	24 912	-	-	-	-	2 135 359
Future Extent - FY25	2 026 546	708 104	321 733	-	-	-	-	3 056 383
Future Extent - FY26	2 401 459	991 590	678 924	252 584	79 939	-	-	4 404 494
Future Extent - FY27	2 804 349	1 321 770	1 038 354	741 112	388 011	-	-	6 293 598
Future Extent - FY28	3 141 074	1 727 855	1 443 617	1 153 255	727 900	-	-	8 193 701
Future Extent - FY29	3 509 960	2 013 224	1 959 346	1 560 627	1 026 984	-	-	10 070 142
Future Extent - FY30	3 932 177	2 250 366	2 319 463	1 964 625	1 263 625	-	-	11 730 256
Future Extent - FY31	4 328 946	2 451 419	2 729 996	2 304 849	1 484 587	-	-	13 299 798
Future Extent - FY32	4 667 731	2 629 658	3 147 650	2 586 737	1 672 386	-	-	14 704 162
Future Extent - FY33	4 963 044	2 835 557	3 550 325	2 855 735	1 855 526	-	-	16 060 188
Future Extent - FY34	5 172 060	3 027 030	3 990 983	3 099 638	2 042 078	-	-	17 331 789
Future Extent - FY35	5 172 060	3 218 131	4 321 815	3 332 618	2 235 286	-	-	18 279 910
Future Extent - FY36	5 172 060	3 376 307	4 401 177	3 558 427	2 518 504	-	-	19 026 474
Future Extent - FY37	5 172 060	3 578 128	4 401 177	3 806 053	2 785 813	-	-	19 743 230
Future Extent - FY38	5 172 060	3 771 306	4 401 177	4 070 948	3 048 337	-	-	20 463 828
Future Extent - FY39	5 172 060	3 939 272	4 401 177	4 341 858	3 326 379	-	-	21 180 746
Future Extent - FY40	5 172 060	4 150 544	4 401 177	4 614 439	3 365 010	186 281	-	21 889 511
Future Extent - FY41	5 172 060	4 338 564	4 401 177	4 892 424	3 365 010	325 603	-	22 494 836
Future Extent - FY42	5 172 060	4 583 201	4 401 177	5 174 267	3 365 010	491 632	-	23 187 347
Future Extent - FY43	5 172 060	4 829 035	4 401 177	5 468 570	3 365 010	701 667	-	23 937 519
Future Extent - FY44	5 172 060	5 040 574	4 401 177	5 683 603	3 365 010	891 578	-	24 554 001
Future Extent - FY45	5 172 060	5 300 330	4 401 177	5 905 547	3 365 010	1 086 661	-	25 230 785
Future Extent - FY46	5 172 060	5 367 312	4 401 177	6 150 532	3 365 010	1 235 215	-	25 691 305
Future Extent - FY47	5 172 060	5 367 312	4 401 177	6 469 659	3 365 010	1 423 313	6 620	26 205 151
Future Extent - FY48	5 172 060	5 367 312	4 401 177	6 856 834	3 365 010	1 437 209	195 728	26 795 328
Future Extent - FY49	5 172 060	5 367 312	4 401 177	7 287 521	3 365 010	1 437 209	327 775	27 358 063
Future Extent - FY50	5 172 060	5 367 312	4 401 177	7 842 417	3 365 010	1 437 209	490 759	28 075 944
Future Extent - FY51	5 172 060	5 367 312	4 401 177	8 475 686	3 365 010	1 437 209	692 756	28 911 209
Future Extent - FY52	5 172 060	5 367 312	4 401 177	8 808 639	3 365 010	1 437 209	930 800	29 482 205
Future Extent - FY53	5 172 060	5 367 312	4 401 177	9 121 620	3 365 010	1 437 209	1 092 283	29 956 671
Future Extent - FY54	5 172 060	5 367 312	4 401 177	9 407 953	3 365 010	1 437 209	1 220 337	30 371 057
Future Extent - FY55	5 172 060	5 367 312	4 401 177	9 696 685	3 365 010	1 437 209	1 405 100	30 844 552
Future Extent - FY56	5 172 060	5 367 312	4 401 177	9 885 716	3 365 010	1 437 209	1 563 130	31 191 614

3.2.1 Pit D

Mining at Pit D commenced in 2020, as an extension of the adjacent Klipfontein Colliery Opencast Workings, located to the west of the New Largo Mining Right Boundary (Figure 3.2.1(a)). The coal within Pit D is mined and crushed by Africoal SA (Pty) Ltd on behalf of New Largo Coal (Pty) Ltd, as agreed between the two companies. For the purpose of the water and salt balance calculations, the Klipfontein Opencast Pit and Pit D, will be handled as one opencast pit – namely Pit D.

Mining at Pit D is currently taking place in two areas or cuts of the same pit, namely the 'North Pit' and the 'South Pit'. Mining at the 'North Pit' is progressing in a southerly direction, whilst mining at the 'South Pit' is progressing in a northerly direction. These two areas will eventually join together, whereafter mining will progress in an easterly direction (Figure 3.2.1(b)).

The LOM at Pit D is mostly greenfield, with the exception of three non-defined previously mined areas and the Old Klipfontein Underground Workings, all of which were mined on the No.4 Coal Seam. These underground workings will be opened up and mined out during the LOM of Pit D. The expected volumes of water stored within these old underground workings are summarised in Section 3.1 and will be incorporated into the water balance accordingly.

The No. 2 Coal Seam floor at the combined Klipfontein and New Largo Pit D varies in elevation between 1 504 mamsl and 1 540 mamsl. The floor elevations within the pit are highest in the south-east and western regions and lowest in the central and northern regions. The combined Pit D has a current surface extent of 1 418 483 m^2 with an expected final surface area of 5 172 060 m^2. The current LOM plan indicates that mining at Pit D will be completed in FY34. Pit D will have a maximum storage capacity of 762 925 m^3 at a decant elevation of 1 515 mamsl. The layout plan of Pit D with the delineated mining floor elevations and decant position is depicted as Figure 3.2.1(c).

It is indicated on the LOM plan that the nearby New Largo No.4 seam underground workings will not be opened up by the Pit D opencast workings. It has however been calculated using the No.4 coal seam floor grids provided by New Largo together with the measured water level at borehole M5 (GPT,2023), that the flooding level within the New Largo No.4 seam underground workings are not flooded to the outside parameter of the workings on the western side (Section5.7). This also correlates with the flooding status reported by Hodgson in 2007 where it is evident that the floor of the underground workings to the west is higher in elevation than the measured water level elevation.

Water from Pit D is currently being pumped from Ramps 1 and 2 in the 'North Pit' as well as Ramps 1 and 2 in the 'South Pit'. The water abstracted from the two active cuts in Pit D ('North Pit' and 'South Pit') is pumped to the Klipfontein Office Void and occasionally to the Klipfontein PCD when additional water is required for dust suppression. It should be noted that one of the main mine 256 ML PCD's will be constructed as part of the Pit-D water management strategy. This dam, although not included in the implementation scope of this project, will form part of the greater Main Mine water management plan (Seriti, 2023). Excess water from the 256 ML PCD will be treated at the New Largo Treatment Plant with a planned treatment of 4 Ml/day (from 2024 onwards) and 6 Ml/day (from 2032 onwards) (Ukwazi, 2023).

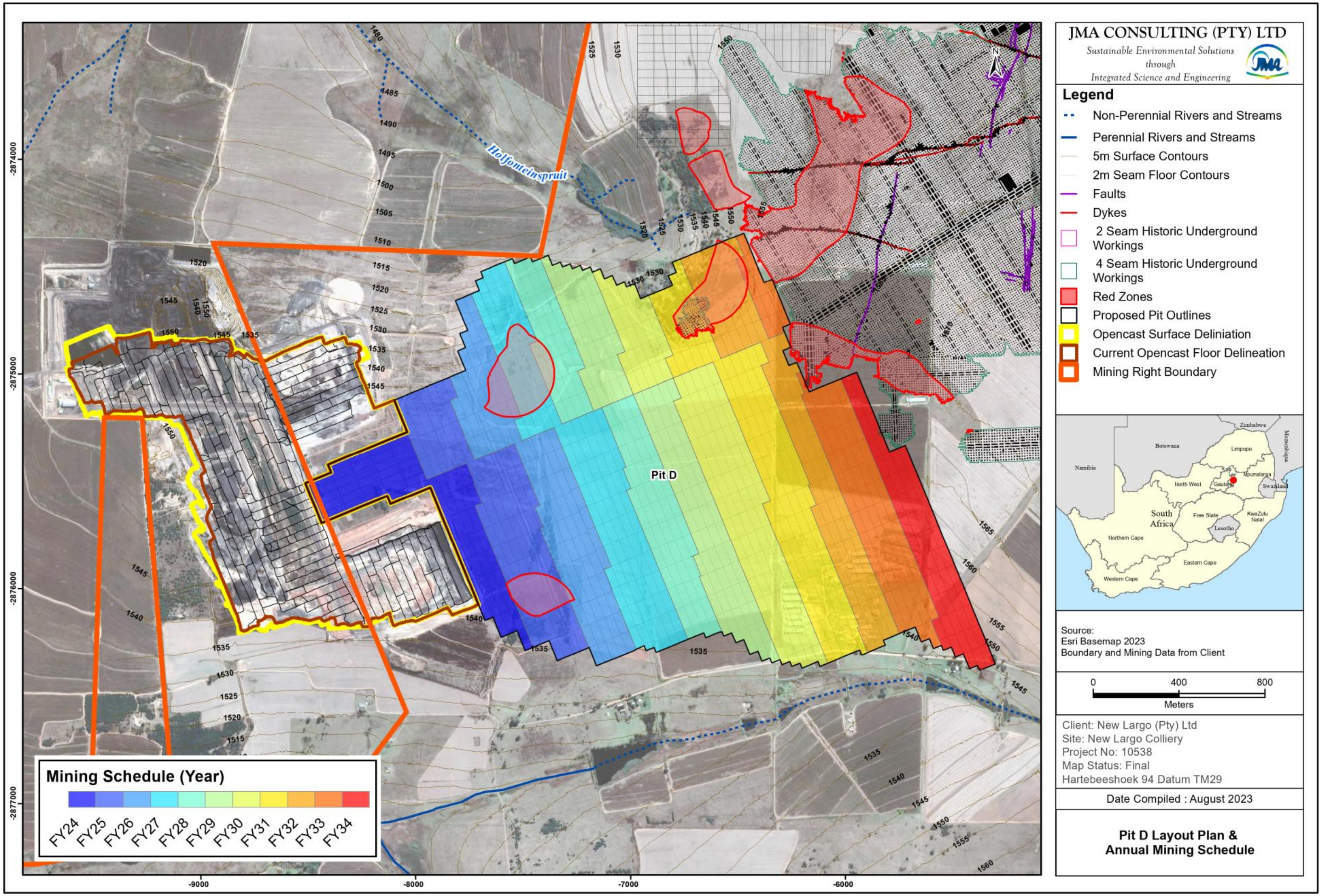


Figure 3.2.1(a): Pit D Layout Plan & Annual Mining Schedule

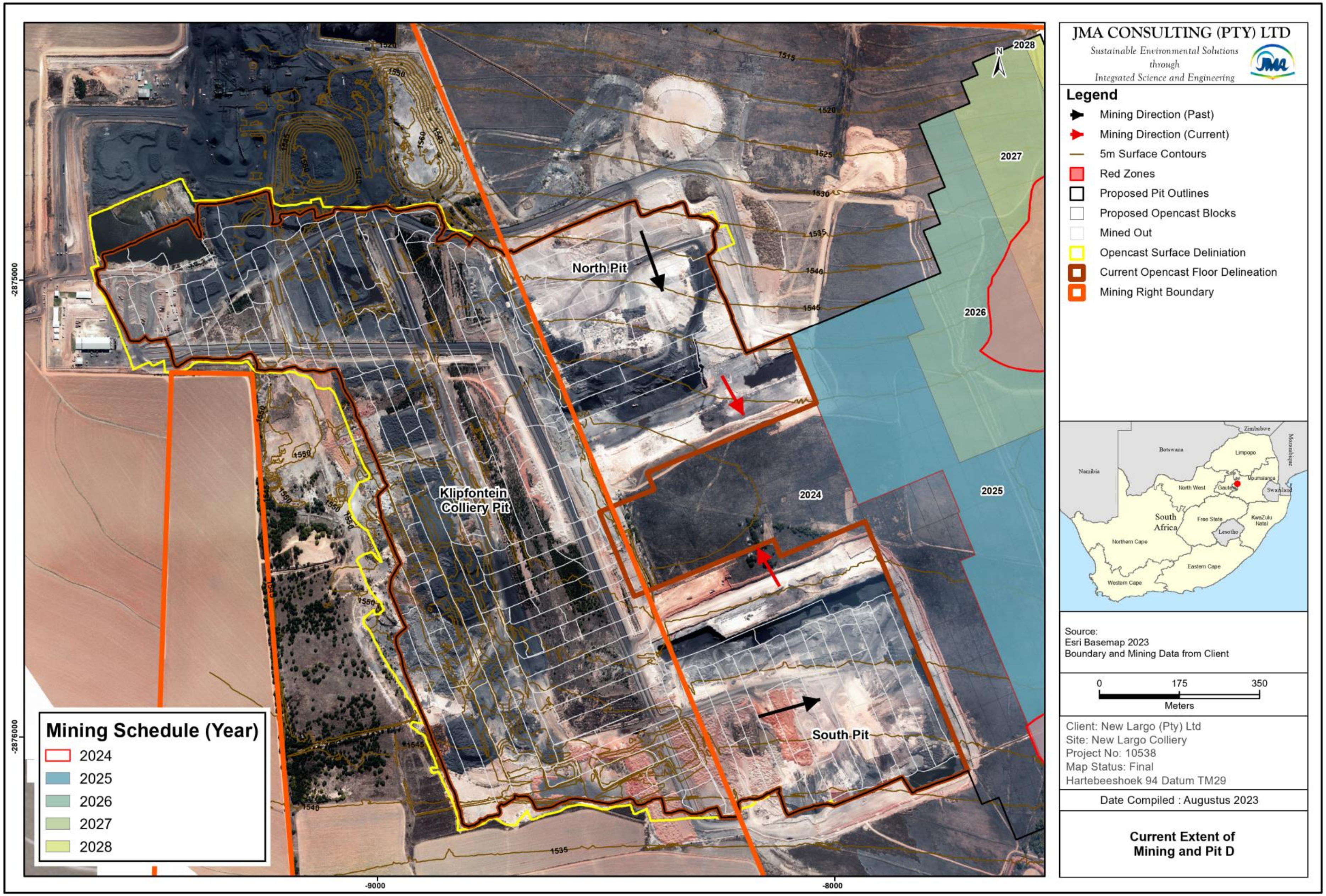


Figure 3.2.1(b): Current extent of mining and Pit D

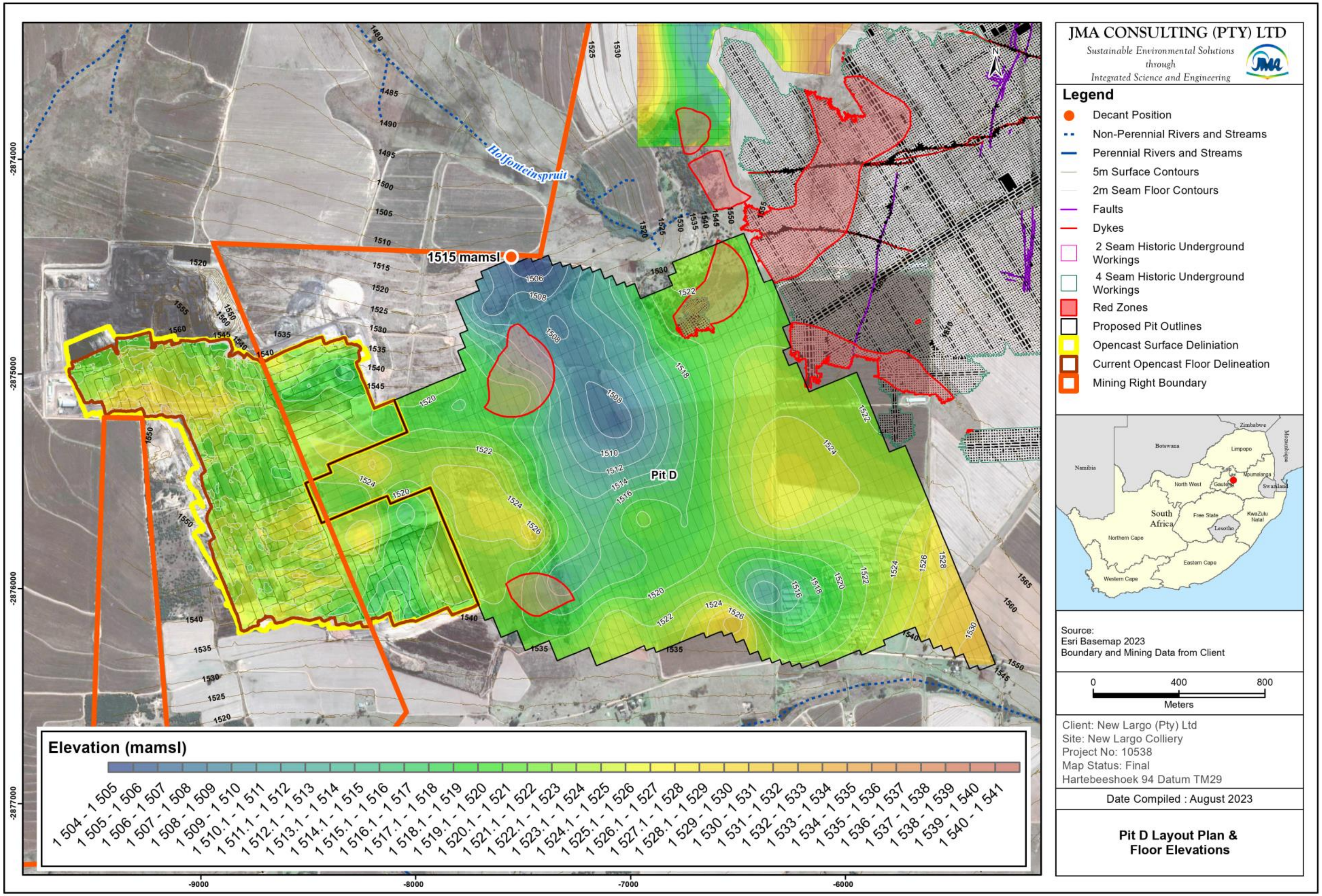


Figure 3.2.1(c): Pit D Layout Plan & Floor Elevations

3.2.2 Pit F

Mining at Pit F commenced in FY24 (April 2023) from the north-east of the proposed pit extent and will initially progress towards the south-west, and then towards the north-west. Mining will then continue towards the north-west from the original cut as indicated on Figure 3.2.2(a).

The LOM extent of Pit F is greenfield within a secluded section of the New Largo Mining Right Boundary to the south east of the Vlakfontein Workings, with no direct interaction with any adjacent opencast and underground workings expected during the LOM.

The No. 2 Coal Seam floor at Pit F varies in elevation between 1 504 mamsl and 1 539 mamsl. The floor elevations within the pit are highest in the north and south, and lowest in the central portions of the pit (from west to east). Pit F has an expected final surface area of 5 367 312 m^2. The current LOM plan indicates that mining at Pit F will be completed in FY46. Pit F will have a maximum storage capacity of 4 226 184 m^3 at a decant elevation of 1 522.5 mamsl. The layout plan of Pit F with the delineated mining floor elevations and decant position is depicted as Figure 3.2.2(b).

Water make from the Pit F workings is currently managed within an in-pit sump from where water is evaporated and used for dust suppression. It is indicated by Golder (2021) that the water make for Pit F will be managed and contained within the proposed Eastern PCD which are being constructed at Pit F. The excess water make from Pit F can be pumped to and managed by Seriti's Klipspruit Colliery to the south of New Largo. This was communicated as a possible long term option

3.2.3 Pit H

Mining at Pit H will commence during FY24 from a cut in the central regions of the proposed pit extent and then progress towards the west and east simultaneously. From there mining will progress in a southern direction with 2 separate sections as well as to the north-east with another section. The two southern sections will eventually be joined by a third section between the two original sections and progress further towards the south (Figure 3.2.3(a)).

The proposed mining extent of Pit H is greenfield, with no reopening of historic underground workings or red zoned. It is however indicated that the north-eastern section of Pit H will connect with the neighbouring Mzimkhulu Opencast Colliery which will have additional water make implications depending on the flooding status of the Mzimkhulu Colliery opencast pit.

The No.2 Coal Seam floor at Pit H varies in elevation between 1 522 mamsl and 1 550 mamsl. The floor elevations within the pit are highest in the central, southern and northern sections of the pit and lowest in the south-eastern section of the pit. Pit H has an expected final surface area of 4 401 177 m^2. The current LOM plan indicates that mining at Pit H will be completed in FY36. Pit H will have a maximum storage capacity of 10 860 381 m^3 at a decant elevation of 1 545 mamsl. The layout plan of Pit H with the delineated mining floor elevations and decant position is depicted as Figure 3.2.3(b).

It is indicated by Golder (2020) that the water make for Pit H will be managed and contained within the proposed PCD2 which will be constructed at Pit H. The excess water make from Pit F will be pumped to and managed by Seriti's Klipspruit Colliery to the south of New Largo.

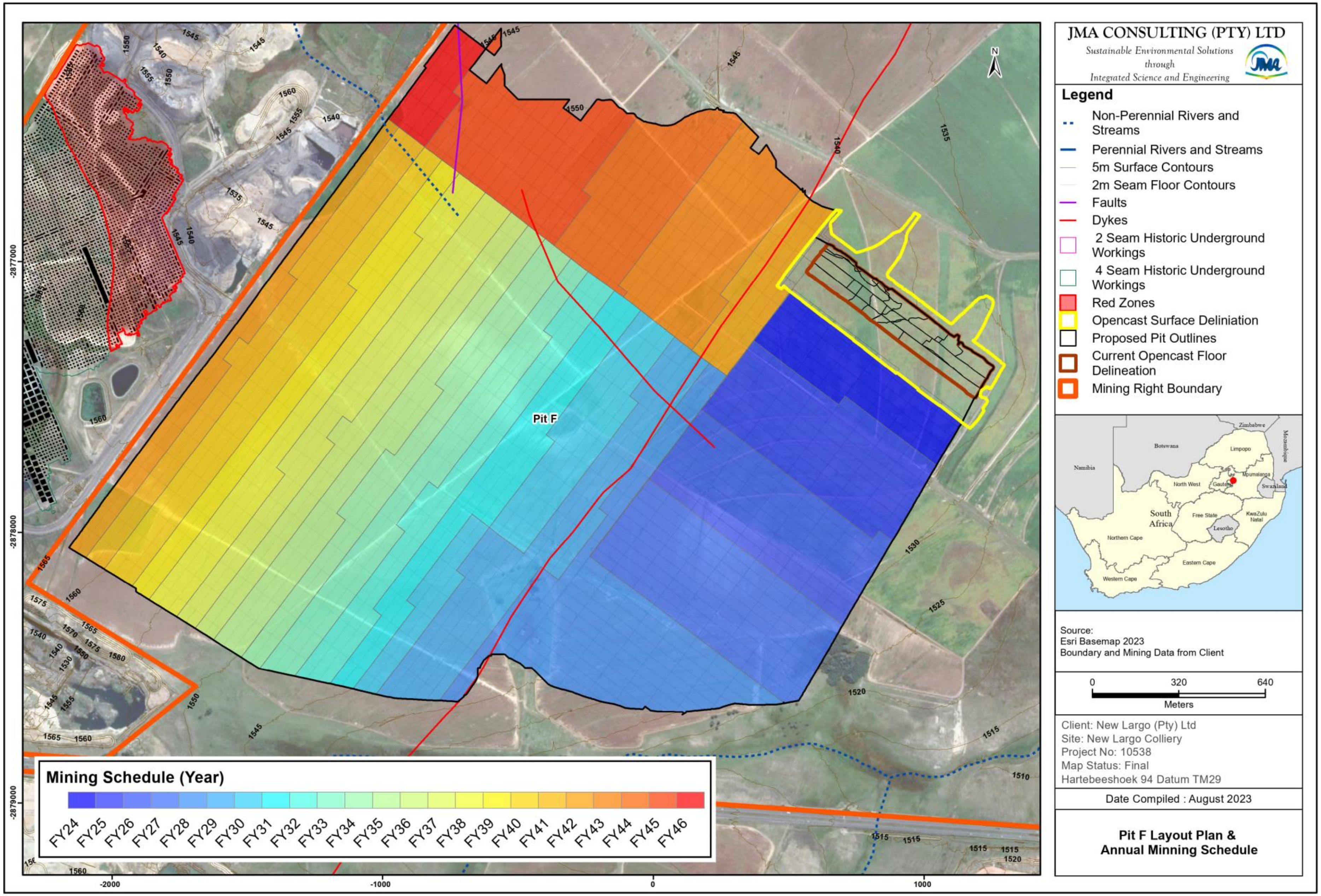


Figure 3.2.2(a): Pit F Layout Plan & Annual Mining Schedule

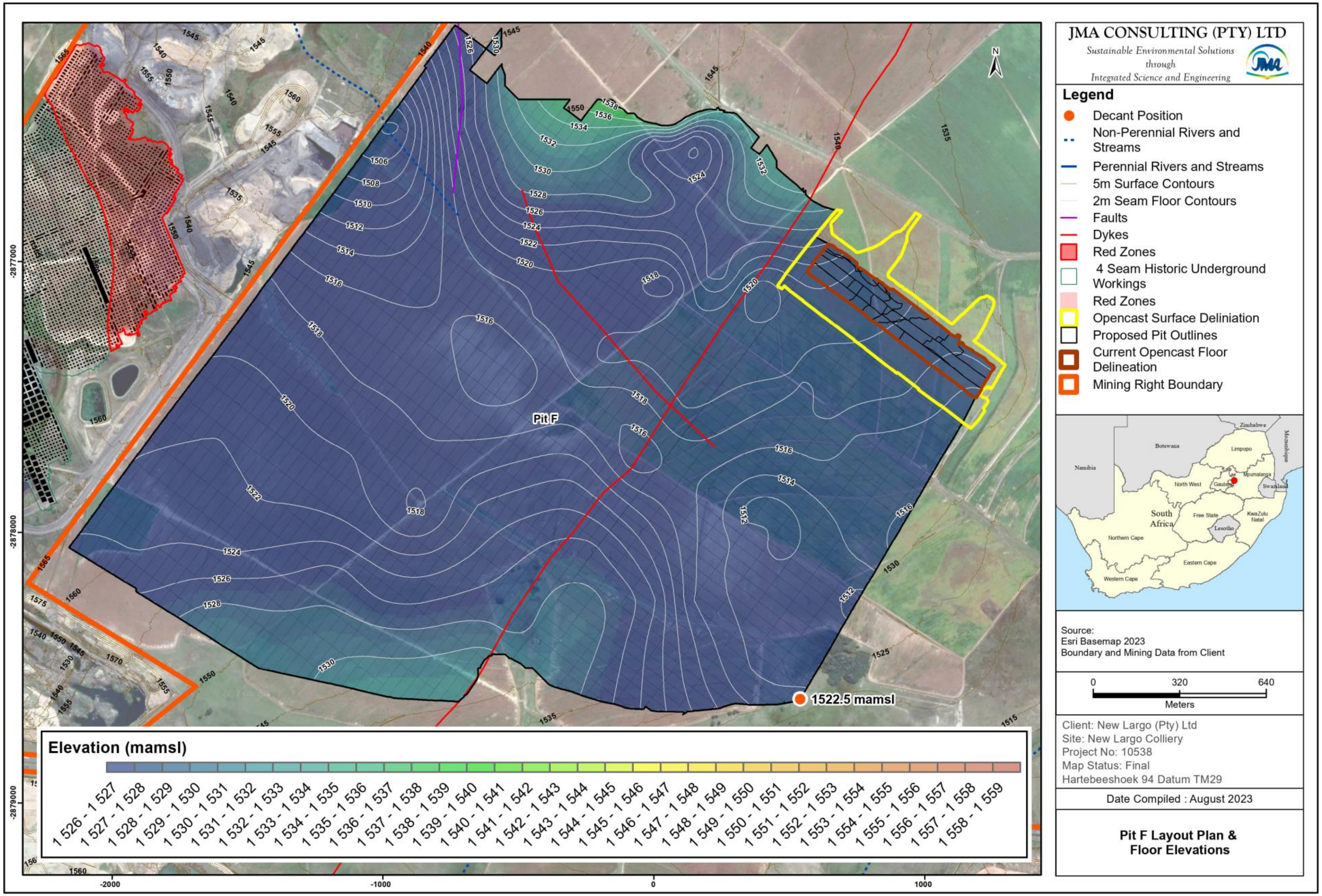


Figure 3.2.2(b): Pit F Layout Plan & Floor Elevations

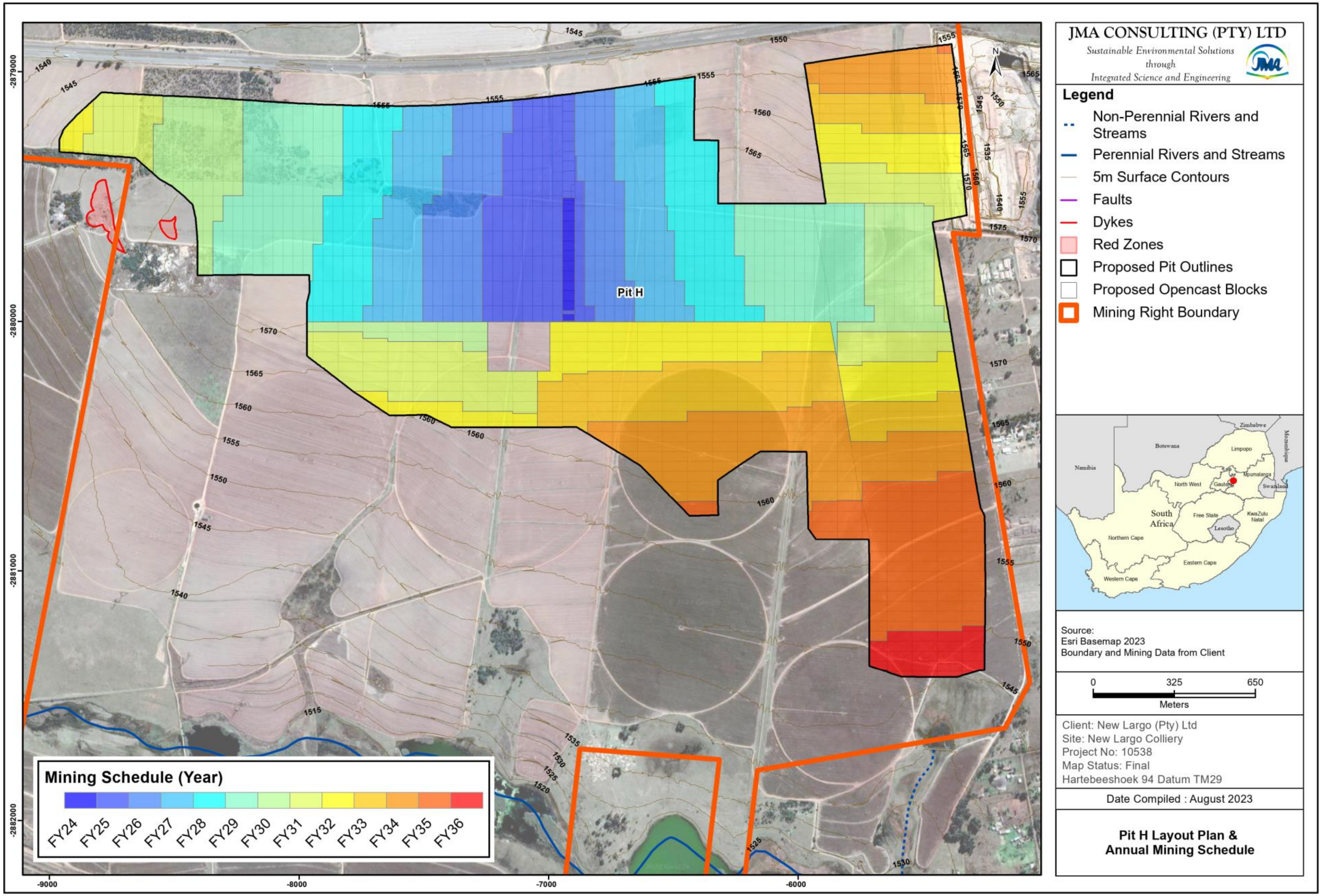


Figure 3.2.3(a): Pit H Layout Plan & Annual Mining Schedule

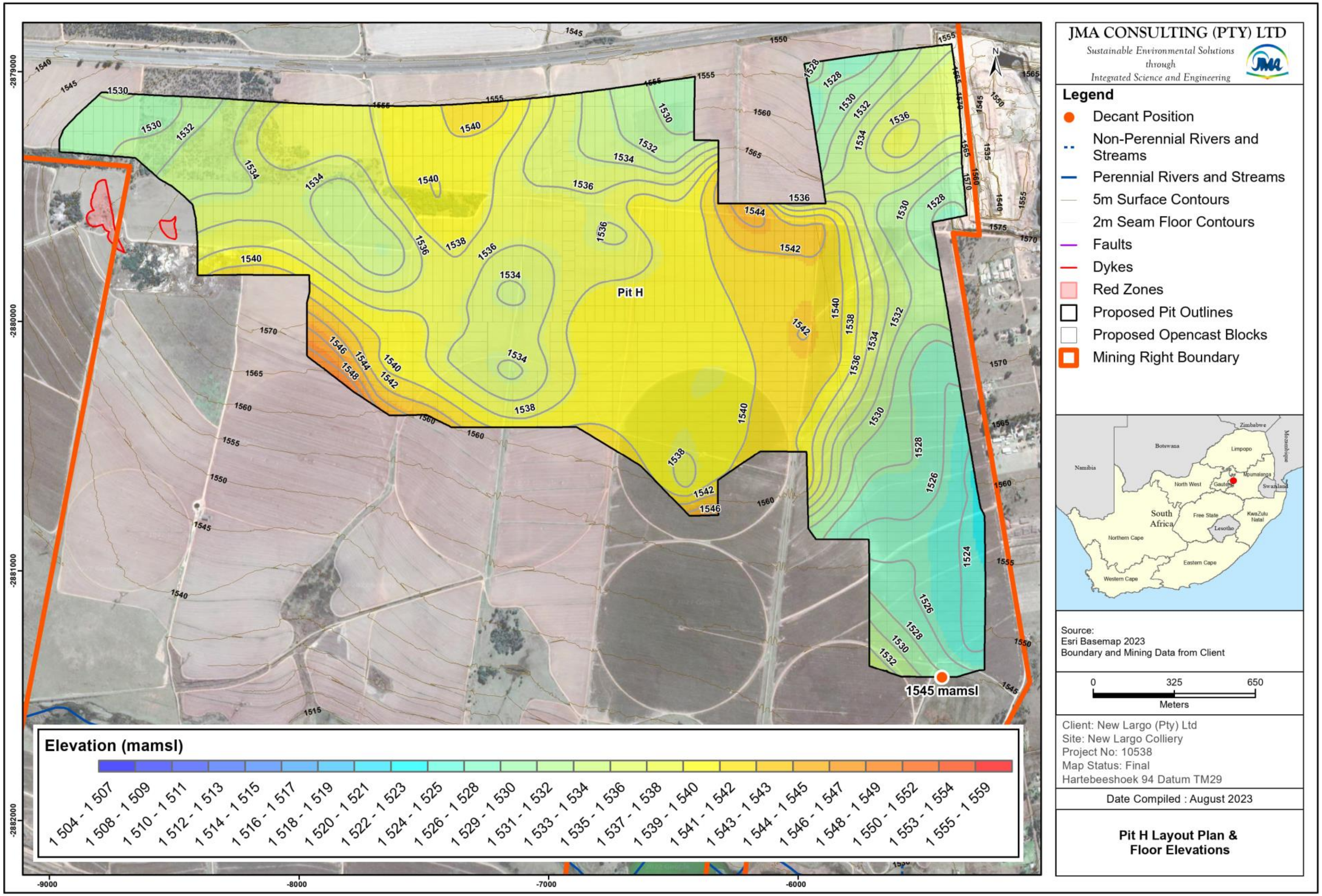


Figure 3.2.3(b): Pit H Layout Plan & Floor Elevations

3.2.4 Pit A/G (Main Mine)

Mining at Pit A/G will commence during FY26 in the south-western sections of the proposed pit extent. Mining will progress in a northerly direction as well as towards the east. The eastern section will expand towards the north during FY44 whilst still progressing further towards the east. A second north progressing area to the far north-east will commence during FY53 (Figure 3.2.4(a)).

The proposed mining extents at Pit A/G are mostly greenfield, with the exception of one non-defined previously mined area on the No.2 Coal Seam that will be opened up and mined out during FY27. The expected volumes of water stored within the old underground workings are summarised in Section 3.1 and will be incorporated into the water balance accordingly.

The No.2 Coal Seam floor at the combined Pit A and G varies in elevation between 1 528 mamsl and 1 555 mamsl. The floor elevations within the pit are highest in the south-west and north- eastern regions and lowest in the central and south eastern regions. Pit A/G has an expected final surface area of 9 885 716 m^2. The current LOM plan indicates that mining Pit A/G will be completed in FY56. Pit A/G will have a maximum storage capacity of 7 564 019 m^3 at a decant elevation of 1 541.5 mamsl. The layout plan of Pit A/G with the delineated pit shell elevations and decant position is depicted as Figure 3.2.4(b).

Pit Water Transfer Dams (PWTD), each with an authorised capacity of 5 Ml as well as a cluster of PCD's (Main Mine PCD's) with an authorised capacity of 1 200 Ml will be constructed and used to store and manage runoff from rainwater in the dirty water areas from Pit A/G. Dewatering from Pit A/G will be reticulated from the temporary in pit sumps to five strategically located PWTDs, which have been allocated specifically for Pit A/G. Water from the PWTDs will be transferred to the Main Mine PCD's. Water from the PCD's will be abstracted to feed the water treatment plant, wash plant and for dust suppression. Potable and non-potable (process) water will be distributed from the water treatment plant. The process water will be used in the facilities such as wash bays. The potable water will be used for human consumption and other safety purposes such as emergency eyewash or showers (Seriti, 2023).

3.2.5 Pit C (Main Mine)

Mining at Pit C will commence from the north-west of the proposed pit extent in FY26 and will initially progress towards the east and then towards the south (Figure 3.2.5(a)). The LOM of Pit C is expected to be greenfield with no interaction with the adjacent historic underground workings to the south of Pit C.

The No.2 Coal Seam floor at Pit C varies in elevation between 1 534 mamsl and 1 564 mamsl. The floor elevations within the pit are highest in the south western regions and lowest in the north-western, central and south eastern regions. Pit C has an expected final surface area of 3 365 010 m^2. The current LOM plan indicates that mining at Pit C will be completed in FY40. Pit C will have a maximum storage capacity of 5 103 177 m^3 at a decant elevation of 1 545 mamsl. The layout plan of Pit C with the delineated mining floor elevations and decant position is depicted as Figure 3.2.3(b).

It is indicated on the LOM plan that the New Largo No.2 and No.4 seam underground workings will not be opened up by Pit C. If the New Largo Underground Workings are punctured or opened up as part of the proposed opencast workings it will result in sudden and significantly higher water makes than predicted, as mentioned in Section 3.1.3.

Dewatering from Pit C will be reticulated from the temporary in pit sumps to a strategically located PWTD with an authorised capacity of 5 Ml, which have been allocated for Pit C, from where water will be transferred to the Main Mine PCD's. Water from the PCD's will be abstracted to feed the water treatment plant, wash plant and for dust suppression.

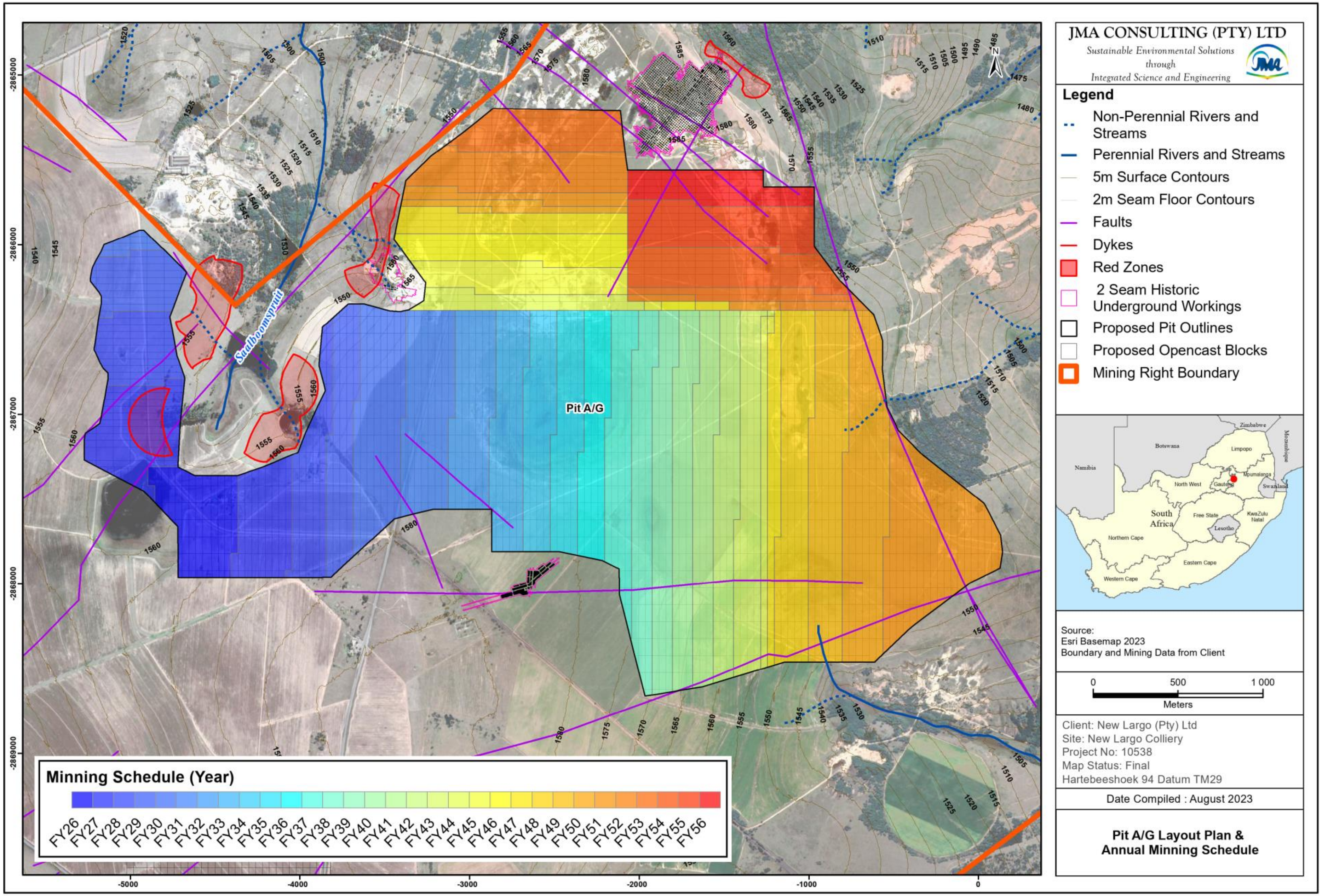


Figure 3.2.4(a): Pit A/G Layout Plan & Annual Mining Schedule

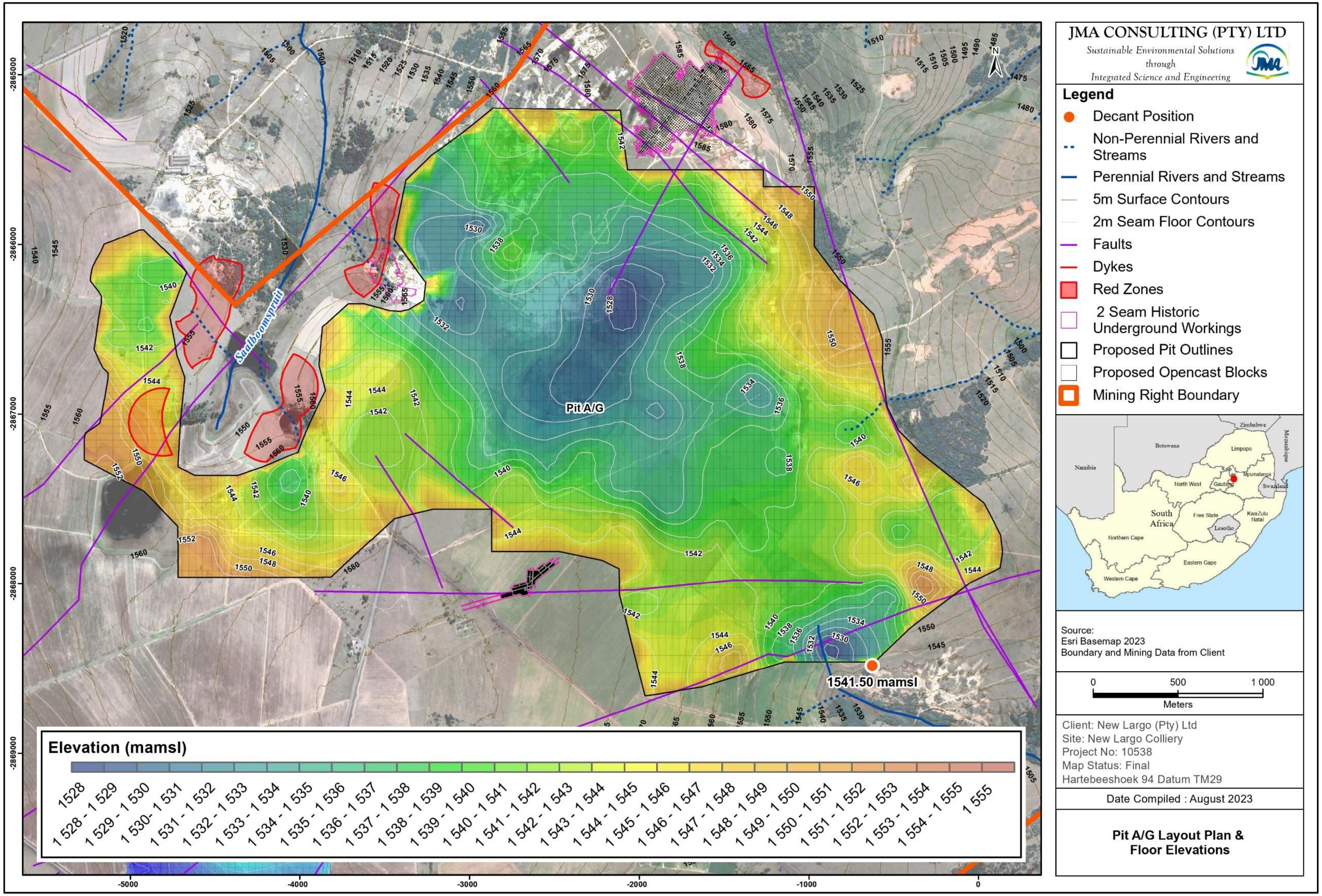


Figure 3.2.4(b): Pit A/G Layout Plan & Floor Elevations

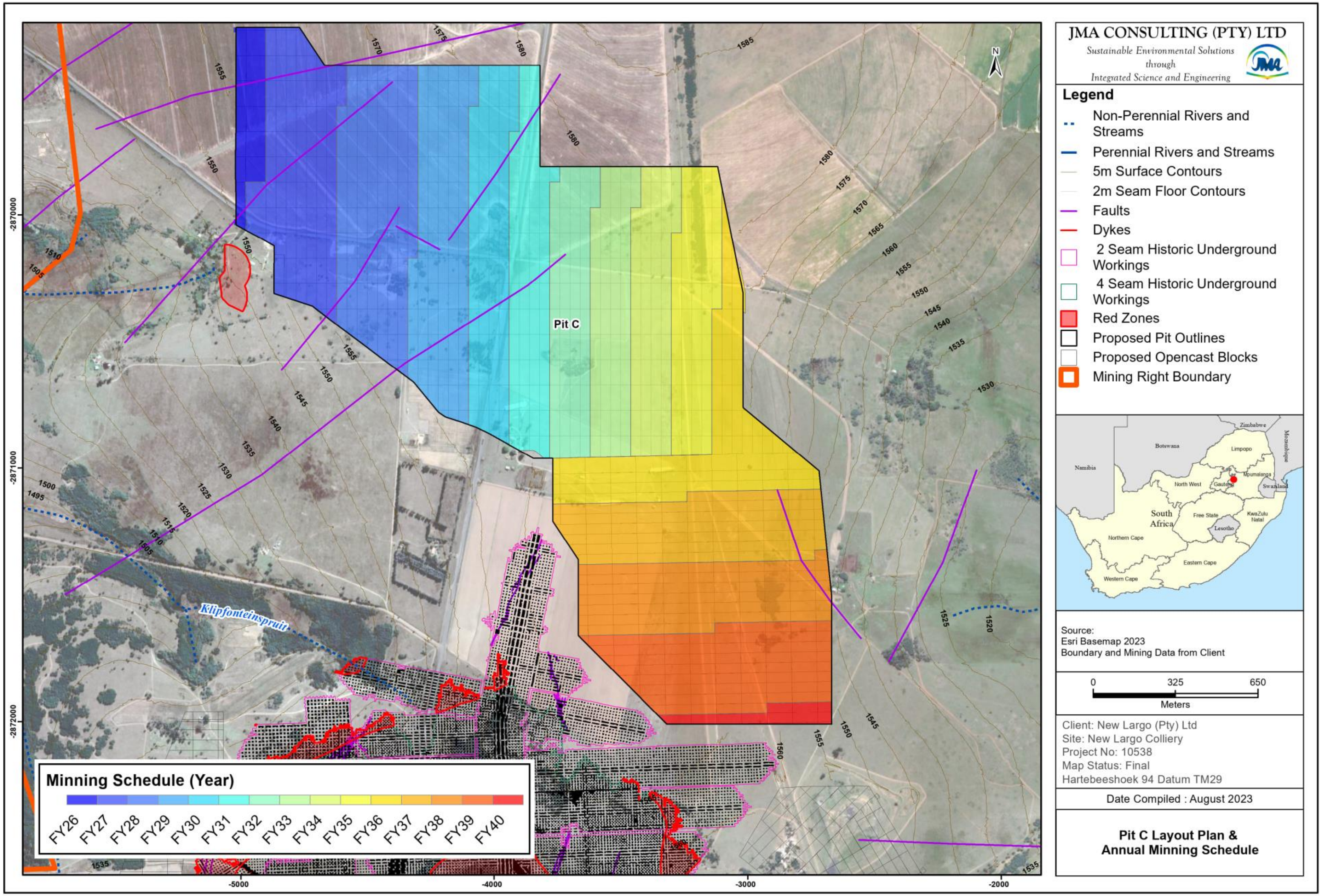


Figure 3.2.5(a): Pit C Layout Plan & Annual Mining Schedule

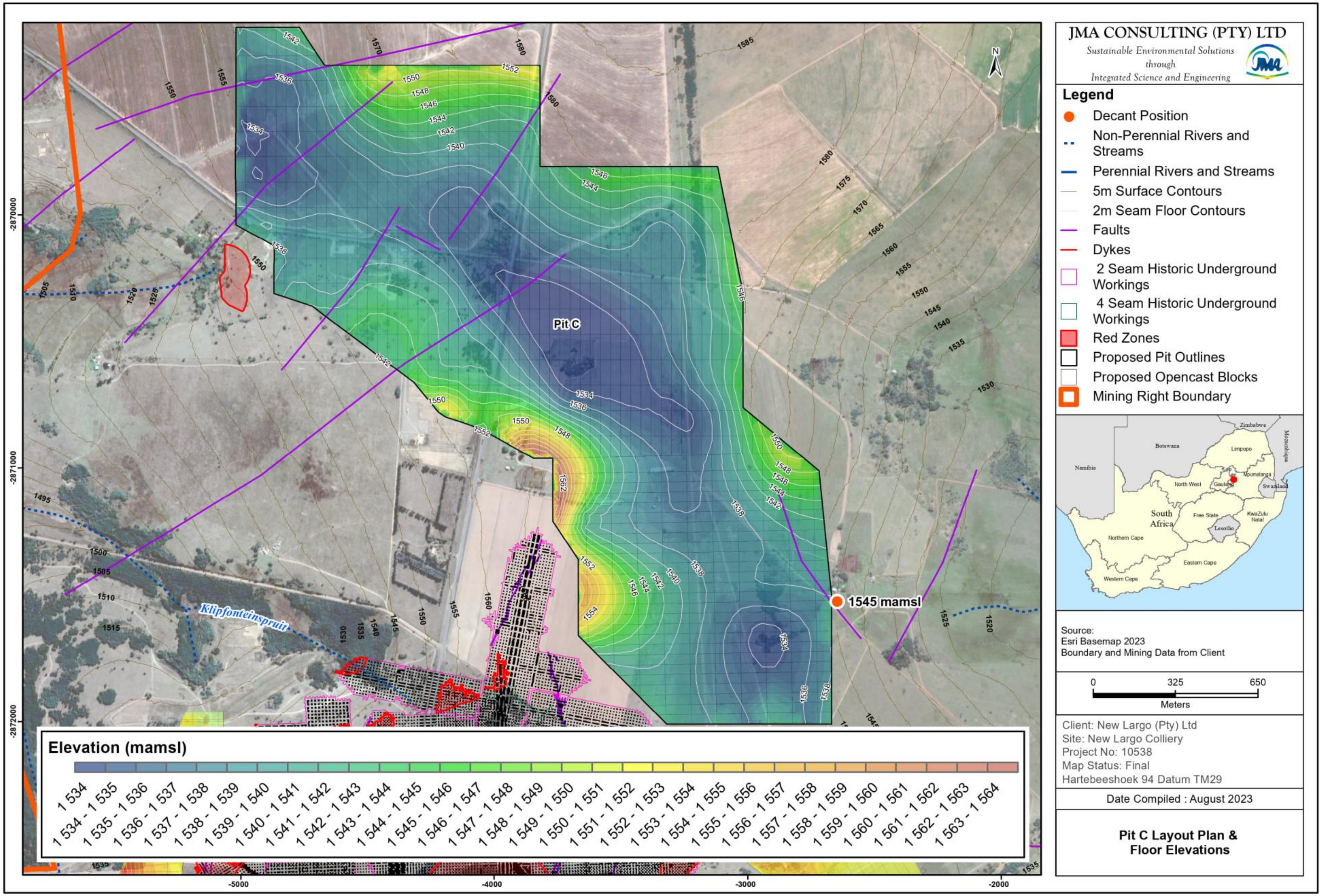


Figure 3.2.5(b): Pit C Layout Plan & Floor Elevations

Potable and non-potable (process) water will be distributed from the water treatment plant. The process water will be used in the facilities such as wash bays. The potable water will be used for human consumption and other safety purposes such as emergency eyewash or showers (Seriti, 2023).

3.2.6 Pit D North (Main Mine)

Mining at Pit D North will commence from the west of the proposed pit extent in FY40 and will initially progress towards the east and then towards the north-east. It will also progress towards the south from the far west of the pit from FY45 onwards (Figure 3.2.6(a)). The proposed mining extents at Pit D North are mostly greenfield, with the exception of one non-defined previously mined area on the No.4 Coal Seam(Good Year North Red Zone) that will be opened up and mined out during FY46. The expected volumes of water stored within the old underground workings are summarised in Section 3.1 and will be incorporated into the water balance accordingly.

The No.2 Coal Seam floor at Pit D North varies in elevation between 1 507 mamsl and 1 523 mamsl. The floor elevations within the pit are highest in the central region and lowest in the western regions. Pit D North has an expected final surface area of 1 437 209 m^2. The current LOM plan indicates that mining at Pit D North will be completed in FY48. Pit D North will have a maximum storage capacity of 3 793 996 m^3 at a decant elevation of 1 525.5 mamsl. The layout plan of Pit D North with the delineated mining floor elevations and decant position is depicted as Figure 3.2.6(b).

It is indicated on the LOM plan that the New Largo No.2 and No.4 seam underground workings will not be opened up by Pit D North. If the New Largo Underground Workings are punctured or opened up as part of the proposed opencast workings it will result in sudden and significantly higher water makes than predicted, as mentioned in Section 3.1.3.

Dewatering from Pit D North will be reticulated from the temporary in pit sumps to a strategically located PWTD with an authorised capacity of 5 Ml, which have been allocated for Pit D North, from where water will be transferred to the Main Mine PCD's. Water from the PCD's will be abstracted to feed the water treatment plant, wash plant and for dust suppression. Potable and non-potable (process) water will be distributed from the water treatment plant. The process water will be used in the facilities such as wash bays. The potable water will be used for human consumption and other safety purposes such as emergency eyewash or showers (Seriti, 2023).

3.2.7 Pit Wilge (Main Mine)

Pit Wilge will commence in the north of the proposed mining extent in FY47, from where it will progress in a southern direction (Figure 3.2.7(a)). The proposed mining extent of Pit Wilge is expected to be greenfield, with no interaction with the adjacent underground workings.

The No.2 Coal Seam floor at Pit Wilge varies in elevation between 1 503 mamsl and 1 536 mamsl. The floor elevations within the pit are highest in the north and lowest in the south. Pit Wilge has an expected final surface area of 1 563 130 m^2. The current LOM plan indicates that mining at Pit Wilge will be completed in FY56. Pit Wilge will have a maximum storage capacity of 2 247 321 m^3 at its decant elevation of 1 523 mamsl. The layout plan of Pit Wilge with the delineated mining floor elevations and decant position is depicted as Figure 3.2.7(b).

It is indicated on the LOM plan that the New Largo No.2 and No.4 seam underground workings will not be opened up by Pit Wilge. If the New Largo Underground Workings are punctured or opened up as part of the proposed opencast workings it will result in sudden and significantly higher water makes than predicted, as mentioned in Section 3.1.3.

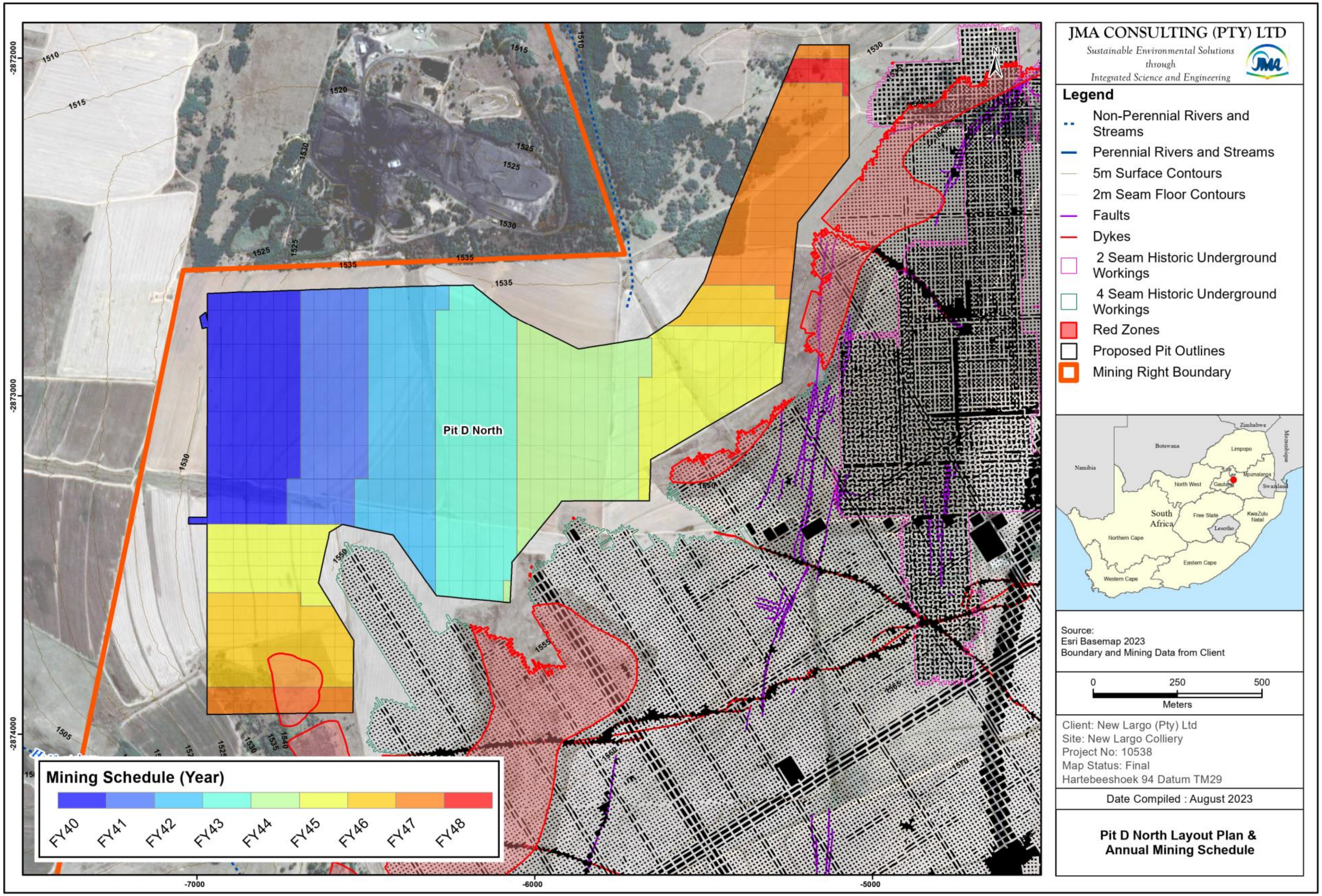


Figure 3.2.6(a): Pit D North Layout Plan & Annual Mining Schedule

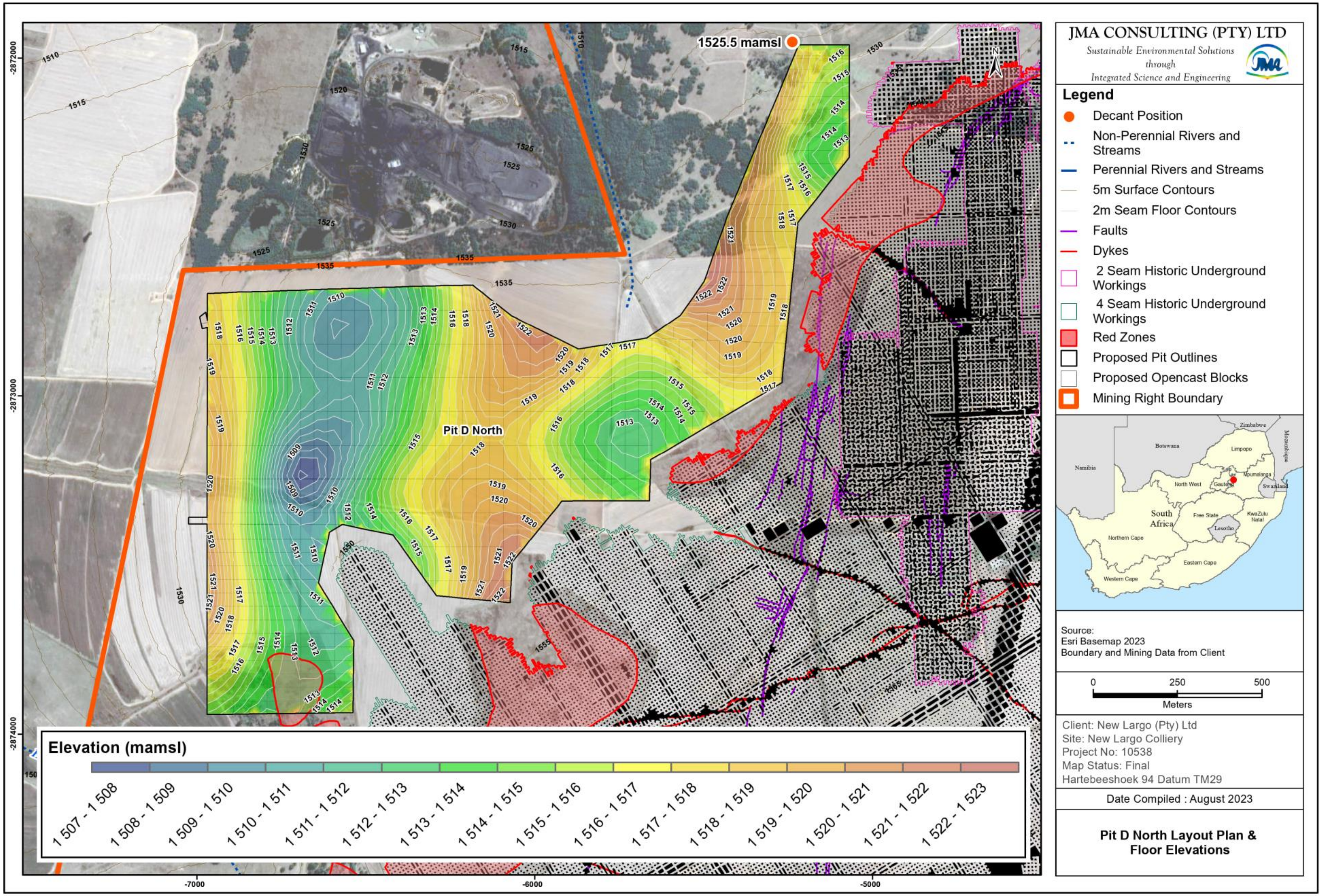


Figure 3.2.6(b): Pit D North Layout Plan & Floor Elevations

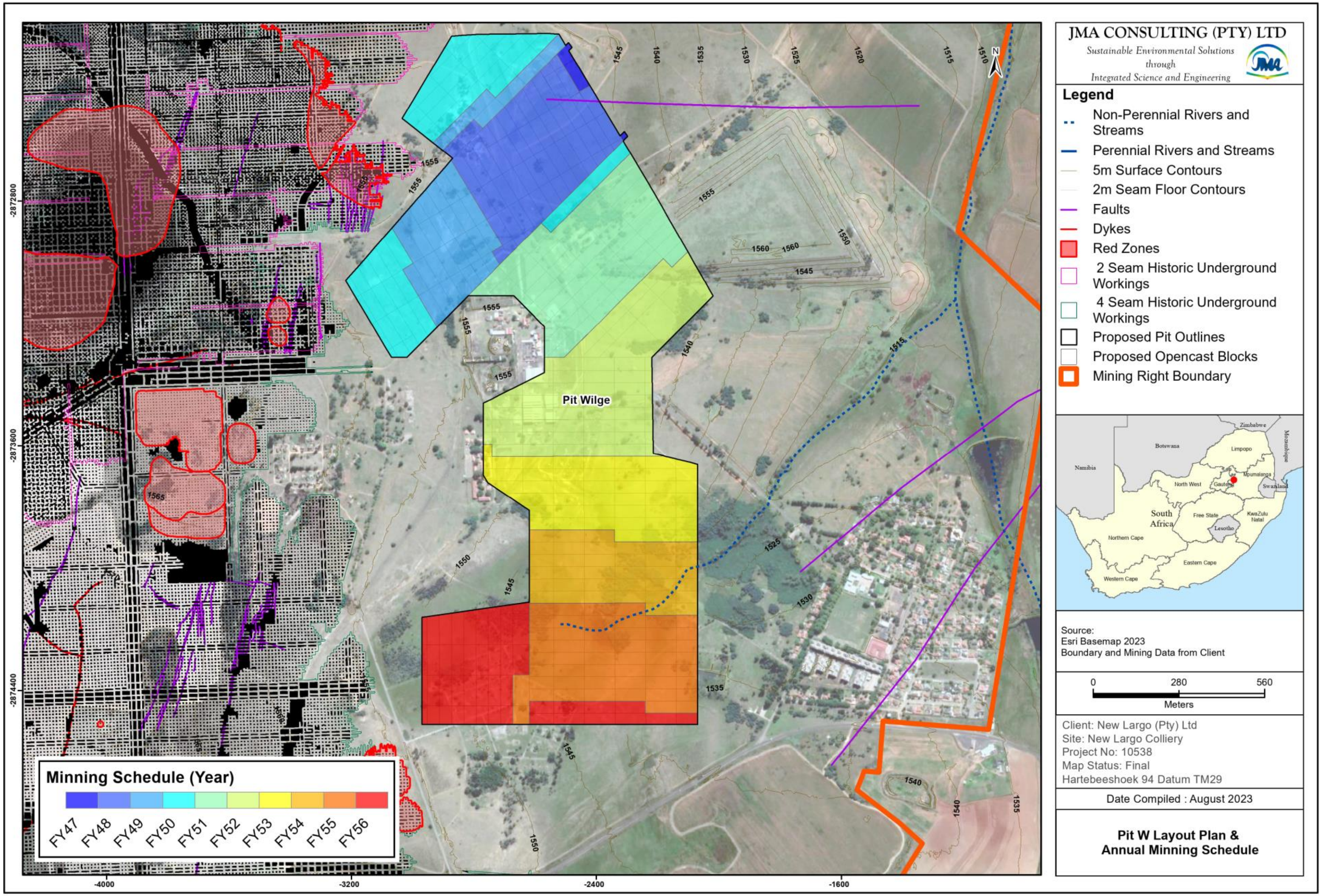


Figure 3.2.7(a): Pit Wilge Layout Plan & Annual Mining Schedule

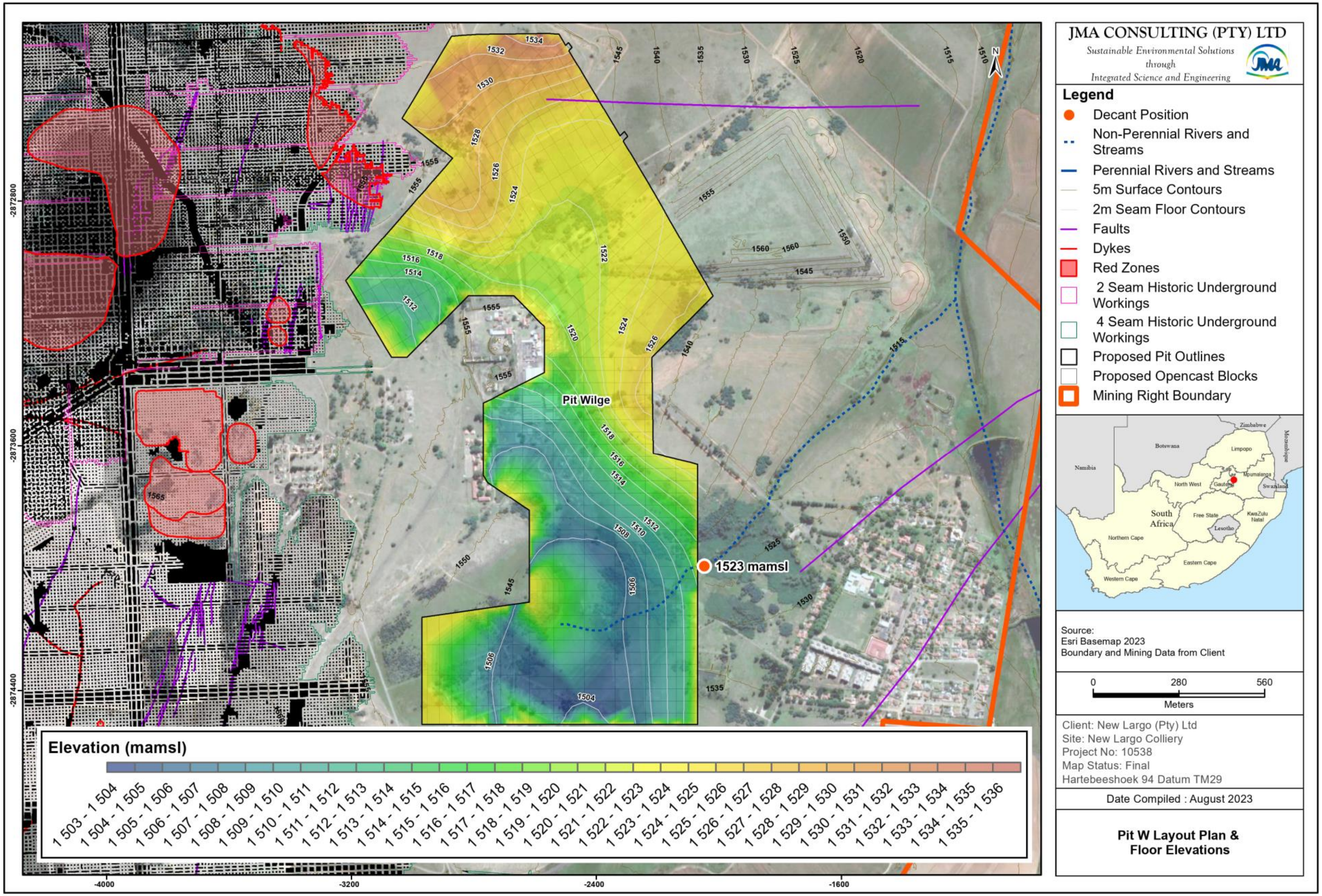


Figure 3.2.7(b): Pit Wilge Layout Plan & Floor Elevations

Dewatering from Pit Wilge will be reticulated from the temporary in pit sumps to a strategically located PWTD with an authorised capacity of 5 Ml, which have been allocated for Pit Wilge, from where water will be transferred to the Main Mine PCD's. Water from the PCD's will be abstracted to feed the water treatment plant, wash plant and for dust suppression. Potable and non-potable (process) water will be distributed from the water treatment plant. The process water will be used in the facilities such as wash bays. The potable water will be used for human consumption and other safety purposes such as emergency eyewash or showers (Seriti, 2023).

3.3 SURFACE INFRASTRUCTURE

New Largo Colliery is predominantly situated between two National Roads, the N4 in the north and the N12 in the south. With the exception of the proposed Pit H which is located south of the N12, all the proposed opencast workings are situated between the N4 and N12 National Roads, and will be accessed via the R545 tarred road which links to the two National Roads (Figure 2.1(a)). The 'Farm House' Offices are currently the only administrative offices for New Largo Colliery and are also accessed via the R545.

All surface infrastructure associated with the current opencast mining operations at New Largo, apart from the administrative 'Farm House' Offices, is situated at Klipfontein Colliery for Pit D and at Pit F. The Pit D opencast workings are accessed in the west at Klipfontein Colliery, situated just off the R686 road. The R686 runs from the R555 in the south-west past the N12 and connects with the R545 just north of the New Largo Farm House Offices. The coal mined at Pit D is currently trucked to and stockpiled at Klipfontein Colliery, before being transported offsite by road. Export Coal from Pit F and the rest of the proposed opencast pits is and will be trucked to the Phola Coal Processing Plant for processing and export. Coal intended for Eskom's Kusile Power Station will be conveyed with overland conveyors. The facilities which are proposed for Main Mine includes offices and ablution facilities, a laboratory, workshops, wash bay, fuel storage, oil-water separation system, oil skimmer, weighbridge and a site security fence (Seriti 2023).

3.4 MATERIAL STOCKPILES AND DISPOSAL FACILITIES

New Largo has been issued with a WUL (No. 04/B20G/ACFGIJ/2538) for various stockpiles associated with the future opencast pits. The coal that is mined from Pit D is stockpiled at and managed by Klipfontein Colliery. The Water Use Licence (WUL) (No. 04/B20F/ACGIJ/2732) issued to Iyanga Mining for Klipfontein Colliery authorises four dedicated overburden stockpile areas and two ROM coal stockpile areas as Section 21(g) water uses.

In the Surface Water Baseline and Impact Assessment Report by Golder (2021), it is indicated that the proposed Pit F will have one topsoil stockpile, which is considered a clean water generating catchment. Pit F will also have two overburden stockpiles namely a soft overburden and a hard overburden stockpile. The soft overburden is also classified as a clean water generating system and the hard overburden stockpile a dirty water generating catchment. Each of the stockpiles will have evaporation paddocks for surface runoff with the clean water spills being released into the environment and the dirty water being channelled to the western PCD. It is assumed (Golder, 2021) that the side slope runoff coefficient will be between 10-15% and the seepage from the stockpiles will be 15% of the MAP. The footprint sizes of the stockpiles in summarised in Table 3.4(a) below.

Table 3.4(a): Pit F Overburden Stockpile Footprint Areas (Golder, 2021)

Stockpile	Footprint Area (m^2)
Hard Overburden Stockpile	44 918
Soft Overburden Stockpile	86 710
Topsoil Stockpile	105 585
Temporary Discard Stockpile	35 200

In the Pit H Water balance report by Golder (2020), it is indicated that four overburden stockpiles will be constructed at Pit H. The surface water runoff will be captured in evaporation paddocks located on the downslope side of the overburden stockpiles. The evaporation paddocks will comprise of a cascading pond setup, with an approximate depth of 0.4 m. This will allow for improved evaporation rates therefore reducing the required PCD storage capacity for the mine. Topsoil and overburden (hards and softs) stockpiles will be placed in specific areas to serve as screens for noise and visual impacts as well.

According to the Main Mine Technical Study Report (Seriti, 2023), topsoil stripped from Pit A/G and Pit C will be dumped to the west and north of the Pit A/G footprint. Pit D North and Pit Wilge will have their respective topsoil dumps. Stormwater in and around this area is deemed clean water and must be directed/ allowed to flow in its natural flow direction. If this is not achieved, adequate stormwater open V-drains will be provided to direct clean stormwater to discharge in clean watercourses. The footprint areas for the Main Mine waste rock facilities are summarised in Table 3.4(b) below.

Table 3.4(b): Waste rock facility footprints

Stockpile	Footprint Area (ha)
Pit A/G & C - Hard Over Burden	19 700
Pit A/G & C - Soft Over Burden	18 700
Pit D North - Hard Over Burden	7 300
Pit D North - Soft Over Burden	2 600
Pit Wilge - Hard Over Burden	7 500
Pit Wilge - Soft Over Burden	2 300

3.5 CATCHMENTS AND STORMWATER MANAGEMENT

The current mining operations at Pit D are accessed and managed from Klipfontein Colliery as stated previously. All storm water management associated with the Pit D surface infrastructure is also managed by Klipfontein Colliery. Various catchments have been defined and delineated at Klipfontein Colliery, based on the existing mining-related and stormwater management activities. The general stormwater catchments at Klipfontein colliery can be seen on Figure 3.5(a). These catchments are classified and segregated as clean and dirty water catchments and are managed accordingly.

Stormwater runoff from the clean catchments is released back into the environment using various berms, whereas the stormwater runoff from the defined and delineated dirty water catchments is channelled to and contained within the constructed Klipfontein Pollution Control Dam (PCD).

Each of the future pits will have delineated dirty and clean water catchments from where the water will be reticulated appropriately either back into the environment if it is fit to do so or into the PCD's which will be constructed. Golder (2021) indicated that the dirty water contributing area for each of the Pit F PCD's will have an area of 182 018 m2.

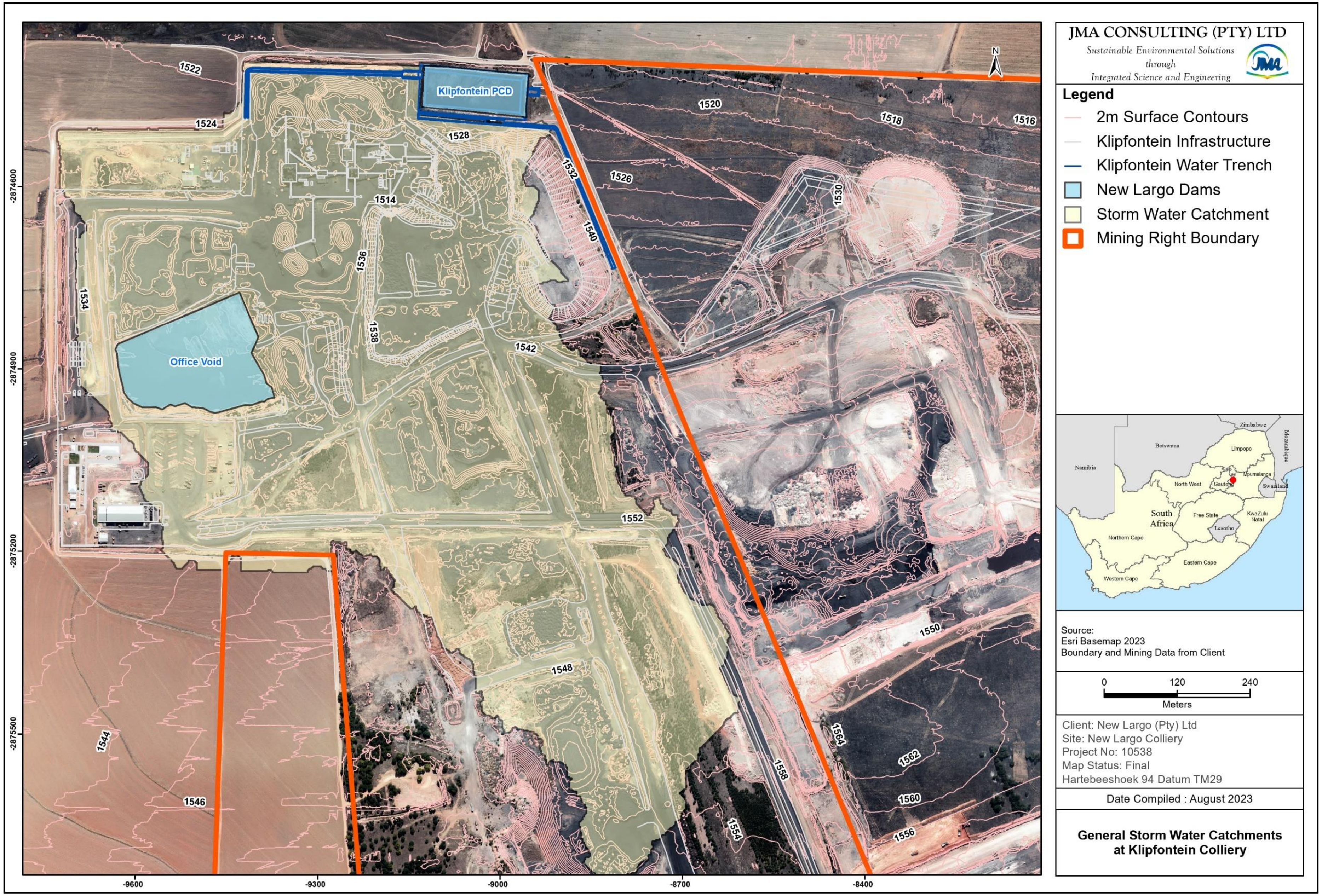


Figure 3.5(a): General Storm Water Catchments at Klipfontein Colliery

3.6 WATER STORAGE FACILITIES

There are currently two water storage facilities at Klipfontein Colliery, namely the Klipfontein PCD and the Office Void. These two facilities are used as the current water storage facilities for the mine water abstracted from Pit D, as well as for storm water runoff form the delineated dirty catchment areas at Klipfontein. The localities of these two facilities are depicted on Figure 3.6(a), with a summary of the relevant information provided in Table 3.6(a).

Table 3.6(a): Summary of the Current Klipfontein Water Storage Facilities

Description	Liner Type	Authorised Volume (m^3/annum)	Authorised Capacity (m^3)	Latitude Longitude	Property Description
Klipfontein PCD	2mm HDPE Geomembrane floor liner	31 900	31 612*	25° 58' 42.4" S 28° 54' 35.1" E	Portion 20 of the Farm Klipfontein 568 JR
Office Void	Opencast Mine Void – unlined	-	328 163**	25° 58' 56.8" S 28° 54' 18.5" E	Portions 3 & 20 of the Farm Klipfontein 568 JR

* Volume at Spillway (Full Supply Level)

** Volume at direct decant elevation of 1534.25 mamsl

New Largo is also authorised to have various PCD's for the remaining opencast pits within the New Largo Mining Right Boundary as detailed within the New Largo Colliery WUL (No. 04/B20G/ACFGIJ/2538). New Largo also intends to commission additional PCD's for Pit F and the proposed opencast pits in the future. One of the PCDs are being constructed at this stage. It is currently planned that two PCD's will be constructed at both Pit F and Pit H. Although no detailed drawings have been provided for the proposed dams at Pit F and Pit H, the intended storage capacities have been specified and are summarised in Table 3.6(b).

Figure 3.6(a): General Layout Plan of the current Klipfontein Surface Water Containment Facilities

Table 3.6(b): Summary of the Planned Pit F and Pit H Water Storage Facilities

Proposed Pit	Description	Planned Capacity (m^3)	Planned Commission Date
Pit F	**Western Pollution Control Dam**	18 000	FY24
Pit F	**Eastern Pollution Control Dam**	160 000	FY24
Pit H	**Pit H Pollution Control Dam 1**	45 000	FY25
Pit H	**Pit H Pollution Control Dam 2**	65 000	FY25

Eight Pit Water Transfer Dams (PWTD), each with an authorised capacity of 5 Ml as well as a cluster of PCD's (Main Mine PCD's) with an authorised capacity of 1 200 Ml will be constructed and used to store and manage runoff from rainwater in the dirty water areas from the Main Mine Pits. The Main Mine PCD's will have an initial capacity of 256 ML for the first phase of construction and the future PCD's will be constructed, up to a capacity of 855 ML or as deemed required based on the water balance and storage requirements (Seriti, 2023). The localities of these Main Mine facilities are depicted on Figure 3.6(b).

3.6.1 Klipfontein PCD

The existing infrastructure at Klipfontein Colliery is used to support stormwater management within the area. Contaminated storm water runoff at Klipfontein Colliery is channelled to and contained within the Klipfontein PCD. The water contained in the Klipfontein PCD is reused for dust suppression or is allowed to evaporate. The PCD is authorised in the Klipfontein Colliery WUL (No. 04/B20F/ACGIJ/2732) as a Section 21(g) water use.

The Klipfontein PCD, as seen on Figure 3.6.1(a), was constructed to the north of the Klipfontein plant area and was designed to have a capacity of 31 612 m^3 at its Full Supply Level. The dam sizing was based on the principles that the dam should accommodate runoff generated from a 100-year rainfall event or the excess water resulting from a long-term monthly water balance, plus the 50-year storm runoff volume. The PCD sizing is summarised in Table 3.6(a). The PCD was constructed by excavating the top and subsoil over the dam area with a 2mm thick HDPE Geomembrane floor liner (Geovicon, 2019).

Table 3.6(a): Klipfontein Colliery PCD Sizing Parameter Summary (Geovicon, 2019)

Parameter	Sizing (m^3)
Full Supply Area	13 200 m^2
50-Year Storm Volume	9 115 m^3
Normal Operating Storage	12 301 m^3
Normal Operating Storage + 50-Year Storm Volume	21 416 m^3
Volume at Spillway Level	31 612 m^3

3.6.2 Office Void

Water that collects in the opencast workings at Pit D is channelled to sumps positioned in the active mining sections or ramps (South Pit and North Pit), from which it is pumped out of the workings as part of the mine's dewatering operations. The water that is pumped out or dewatered from the mine workings is primarily pumped into the Office Void. The Office is positioned within a backfilled section of the Klipfontein Colliery Pit and has an estimated capacity of 291 673 m^3. Due to the nature of the backfilled material, the recharge through the spoils is high and the water seeps back into the opencast pit. As a result of this vertical seepage, water losses from the Office Void can be attributed to both evaporation as well as seepage into the rehabilitated spoils.

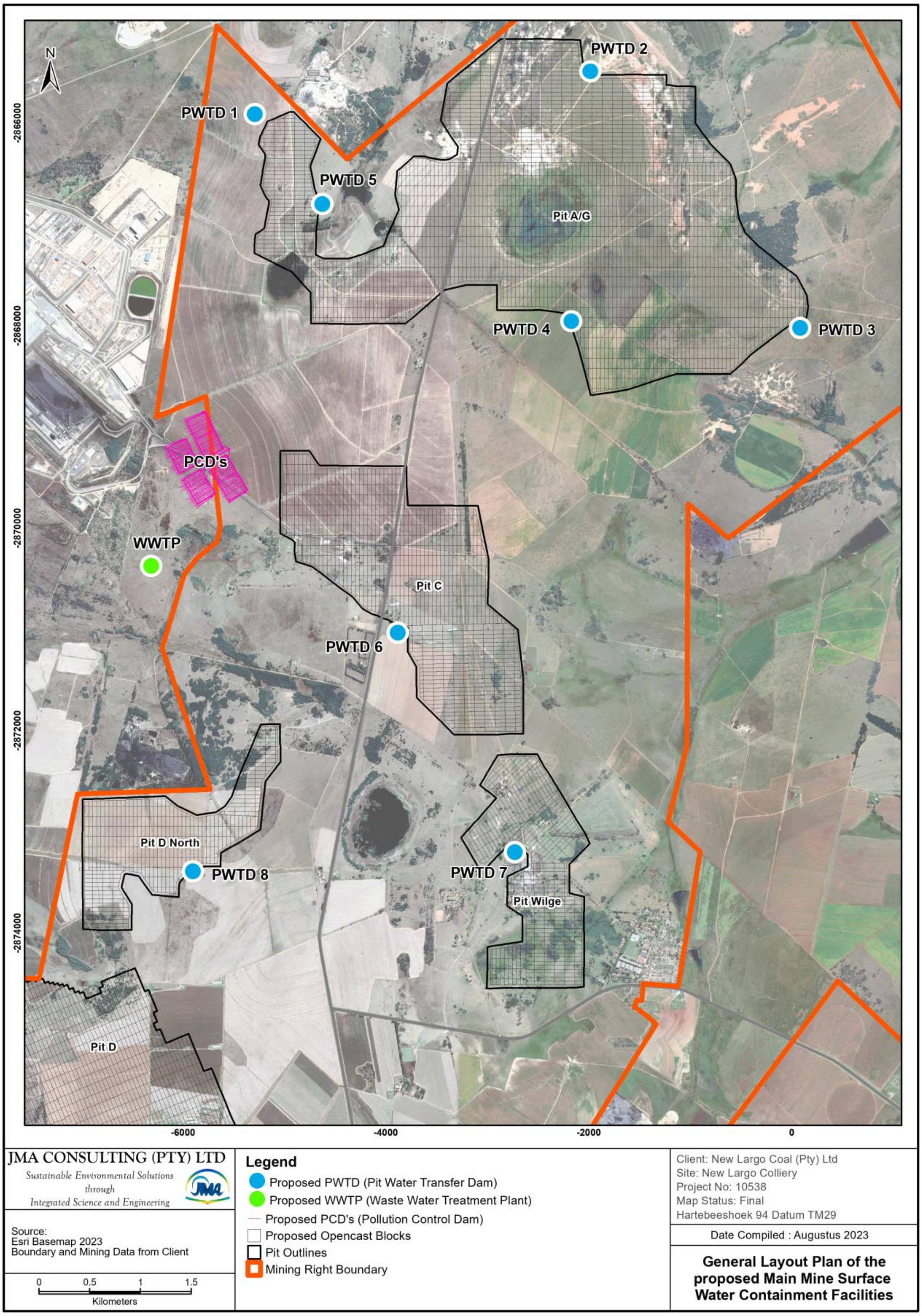


Figure 3.6(b): General Layout Plan of the Proposed Main Mine Surface Water Containment Facilities

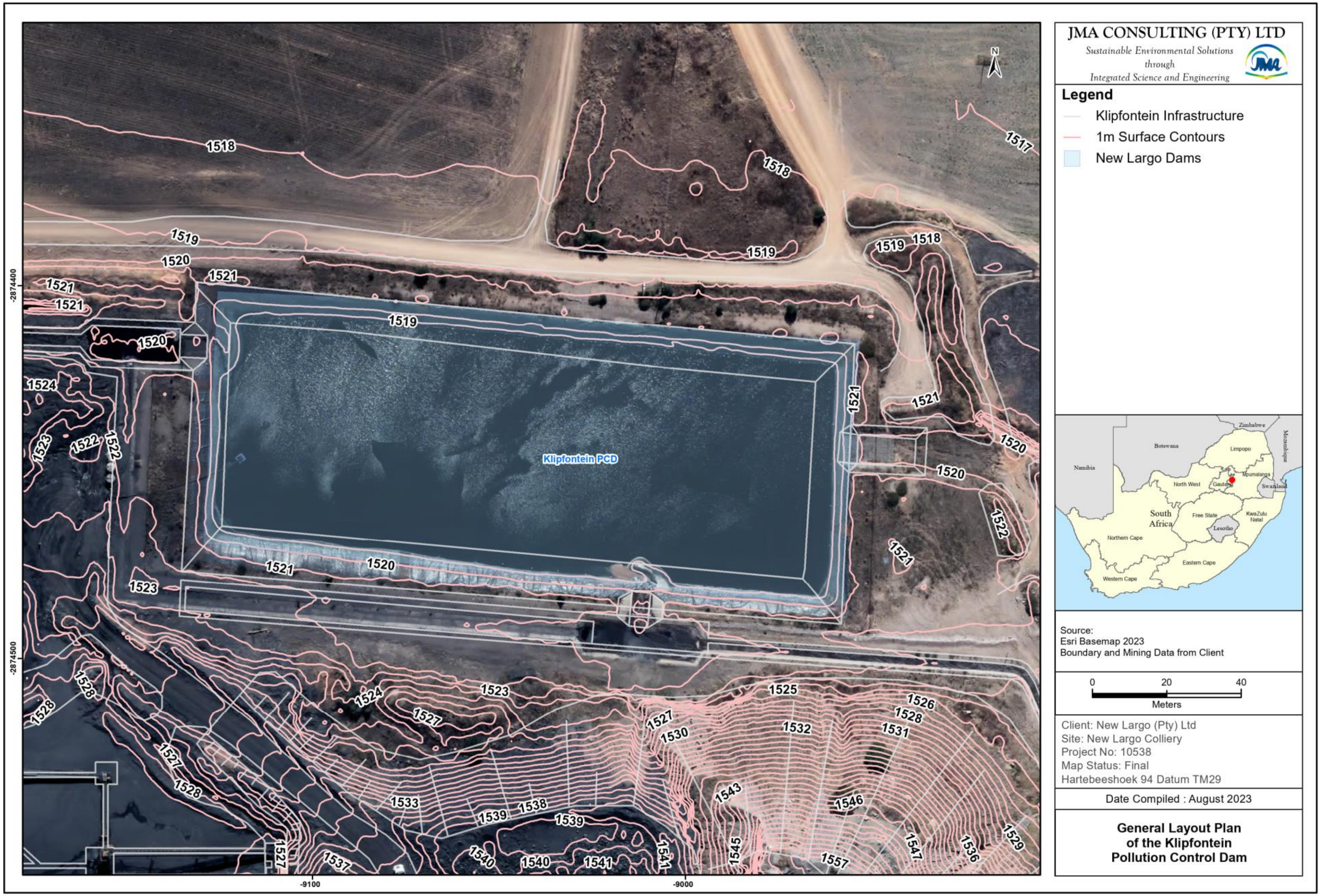


Figure 3.6.1(a): General Layout Plan of the Klipfontein Pollution Control Dam

3.6.3 Pit F - Eastern PCD (Proposed)

One of the two proposed PCD's that will be required at Pit F is the Eastern PCD, with a planned capacity of 160 000 m^3. The Eastern PCD will primarily receive in-pit runoff water as well as the groundwater inflows. Water will be sourced from Eastern PCD to meet the dust suppression demands on the haul roads.

3.6.4 Pit F - Western PCD (Proposed)

A second dam namely the Western PCD will also be constructed at the future Pit F, with a planned capacity of 18 000 m^3. The Western PCD will receive runoff from the proposed Plant area and ROM stockpile. The Temporary Stockpile and Hard Overburden Stockpile Paddock's overflow will also report to the Western PCD (any spills from the evaporation paddocks will be captured in this PCD).

3.6.5 Pit F - Evaporation Paddocks (Proposed)

Each of the stockpiles at Pit F will have an evaporation paddock system to evaporate sufficient water so that there will be no spills into the environment. The evaporation paddocks at Pit will comprise of a series of paddocks, 30 m by 10 m with a depth of 0.4 m (Golder, 2021). The volumes simulated by Golder for each of the evaporation paddock systems at Pit F is summarised in Table 3.5.5(a).

Table 3.5.5(a): Details of the Evaporation Paddocks at Pit F (Golder, 2021)

Evaporation Paddock Systems	Required Capacity (m^3)	Area (m^2)
Hard Overburden Stockpile Evaporation Paddocks	15 000	37 500
Soft Overburden Stockpile Evaporation Paddocks	20 000	50 000
Topsoil Stockpile Evaporation Paddocks	10 000	24 300

3.6.6 Pit H - PCD 1 (Proposed)

Golder (2020) reported that there will be two new dams required (GNR704 requirement) at Pit H, one of which is PCD 1. PCD 1 will predominantly receive water from the plant area and overburden stockpile seepage pumped from the Eastern and Western Seepage Water Collection Sumps. PCD 1 receives inflow from direct rainfall and runoff from the plant area. Outflows from this PCD are evaporation, dust suppression and spillage. The capacity of the PCD1 is 45 000 m^3. The operational rule for dust suppression at the dam is that the water can be extracted at any time. This was done to ensure that the PCD remains as empty as possible.

3.6.7 Pit H - PCD2 (Proposed)

Golder (2020) reported that a second PCD, PCD2 will be required (GNR704 requirement) at Pit H. Water pumped from the in-pit sump (30 000 m^3) will be discharged into PCD2, there is no catchment directly contributing to the PCD. The water losses from PCD2 are evaporation, dust suppression and spillage. The capacity of the PCD is 59 533 m^3. Water from both Pit H PCD's will be used for dust suppression purposes which amounts for an estimated 1.2 ML/d. It has been indicated by New Largo that the excess water that cannot be managed by the PCD's will need to be treated accordingly.

3.6.8 Pit H - Evaporation Paddocks (Proposed)

The surface water runoff from the overburden stockpiles will be captured in the cascading paddock system which would allow for sufficient evaporation to occur so that no spills to the environment would occur. The evaporation paddocks will comprise of a series of paddocks 30 m by 10 m with a depth of 0.4 m. No water is pumped out of the paddock systems, the outflows will be the evaporation and spills (Golder, 2020).

3.7 POTABLE WATER SUPPLY

Potable water for the Klipfontein Colliery offices is currently sourced from a borehole as authorised in the Klipfontein Colliery WUL (No. 04/B20F/ACGIJ/2732) as a Section 21(a) water use. Klipfontein is authorised to abstract up to 1 825 m^3/annum from the borehole situated on Portion 20 of the Farm Klipfontein 568 JR.

Future potable water supply for each of the standalone contractor mined pits will also be sourced from groundwater abstraction boreholes. The positions and the number of boreholes will still need to be determined, applied for to be authorised and commissioned accordingly.

4. DEFINITION OF MODEL BOUNDARIES AND WATER FLOW DIAGRAMS

4.1 GENERAL

In order to develop a water and salt balance, a clear definition and understanding of the boundaries of the system under investigation, as well as the layout or reticulation of the water circuits, are required. For larger sites, this often involves the sub-division of the operations into separate management areas, units or boundaries according to geographical areas, operational areas, catchment areas, or processes. To support this, water management at New Largo Colliery has been sub-divided up into five (5) management areas, namely:

- Klipfontein Colliery and Pit D,
- Pit F,
- Pit H,
- Pit A/G,
- Pit C/W, and
- Pit D North.

The water and salt balance model update was developed to cater for the entire mining operations at New Largo Colliery including the potable water circuits, mining/process water circuits and catchment runoff area calculations. The water circuits comprise of a series of pumps, pipes and transfer dams and are viewed as closed water circuits, except where they are exposed to climatic conditions.

A Schematic process flow diagram (PFD) of these circuits were developed through information obtained from, and in collaboration with the New Largo Colliery personnel. The PFD's addressed in this water and salt balance update are therefore representative of the current and future operational philosophy of the five (5) management areas, as confirmed by New Largo Colliery. The PFD for the current (2022) and future (2022-2045) Life of Mine situations are depicted as Figures 4.1(a).

The following sections summarise the operational philosophy of the five (5) management areas, in adherence with the DWAF Best Practice Guideline for Water and Salt Balances (DWAF, 2006).

4.2 KLIPFONTEIN COLLIERY AND PIT D AREA

Mining at Pit D commenced from the adjacent Klipfontein Pit directly to the west of the New Largo Mining Right Boundary. Mining progresses in a southern and eastern direction until FY34.

Water from Pit D is currently being pumped from sumps at Ramps 1 and 2 North and Ramps 1 and 2 South to the Office Void. The Office Void is a surface dam located on top of a backfilled section in the north of the Klipfontein Section of Pit D. During 2024, dewatering from Pit D is will commence to the proposed Main Mine PCD and excess water will be pumped to a proposed treatment for treatment. It was indicated by New Largo Colliery that the proposed Main Mine PCD will be commissioned in 2024. Expected treatment rates at Main Mine were indicated by New Largo Colliery (New Largo, 2023) at 4 Ml/day from 2024 onwards and 6 Ml/day from 2032 onwards.

Both clean and dirty water catchments exist at the Klipfontein Colliery. Stormwater runoff from the clean catchments is being collected and controlled back into the environment using various berms, whereas the stormwater entering the dirty water catchments of the stockpile areas is channelled to the Klipfontein PCD as authorised in the WUL (No. 04/B20F/ACGIJ/2732).

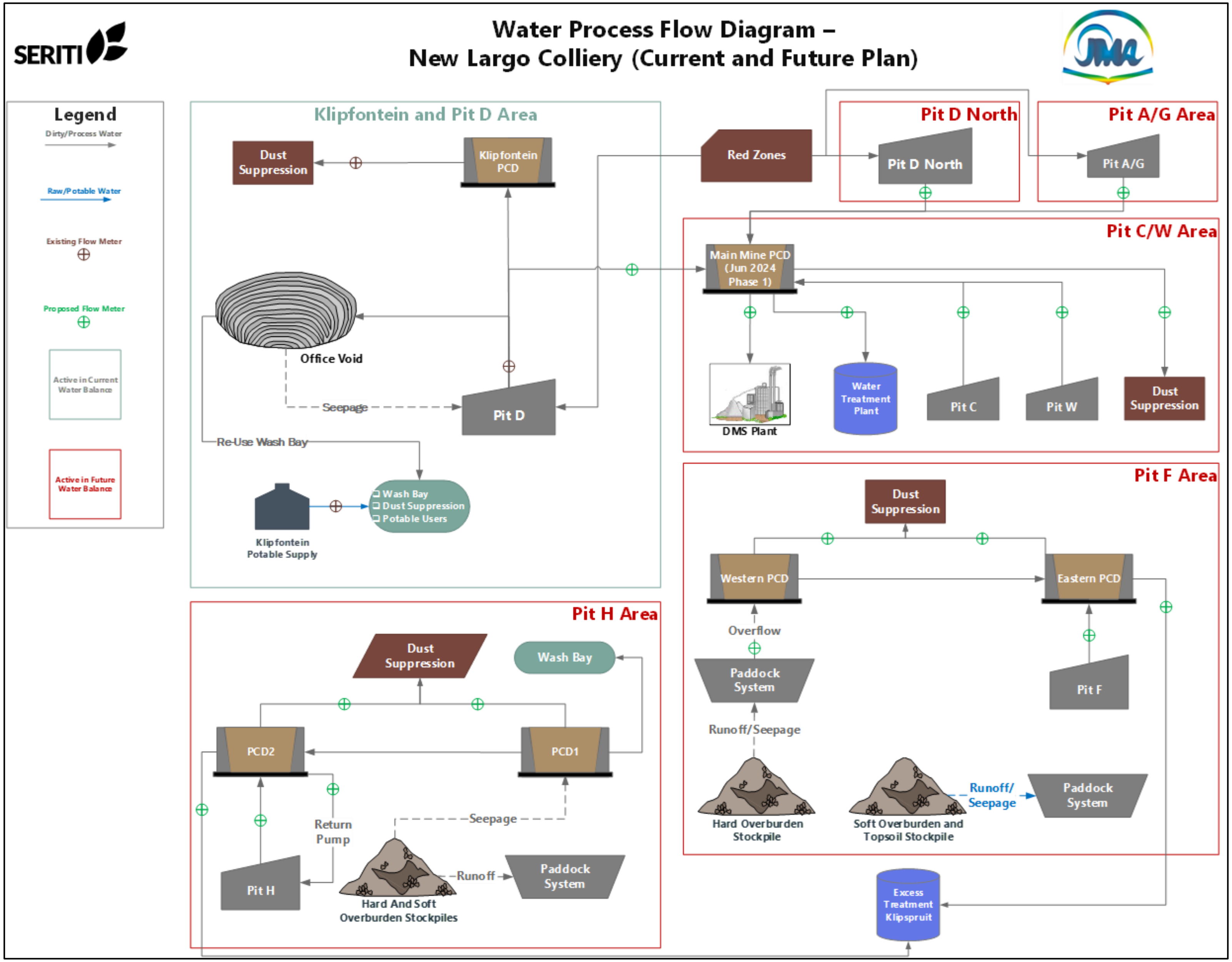


Figure 3.6.1(a): General Layout Plan of the Klipfontein Pollution Control Dam

4.3 PIT F AREA

Future operations at Pit F include mining operations from FY 2023 onwards and is expected to be greenfield with no interaction with the adjacent opencast and underground workings.

The latest SWMP received (Ukwazi, 2022) dates from January 2022 and indicates that the mine will require two (2) PCD's (Eastern and Western PCD) for containment of polluted water and for ensuring water supply for mining support services water demands. At that time this also includes a DMS plant as part of the operations.

Temporary stockpiling of discard material will be required, the stockpile will be placed on the central area of the pit footprint up until 2026, thereafter the temporary discard stockpile will be moved into the pit.

Borehole water is used used for potable water at the start-up phase and for operational purposes. A package sewage plant will be established for domestic wastewater management. Treated wastewater will be discharged to the Western PCD for reuse or the Saalklapspruit-Saalboomspruit if water quality is compliant.

Two overburden stockpiles will be constructed, these are further classified as hard and soft overburden stockpiles. The hard overburden stockpile is considered a dirty water generating catchment and as such, the surface water runoff will be captured in evaporation paddocks, any spills occurring from this system will be diverted to the Western PCD. The soft overburden stockpile is considered a clean water generating catchment, the surface water runoff generated will also be captured in an evaporation paddock system.

A recent site visit undertaken on the 13th of September confirmed that the Ukwazi (2022) SWMP has not been formalised and that current infrastructure layout plans will deviate from the official SWMP. No DMS plant is part of the future operations, and it is unclear whether the Eastern PCD is sufficiently large to handle rainfall/runoff from newly planned dirty water area catchments. For the next water and salt balance update it is essential to formalise an updated SWMP including re-designs of the Eastern PCD and confirm compliance of the updated SWMP.

4.4 PIT H AREA

Mining at Pit H will commence from the west of the proposed pit extent in FY25 and will commence towards the east. Golder (2021) described that ROM coal from the Pit H opencast area is hauled by trucks and dumped at a temporary stockpile, with phase 1 processing occurring within the pit footprint. Phase 2 will involve permanent crushing, screening and stockpiling facilities located on the periphery of the pit area. The waste rock from the plant will be stored in-pit.

It is proposed to construct an FX Plant (airdry processing system) during operations. The FX Plant will not require use of water. Potable water will be sourced from boreholes on the proposed site, this water will be used to supply the domestic water demand.

Golder (2021) also determined that the mine will require two (2) PCD's (PCD 1 and PCD2) for polluted water containment and for ensuring water supply for mining support services water demands:

1. PCD 1 will receive runoff from the plant area and overburden stockpile seepage pumped from the paddock system spilling into the eastern and western seepage collection Sumps. Water is sourced from PCD 1 for dust suppression demands on the haul roads.
2. PCD2 receives pit water accrued in Pit H. Water is sourced from PCD2 for dust suppression demands on the haul roads.

3. It was communicated by New Largo Colliery that any excess water will be pumped to Klipspruit Colliery for treatment.

Four overburden stockpiles will be constructed, these are further classified as hard and soft overburden stockpiles. An unlined paddock system to collect runoff and seepage collection will be implemented. If there is any spillage, water will be pumped to the PCD 1. Due to the proposed cascading system setup of the paddocks, evaporation rates can accelerate and subsequently reduce required PCD storage capacities for Pit H area.

4.5 PIT A/G AREA (MAIN MINE)

Pit A and Pit G will initially be two (2) separate pits and will merge during FY30. No recent and up-to-date infrastructure layout plan was available. The following was therefore collectively decided in liaison with New Largo personnel.

It was indicated by New Largo Colliery that all water, which accrues in the operational opencast pits (Pit A and Pit G), will be pumped to the proposed Main Mine PCD(s) and excess water to the proposed treatment plant. This water management strategy forms part of the medium to long term LOM scenario (Figure 4(a)) and will apply for the remainder of the LOM until 2056.

Conceptual infrastructure layouts and designs were provided for this water and salt balance update (Ukwazi, 2023) and preliminary sizing of the Main Mine PCD was confirmed for this 2023 update (Section 7.4.3). It is expected that for the next 2024 water and salt balance update, more detailed information will be available on potential footprint areas of stockpiles, plant area, discard facility and water requirements (e.g., plant demand and dust suppression) for the Pit A/G area.

4.6 PIT C/W (MAIN MINE)

Mining at Pit C and W will commence from the north-west of the proposed pit extent in FY26 and will initially commence towards the east and then towards the south. The LOM of Pit C is expected to be greenfield with no interaction with the adjacent underground workings. Pit W is the smallest of all the pits and will commence in the south-west of the proposed mining extent. It was assumed that Pit C and W will be managed separately in comparison to previous water balance updates (JMA, 2022).

A similar approach, as described for Pit A/G, was assumed as for Pit C/W. All water, which accrues in the operational opencast pits (Pit C and Pit W), will be pumped to the proposed Main Mine PCD and subsequently treatment plant where there is excess water. It is expected that for the next 2024 water and salt balance update, more information will become available.

4.7 PIT D NORTH (MAIN MINE)

Mining at Pit D North will commence from the west of the proposed pit extent in FY40 and will initially commence towards the east and then towards south and northeast. The LOM of Pit D North is expected to be greenfield with interaction with Good Year North Red Zone (Table 3.1.3(a)). It was assumed that Pit D North will be managed as one (1) opencast pit and separately from Pit D in comparison with previous water balance updates.

A similar approach, as described for Pit A/G and Pit C/W. All water, which accrues in the operational opencast pit, will be pumped to the proposed Main Mine PCD(s) and treatment plant if there is excess water. It is expected that for the next 2024 water and salt balance update, more information will become available.

5. DATA COLLECTION AND MONITORING PROGRAMME

5.1 GENERAL

As indicated in Step 4 of the DWAF BPG G2: Water and Salt Balances (DWA, 2006), it is critical to obtain accurate flow rates, levels and quality data for each of the identified water circuits in order to validate and calibrate the water and salt balances. Inaccurate or insufficient monitoring data will inevitably lead to ineffective or insufficient model calibration and confidence.

Water flow rates, water levels and water quality monitoring data was received from both Klipfontein and New Largo Collieries, and was assessed and interpreted accordingly. Given the extent of mining currently, the water monitoring data provided is primarily associated with the Klipfontein and Pit D mining operations, a summary of which is provided in the sub-sections that follow.

5.2 FLOW METER DATA

Flow data recorded using flowmeters was provided for the period January 2021 until June 2023 and was used to calibrate the GoldSim water balance model. The flow data provided was associated with the Pit D dewatering from both the North Pit and South Pit, as well as water used for dust suppression on surface at Klipfontein Colliery. The localities of the flow meters in terms of the water distribution circuits are indicated on Figure 4.1(a).

Table 5.2(a) summarises the major pumping systems, as well as the monitored average flow rates for each of the major systems over the specified monitoring periods. The monitored daily flow rates for each of the major systems is depicted on Figure 5.2(a) for the monitoring period January 2021 to June 2023.

Table 5.2(a): Summary of the Flow Meter Data Received

From	To	Flow Meter ID	Comment	Average Flow (m^3/d)
Klipfontein Colliery				
Pit D North Face	**Office Void/PCD**	Pit D North	01/2021-06/2023	630
Pit D South Face	**Office Void/PCD**	Pit D South	01/2021-06/2023	198
PCD	**Road Dust Suppression**	Gooseneck Road Dust Suppression	01/2021-06/2023	272
PCD	**Plant Dust Suppression**	Plant Dust Suppression	01/2021-06/2023	211
Klipfontein Colliery - Potable				
Potable	**Potable Users**	Klipfontein Potable	01/2021-06/2023	918
Septic Tanks	**Trucking**	Klipfontein Waste Water	01/2021-06/2023	103

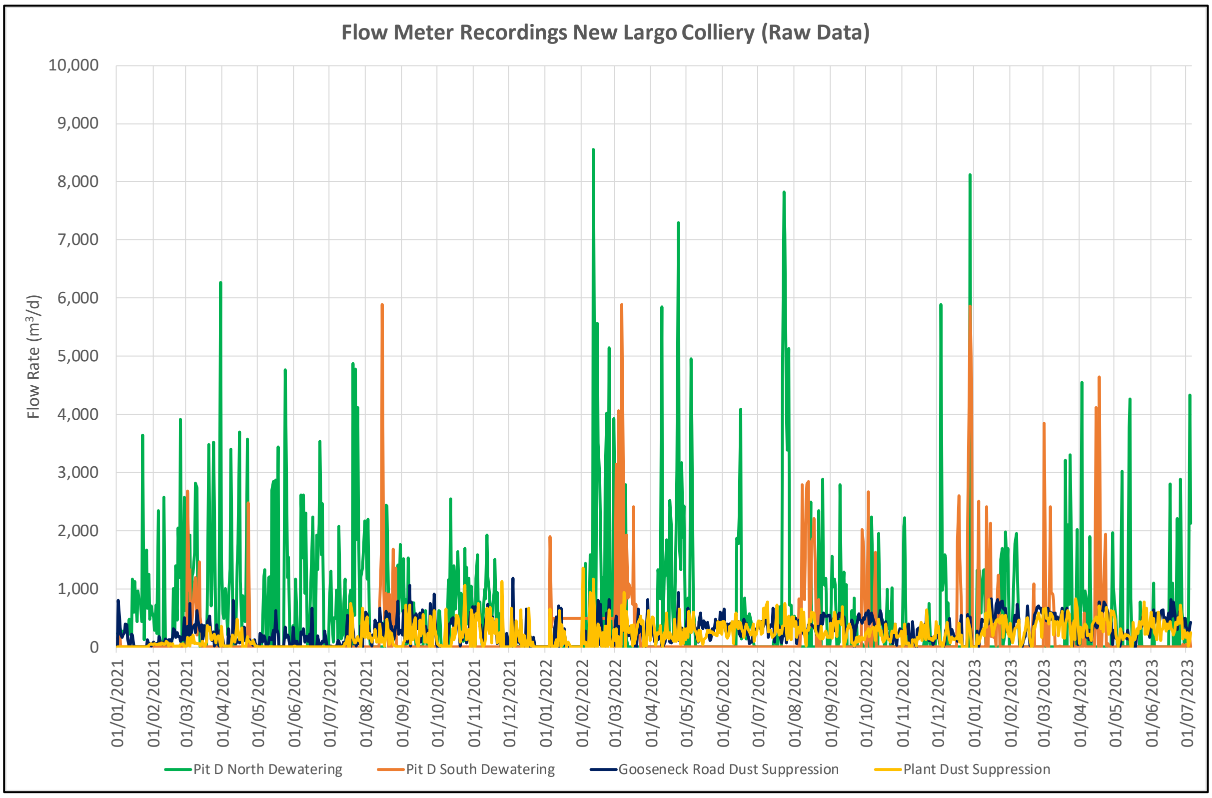


Figure 5.2(a): Daily Monitored Flow Rates

5.3 DAM WATER LEVELS

Water levels within the Klipfontein Office Void and PCD are measured two to three times a month and were provided for the period December 2020 to June 2023. These water levels are indicated in Figures 5.3(a) and Figure 5.3(b) for the Office Void and PCD respectively. The decant or spillway elevations of both these facilities are also indicated for further reference or interpretation purposes.

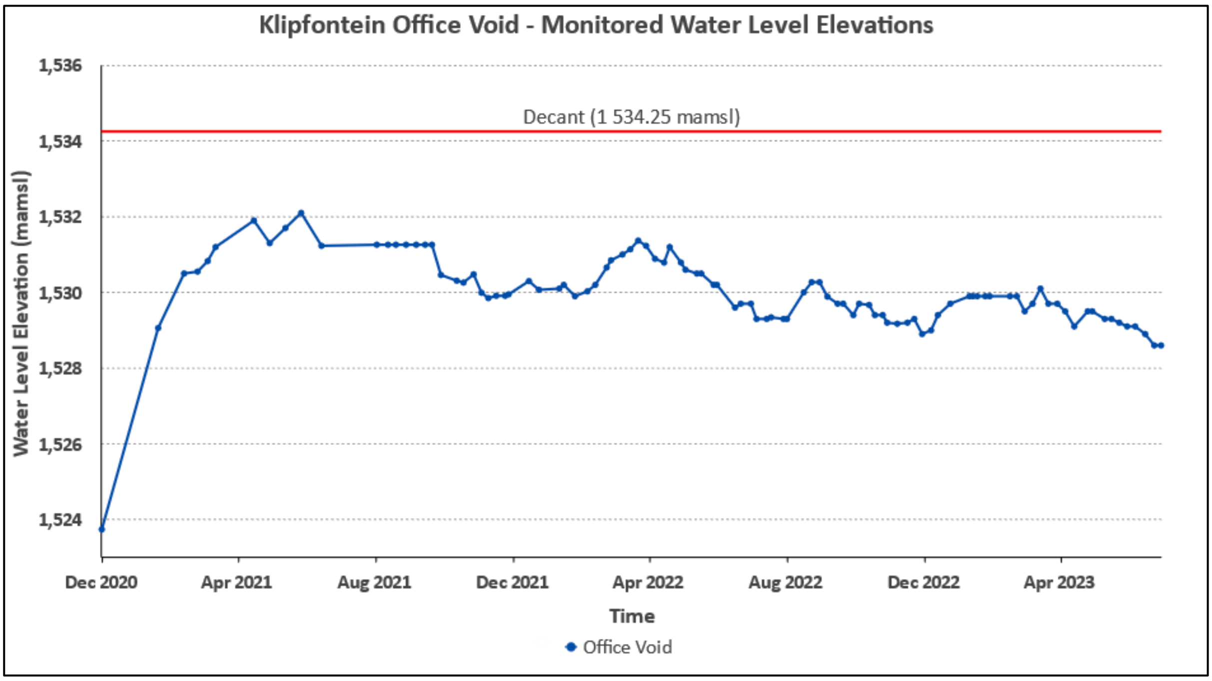


Figure 5.3(a): Office Void - Water Level Elevations (mamsl)

The flow data provided indicates that 65.6% of the water dewatered from Pit D was pumped into the Office Void and 34.4% to Klipfontein PCD over the monitoring period between June 2022 and June 2023. It is important to note from Figure 5.3(a), that the water levels in the Office Void decreases for the same period , whilst receiving 264 m^3/day of water from Pit D on average.

The water level in the Office Void remained between 2 m and 10 m below the decant elevation of the void and did therefore not directly decant or spill during the monitoring period. High volumes of seepage from the Office Void towards the aquifer and backfilled pit are however expected, resulting in the stable and lowering water levels. The Office Void is an unlined facility within the rehabilitated opencast spoils of Pit D and the pumping of water from the active mining areas creates a hydraulic gradient from the Office Void back towards the ramps through the backfilled spoils, which increases the seepage rate (loss of water) from the facility. Based on the 2022 water balance update, water losses from office void through the spoils were estimated to be between 500 and 600 m^3/day which is dependent on the water level within the office void. Based on the mine schedule and operational rules, water will be pumped from next year (FY25) onwards to main mine which will probably cause the water level within office void to drop.

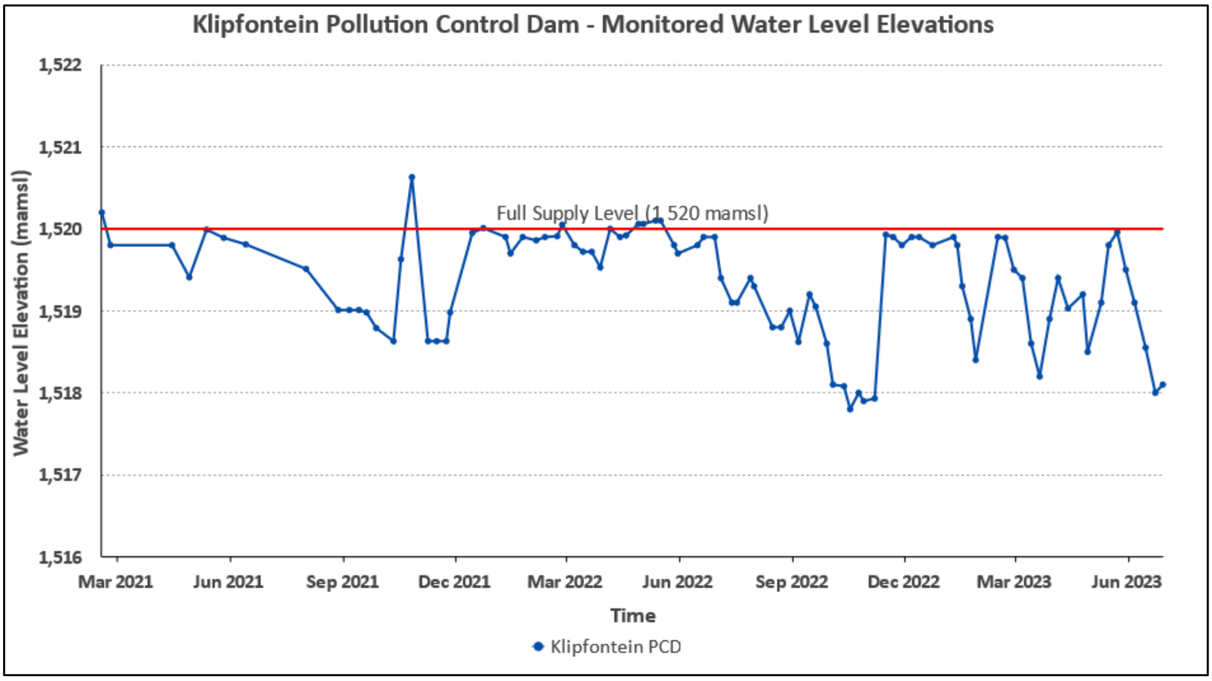


Figure 5.3(b): Klipfontein PCD - Water Level Elevations (mamsl)

About 35.4% of the mine water dewatered from Pit D was pumped directly into the PCD (439 m^3/day on average) between June 2022 and June 2023, which also receives stormwater runoff from the plant area.

It is evident from Figure 5.3(b) that the water levels in the PCD were the lowest prior to the summer rainfall in 2021 and 2022 as expected, and then remained relatively stable at levels between 0 m and 1 m below the Full Supply Level (Spillway Level). Various sharp declines in water levels can be seen between January 2023 and June 2023 over the dry season. It is also apparent from Figure 5.3(b) that the PCD spilled at least twice during the monitoring period, based on the water level data provided.

5.4 DAM WATER QUALITIES

Total Dissolved Solids (TDS) was chosen to provide input into the salt balance model as it serves as a relatively good tracer with acceptable chemical losses/gains in the system, although it is not fully conservative. The average measured TDS concentrations were used as the input and calibration for the salt balances (Table 5.4(a)), as obtained from the water monitoring data for the period from 2020 to 2023. The temporal TDS concentrations of the dams are indicated on Figure 5.4(a).

Table 5.4(a): New Largo Dam Water Quality Summary

Description	Average TDS Concentration (mg/l)	Monitoring Period
Klipfontein PCD	2 596	03/2020 - 06/2023
Office Void	2 229	03/2020 - 06/2023

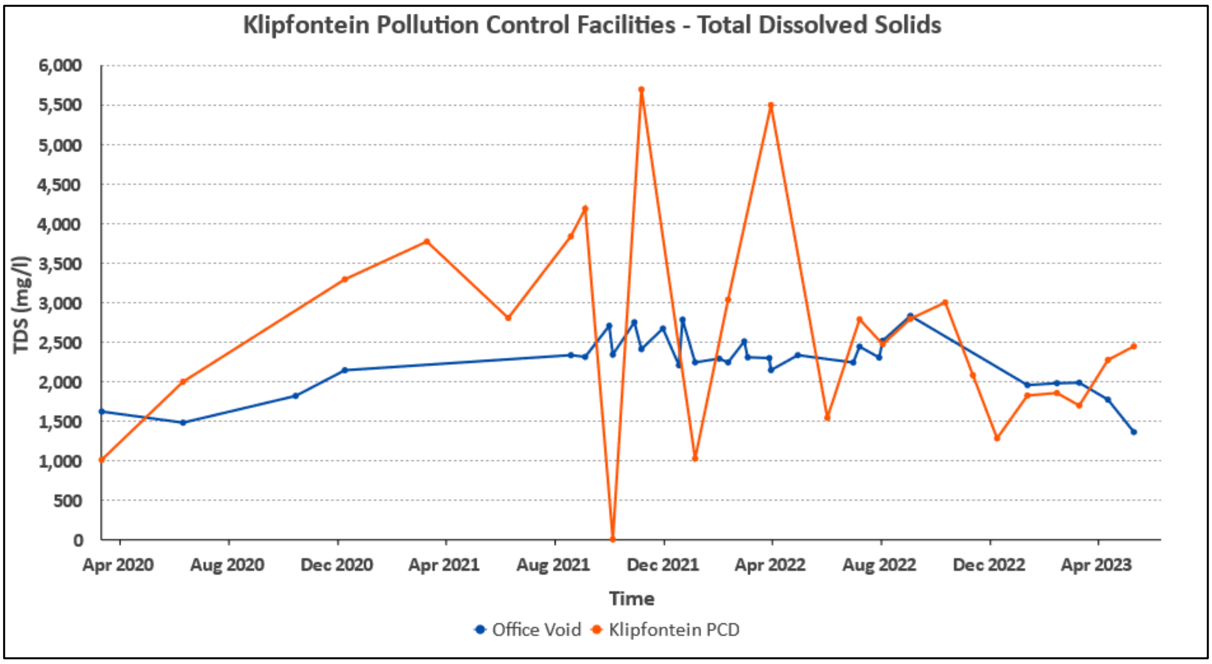


Figure 5.4(a): Klipfontein Pollution Control Facilities - Temporal Dam TDS Concentrations

It is evident from the chemistry data and trends that there has been a significant deterioration in the water quality of the Klipfontein PCD between March 2020 and April 2022 and an improvement again until June 2023. Some outliers in the data has significantly lower/higher TDS concentrations with regards to the trending TDS concentrations. The outliers may be as a result of high rainfall events with clean rainwater entering the system. It has been communicated by Seriti that the PCD receives contaminated runoff from the product during the wet season which increases the salinity of the water in the PCD.

There has also been some deterioration in the water quality of Office Void with the TDS concentration increasing between March 2020 and September 2022 with an improvement from thereon until June 2023. It is important to keep monitoring the water qualities within the dams on a monthly basis to observe any seasonality and long term trends.

5.5 PIT WATER LEVELS

Water level elevations at Pit D were only measured at the water accumulation areas at the ramps from where water is pumped into Office Void and at the Office Void itself until June 2023. These water levels will be influenced by pumping and cannot be used to interpret spoils water levels. Four boreholes have however been drilled into the Pit D spoils during June 2023. From the initial monitoring data recorded during July 2023 at the four boreholes (OC1, OC2, OC3 and OC4) it was observed that two of the boreholes were dry with water level elevations of 1526.98 mamsl and 1529.58 mamsl being measured at OC3 and OC4. The opencast water level elevations measured at the boreholes along with the water level elevations measured at Office Void is portrayed as (Figure 5.5(a)). The latest water levels measured during the site visit on 13 September 2023 is also portrayed along with the borehole localities on Figure 5.5(b).

The monitoring of the spoils boreholes should continue post closure in order to manage the water levels within the pits. It is understood that the pits will all be fully rehabilitated, but should there be any final voids within the spoils they should also be monitored. It is recommended that the opencast water levels be monitored on a monthly basis, with the voids being measured on a weekly basis along with the other surface dams. As mining progress within Pit D and Pit F, it is recommended that various opencast spoils boreholes be drilled as well as in future pits when mining commenced.

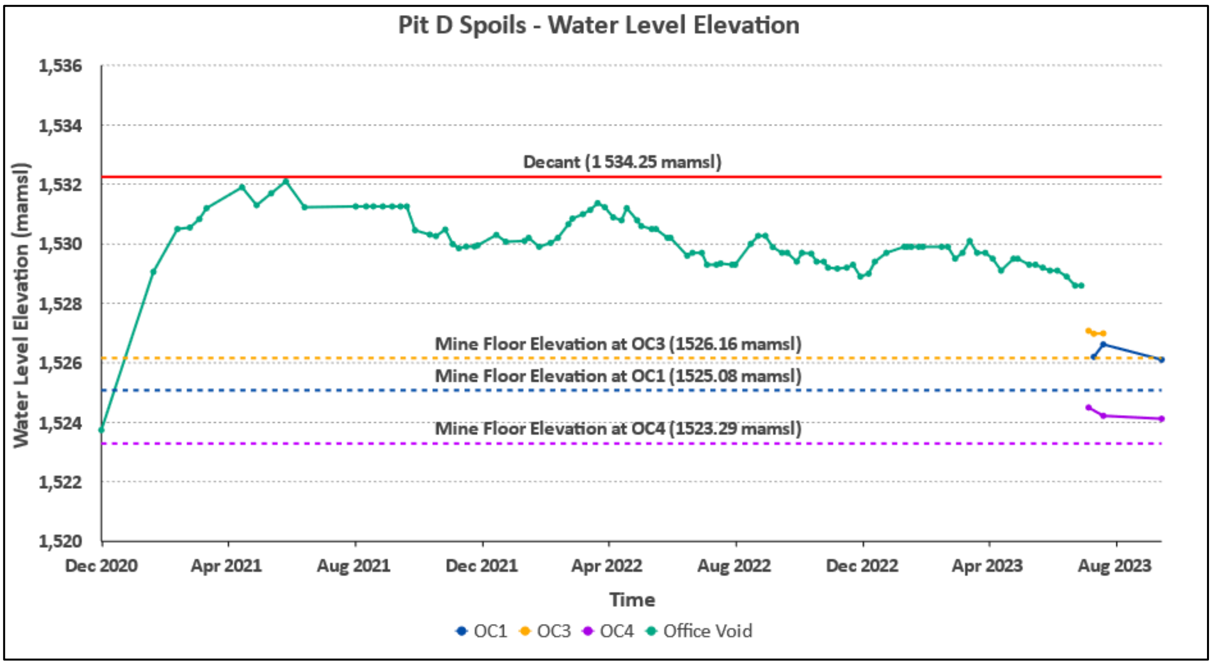


Figure 5.5(a): Pit D Spoils - Water Level Elevations

5.6 PIT WATER QUALITIES

Until June 2023, the Office Void was the only monitored facility representative of the mine water at Pit D along with the two voids within the Pit D Opencast Workings. The quality of Office Void should be a good overall representation of the water quality within Pit D, as it not only represents the water quality of the backfilled spoils, but also of the dewatered active mining areas. Quality monitoring also commenced at the newly drilled spoils boreholes (OC1, OC2, OC3 and OC4). The first samples analysed during July 2023 for OC1 and OC4 had TDS concentrations of 1964 mg/l and 2216 mg/l which correlates very well with the qualities analysed for the mine water in Office Void.

An average TDS of 2 221 mg/l is therefore representative for the use in the water and salt balance calculations.

As mentioned in Section 5.5, it is important to have representative monitoring localities within the opencast spoils. The recommendations within Section 5.5 is therefore also applicable for the water quality monitoring of the opencast spoils. Water qualities can be obtained from both boreholes and voids within the opencast workings and it is recommended that the qualities be monitored at least on a quarterly basis.

As there might be stratification within the voids and boreholes, it is important to do vertical profiling on the boreholes and voids to identify and sample at the appropriate depths as well. The construction of future mine water monitoring boreholes is therefore critically important and should be carefully considered before drilling any boreholes. The spoils boreholes should be perforated for the full length of the borehole with only the first 3 m being sealed off with bentonite and solid casing to avoid surface water interaction. It is recommended that the spoils boreholes be sited so that they monitor the lowest areas of the pit, especially with the initial boreholes.

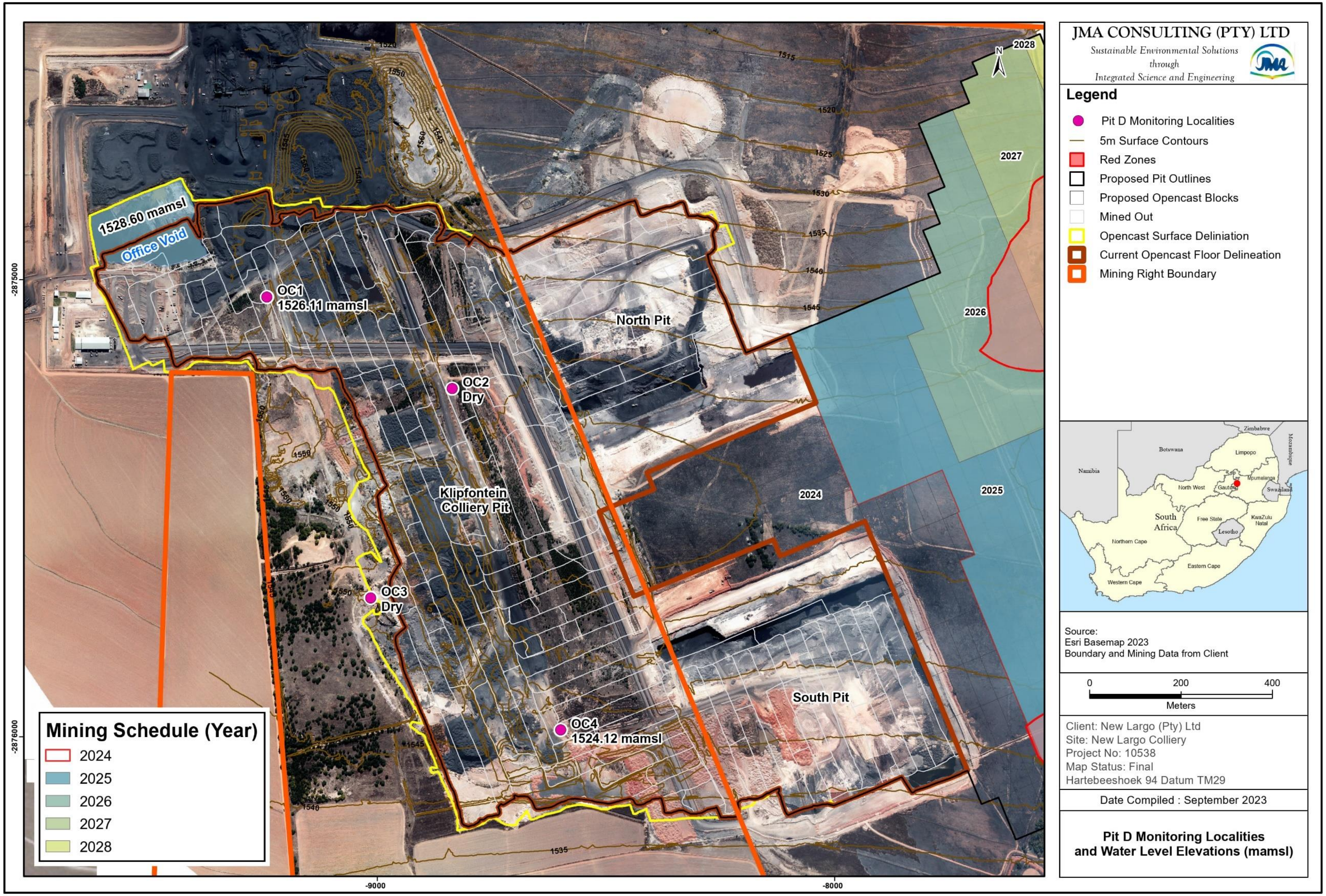


Figure 5.5(b): Pit D Opencast Monitoring Localities and Water Level Elevations (September 2023)

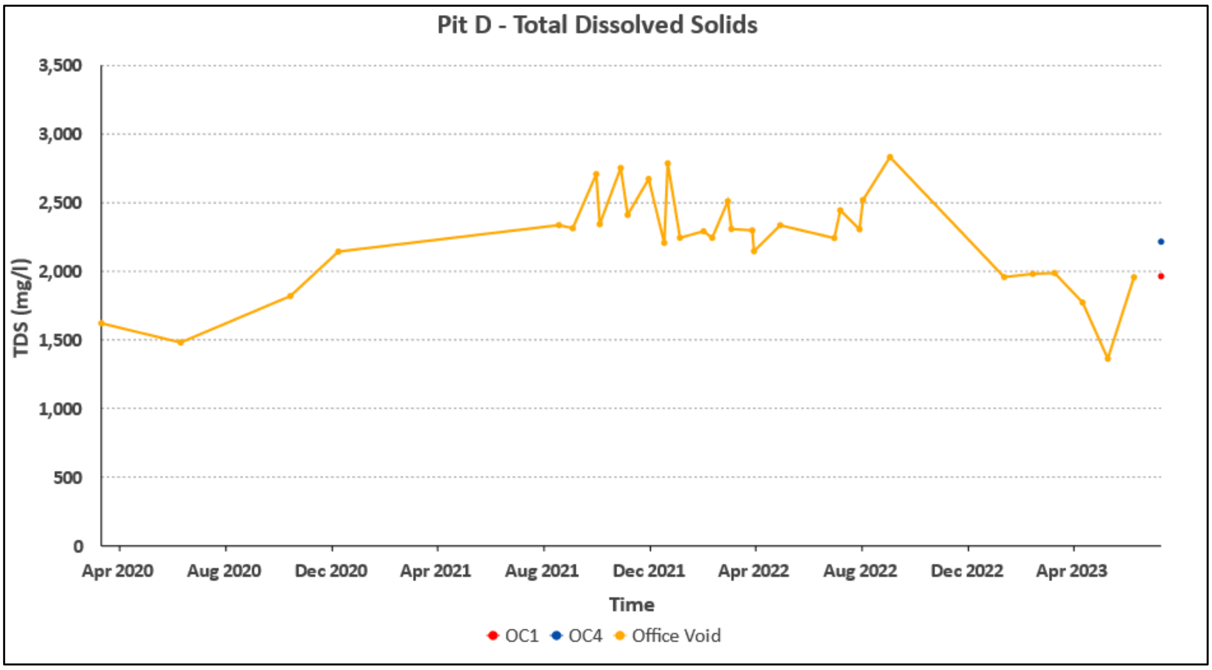


Figure 5.6(a): Temporal Dam TDS Concentrations

5.7 UNDERGROUND WATER LEVELS

Mine water monitoring of the New Largo underground workings were undertaken on a regular basis between 1992 and 2003 from where there is a gap in the available monitoring data. Duo to the critical importance of the underground mine water monitoring data for the water balance calculations and other modelling calibration, an assessment was undertaken by GPT during 2022 to locate and assess the old mine water monitoring localities at New Largo for the possibility to use them for proceeding mine water monitoring. From the results of the study (GPT, 2022) it was interpreted that on one borehole, M5, was still accessible for representative mine water monitoring. New largo also reobtained some of the "Hodgson" mine water monitoring data from the Institute for Groundwater Studies (IGS) for the purpose of interpretations.

In a report by Hodgson (2007) it was reported that the water levels within the New Largo underground workings were separated into 3 water bodies due to the geometry of the mine floor. The three water bodies along with the positions of the monitoring boreholes are indicated on Figure 5.7(a). The water levels indicated for the water bodies were measured during the year 2000.

The historic mine water level elevations provided by the IGS along with the latest measured water level elevations at borehole M5 (1536.19 mamsl) were used to create a time dependent water level elevation graph for the New Largo underground workings as seen in Figure 5.7(b). The time dependent water level elevation graph for the New Largo underground workings reported by Hodgson (2007) is also provided in Figure 5.7(c).

It is evident from the water level elevation trends in Figure 5.7(b) and Figure 5.7(c) that there was an increase in the water levels from 1991 until 2003 from where an increase is further observed until 2023. The water level elevation within the underground workings has been higher than the decant elevation since 1998. Assuming that the No.4 and the No.2 Seam Underground Workings are hydraulically connected and using the provided geology coal floor grids for the mine floor geometry, the latest water level elevation measured at M5 was used to illustrate the flooding extent of the New Largo underground working (Figure 5.7(d) and Figure 5.7(e)).

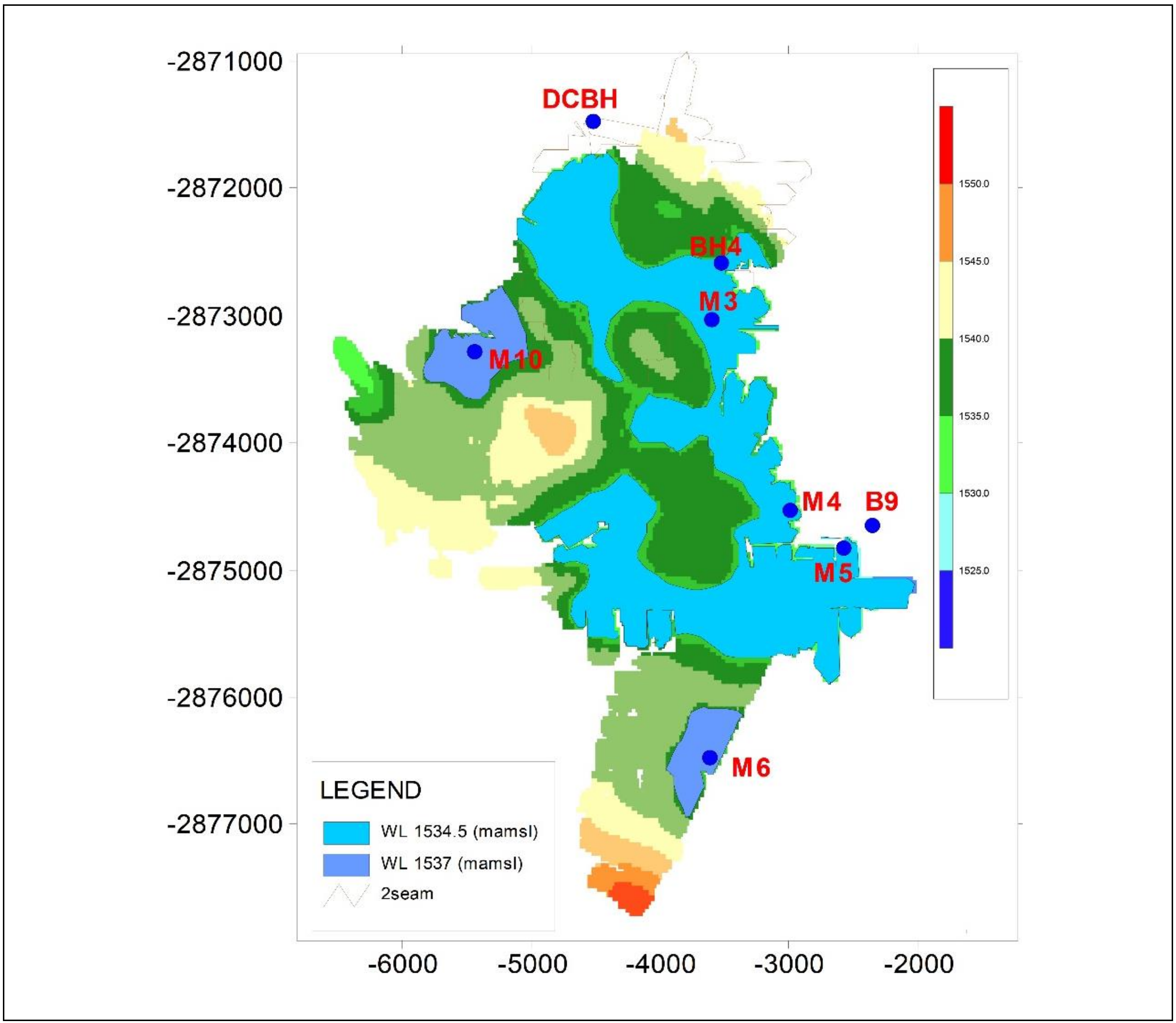


Figure 5.7(a): No.4 Seam Underground Workings and Mine Water Monitoring Localities

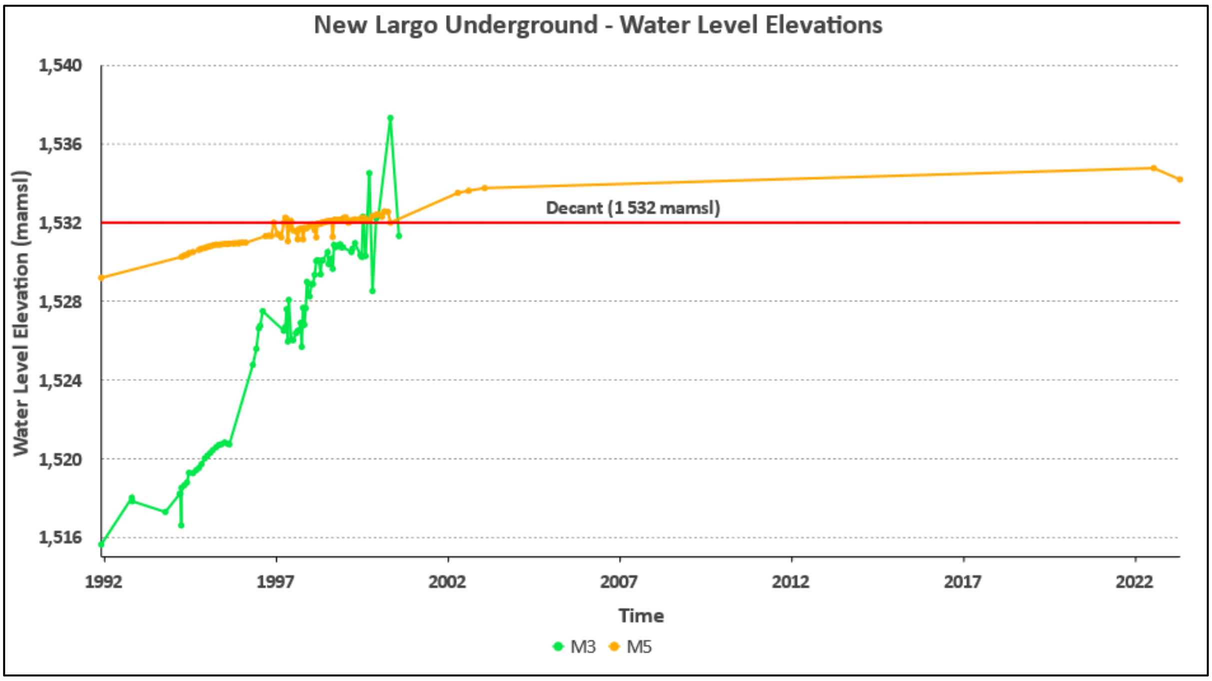


Figure 5.7(b): Temporal Underground Mine Water Level Elevations (mamsl)

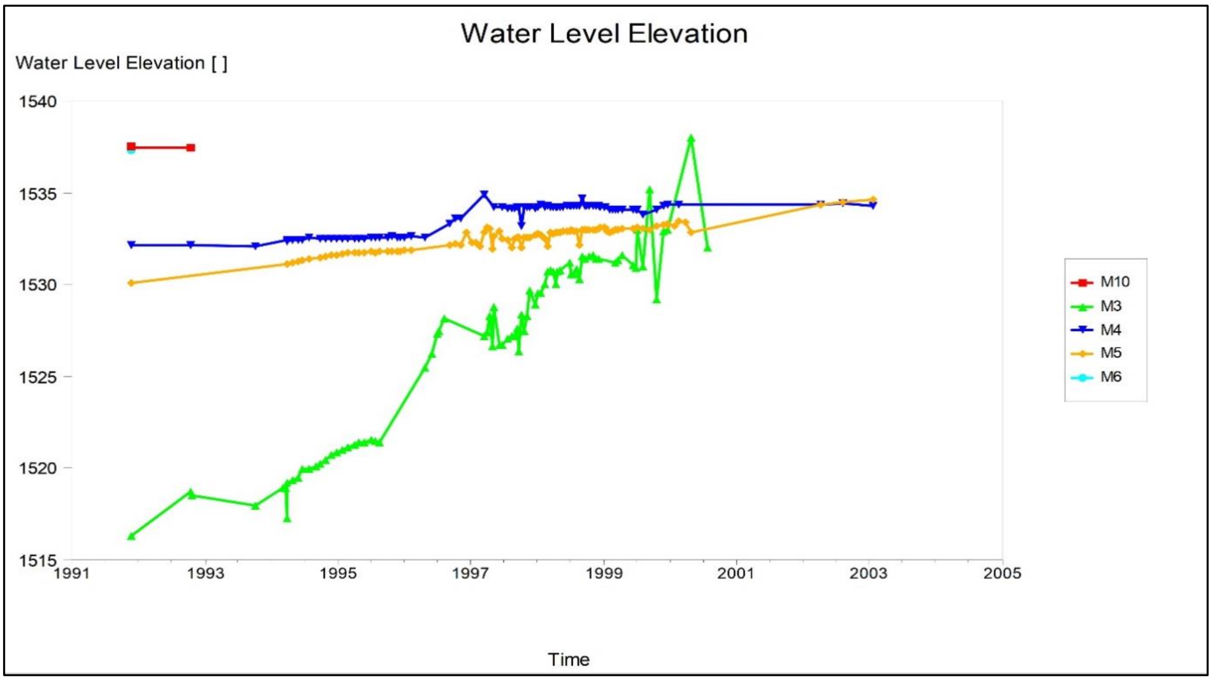


Figure 5.7(c): Temporal Underground Mine Water Level Elevations (mamsl) (Hodgson, 2007)

It is evident from Figure 5.7(d) and Figure 5.7(e) that the No.2 Seam Underground Workings are nearly fully flooded. The 3 water bodies within the No.4 Seam Underground Workings to which Hodgson referred is not seen in the latest flooding extent. This is partially due to the lack of monitoring data from M6 and M10 as well as an increase in water level elevation since the year 2000. It is therefore very important that boreholes M6 and M10 be reopened/redrilled into the workings. It is also highly recommended that M3 be redrilled/reopened for the purpose of monitoring in the No.2 seam underground workings. It also seems that the incorrect coordinates for M6 was provided, as the Hodgson report indicated the borehole to be situated with the underground workings. The provided coordinates plots outside of the mining extent.

The flooding status of the historic underground workings at New Largo is critically important to quantify for the purpose of the water balance calculations. Additional boreholes are expected to be drilled in areas where there are currently no mine water monitoring boreholes for instance some of the red zones and smaller underground workings. These boreholes are important for quantification of inter-mine flow between underground mines and pits and will be important going into the closure phase of the mine in the future. It is imperative that the flooding status of each of the historic underground workings be quantified and continue to be monitored on at least a quarterly basis.

The construction of the underground mine water monitoring boreholes is critically important. These boreholes must penetrate the roof of the workings and be drilled and cased to the floor of the underground workings. The bottom 12 m of the casing should be perforated with the rest of the borehole sealed off from surface water and the aquifers.

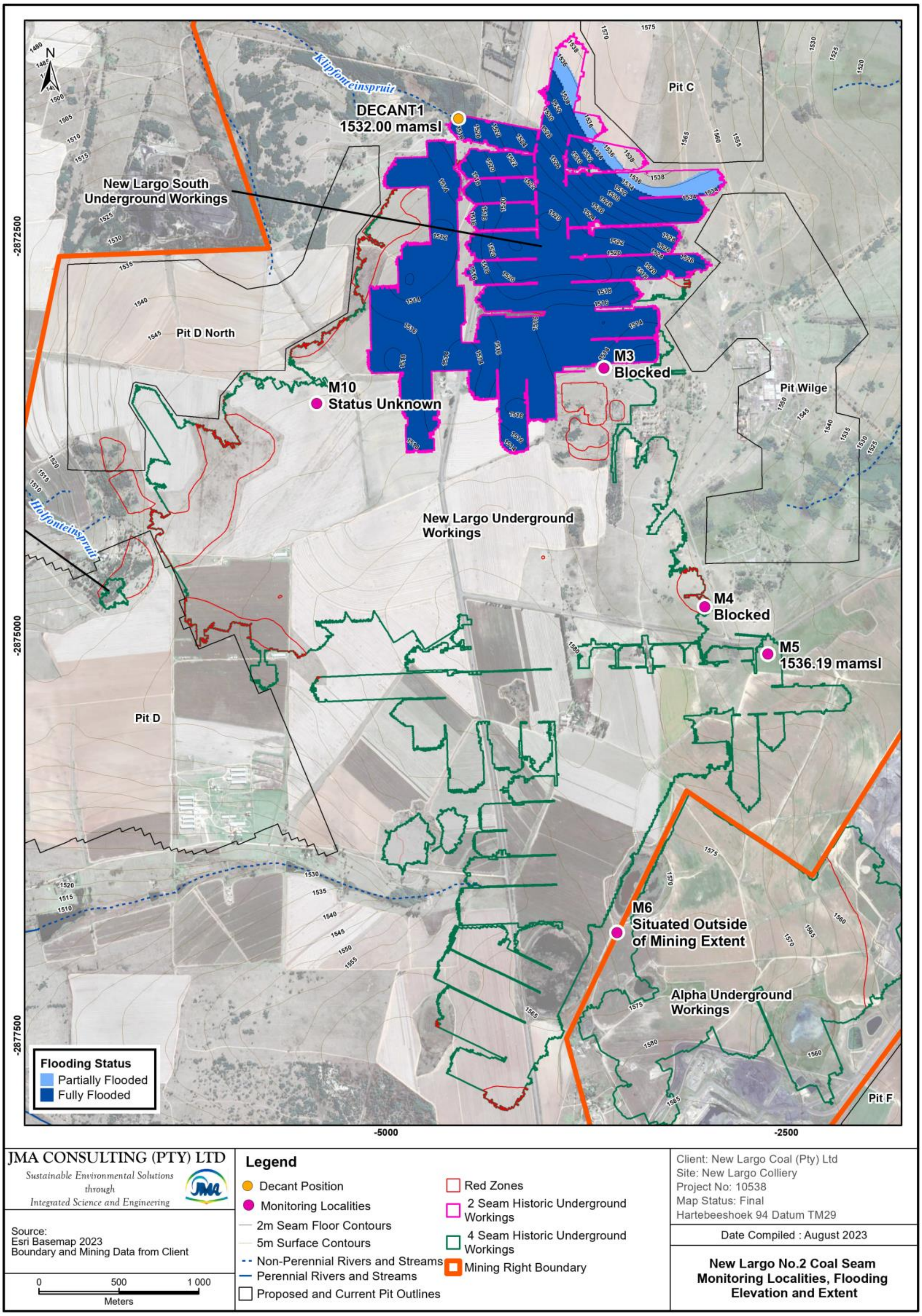


Figure 5.7(d): Flooding extent of the New Largo No.2 Seam Underground Workings

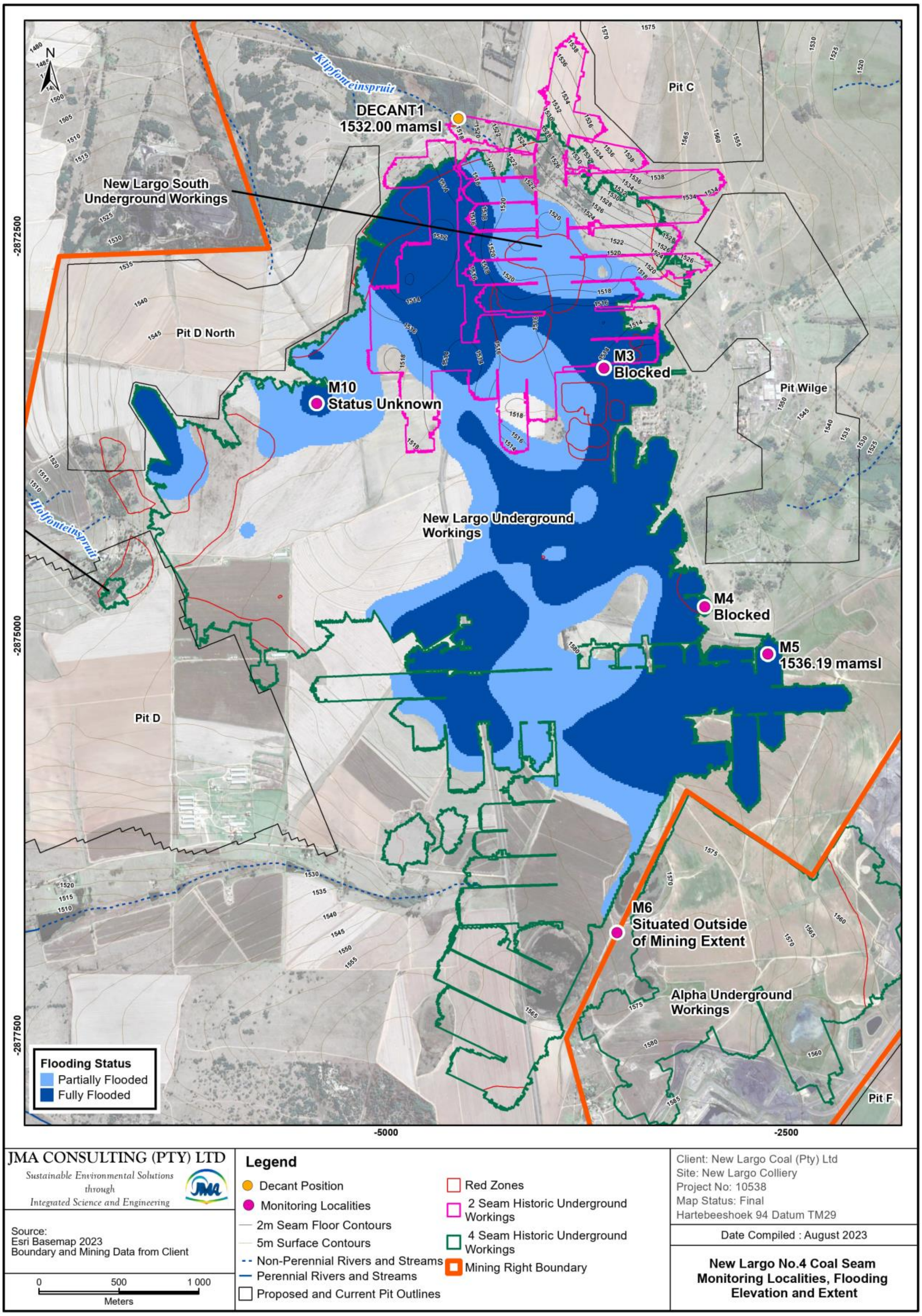


Figure 5.7(e): Flooding extent of the New Largo No.4 Seam Underground Workings

5.8 UNDERGROUND WATER QUALITIES

It was reported by Hodgson (2007) that the average electrical conductivity (EC) within the mine water ranged from 3 500 – 3 850 µS/cm (converted from mS/m).

In a study by Hubert (2015), it is concluded that in order to convert EC (µS/cm) to TDS (mg/l) a conversion factor of 0.97 can be used for mine water from Mpumalanga with an EC less than 5 000 µS/cm. This calculates to TDS concentrations between 3 395 and 3 735 mg/l.

Table 5.8(a): New Largo Dam Water Quality Summary

Description	Average TDS Concentration (mg/l)	Monitoring Period
New Largo No.4 Seam Underground Workings	3 565	April 2002 – August 2002

During 2022, mine water samples from borehole M5 and the decant were analysed and the TDS concentrations at those 2 localities were 2796 mg/l and 1194 mg/l. This is lower than the concentrations measured in the past. Continuous monitoring of groundwater quality is important. The latest TDS concentrations along with the reported and provided historic TDS concentrations were used to create a trends (Figure 5.8(a)).

It is evident that the sampling data is very inconsistent with outliers. It is important that the correct sampling techniques are employed when taking underground mine water samples in order to get representative quality results.

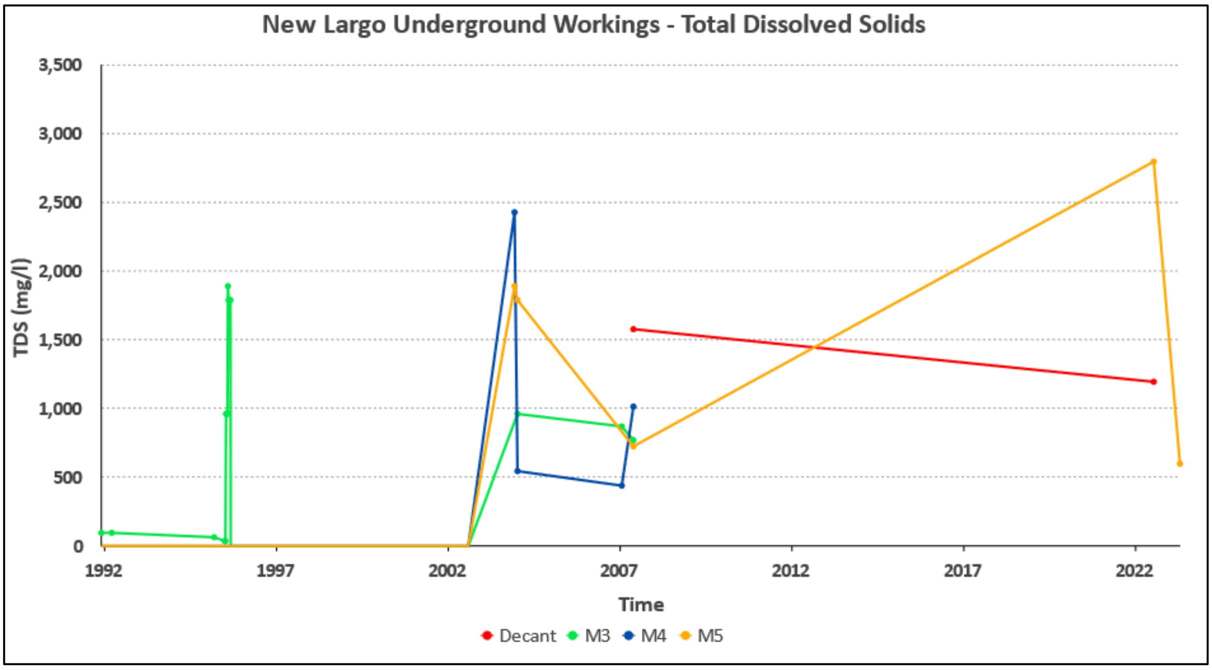


Figure 5.8(a): New Largo Underground Workings - Temporal Dam TDS Concentrations

6. MODEL CHARACTERISTICS, METHODOLOGY AND ASSUMPTIONS

6.1 MODEL CHARACTERISTICS

The New Largo Colliery Water and Salt Balance Model is a statistical computer-based model which has been developed using the GoldSim Modelling Software (GoldSim Technology Group, 2022). The GoldSim model simulates the flow of water over time, using stochastic rainfall, runoff and recharge as hydrological inputs to account for seasonal changes and models the impacts of all relevant mining infrastructure.

6.2 METHODOLOGY

The dynamic water and salt balance model for New Largo Colliery was developed during 2021 and was set up using a top-down approach. This implies starting with a broad overview of the mine wide water balance, and then going down to the next level of intricate detail where available and where required.

Currently, Klipfontein Colliery extending into Pit D uses an extensive system of water supply and management options for the opencast pits and surface infrastructure to manage all process/mining and potable water on site. This water and salt balance update, which now expands on the previous model that was developed in 2021, has taken cognisance of these systems and includes all relevant updates and changes or modifications which have been made thereto since the previous water and salt balances in 2022 and 2023.

This updated water and salt balance now accurately includes each of the major elements to correctly represent the New Largo Colliery water management system, and comprises of the following management areas or units:

- Klipfontein Colliery and Pit D,
- Pit F,
- Pit H,
- Pit A/G,
- Pit C/W, and
- Pit D North.

These management areas or units including the associated circuits are visually represented in the updated and verified PFDs for New Largo Colliery, depicted as Figure 4(a).

The water and salt balance model is flexible and has now been set up in such a way so that it can furthermore easily accommodate updated monitoring information, future changes made to the reticulation systems as well as the planned LOM schedules. The way in which the model has been set-up also allows for both the overall integrated balance or separate balances for smaller units to be refined and updated as required for future changes.

The following inputs and calculations undertaken within the GoldSim water and salt balance model was reviewed and updated, as required:

- A daily rainfall record from Klipfontein Colliery until June 2023 was received and incorporated in the water balance model.
- Fixed monthly evaporation rates were used in the model according to the latest recorded data obtained from the DWS Bronkhorstspruit Dam Monitoring Station (Section 2.3).

- The actual areas of the current extent of mining as well as the proposed yearly areas of the future LOM workings until 2056 (Section 3.1 to Section 3.3) were built into the water balance model for each of the mining areas.
- The footprint areas and stage-storage capacity curves of the individual workings and mine water compartments (i.e., Red Zones) (Section 3.1 and Section 3.2) were calculated and incorporated in the water balance model.
- Preliminary details of a closure water management strategy for the rehabilitated pits were communicated with New Largo Colliery and were incorporated into the model.
- The linkages in the process water reticulation and operational philosophy (Section 4), and linkages between the various sections were incorporated into the model.
- The recorded flow meter data (Section 5.2), dam levels (Section 5.3), water chemistry (Section 5.4, Section 5.6 and Section 5.8) and mine water levels (Section 5.7) within the flooded pits and mine water compartments (Section 5.5 and Section 5.7) have been integrated with the water balance model.

After these changes were incorporated in the water balance model, calibration was undertaken from the period when the previous water balance update stopped. Calibration was conducted for the period between January 2021 until June 2023 and is described in Section 7.1.

To assess the future mine water management system under different rainfall sequences, a daily stochastic rainfall generator, adopted from historical rainfall statistics from SAWS Ogies rainfall station (Section 2.3) was developed. This allowed for different sequences of daily rainfall to be generated within the model to determine the probability of excess/shortage of water for a particular water management strategy.

The following predictive simulations were performed using the stochastic rainfall generator for 50 realisations, and further described in Section 7.3 onwards:

- The hydrological period October 2023 to October 2024 to account for the annual average water and salt balance update as per DWS requirements. These calculations are used to determine 5th percentile, 50th percentile and 95th percentile flow and rain quantities to provide information on dry, average and wet periods respectively. Concentrations of pollutants based on the same percentiles were used to calculate loads for worst-case scenarios, average conditions and best-case scenarios.
- A future LOM scenario was simulated until April 2056 to analyse water use and storage for medium and long-term planning over the LOM and to determine probable planning for treatment.
- Post-closure simulations were performed to assess the long-term post closure phase at New Largo Colliery.

6.3 ASSUMPTIONS

The following assumptions were made during the calculation of the water balances for the current and future New Largo Colliery mining operations:

- The stochastic rainfall generator is based on historical rainfall data and does not take the effects of climate change into account.
- The planned LOM ends on the 31st of March 2056.
- The yearly mining extents of the proposed opencast pits will take place as expected / indicated by New Largo Colliery on the LOM Plan. There will be no deviation from the planned yearly mining schedules or extents.
- Some water is currently contained in former underground workings (i.e., "Red Zones" (Section 3.1)) and these will need to be dewatered where opencast mining takes place. Where no data (i.e. borehole water level) was available, it was assumed that fully flooded capacities at

5m mining height of these Red Zones are added to the total dewatering requirement and potential excess water to be treated.
- The monitored flow volumes, water levels and water quality data provided is sufficiently accurate and representative of the systems being monitored.
- Sizing of containment dams for the Pit A/G and Pit C/W areas at Main Mine were included for this water and salt balance as requested by New Largo Colliery. It is evident that New Largo Colliery will construct sufficiently large dams to handle the total water make from the opencast workings.
- Recharge rates into the opencast workings for each mining management area were calibrated based recorded flow data pumping water to the surface (Office Void) which are assumed to be calibrated and correct.
- As a result of the recent mining schedule change, no numerical groundwater modelling was undertaken to determine groundwater inflows for each opencast pit. Groundwater inflows were therefore determined for each opencast pit individually, using the analytical Dupuit-Forcheimer equation.

To provide parameter input for the Dupuit-Forcheimer equation, it was assumed that the hydraulic conductivities (0.015 m/d) are uniform for the entire New largo Colliery, an average unsaturated zone thickness of 6 m applies and that the subsequent average pit depth was calculated using the provided No. 2 Coals Seam floor elevations (Section 3.2).

7. WATER BALANCES

7.1 GENERAL

In adherence with step 5 of the BPG G2: Water and Salt Balances, the water balance model is developed according to the principle that the mass of water that enters a system must equal the mass of water that exits the system (Law of Conservation of Mass) (DWA, 2006). The same basic principles for the water balance are applicable to the salt balances, which exclude advanced capabilities such as chemical speciation.

7.2 CALIBRATION

The flow rate measurements received from New Largo Colliery (Section 5.2) were used, where available to calibrate the water balance. The positions of the flow meters are shown in the PFD's depicted as Figure 4(a) and provided flow data for the relevant flow streams from opencast pit D and pump rates to Office Void, Klipfontein PCD and dust suppression.

After developing the required elements in the GoldSim model, as described in Section 6.2, the water balance model was simulated using the recorded rainfall over the calibration period. Calibration of the water balance model was undertaken for the period between January 2010 and June 2023. This was required to verify if actual recorded rainfall would result in expected dewatering rates from Pit D and water levels in the Office Void. Water levels of Office Void were calibrated for the same period.

Recharge estimates into the semi-rehabilitated, levelled spoils and current workings of Pit D (and future other pits) were calibrated by adjusting factors and values given by Hodgson and Kranz (1998). It was possible to calibrate Pit D for the current situation based on actual monitored data, and estimated recharge rates for Pit D were adjusted to 30.6% short-term and at approximately 29% of total rainfall over a long period (>25 years). Long term recharge rates into the backfilled spoils will gradually decrease as rehabilitation progresses to approximately 9-10% of total rainfall. This will be applied for all rehabilitated pits over the LOM and post-closure scenarios (Section 7.4).

Pit runoff was adjusted to 38% short term and at approximately 41% of total rainfall over a long period (>25 years). In addition to adjusting recharge and runoff rates, seepage outflows were calibrated for the Office Void to match recorded water storage levels in the Office Void.

The final calibrated and monitored flow rates over the period January 2021 to June 2023 are presented in Figures 7.2(b) and 7.2(c). The final calibrated Office Void water levels and Klipfontein PCD are presented in Figures 7.2(d) and Figures 7.2(e), respectively.

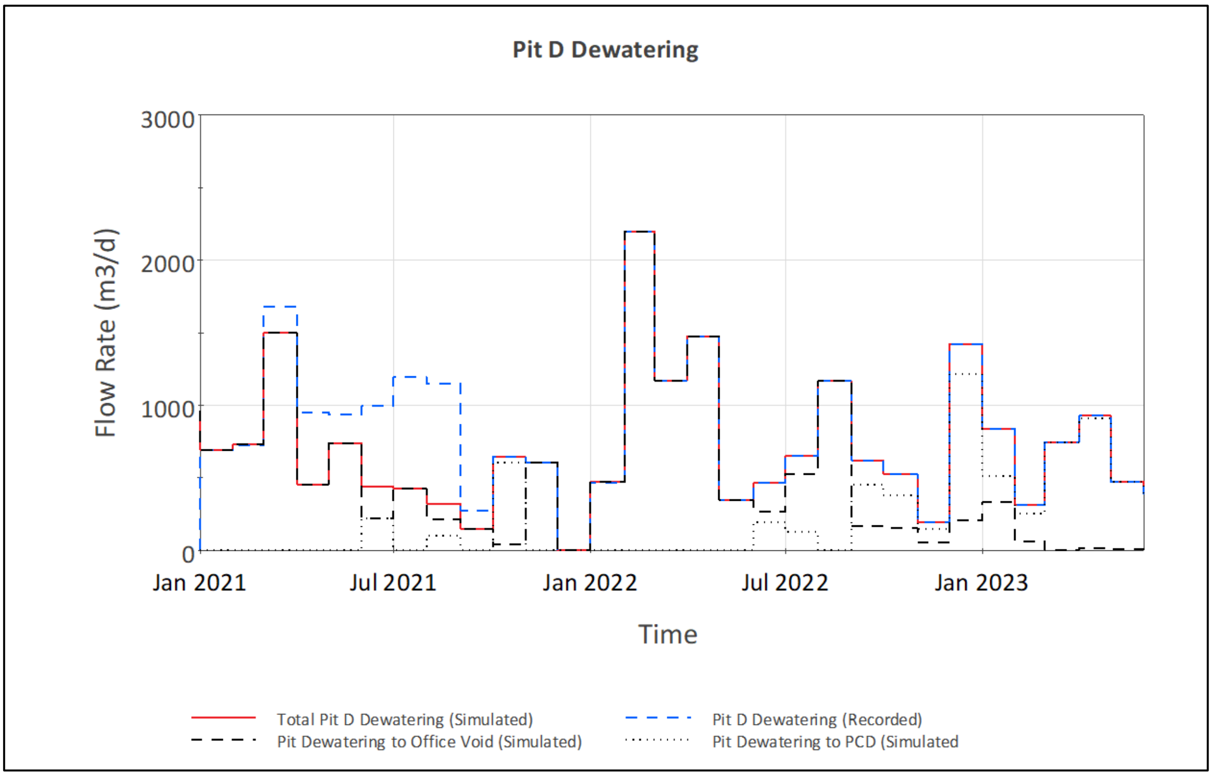


Figure 7.2(b): Recorded vs. Simulated Flow Rates from Pit D to Office Void or Klipfontein PCD

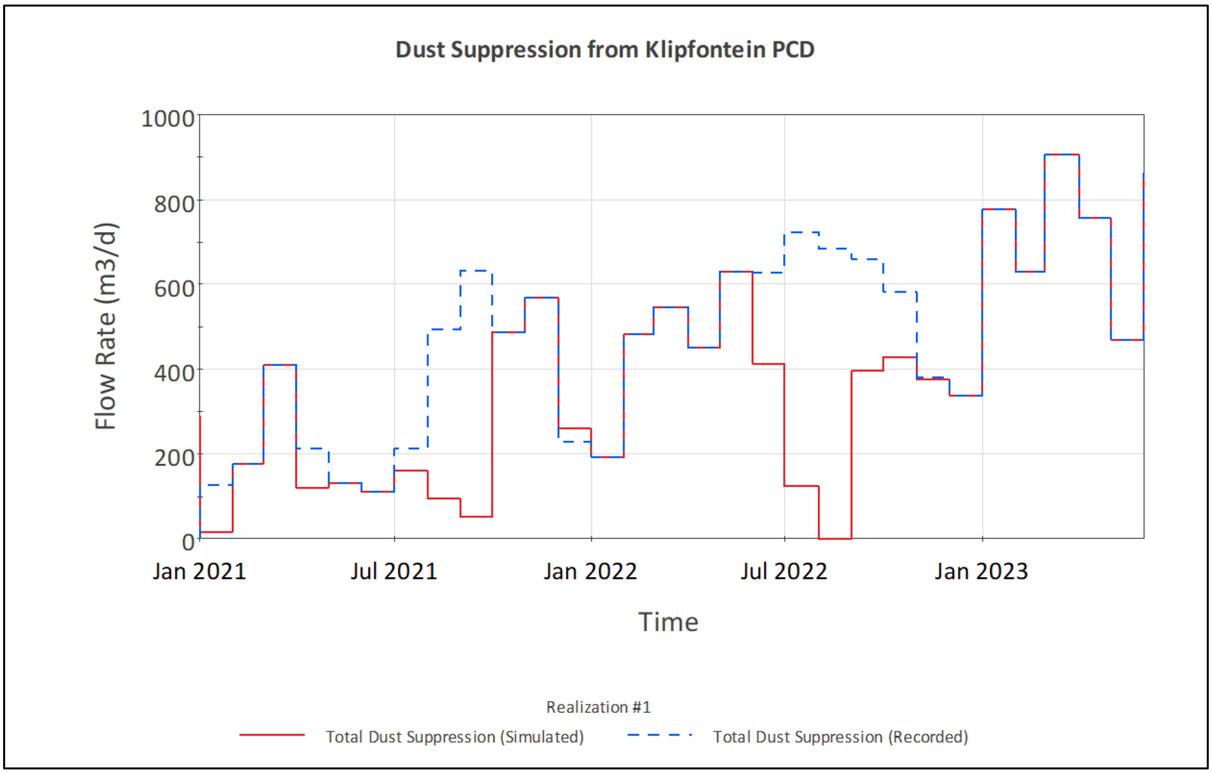


Figure 7.2(c): Recorded vs. Simulated Flow Rates from Klipfontein PCD to dust suppression (Road and Plant)

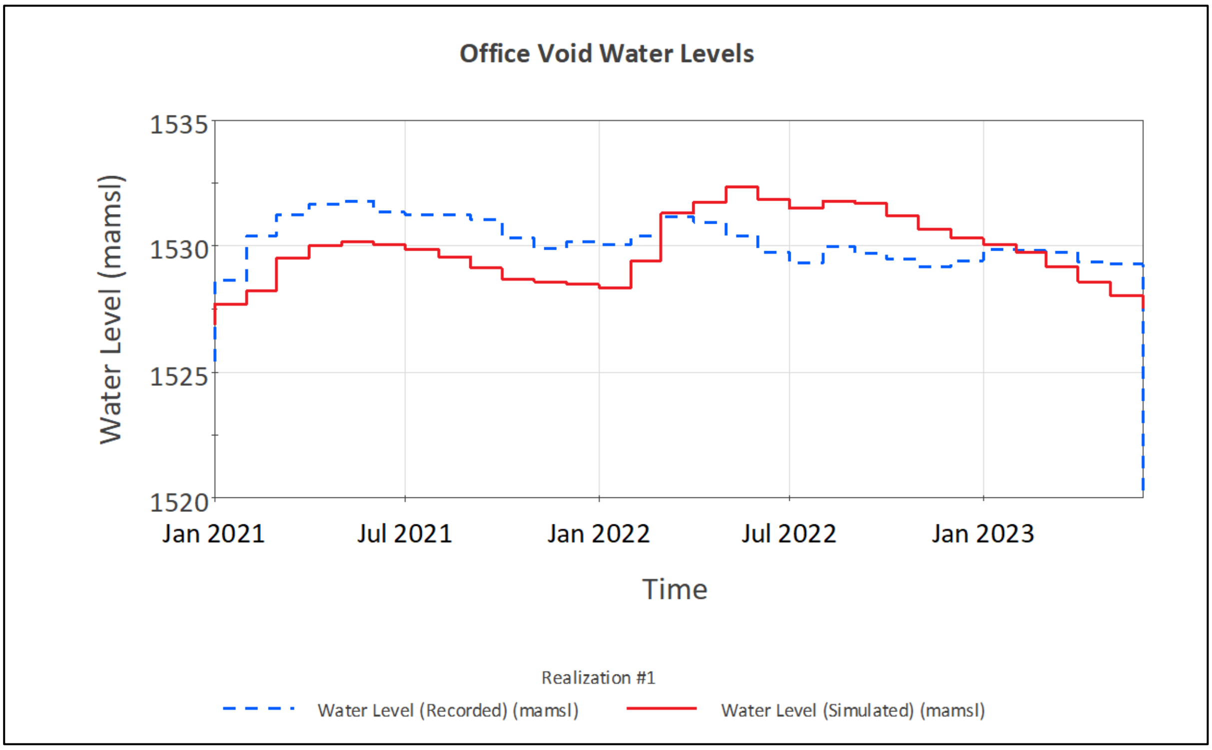


Figure 7.2(d): Recorded vs. Simulated Storage Levels in Office Void

It is evident from the Figures 7.2(b) and 7.2(c) that the recorded pumping and simulated (dewatering) rates from Pit D to the Office Void or Klipfontein PCD, correlate well with recorded flow rates. Recorded pump rates were used as input into the model to verify if all pit water was pumped out and if simulated water levels in the Office Void correlate well with the recorded water levels by modelling estimated seepage rates from the Office Void.

Both the simulated and recorded water levels, within the Office Void, showed relatively good correlation and a relative stable and quasi-steady water level (Figure 7.2(d)). Higher rainfall and runoff during 2021/2022 resulted in increased dewatering rates (as presented in Figure 7.2(b)) as well as decreasing water levels simulated in the Office Void between July 2022 and June 2023 due to average rainfall and lower pumped volumes to the Office Void.

It is probable that seepage inflows emanate from Office Void though the upstream spoils into the pit workings and recirculation of water occurs. It is also probable that total flow rates will increase in the future due to expanding mining activities and subsequently larger footprint areas. It is therefore probable that seepage outflow from this backfilled spoil void is relatively large and that the bulk of the seepage flows towards the Pit D workings. A portion of seepage flows via subsurface flow towards the northern located watercourse. The calculated seepage outflows for the rehabilitated southern pits are provided in Table 7.2(b). This demonstrates the significance of potential seepage outflow and (detailed) ongoing flow monitoring.

Most of the dewatering took place from Pit D into the Office Void during 2022 and during 2023 most of the dewatering was pumped to Klipfontein PCD. A seasonal increase of pump rates was recorded owing to extreme high rainfall during the wet season of 2021/2022 (1 081 mm). Fluctuating pump rates from Pit D from June 2022 onwards were recorded varying between 300 m^3/day and 1 500 m^3/day. However, total recorded pumping rates from the Klipfontein PCD used for dust suppression (Figure 7.2(c)) showed increasing volumes pumped during the calibration period peaking at 900 m^3/day . Recorded pumping rates were therefore used as simulated input when recordings were available. There was not sufficient water in the Klipfontein PCD between July 2021 - September 2021 and from July 2022 until October 2022 to sustain recorded dust suppression rates despite of some additional inflow coming from Pit D dewatering (Figure 7.2(e)).

In addition, relatively constant water levels recorded in the Klipfontein PCD from November 2022 onwards (Figure 7.2(e)) and increasing volumes pumped for dust suppression (Figure 7.2(c)) suggest that the total water make at Klipfontein is steadily increasing. It is recommended to continue monitoring this trend, maintain dust suppression volumes withing licensed volumes and verify this for the next water balance update.

It should be noted that no formalised stage volume relation from a design report was available for Klipfontein PCD. Design drawings and reports of the Klipfontein PCD should be provided for the next water balance update.

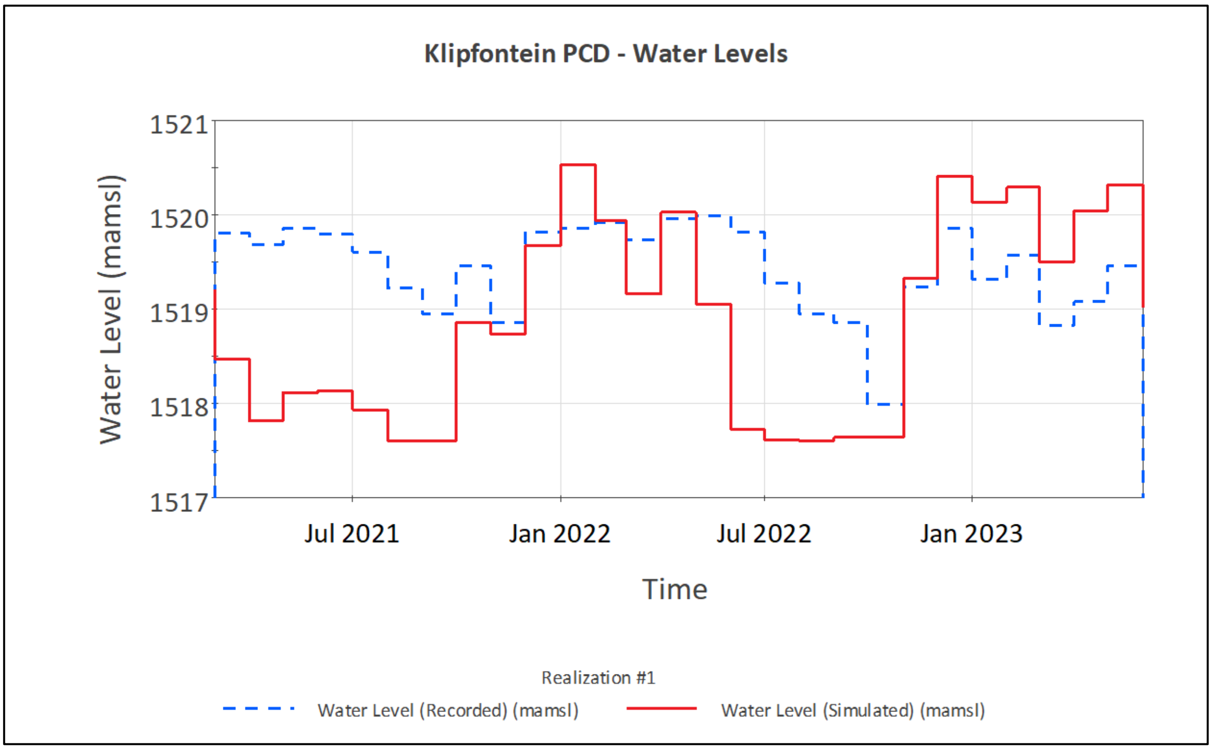


Figure 7.2(e): Recorded vs. Simulated Storage Levels in Klipfontein PCD

7.3 CURRENT 2023/2024 SCENARIO

Three (3) water balances were calculated for New Largo Colliery for the upcoming hydrological year (October 2023 to October 2024). The calculated water balances are calculated for average, wet, and dry conditions, and provide general insight into the overall total water use and consumption of the mine. The GoldSim water balance model simulates the water system for various rainfall sequences, stores the results for all 50 realisations and statistically summarises the results.

The average water balance diagrams for the 2023/2024 hydrological year for each of the average, wet and dry conditions are depicted as the following Figures:

- Figure 7.3(a): Simulated 2023/2024 Water Balance for Average Conditions.
- Figure 7.3(b): Simulated 2023/2024 Water Balance for Wet Conditions.
- Figure 7.3(c): Simulated 2023/2024 Water Balance for Dry Conditions.

Where descriptions are provided in brackets in Figures 7.3(a) to 7.3(c), indicates future status' of the opencast pits and has been included for future reference and modelling purposes.

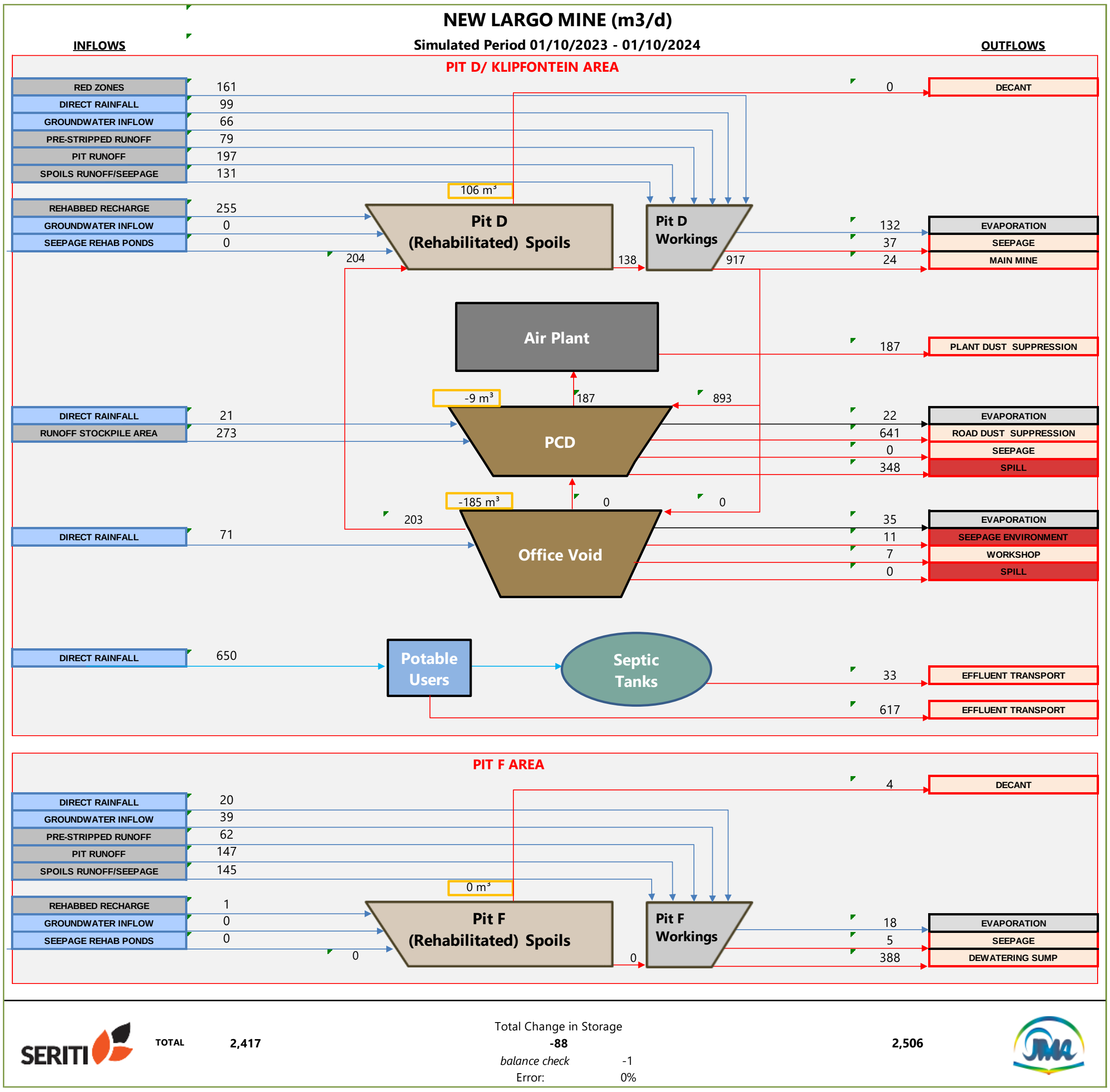


Figure 7.3(a): Simulated 2023/2024 Water Balance for Average Conditions

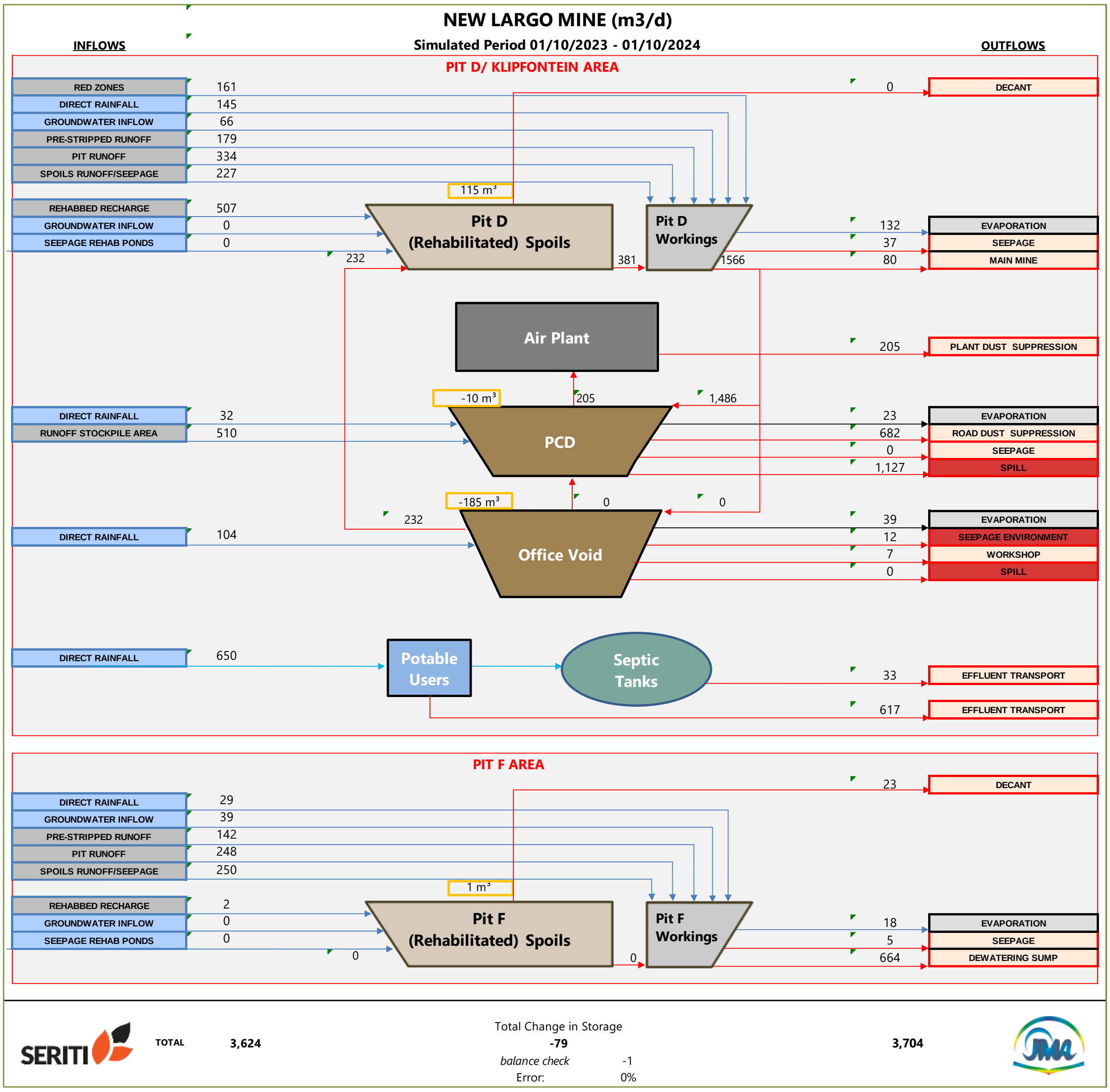


Figure 7.3(b): Simulated 2023/2024 Water Balance for Wet Conditions

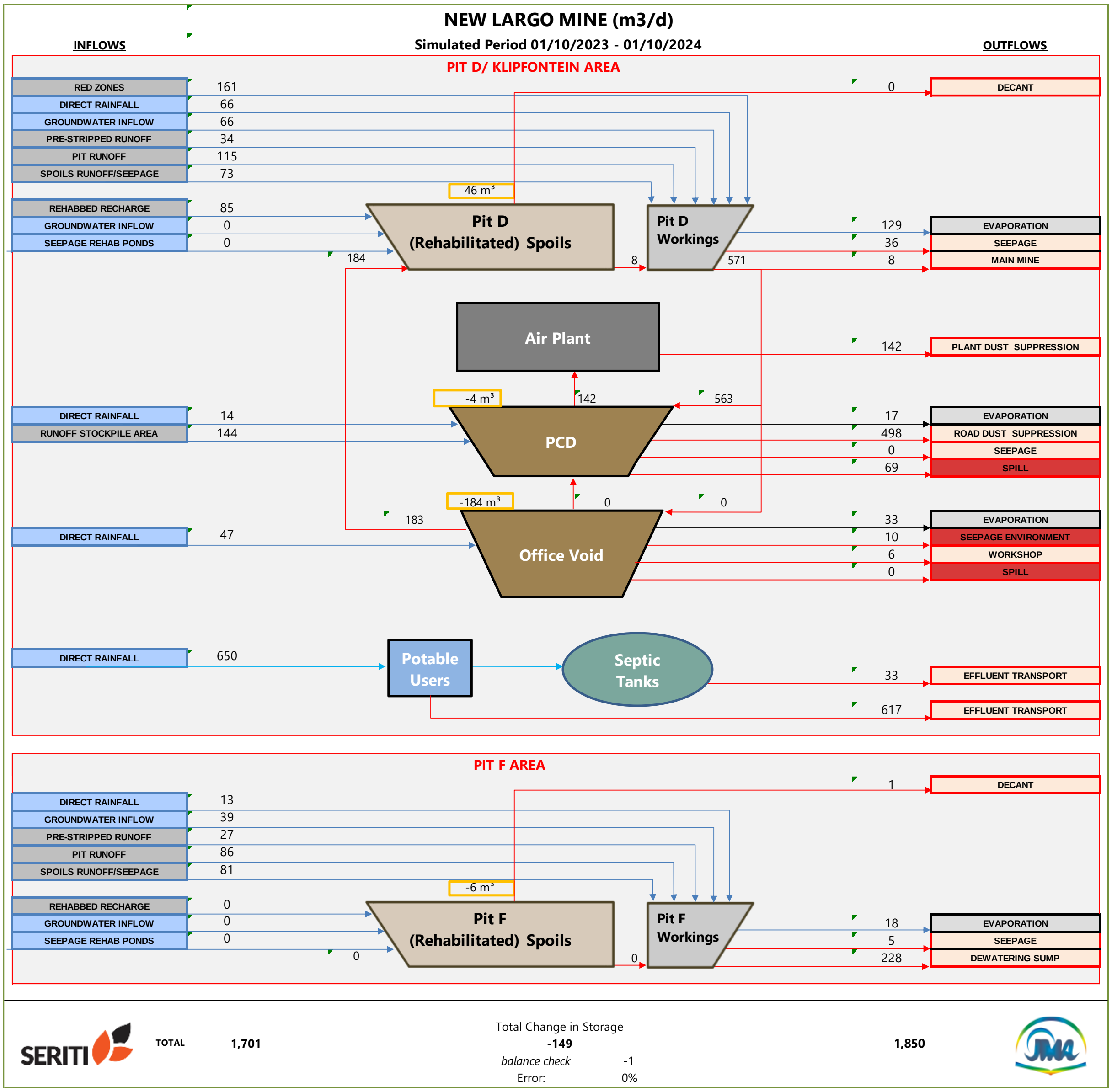


Figure 7.3(c): Simulated 2023/2024 Water Balance for Dry Conditions

7.4 FUTURE LIFE OF MINE SCENARIO

7.4.1 General

The future LOM water balances (October 2022 to March 2056) were simulated using the annual projected LOM areas for the opencast pits, which were built into the water balance model for each of the mining sections up until the end of mining in 2056 (Sections 3.2.1 to 3.2.6). This will result in changes to the total water make to the opencast pit workings and different dewatering rates from the opencast pits, as the extent of mining increases. The flooding status' and available storage capacities were also incorporated into the water balance model for the future scenarios.

Water that is dewatered from Pit F and Pit H will be pumped to different PCD's for evaporation, re-use (dust suppression) or to be pumped for treatment. This forms part of the proposed water management strategy as explained in Golder (2020) and Golder (2021) and confirmed by New Largo Colliery.

It was indicated and requested by New Largo Colliery that for the proposed Main Mine, including Pit D, Pit D North, Pit A/G and Pit C/W, all excess water will be pumped to sufficiently large PCD(s) to handle the total water make from the opencast workings. From PCD(s), dirty water is pumped to the proposed DMS plant, road dust suppression and a proposed water treatment plant (in case of excess) in the same order of priority. Indicative sizing of proposed PCD's and are confirmed in this water balance update as well as the proposed water treatment requirement of 4 Ml/day (from 2024 onwards) and 6 Ml/day (from 2032 onwards). All model input is based on assumptions received from New Largo Colliery (Ukwazi (2023) and New Largo (2023)).

7.4.2 Opencast Pit Dewatering

Overall mean peak dewatering rates from the opencast pits can be expected at mean dewatering rates between 3 000 m^3/day and 9 000 m^3/day (Figure 7.4(a)). The highest mean dewatering rates can be expected from Pit A/G with mean dewatering rates exceeding 6 000 m^3/day during the wet season towards the end of LOM in 2056. The variability or seasonality of the water makes to the proposed opencast pits is evident on Figure 7.4(a) and will need to be catered for accordingly when pumping to the PCD's. It will require around 684 423 m^3 to dewater red zone from the Pit D and Pit A/G mining area based on the information as indicated in Section 3.1.

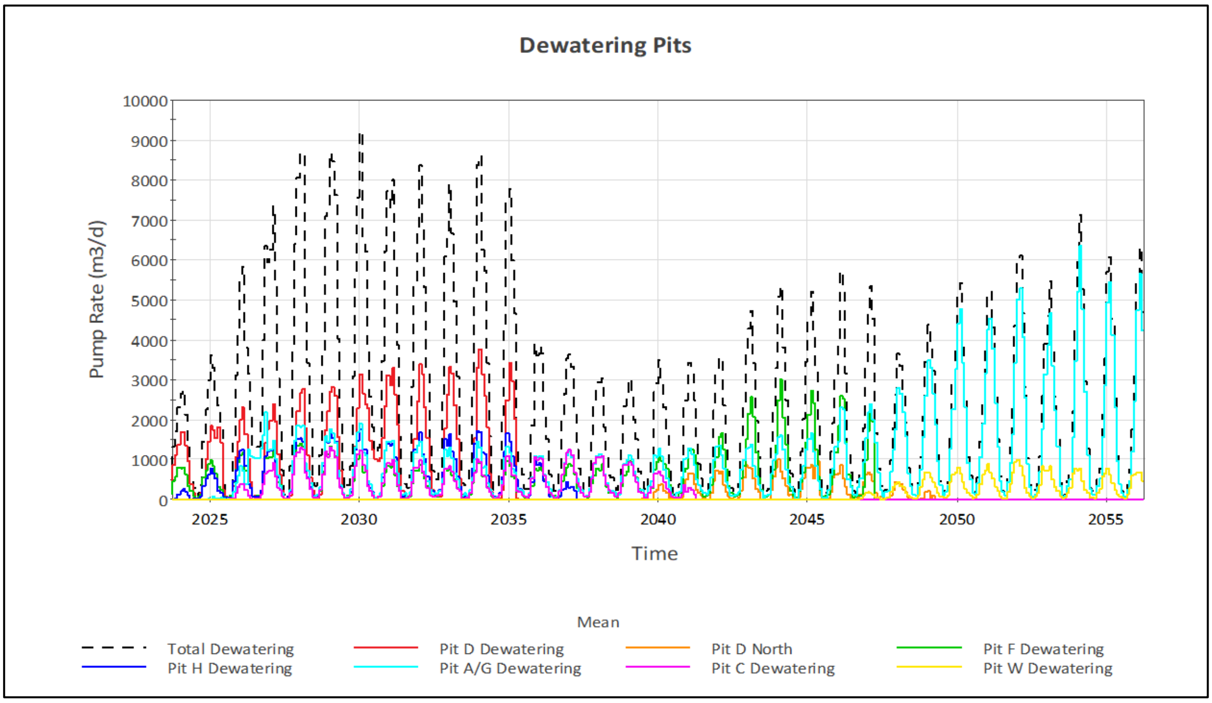


Figure 7.4(a): Simulated Mean Dewatering Rates from each Pit over the LOM

Figure 7.4(b) to 7.4(h) depict the total simulated probabilistic dewatering rates for the opencast pits over the LOM and for each opencast separately. Maximum pumping rates during the LOM, using the 99th percentile, will vary between 10 000 m³/day (2041) and 27 000 m³/day (2031) as indicated on Figure 7.4(b).

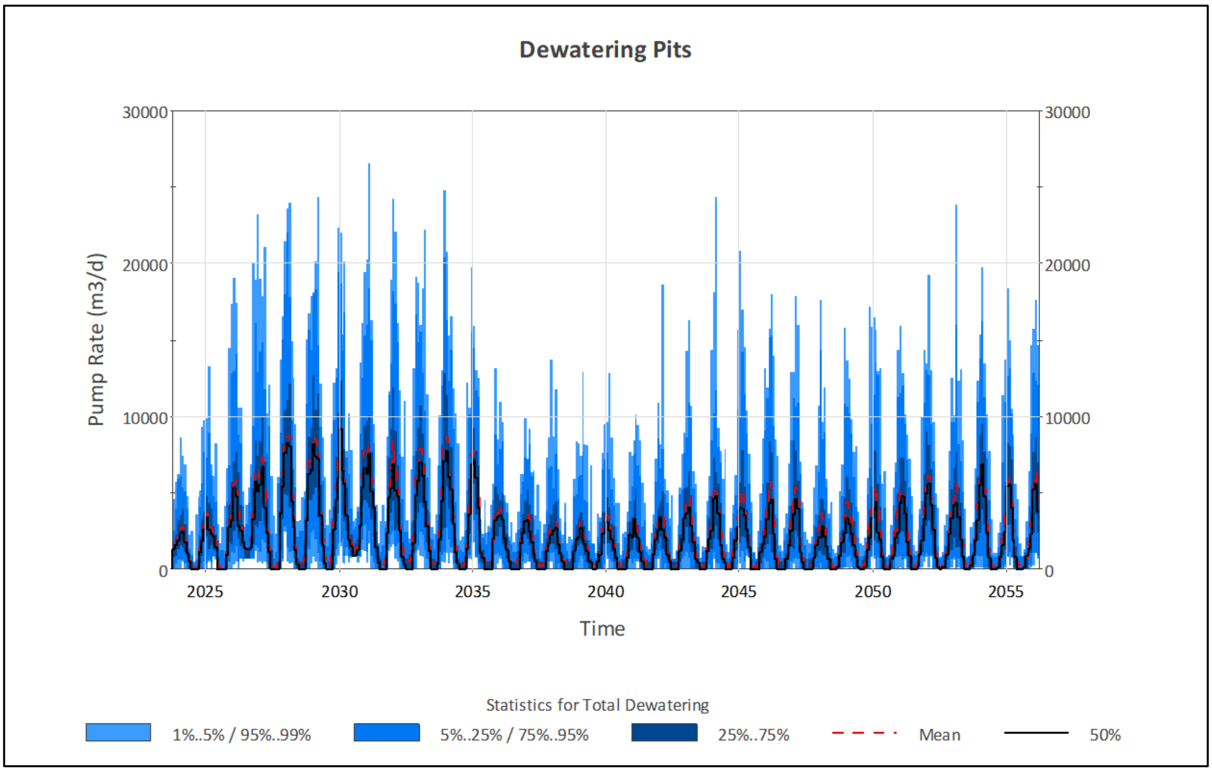


Figure 7.4(b): Simulated Probabilistic Dewatering Rates from all Opencast Pits over the Life of Mine

It was calculated that the storage capacity within the rehabilitated footprint areas at Pit D is limited and that that decant may be expected towards the end of LOM. This is owing to a low elevation decant point and therefore limited storage capacity in the spoils. This will result in a gradually increasing dewatering rates as illustrated in Figure 7.4(c). Compared to the previous water balance update (JMA, 2023), operational pump rules have been designed to maintain a maximum of 10 000 m³/day within the pit workings. Peak dewatering rates (99th percentile) were calculated between 9 000 and 10 000 m³/d. Pit D North will be a completely separated opencast pit from Pit D and peak dewatering rates for Pit D North (99th percentile) were simulated at 5 000 m³/d around 2045 (Figure 7.4(d)).

Dewatering of Red Zones during mining of Pit D can be noticed in 2030 when the Old Klipfontein underground workings is scheduled to be mined. It is recommended to investigate final storage volumes to be dewatered around Old Klipfontein.

Peak dewatering rates for Pit F were simulated at 10 000 m³/d between 2043 and 2045. After 2027, a portion of the total water make can be stored in the rehabilitated spoils as can be seen in Figure 7.4(e). It was calculated that the total spoil storage capacity of 4.2 million m³ within the rehabilitated footprint areas, will be sufficient to contain recharge through the rehabilitated spoils.

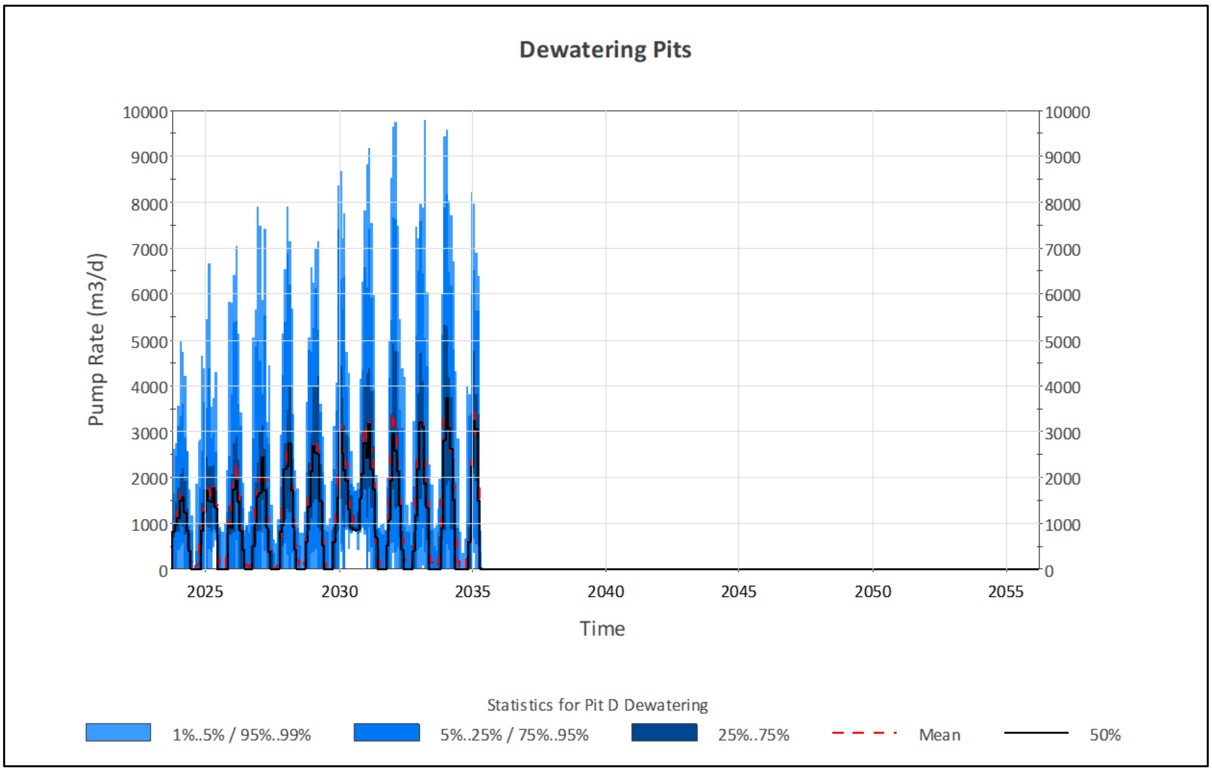


Figure 7.4(c): Simulated Probabilistic Dewatering Rates from Pit D over the Life of Mine

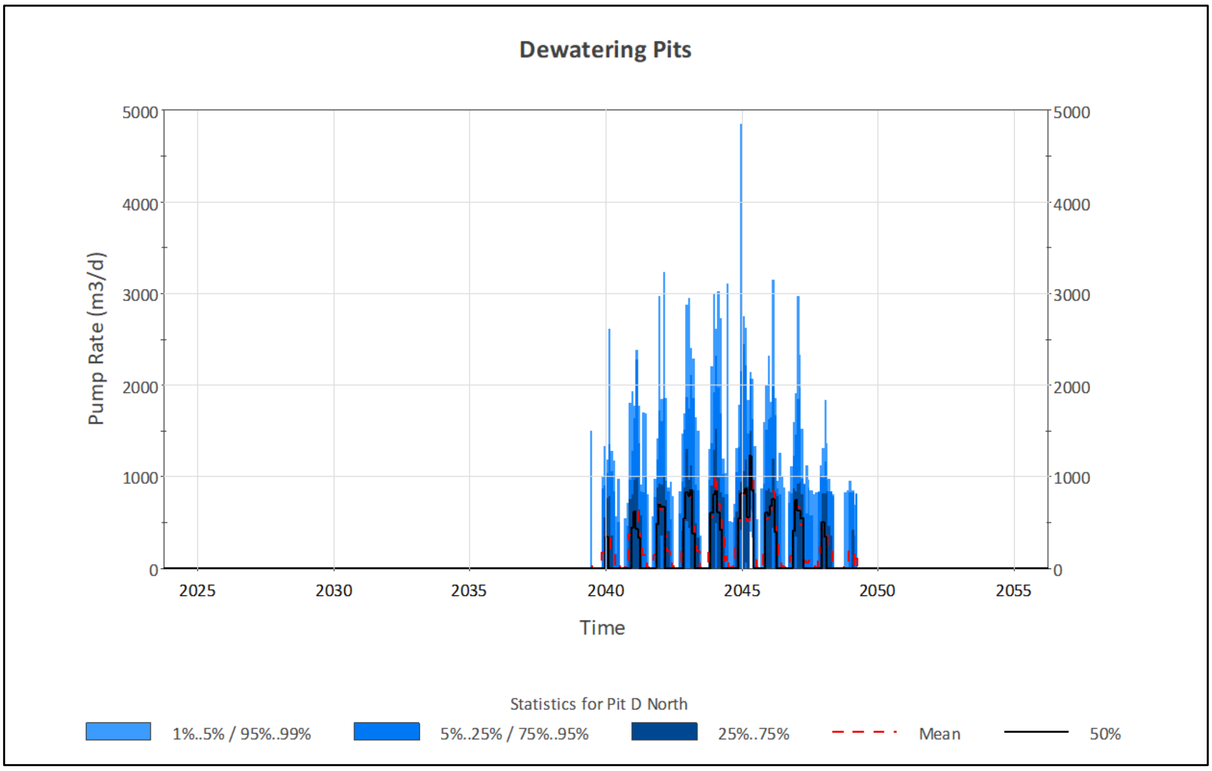


Figure 7.4(d): Simulated Probabilistic Dewatering Rates from Pit D North over the Life of Mine

A similar approach can be followed for dewatering Pit H (Figure 7.4(f)). When rehabilitation commences two (2) years after the mining has started, sufficient storage capacity will be available to maintain the total water make at a relative low rate. Peak dewatering rates that were simulated, using the 99th percentile, were approximately calculated at 2 500 m^3/day.

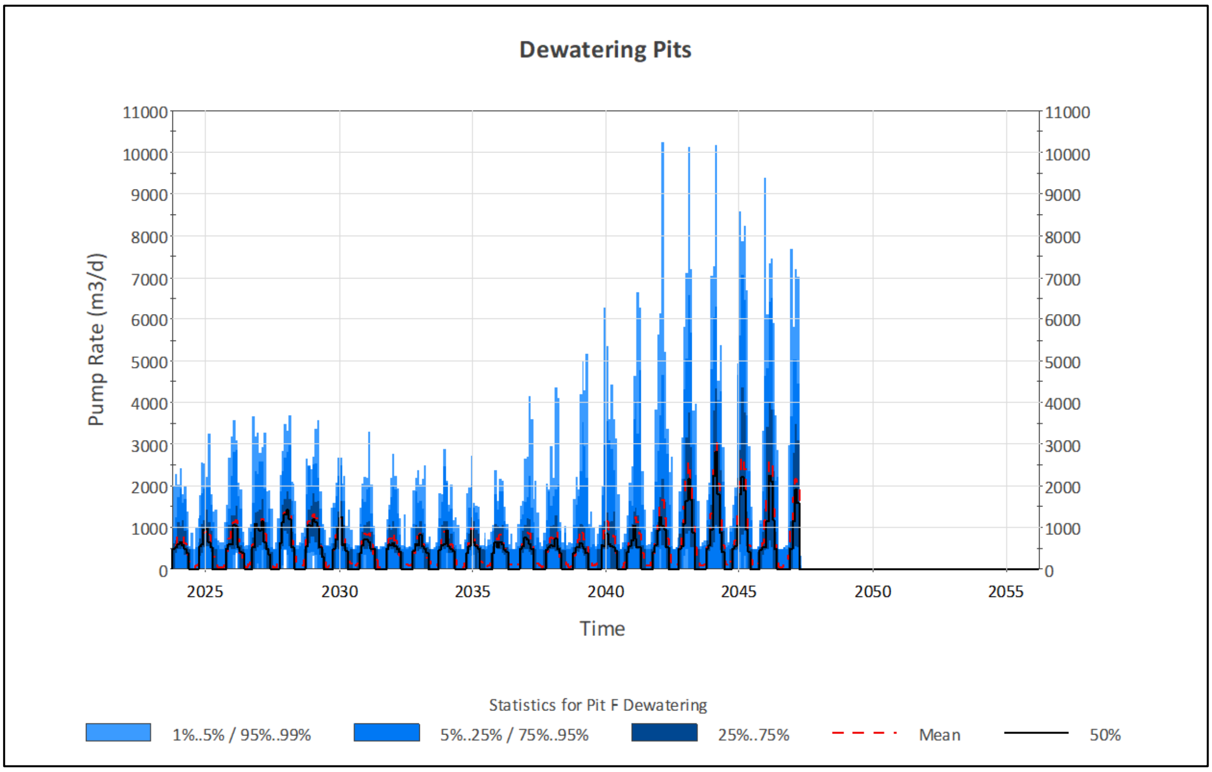


Figure 7.4(e): Simulated Probabilistic Dewatering Rates from Pit F over the Life of Mine

Dewatering of Pit A/G, as depicted in Figure 7.4(g), showed that peak dewatering rates were simulated towards the end of LOM form 2050 onwards. A single red zone to be mined include the former underground workings of Hartebeest 2 and based on the information as indicated in Section 3.1, it is expected that around 243 600 m^3 will be required to dewater from the Pit A/G around 2026. Furthermore, due to limited storage under rehabilitated spoils, increased dewatering rates can be expected from 2044 onwards and simulated peak dewatering rates at the end of mining were calculated at 19 500 m^3/day.

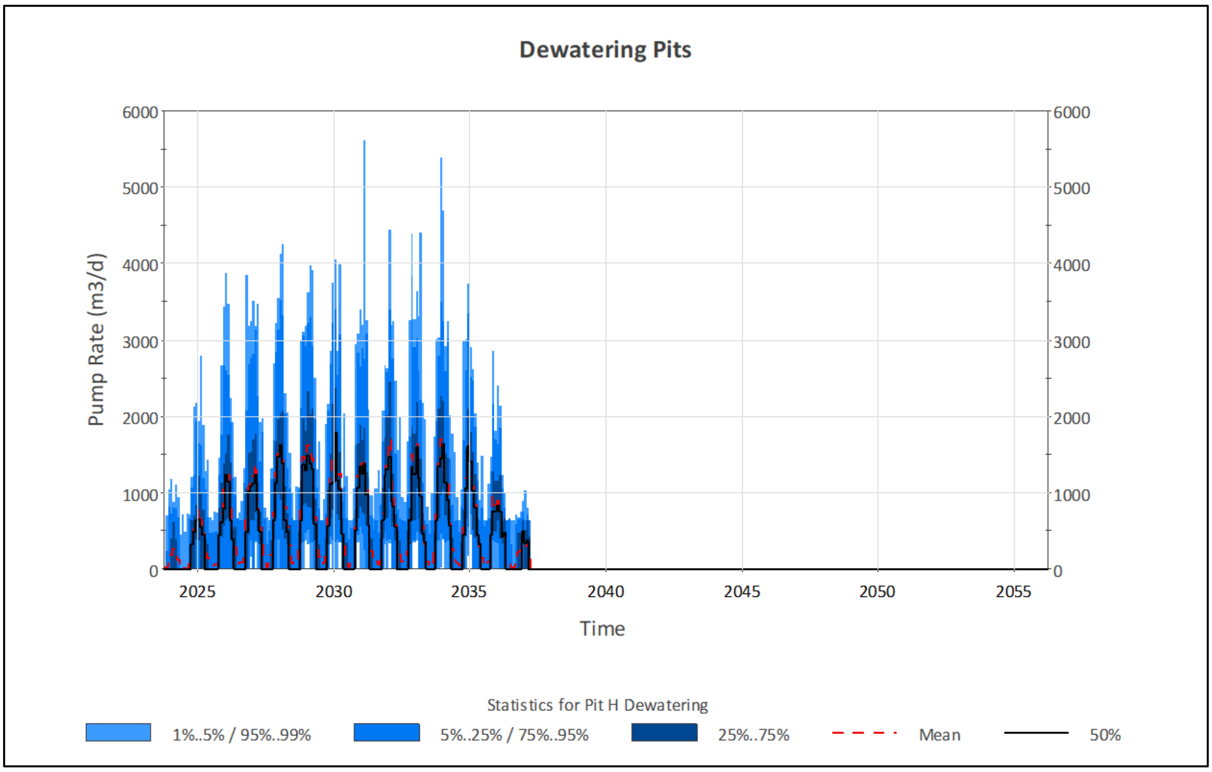


Figure 7.4(f): Simulated Probabilistic Dewatering Rates from Pit H over the Life of Mine

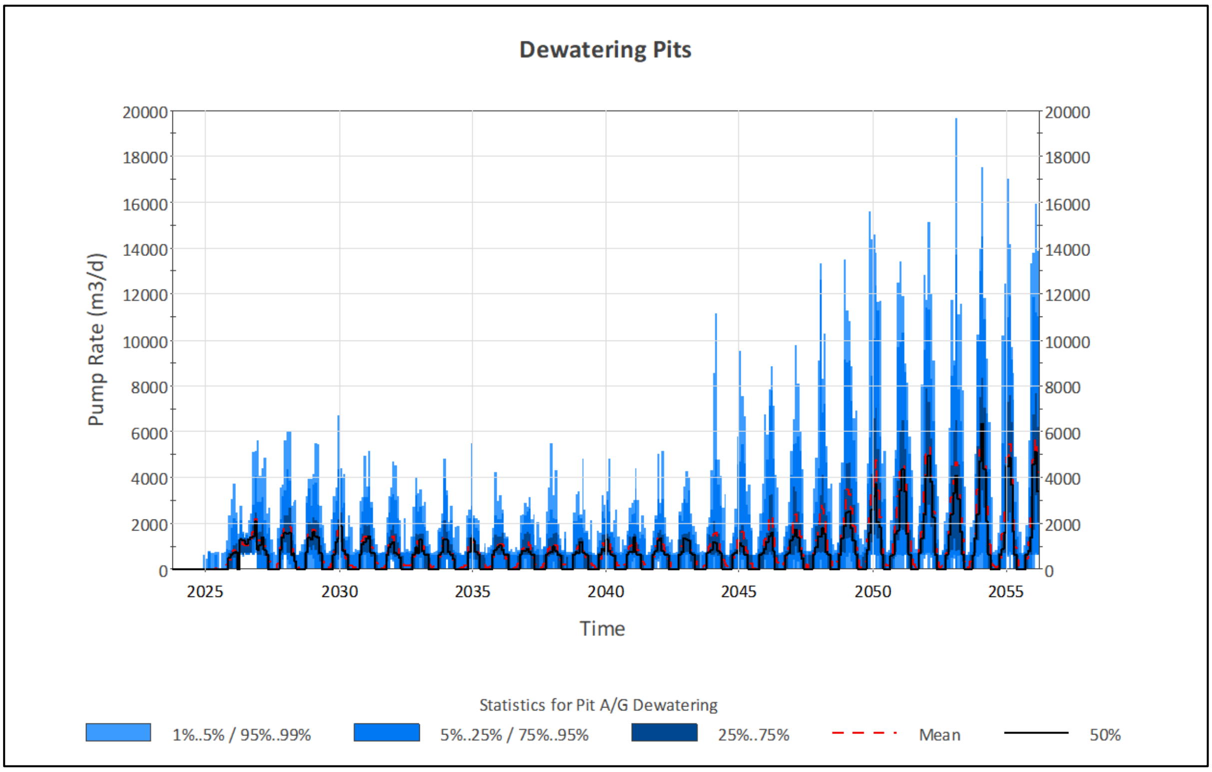


Figure 7.4(g): Simulated Probabilistic Dewatering Rates from Pit A/G over the Life of Mine

Also due to limited storage available within rehabilitated spoils, gradually increasing dewatering rates can be expected for Pit C can be expected during mining. Simulated probabilistic peak dewatering rates, using the 99th percentile, indicated a maximum pump rate of 5 300 m^3/day (Figure 7.4 (h)). Early surface decant can therefore be expected (Section 7.5).

Pit W is the smallest pit and has a relative short life. It has a relatively larger storage capacity under rehabilitated spoils at approximately 1.8 million m^3. This will result in the lowest (peak) dewatering rates at 4 200 m^3/day using the 99th percentile (Figure 7.4(i)).

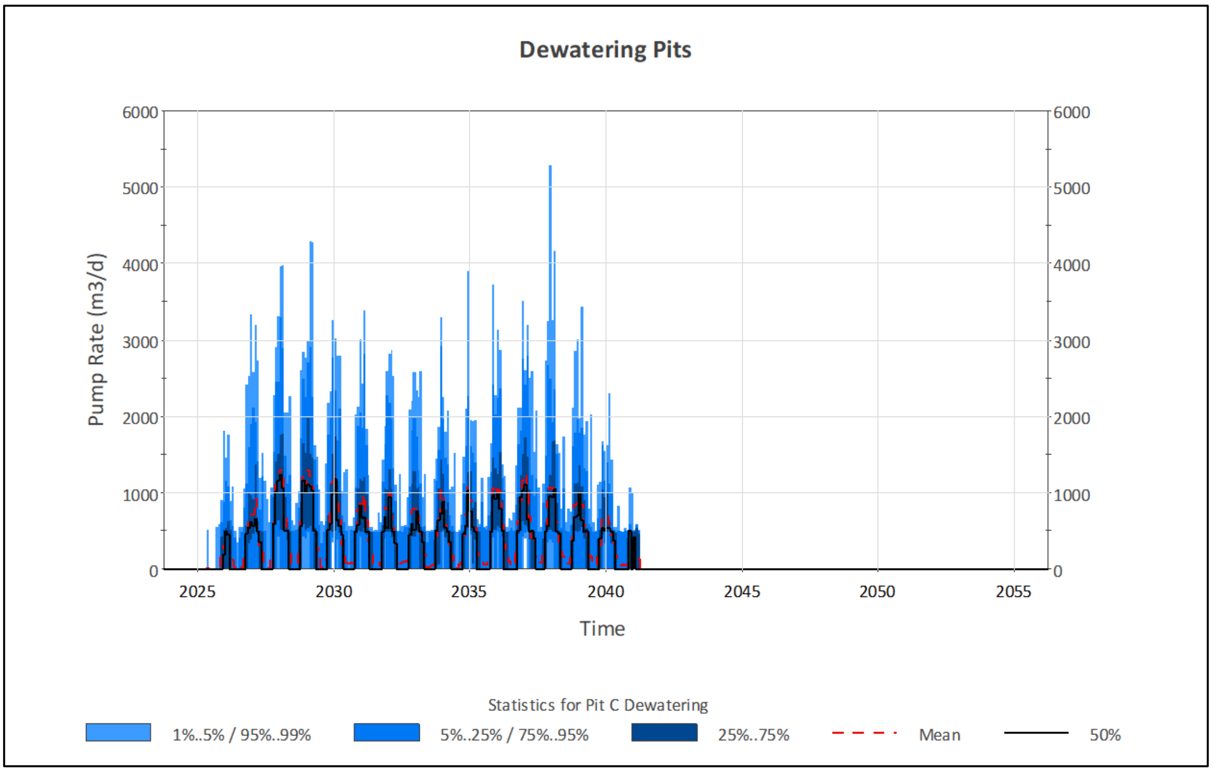


Figure 7.4(h): Simulated Probabilistic Dewatering Rates from Pit C over the Life of Mine

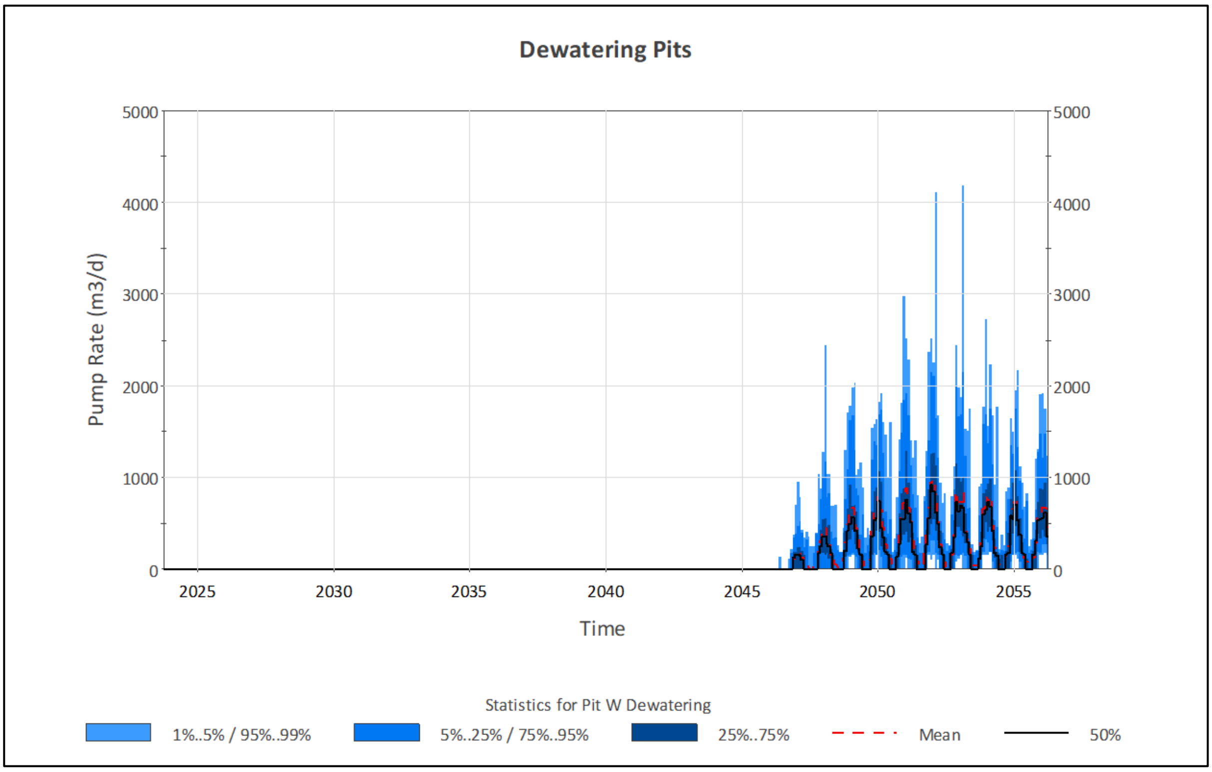


Figure 7.4(i): Simulated Probabilistic Dewatering Rates from Pit W over the Life of Mine

7.4.3 Pollution Control Dams (PCD)

Probabilistic simulated storage volumes of the proposed Main Mine PCD, Eastern PCD, Western PCD, PCD1 and PCD2 are shown on Figure 7.4(j) to Figure 7.4(o).

Calculated water makes from all Main Mine related opencast pits will be dewatered to potentially four (4) proposed PCD's (Ukwazi, 2023) depending on the total volume of water make emanating from the Main Mine area. Designed and licensed storage volumes for each PCD are as follows:

- Phase 1 – 256 Ml
- Phase 2 – 256 Ml
- Phase 3 – 343.8 Ml
- Phase 4 – 343.8 Ml

This will imply that, if all PCD's will be required, a total storage capacity of 1 200 Ml (1.2 million m^3) is available to store dirty water at the Main Mine.

Figure 7.4(j) depicts the simulated storage volumes of the Main Mine PCD during LOM. Some of realisations simulated annual overflows to be expected, but the 98th percentile (1: 50-year storage volume) was calculated at 852 313 m^3. As per designed PCD's, a total capacity of 855.8 Ml (855 800 m^3) will be required (i.e. Phase 1 to Phase 3) and constructed. Also, it can clearly be seen that most water will need to be handled around 2030 due to the mining schedule provided.

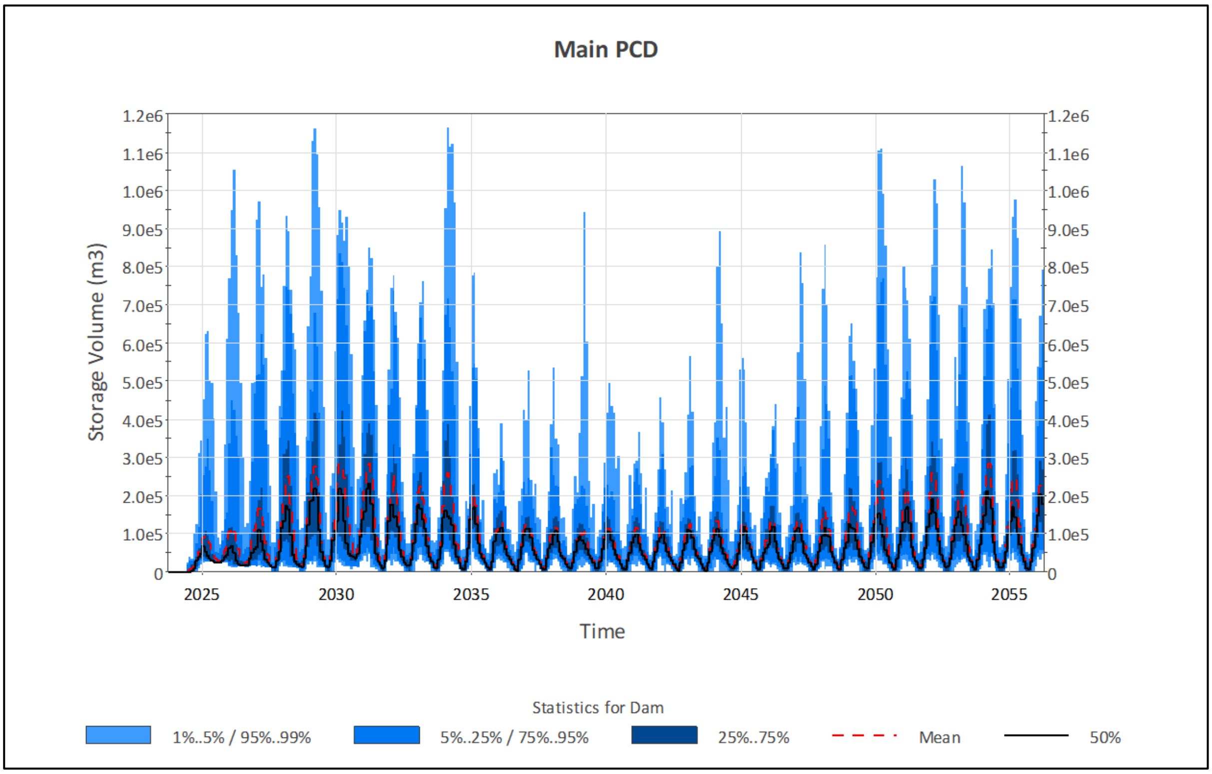


Figure 7.4(j): Simulated Probabilistic Storage Volumes in Main PCD over the Life of Mine

Almost no overflow can be expected from Pit F Eastern PCD and Western PCD, respectively when excess water is pumped to the Klipspruit treatment plant (Section 7.4.4). Both PCD's will handle water make from the Pit F area (Figure 7.4(k) and 7.4(l)). Initial sizing was undertaken by Golder (2021) and confirmed during this water balance update. Figure 7.4(k) confirms that a proposed storage capacity between 150 000 m^3 and 160 000 m^3 for Eastern PCD will be sufficient to adhere to GNR704 requirements to prevent spillage of less than once in 50 years on average. Western PCD was initially dimensioned at 20 000 m^3 (Golder, 2021) and simulated storage volumes suggest this could slightly be reduced to 18 000 m^3. Some treatment will be required for Pit F at this stage as initially proposed (Golder 2021) to be sent to Klipspruit as communicated by New Largo Colliery.

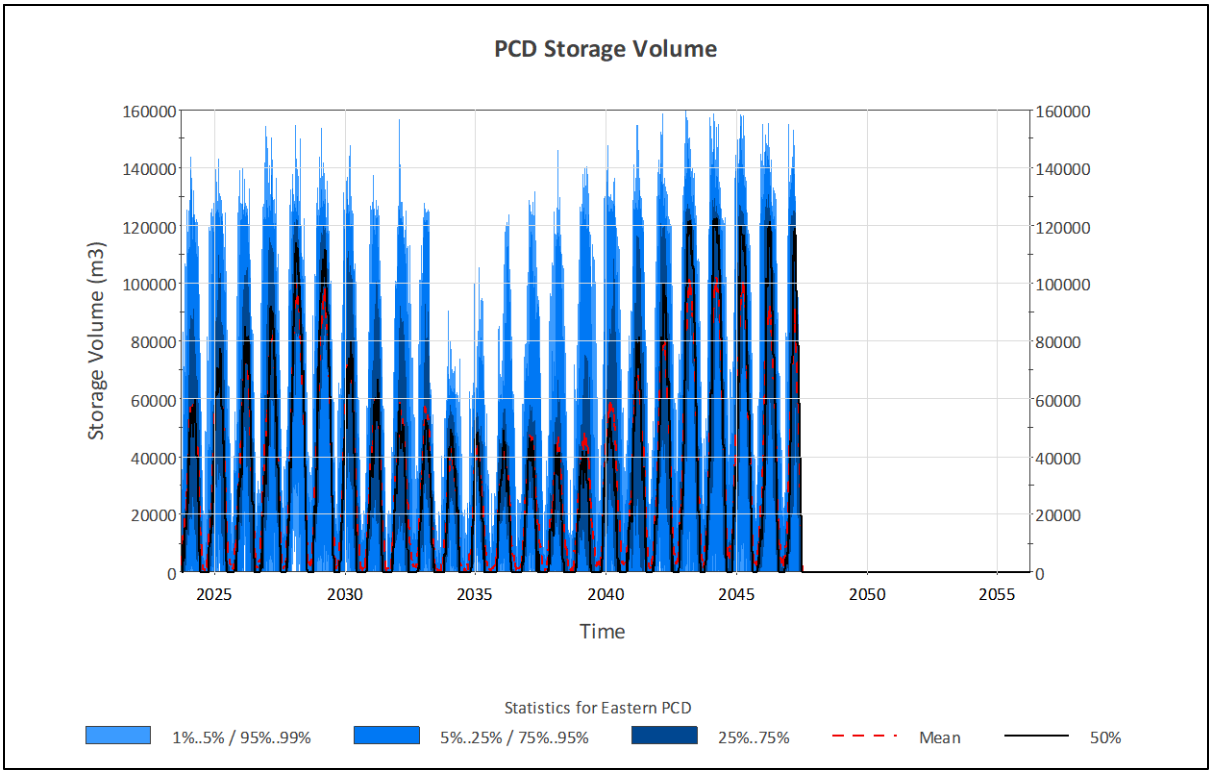


Figure 7.4(k): Simulated Probabilistic Storage Volumes in Eastern PCD over the Life of Mine

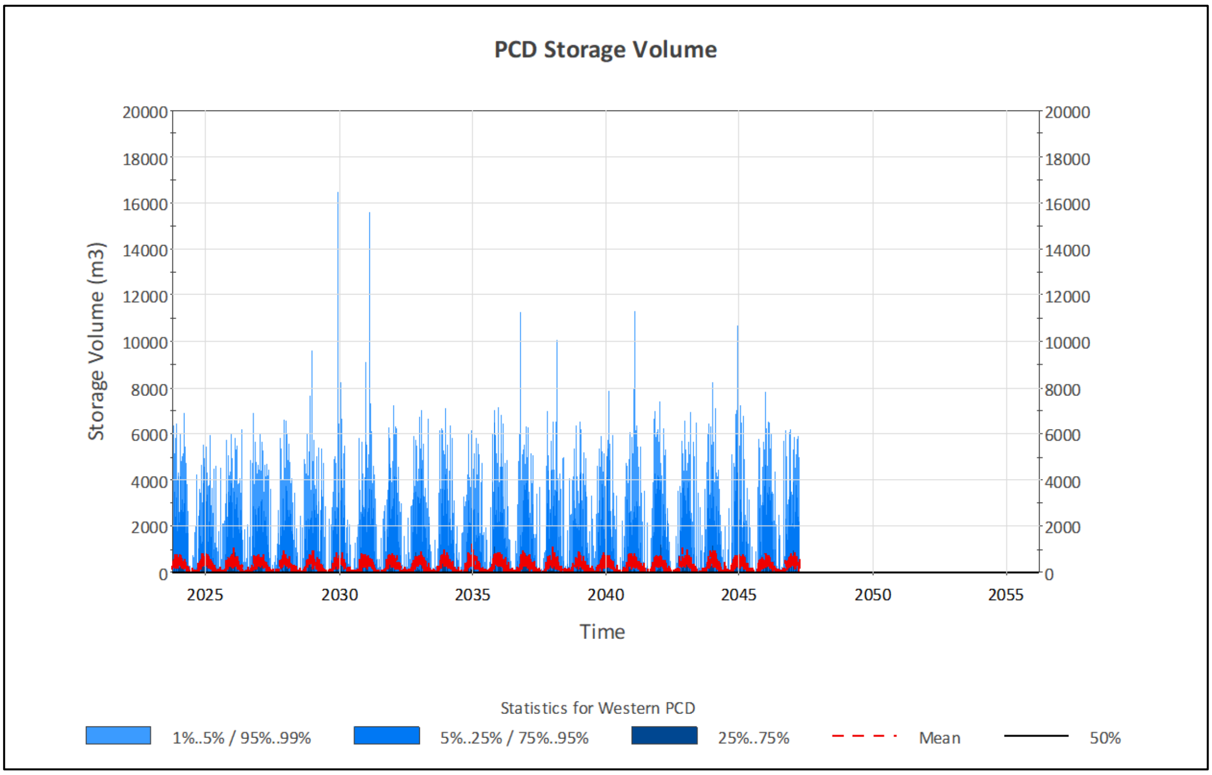


Figure 7.4(l): Simulated Probabilistic Storage Volumes in Western PCD over the Life of Mine

Pit H PCD1 and PCD2 were sized at 45 000m^3 and 65 000m^3, respectively (Golder, 2020). Due to potentially available storage in rehabilitated spoils after 2025, simulated storage volumes for both PCD's (Figure 7.4(m) and 7.4(n)) show that the proposed storage capacities of PCD1 and PCD2 can remain. Both PCD's are in adherence with GNR704 requirements. Dirty water contained before 2025 in PCD2 will need to be pumped to Klipspruit for treatment (see also Section 7.4.4.).

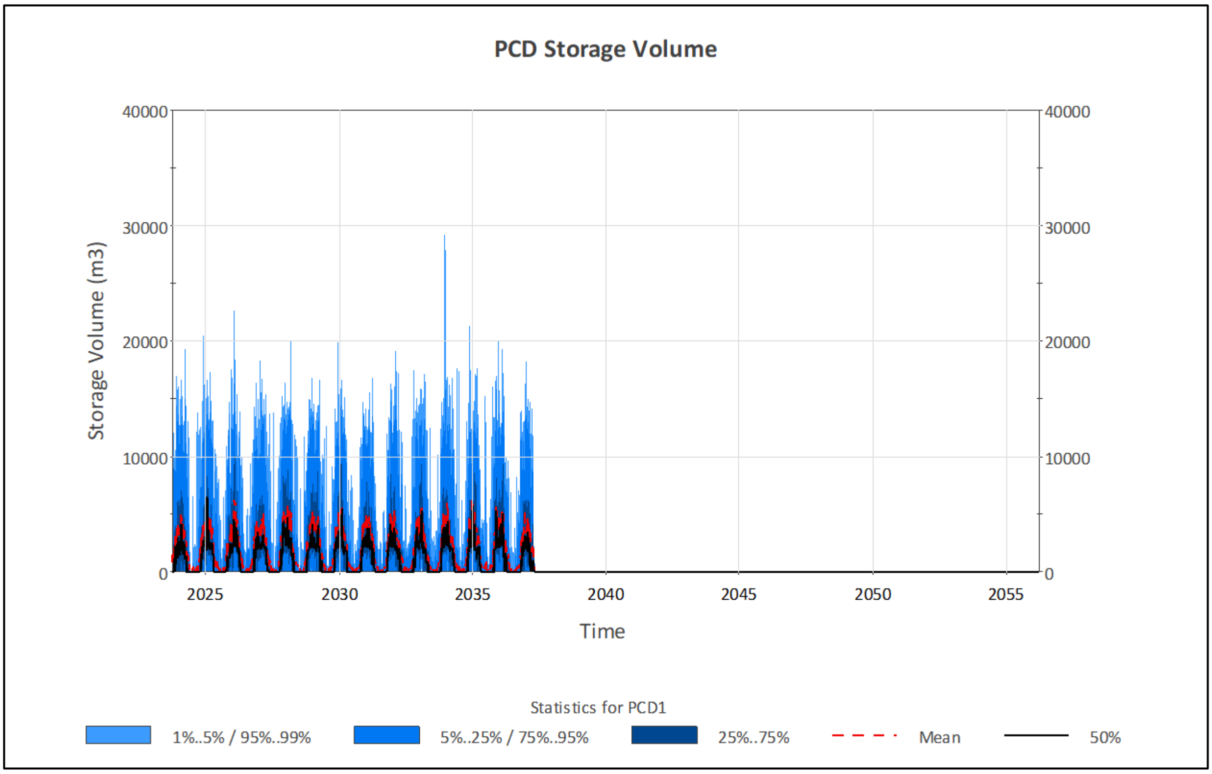


Figure 7.4(m): Simulated Probabilistic Storage Volumes in PCD1 over the Life of Mine

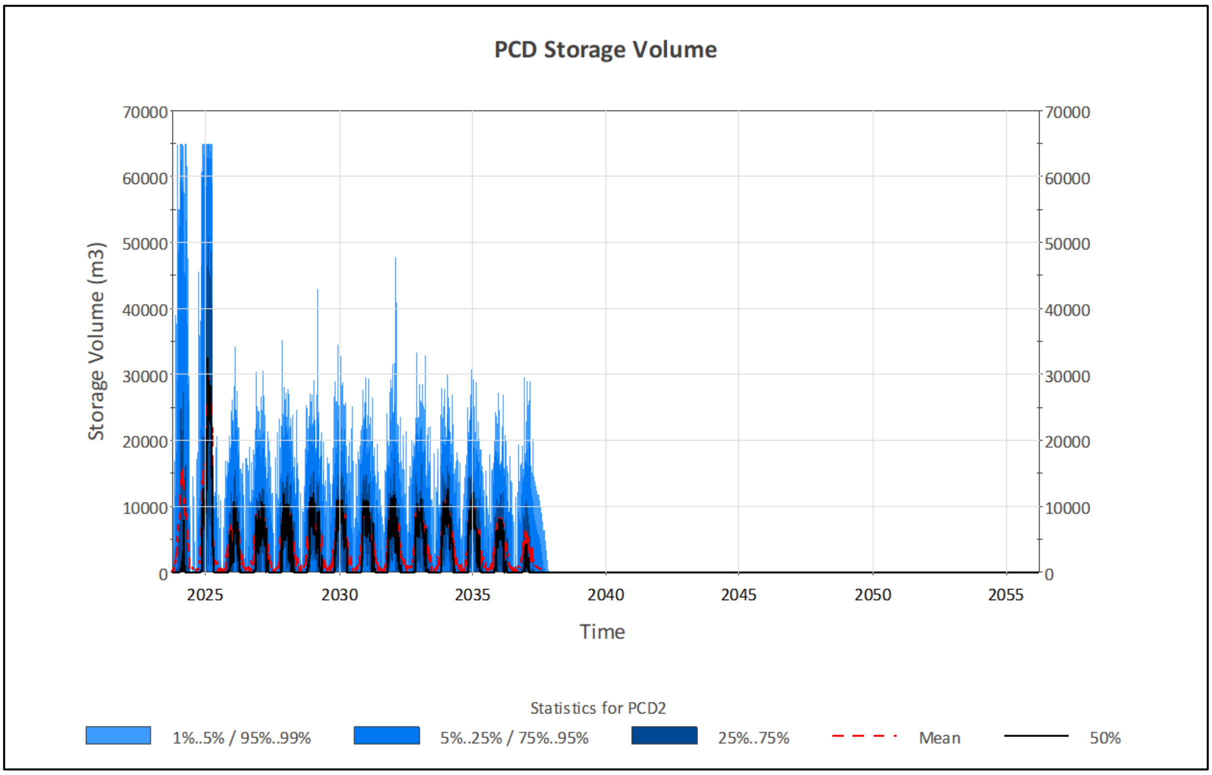


Figure 7.4(o): Simulated Probabilistic Storage Volumes in PCD2 over the Life of Mine

7.4.4 Water Treatment

Expected treatment rates at Main Mine were simulated based on proposed treatment of 4 Ml/day (from 2024 onwards) and 6 Ml/day (from 2032 onwards) (Ukwazi (2023) and New Largo (2023)). Simulated treatment rates are presented in Figure 7.4(p). If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 4 Ml/day and 6Ml/day during various wet seasons. It appears that (see also Figure 7.4(j)) that the most water on the Main Mine needs to be handled between 2027 and 2031 and between 2049 and 2056. It can therefore be beneficial to move the 6 Ml/day treatment capacity forward (or higher) between 2027 and 2031 and lower the treatment capacity from 2032 onwards to 2048 if actual water make volumes from Main Mine will allow this. If New Largo Colliery considers modular treatment plants, this can potentially be achieved, provided that water balances are updated annually based on actual flow rates from Main Mine.

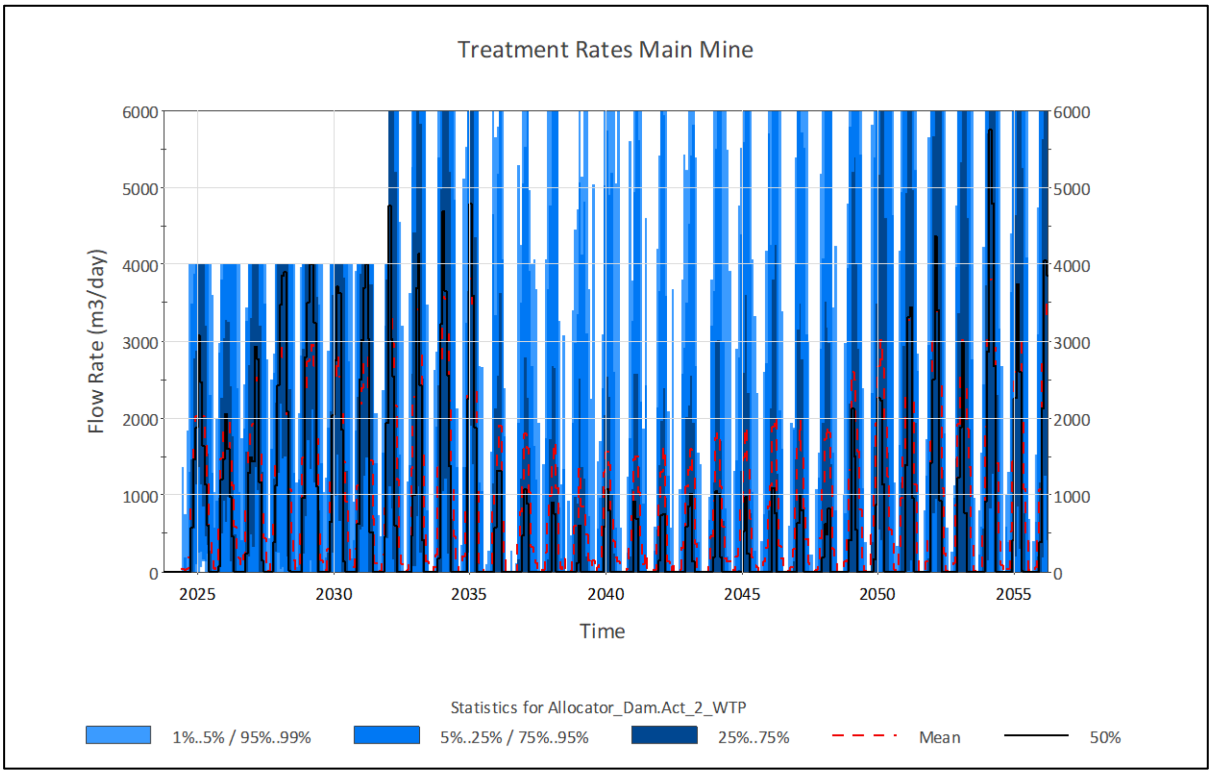


Figure 7.4(p): Simulated Probabilistic Treatment Rates required for Maine Mine at New Largo Colliery over the LOM

The combined volumes that will need to be pumped to the Klipspruit treatment plant will fluctuate seasonally and will be dependent on the depth of rainfall occurring and the operational philosophy regarding the management of dewatering of the opencast pits and final infrastructure for Pit F and H areas that will need to be catered for. Figure 7.4(q) illustrates the total probabilistic treatment rate for New Largo Colliery during LOM to be pumped to Klipspruit.

If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 1 800 m^3/day (1.8 Ml/day) and 3 900 m^3/day (3.9 Ml/day) between 2043 and 2047. It should be noted that this calculation is preliminary and that large uncertainties still exists at this stage. More accurate treatment can be determined for the 2024 water and salt balance update when more information is available and updated mine schedules and formalised infrastructure plans have been provided.

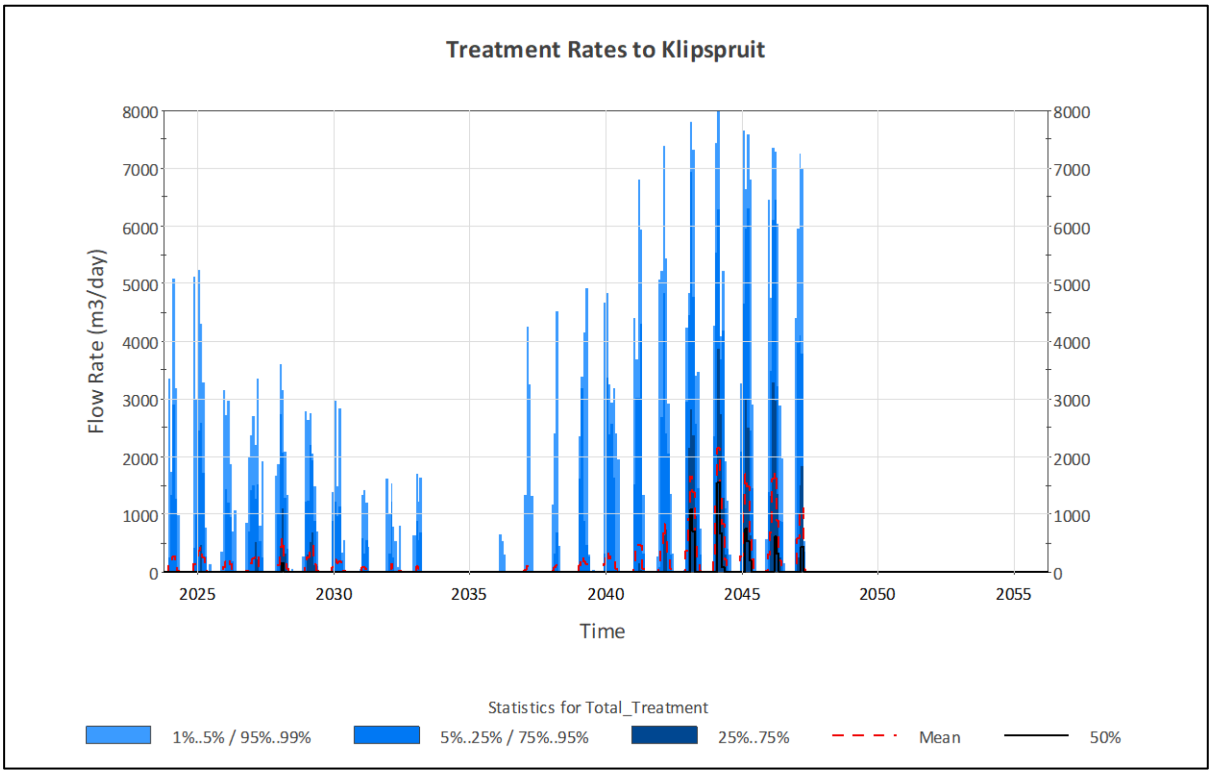


Figure 7.4(q): Simulated Probabilistic Treatment Rates required for New Largo Colliery to Klipspruit (Pit F and Pit H areas, respectively) over the LOM

7.5 POST-CLOSURE SCENARIO

The main purpose of simulating the post-closure water balances for opencast pits, is to investigate the time it would take to potentially flood the backfilled pits.

According to the communicated New Largo Colliery's post-closure water management strategy, all opencast pits will be backfilled entirely and rehabilitated without a final void. A simulation of recharge into the rehabilitated spoils and groundwater inflow was performed to determine the approximate flooding time and decant rates. Groundwater inflows were linearly modelled from a maximum inflow at (where the mine water levels were dewatered to the bottom of the coal floor) to 0 m^3/day (where the mine water levels had recovered to the average unsaturated zone thickness of 6 m). This is a limitation in the current model and should be improved through means of updated and calibrated numerical groundwater flow modelling.

A stochastic post-closure scenario was set-up for the New Largo Colliery opencast pits and was simulated from April 2056 until January 2080, using 50 predictive realisations. Decant elevations of each opencast pit are depicted in Table 7.5(a) below and the mean modelled water levels in the backfilled opencast pits in Figure 7.5(a).

Table 7.5(a): Decant Elevations of New Largo Colliery Opencast Pits Post-Closure

Opencast Pit	Decant Elevation (mamsl)
Pit D	1 515
Pit D North	1 525.5
Pit F	1 522.5
Pit H	1 545
Pit A/G	1 541.5
Pit C	1 545
Pit W	1 523

Post-closure flooding levels for all opencast pits are presented in Figure 7.5(a). Pit D, Pit C and Pit F will flood to its decant elevation during LOM. Pit H and A/G and C will flood to their decant elevations between 2055 and 2060. Pit D North and Pit W will flood to decant elevation at around 2077 and 2073, respectively. In case of post-closure decant, excess water will need to be managed to prevent spillage into the environment. The largest mean decant rates can be expected from Pit A/G at approximately 2 300 m³/day, as presented in Figure 7.5(b), due to the largest footprint area. Total probabilistic post-closure decant was calculated and is presented in Figure 7.5 (c) and expected flow rates are between 4 500 m³/day and 8 500 m³/day using the 25th and 75th percentile.

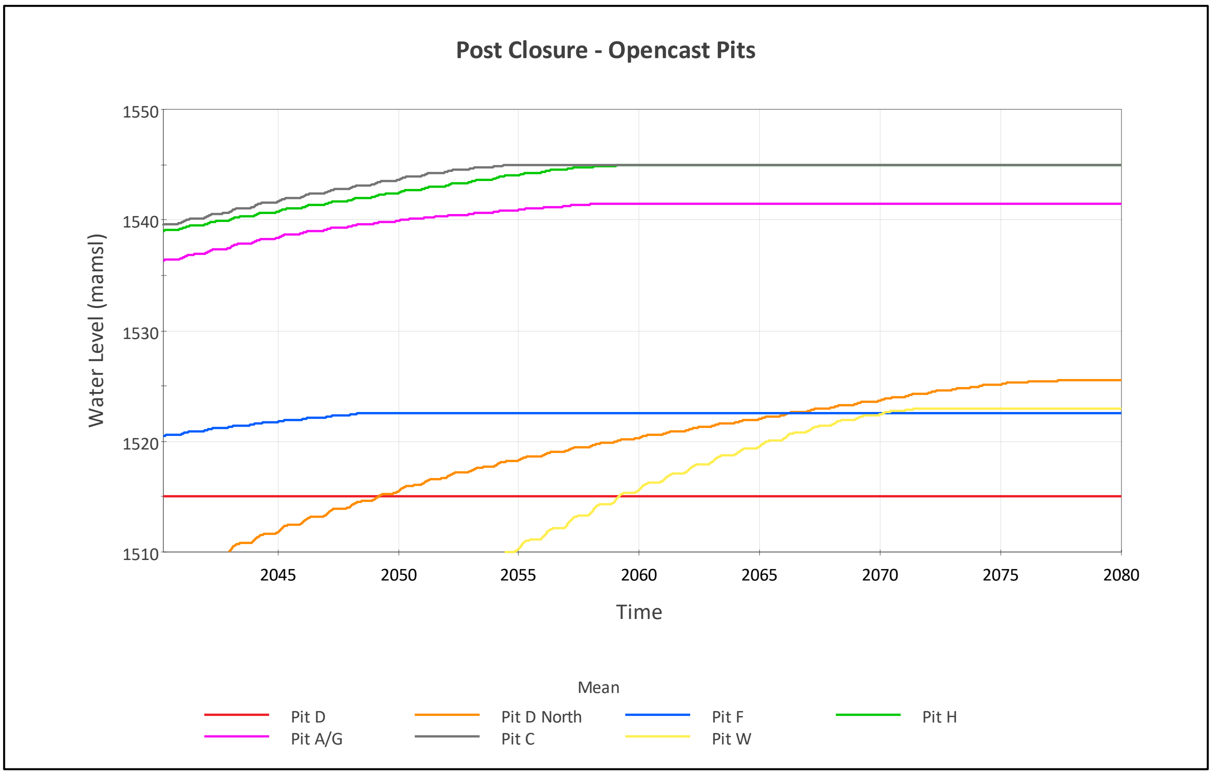


Figure 7.5(a): Simulated Mean Water Levels all Opencast Pits Post-Closure

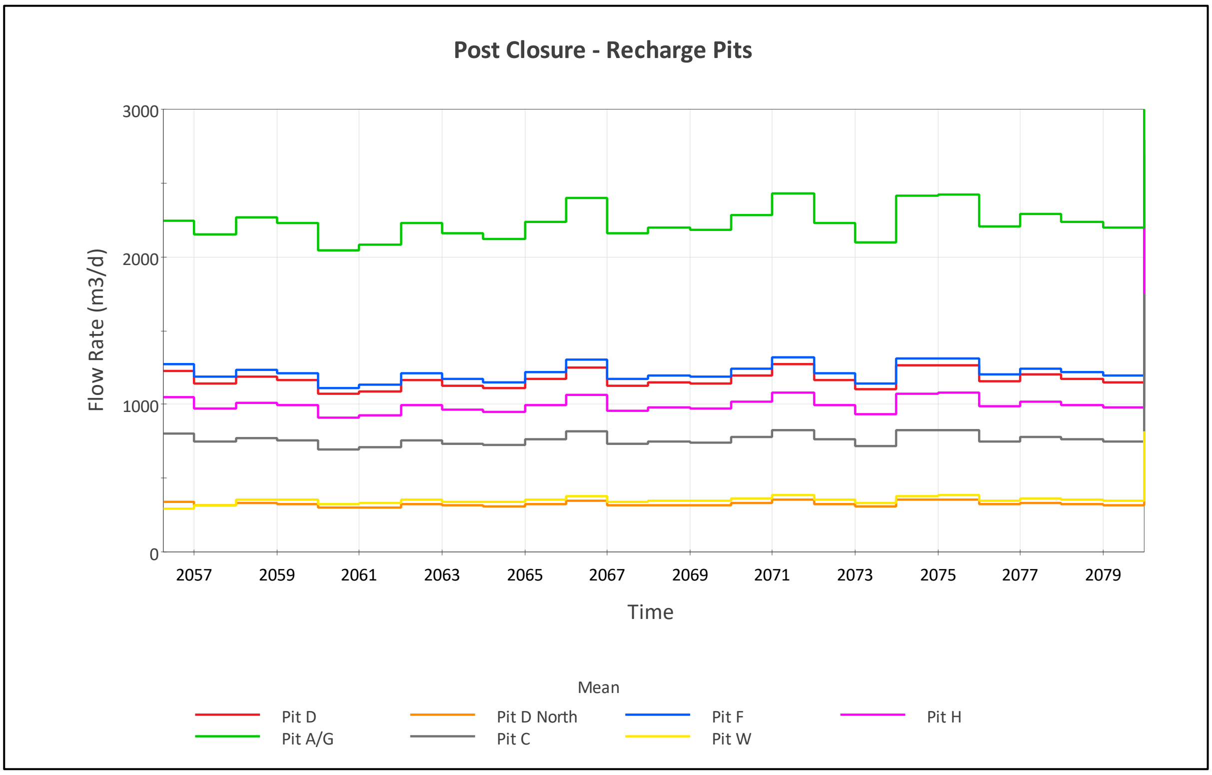


Figure 7.5(b): Simulated Mean Recharge Rates for all Opencast Pits Post-Closure

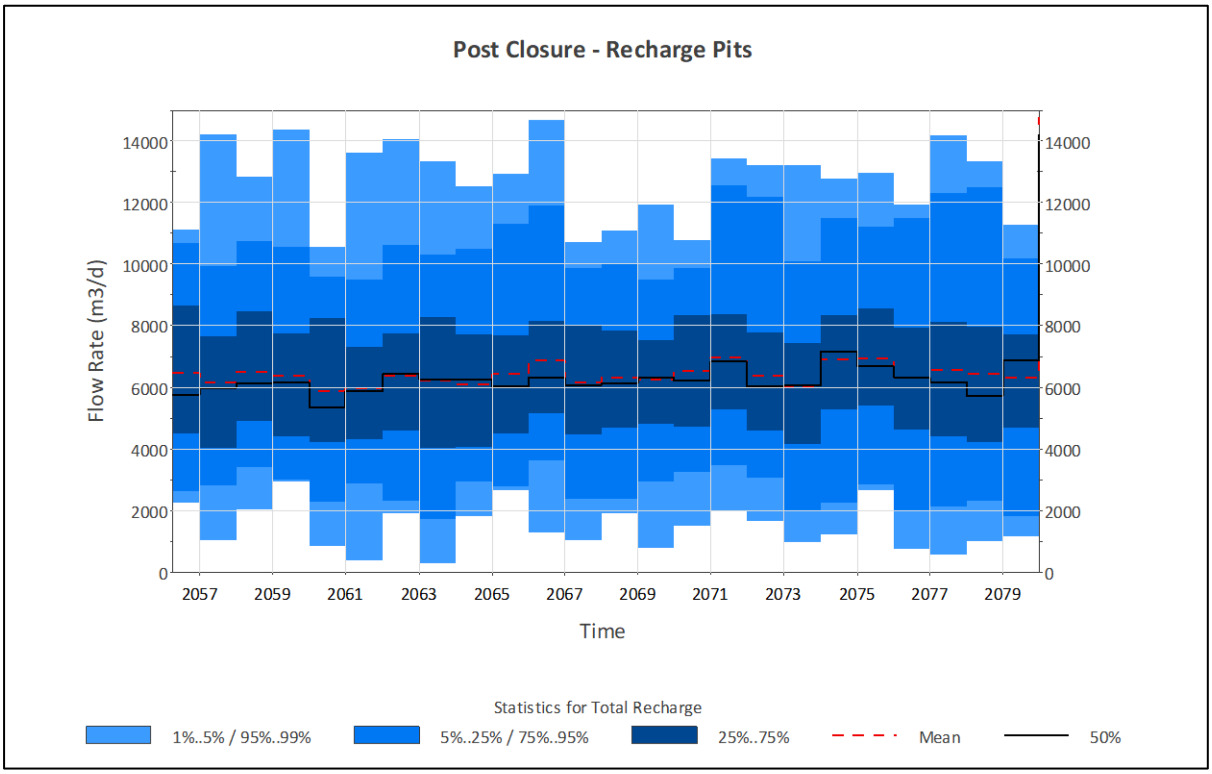


Figure 7.5 (c): Total Simulated Probabilistic Recharge Rates for all Opencast Pits Post-Closure

8. SALT BALANCES

The simulated water balances, together with the recorded and expected TDS concentrations were used for the development and calculation of the Salt Balances for New Largo Colliery. Input mass loads were simulated by multiplying the expected TDS concentrations by the calculated flow volumes for those specific areas. The concentrations at the dams element outflows (C-end) were simulated using the principles of Equation 8(a) and entails that load "in" would be equal to load "out" plus any changes in load due to rainfall, runoff, return flows, seepage and evaporation:

$$Cend = \frac{load_{in} + \Delta load_{dam}}{volume_{end}} \qquad \text{Equation 8(a)}$$

The salt mass balance results were used to quantify the salt loads. The expected TDS concentrations used for input into the salt balances were selected from the water quality analysis results (Sections 5.4, 5.6 and 5.8) and are listed in Table 8(a).

Table 8(a): Expected Average TDS Concentrations

Description	Average TDS Concentration (mg/l)
Rainfall	25
Potable Water (Borehole)	200
Dirty Stormwater Runoff (Stockpile Area)	3 000
Runoff from Pit Workings	300
Seepage/Recharge through Backfilled Spoils	4 500
Site Stormwater Runoff	250
Groundwater Inflow	300
Recharge/Seepage Spoils Pit Workings	4 500

The outcome of the simulated average TDS concentrations determined during the calibration process are indicated in Table 8(b) and correlate reasonably well with the average monitored concentrations provided (Table 8(b)) except for the Klipfontein PCD. This can possibly be explained by large fluctuations of present water in the PCD. Also, a larger quantity of Pit D water will be pumped in the upcoming year than previous years. This will dilute concentrations in the Klipfontein PCD.

The highest salt loads naturally emanate from runoff from the stockpile area at Klipfontein and the water in the backfilled spoils due to the geochemical interactions between the infiltrating water, oxygen in unflooded opencast workings and minerals left in the backfill material. Continued and regular monitoring of the water sources will be required for further and improved model calibration.

Table 8(b): Simulated vs Average Monitored (2021-2022) TDS Concentrations

Description	Simulated Average TDS Concentration (mg/l)	Average Monitored TDS Concentration (mg/l)
Office Void	50	2 229
Pit D	1 843	2 221
Klipfontein PCD	2 154	2 596

In addition, the long term mine water qualities (post-closure) will need to be verified through numerical geochemical modelling, taking the rate of the infiltration, quality of infiltrating water, mineralogy and geochemistry of the remaining material and period of oxidation (assessed through the flooding rates) into account.

The simulated average salt balance diagram for the 2023/2024 hydrological year for average water balance conditions is presented as Figure 8(a).

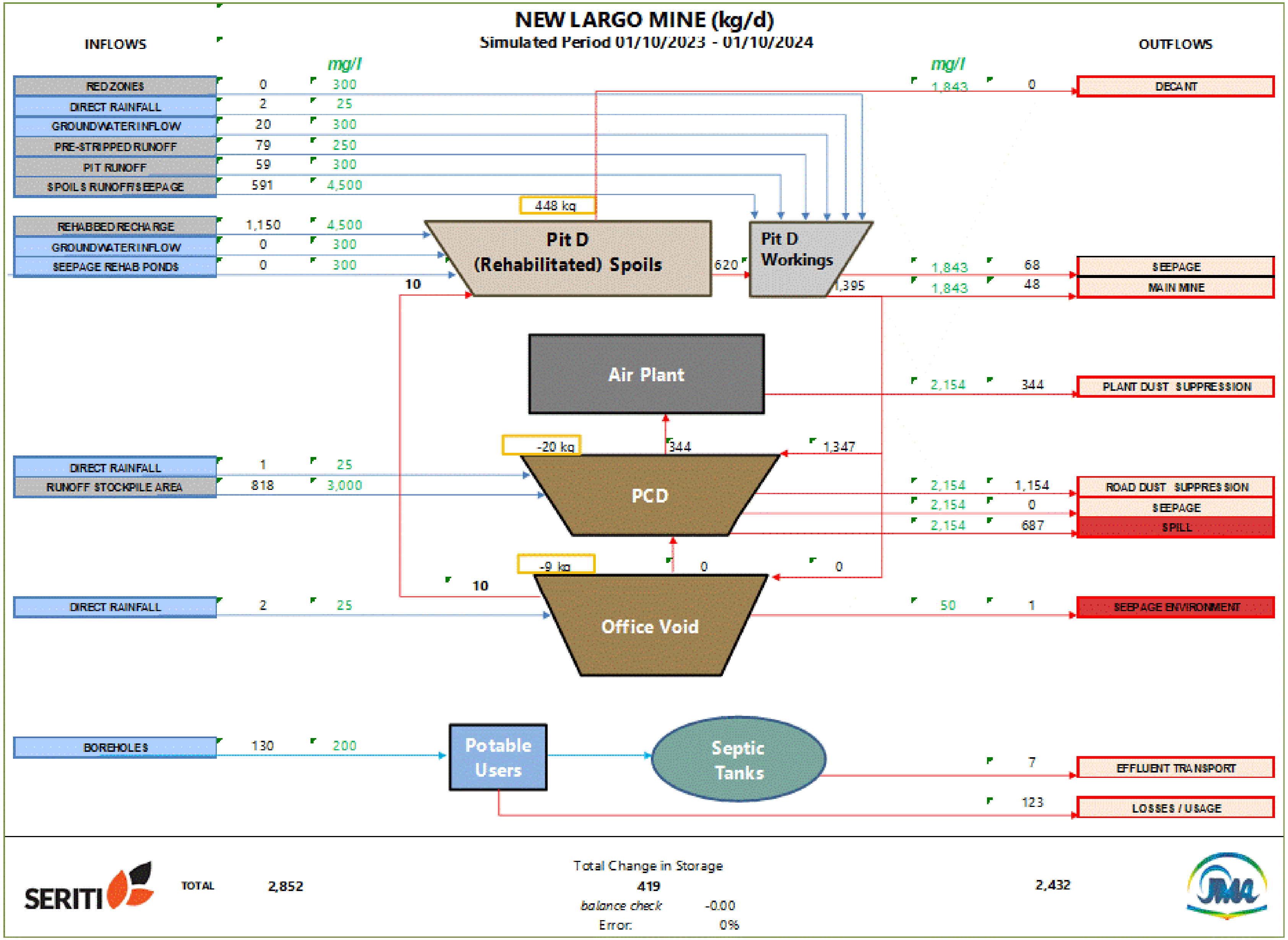


Figure 8(a): Simulated 2023/2024 Salt Balance for Average Conditions

9. CONCLUSIONS & RECOMMENDATIONS

The mine wide GoldSim Water and Salt Balance Model that was developed for New Largo Colliery in 2022, was used as the basis from which updated water and salt balances were calculated. This Water and Salt Balance Report consolidates and documents the information and input data sets used, assumptions made, modelling results and recommendations made regarding the updated water and salt balances for New Largo Colliery. The 2022 GoldSim Model was reviewed, refined and was updated to include the following:

- Daily rainfall data received from Klipfontein Colliery until June 2023.
- Fixed monthly evaporation rates according to the latest recorded data obtained from the DWS Bronkhorstspruit Dam Weather Monitoring Station.
- Updated mining floor elevations, and surface areas of the current extent of mining, as well as the proposed yearly areas of the future LOM workings until 2056, for each of the pits.
- The calculated footprint areas and stage-storage capacity curves of the individual workings and mine water compartments of the historic underground workings (i.e. Red Zones).
- Preliminary details of a closure water management strategy for the rehabilitated pits as communicated by New Largo Colliery.
- Updated flow meter data, dam levels (Office Void and Klipfontein PCD), water chemistry and water level data obtained from Klipfontein Colliery and New Largo Colliery.
- Updates and changes made to the process water reticulation and operational philosophy, and linkages between the various sections.

Once updated with the abovementioned information, the water balance was calibrated using the rainfall and monitoring data provided for the period between January 2021 and June 2023. This was required to verify if actual recorded rainfall would result in expected dewatering rates from Pit D and water levels in the Office Void, subject to the current operational philosophy at New Largo Colliery. Water levels for the Office Void were calibrated for the same period.

It is evident that the recorded pumping and simulated (dewatering) rates from Pit D to the Office Void or Klipfontein PCD, correlate well with recorded flow rates. Recorded pump rates were used as input into the model to verify if all pit water was pumped out and if simulated water levels in the Office Void correlate well with the recorded water levels by modelling estimated seepage rates from the Office Void. Both the simulated and recorded water levels, within the Office Void, showed relatively good correlation and a relative stable and quasi-steady water level. Higher rainfall and runoff during 2021/2022 resulted in increased dewatering rates as well as decreasing water levels simulated in the Office Void between July 2022 and June 2023 due to average rainfall and lower pumped volumes to the Office Void.

It is probable that seepage inflows emanate from Office Void though the upstream spoils into the pit workings and recirculation of water occurs. It is also probable that total flow rates will increase in the future due to expanding mining activities and subsequently larger footprint areas. It is therefore probable that seepage outflow from this backfilled spoil void is relatively large and that the bulk of the seepage flows towards the Pit D workings. A portion of seepage flows via subsurface flow towards the northern located watercourse. Potential seepage outflow is significant and requires (detailed) ongoing flow monitoring.

Most of the dewatering took place from Pit D into the Office Void during 2022 and during 2023 most of the dewatering was pumped to Klipfontein PCD. A seasonal increase of pump rates was recorded owing to extreme high rainfall during the wet season of 2021/2022 (1 081 mm). Fluctuating pump rates from Pit D from June 2022 onwards were recorded varying between 300 m^3/day and 1 500 m^3/day. However, total recorded pumping rates from the Klipfontein PCD used for dust suppression showed increasing volumes pumped during the calibration period peaking at 900 m^3/day . Recorded pumping rates were therefore used as simulated input when recordings were available. There was not sufficient water in the Klipfontein PCD between

July 2021 – September 2021 and from July 2022 until October 2022 to sustain recorded dust suppression rates despite of some additional inflow coming from Pit D dewatering.

In addition, relatively constant water levels recorded in the Klipfontein PCD from November 2022 onwards and increasing volumes pumped for dust suppression suggest that the total water make at Klipfontein is steadily increasing. It is recommended to continue monitoring this trend, maintain dust suppression volumes withing licensed volumes and verify this for the next water balance update.

The future LOM water balances (October 2022 to March 2056) were simulated using the annual projected LOM areas for the opencast pits, which were built into the water balance model for each of the mining sections up until the end of mining in. Water that is dewatered from the proposed Pit F and Pit H will be pumped to different PCD's for evaporation, re-use (dust suppression) or to be pumped for treatment. This forms part of the proposed water management strategy as explained in Golder (2020) and Golder (2021) and confirmed by New Largo Colliery. It was indicated and requested by New Largo Colliery that for the proposed Main Mine, including Pit D, Pit D North, Pit A/G and Pit C/W, all excess water will be pumped to sufficiently large PCD(s) to handle the total water make from the opencast workings. From PCD(s), dirty water is pumped to the proposed DMS plant, road dust suppression and a proposed water treatment plant (in case of excess) in the same order of priority.

Overall mean peak dewatering rates from the opencast pits can be expected at mean dewatering rates between 3 000 m^3/day and 9 000 m^3/day. The highest mean dewatering rates can be expected from Pit A/G with mean dewatering rates exceeding 6 000 m^3/day during the wet season towards the end of LOM in 2056. The variability or seasonality of the water makes to the proposed opencast pits is evident and will need to be catered for accordingly when pumping to the PCD's. Total probabilistic dewatering rates for the opencast pits over the LOM were simulated for each opencast separately. Maximum pumping rates during the LOM, using the 99th percentile, will vary between 10 000 m^3/day (2041) and 27 000 m^3/day (2031). It will require around 684 423 m^3 to dewater red zone from the Pit D and Pit A/G mining area.

It was calculated that the storage capacity within the rehabilitated footprint areas at Pit D is limited and that that decant may be expected towards the end of LOM. This is owing to a low elevation decant point and therefore limited storage capacity in the spoils. This will result in a gradually increasing dewatering rates. Peak dewatering rates (99th percentile were calculated between 9 000 and 10 000 m^3/d. Pit D North will be a completely separated opencast pit from Pit D and peak dewatering rates for Pit D North (99th percentile) were simulated at 5 000 m^3/d around 2045. Dewatering of Red Zones during mining of Pit D can be noticed in 2030 when the Old Klipfontein underground workings is scheduled to be mined. It is recommended to investigate final storage volumes to be dewatered around Old Klipfontein.

Peak dewatering rates for Pit F were simulated at 10 000 m^3/d between 2043 and 2045. After 2027, a portion of the total water make can be stored in the rehabilitated spoils and it was calculated that the total spoil storage capacity of 4.2 million m^3 within the rehabilitated footprint areas, will be sufficient to contain recharge through the rehabilitated spoils. A similar approach can be followed for dewatering Pit H. When rehabilitation commences two (2) years after the mining has started, sufficient storage capacity will be available to maintain the total water make at a relative low rate. Peak dewatering rates that were simulated, using the 99th percentile, were approximately calculated at 2 500 m^3/day.

Simulated dewatering rates of Pit A/G showed that peak dewatering rates were simulated towards the end of LOM form 2050 onwards. A single red zone to be mined include the former underground workings of Hartebeest 2 and it is expected that around 243 600 m^3 will be required to dewater from the Pit A/G around 2026. Furthermore, due to limited storage under rehabilitated spoils, increased dewatering rates can be expected from 2044 onwards and simulated peak dewatering rates at the end of mining were calculated at 19 500 m^3/day.

Also due to limited storage available within rehabilitated spoils, gradually increasing dewatering rates can be expected for Pit C can be expected during mining. Simulated probabilistic peak dewatering rates, using the 99th percentile, indicated a maximum pump rate of 5 300 m^3/day. Early surface decant can therefore be expected.

Calculated water makes from all Main Mine related opencast pits will be dewatered to potentially four (4) proposed PCD's depending on the total volume of water make emanating from the Main Mine area. Designed and licensed storage volumes for each PCD are as follows:

- Phase 1 – 256 Ml
- Phase 2 – 256 Ml
- Phase 3 – 343.8 Ml
- Phase 4 – 343.8 Ml

This will imply that, if all PCD's will be required, a total storage capacity of 1 200 Ml (1.2 million m^3) is available to store dirty water at the Main Mine.

Simulated storage volumes of the Main Mine PCD during LOM calculated the 98th percentile (1: 50-year storage volume) at 852 313 m^3. As per designed PCD's, a total capacity of 855.8 Ml (855 800 m^3) will be required (i.e. Phase 1 to Phase 3) and constructed. Most water will need to be handled around 2030.

Almost no overflow can be expected from Eastern PCD and Western PCD and both PCD's will handle water make from the Pit F area. A proposed storage capacity between 150 000 m^3 and 160 000 m^3 for Eastern PCD will be sufficient to adhere to GNR704 requirements to prevent spillage of less than once in 50 years on average. The proposed Western PCD could slightly be reduced to 18 000 m^3. Some treatment will be required for Pit F at this stage as initially proposed to be sent to Klipspruit as communicated by New Largo Colliery.

Pit H PCD1 and PCD2 were sized at 45 000m^3 and 65 000m^3, respectively. Due to potentially available storage in rehabilitated spoils after 2025, simulated storage volumes for both PCD's show that the proposed storage capacities of PCD1 and PCD2 can remain. Both PCD's are in adherence with GNR704 requirements. Dirty water contained before 2025 in PCD2 will need to be pumped to Klipspruit for treatment.

Expected treatment rates at Main Mine were simulated based on proposed treatment of 4 Ml/day (from 2024 onwards) and 6 Ml/day (from 2032 onwards). If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 4 Ml/day and 6 Ml/day during various wet seasons. It appears that most water on the Main Mine needs to be handled between 2027 and 2031 and between 2049 and 2056. It can therefore be beneficial to move the 6 Ml/day treatment capacity forward (or higher) between 2027 and 2031 and lower the treatment capacity from 2032 onwards to 2048 if actual water make volumes from Main Mine will allow this. If New Largo Colliery considers modular treatment plants, this can potentially be achieved, provided that water balances are updated annually based on actual flow rates from Main Mine.

The combined volumes that will need to be pumped to the Klipspruit treatment plant will fluctuate seasonally and will be dependent on the depth of rainfall occurring and the operational philosophy regarding the management of dewatering of the opencast pits and final infrastructure for Pit F and H areas that will need to be catered for. If New Largo Colliery decides to treat the 75th percentile, it will be required to treat up to 1 800 m^3/day (1.8 Ml/day) and 3 900 m^3/day (3.9 Ml/day) between 2043 and 2047. It should be noted that this calculation is preliminary and that large uncertainties still exists at this stage. More accurate treatment can be determined for the 2024 water and salt balance update when more information is available and updated mine schedules and formalised infrastructure plans have been provided.

According to the provided post-closure water management strategy for New Largo Colliery, all opencast pits will be backfilled entirely and rehabilitated without final voids. Post-closure flooding levels for all opencast pits were calculated. Pit D, Pit C and Pit F will flood to its decant elevation during LOM. Pit H and A/G and C will flood to their decant elevations between 2055 and 2060. Pit D North and Pit W will flood to decant elevation at around 2077 and 2073, respectively. In case of post-closure decant, excess water will need to be managed to prevent spillage into the environment. The largest mean decant rates can be expected from Pit A/G at approximately 2 300 m^3/day, as presented in Figure 7.5(b), due to the largest footprint area. Total probabilistic post-closure decant was calculated and expected flow rates are between 4 500 m^3/day and 8 500 m^3/day using the 25th and 75th percentile.

With reference to the data provided and model simulations, the following is recommended in order to further validate and verify the predicted water and salt balances:

- Recalibrate and Install Flow Meters:

The cumulative recorded dust suppression rates from the Klipfontein PCD exceeded the total cumulative dewatering rates at Pit D and inflows into the PCD, which includes the Pit D dewatering (recorded) and simulated runoff from the plant area. Relatively constant water levels recorded in the Klipfontein PCD suggest that there is always water available in the Klipfontein PCD, indicating possible additional or unaccounted inflows into the Klipfontein PCD may be applicable and/ or that the recorded dust suppression rates are overestimated. It is recommended to verify this for the next water balance update through accurate monitoring of the water flows to and from the Klipfontein PCD.

New Largo should furthermore begin with regular checks and recalibration of the existing flow meters that monitor the volumes of water pumped to and from each of the surface water storage facilities (Office Void, Klipfontein PCD). These monitored flow volumes are required for the calibration and validation of the annual water balances, together with the recorded water level elevations. As indicated in the WUL's the flows should be metered or gauged and reported on a daily basis.

Additional flow meters should be installed at the key localities indicated in the process flow diagrams (Section 4) and should be monitored for the future New Largo Colliery when infrastructure plans have been confirmed. Dedicated flow meters should be installed in each of the Pit D 'North Pit' and 'South Pit' dewatering systems, as well as all off take points on surface at Klipfontein Colliery.

- Update and formalise infrastructure layouts, SWMP at Pit F Area:

  A recent site visit undertaken on the 13th of September 2023 confirmed that the Ukwazi (2022) SWMP has not been formalised and that current infrastructure layout plans will deviate from the official SWMP. No DMS plant is part of the future operations and the Western PCD was subsequently taken out of the future infrastructure plans. It is also unclear whether the Eastern PCD is sufficiently large to handle rainfall/runoff from newly planned dirty water area catchments. For the next water and salt balance update it is essential to formalise an updated SWMP including possible re-designs of the Eastern PCD and confirm compliance of the updated SWMP.

- Update the Post Closure Water Management Strategy:

  Detailed closure landforms and closure water management strategies will need to be developed and provided for each of the opencast pits, along with updated strategies for the historic undergrounds at New Largo Colliery. It is therefore proposed that an updated strategy be developed which addresses each of the existing and proposed opencast pits at New Largo

Colliery. This will support and will be required to accurately quantify the long-term post closure water balances and associated water treatment requirements.

- Assess suitability of the Water Monitoring System for future water and salt balance updates:

  It is of utmost importance that New Largo install at least 5 rain gauges within the New Largo Mining Right Boundary. There should be one rain gauge for each Pit area which includes Pit D, Pit F, Pit H, Pits W/C and Pit A/G. Use can be made of either automatic or manual rain gauges. Site specific rainfall data is critically important as rainfall is the main source of water make to opencast workings both directly and indirectly as groundwater seepage. The rain gauges should be monitored daily and reported as daily rainfall depths.

  The surface dams should continue to have their water level elevations monitored on a weekly basis and their qualities on a monthly basis. The levels in the dams can be measured by using a measuring pole or plate with elevation markers.

  Any opencast void should be monitored on the same basis as the surface dams. The opencast spoils boreholes should be monitored on a monthly basis for water levels and on a quarterly basis for qualities.

  It is recommended that additional mine water monitoring boreholes be drilled into the backfilled sections of the opencast workings as mining progress. This is currently applicable for the Pit D / Klipfontein Colliery Pit and Pit F. This is important to manage and assess the operational and post closure water quality and quantity management of the opencast workings.

  It is further recommended that the boreholes mentioned in the Hodgson (2007) which report be redrilled and reopened into the mine workings. The monitoring data from the underground workings will be critical when modelling the inflows from the underground workings into the opencast workings.

  When drilling new mine water monitoring boreholes, it is critically important to ensure that they are correctly constructed (fully cased and perforated at the mining horizon) to make sure that monitoring is done correctly.

  When taking water quality samples from the mine water monitoring boreholes, it is very important that the sample is taken at the correct depth. Stratified sampling is critical and an EC profile of the borehole can be undertaken at least annually to determine the stratification beforehand. Underground mine workings should be sampled at a depth below the roof of the mining.

  Water levels within the underground working should be monitored monthly and the water qualities quarterly.

  It is critically important that all boreholes be surveyed for accurate coordinates, surface and collar elevations. The surface water level plates or pole markers should also be calibrated by surveying the elevations on the markers.

- Update Numerical Water Modelling:

  The hydraulic interaction between and within the respective workings will need to be simulated through means of a numerical groundwater flow model. Due to the changes which have been made to the current operational plan at New Largo Colliery and expected seepages, it is highly recommended that numerical groundwater flow and mass transport models, as well as the surface water runoff model be updated. It is, however, critical that these models only be updated once the water management strategies for the opencast pits have been developed. The

monitoring system should also be updated and implemented prior to undertaking the numerical modelling to allow for calibration.
A copy of the 2022 GoldSim Water and Salt Balance Model is provided to New Largo along with this report. The water and salt balance model is flexible and has been set up in such a way so that it can easily accommodate updated monitoring information, future changes to the reticulation systems as well as changes to the planned LOM schedules or extent of mining.

The way in which the model has been set-up furthermore also allows for both the overall integrated balance, or separate balances for smaller units, to be refined and updated as required for future changes and as additional monitoring data becomes available. This should assist with future updates that will be required to be made to the water and salt balances and for additional management scenarios to be considered for New Largo Colliery.

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APPENDIX I

PIT STAGE-STORAGE CAPACITY TABLES

PIT A & G

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 528	20 001	5 000	7 559 019
1 529	120 397	30 099	7 533 920
1 530	349 138	87 284	7 476 735
1 531	813 668	203 417	7 360 602
1 532	1 591 799	397 950	7 166 069
1 533	2 792 213	698 053	6 865 966
1 534	4 310 582	1 077 646	6 486 373
1 535	6 141 716	1 535 429	6 028 590
1 536	8 373 420	2 093 355	5 470 664
1 537	11 084 870	2 771 218	4 792 801
1 538	14 276 845	3 569 211	3 994 808
1 539	18 040 779	4 510 195	3 053 824
1 540	22 351 546	5 587 886	1 976 133
1 541	27 380 826	6 845 207	718 812
1 541.5	30 256 076	7 564 019	0

KLIPFONTEIN & PIT D

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 505	1 509	377	762 548
1 506	11 479	2 870	760 055
1 507	33 974	8 494	754 431
1 508	96 583	24 146	738 779
1 509	258 513	64 628	698 296
1 510	524 710	131 178	631 747
1 511	871 784	217 946	544 979
1 512	1 299 484	324 871	438 054
1 513	1 803 633	450 908	312 016
1 514	2 385 956	596 489	166 436
1 515	3 051 699	762 925	0

PIT C

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 534	86 294	21 574	5 081 604
1 535	449 482	112 371	4 990 807
1 536	1 070 209	267 552	4 835 625
1 537	2 031 507	507 877	4 595 301
1 538	3 370 766	842 692	4 260 486
1 539	5 100 730	1 275 183	3 827 995
1 540	7 118 164	1 779 541	3 323 636
1 541	9 381 593	2 345 398	2 757 779
1 542	11 867 206	2 966 802	2 136 376
1 543	14 562 757	3 640 689	1 462 488
1 544	17 429 472	4 357 368	745 809
1 545	20 412 710	5 103 177	0

PIT F

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 504	223	56	4 226 129
1 505	5 691	1 423	4 224 762
1 506	18 896	4 724	4 221 460
1 507	41 848	10 462	4 215 722
1 508	76 411	19 103	4 207 082
1 509	124 312	31 078	4 195 106
1 510	187 765	46 941	4 179 243
1 511	269 294	67 323	4 158 861
1 512	387 448	96 862	4 129 322
1 513	578 109	144 527	4 081 657
1 514	943 363	235 841	3 990 344
1 515	1 497 607	374 402	3 851 783
1 516	2 316 587	579 147	3 647 038
1 517	3 483 917	870 979	3 355 205
1 518	5 007 716	1 251 929	2 974 255
1 519	6 940 151	1 735 038	2 491 147
1 520	9 291 413	2 322 853	1 903 331
1 521	12 055 422	3 013 855	1 212 329
1 522	15 186 889	3 796 722	429 462
1 522.5	16 904 737	4 226 184	0

,

PIT H

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 523	2 499	625	10 859 757
1 524	32 189	8 047	10 852 334
1 525	128 092	32 023	10 828 358
1 526	303 678	75 920	10 784 462
1 527	619 758	154 939	10 705 442
1 528	1 045 871	261 468	10 598 914
1 529	1 600 213	400 053	10 460 328
1 530	2 313 195	578 299	10 282 083
1 531	3 190 287	797 572	10 062 810
1 532	4 217 701	1 054 425	9 805 956
1 533	5 398 927	1 349 732	9 510 650
1 534	6 790 581	1 697 645	9 162 736
1 535	8 433 102	2 108 276	8 752 106
1 536	10 396 790	2 599 197	8 261 184
1 537	12 718 950	3 179 738	7 680 644
1 538	15 415 342	3 853 836	7 006 546
1 539	18 491 971	4 622 993	6 237 389
1 540	22 122 204	5 530 551	5 329 831
1 541	26 112 373	6 528 093	4 332 288
1 542	30 319 775	7 579 944	3 280 438
1 543	34 652 772	8 663 193	2 197 189
1 544	39 032 840	9 758 210	1 102 171
1 545	43 441 526	10 860 381	0

PIT WILGE

Elevation (mamsl)	Total volume (m³)	Storage Capacity (m³)	Available Storage (m³)
1 504	1 073	268	2 247 053
1 505	19 652	4 913	2 242 409
1 506	75 706	18 927	2 228 395
1 507	181 737	45 434	2 201 887
1 508	334 128	83 532	2 163 789
1 509	540 924	135 231	2 112 090
1 510	803 530	200 883	2 046 439
1 511	1 119 466	279 867	1 967 455
1 512	1 488 008	372 002	1 875 319
1 513	1 910 298	477 575	1 769 747
1 514	2 388 714	597 179	1 650 143
1 515	2 916 029	729 007	1 518 314
1 516	3 489 245	872 311	1 375 010
1 517	4 105 564	1 026 391	1 220 930
1 518	4 764 466	1 191 116	1 056 205
1 519	5 466 652	1 366 663	880 659
1 520	6 214 129	1 553 532	693 789
1 521	7 032 266	1 758 066	489 255
1 522	7 946 335	1 986 584	260 738
1 523	8 989 286	2 247 321	0

OFFICE VOID

Elevation (mamsl)	Storage Area (m^3)	Storage Capacity (m^3)	Available Storage (m^3)
1 517	0	0	291 673
1 518	438	127	291 546
1 519	1 289	952	290 721
1 520	3 005	3 008	288 665
1 521	6 158	7 337	284 336
1 522	13 612	17 321	274 352
1 523	16 247	32 323	259 350
1 524	17 298	49 110	242 563
1 525	18 121	66 854	224 820
1 526	18 883	85 363	206 310
1 527	19 641	104 634	187 039
1 528	20 359	124 638	167 035
1 529	21 198	145 395	146 278
1 530	23 147	167 367	124 306
1 531	28 473	192 400	99 273
1 532	32 141	223 214	68 459
1 533	34 339	256 485	35 188
1 534	35 885	291 673	0