MINING METHODOLOGY REPORT

for the

WAIKAKA GOLD MINING PROJECT

MARCH 2024

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CONTENTS

1 INTRODUCTION

1.1 The Mine Site

Waikaka Gold Mines Ltd (WGML) proposes to develop an alluvial gold mining operation within - Exploration Permit 56372 at Waikaka, Southland (the Proposed Mine). The development is subject to the grant of a mining permit, resource consents for mining, and completion of final feasibility studies before a decision to mine can be made.

1.2 Location

The proposed alluvial mine is located 22 kilometres north of the regional centre of Gore (pop. 13,000) and 4 kilometres southwest of the Waikaka township (pop, 140) (). The sealed Waikaka Road bounds the western and northern boundaries of the proposed mining area. The Waikaka Stream runs through the proposed mine path and sections of this stream will require five temporary diversions around the active mine blocks with progressive re-instatement of the stream alignment after mining and backfilling is completed.

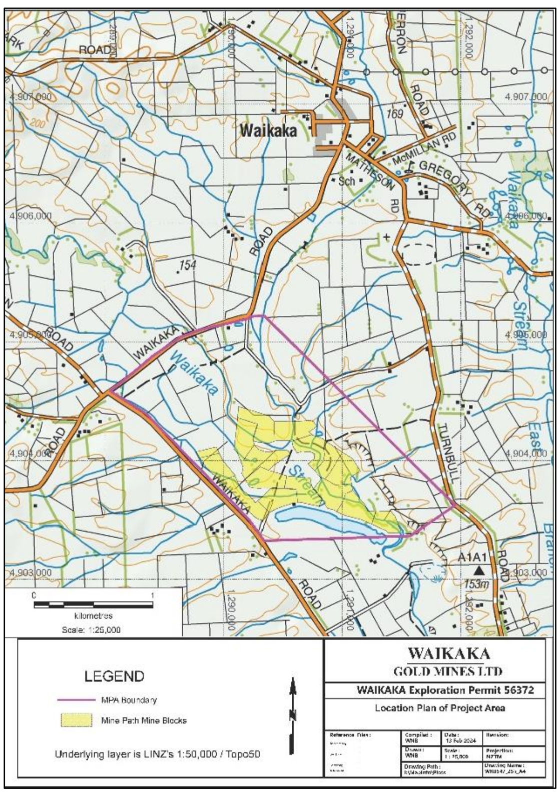

Figure 1 Location Plan of Waikaka Gold Project Area

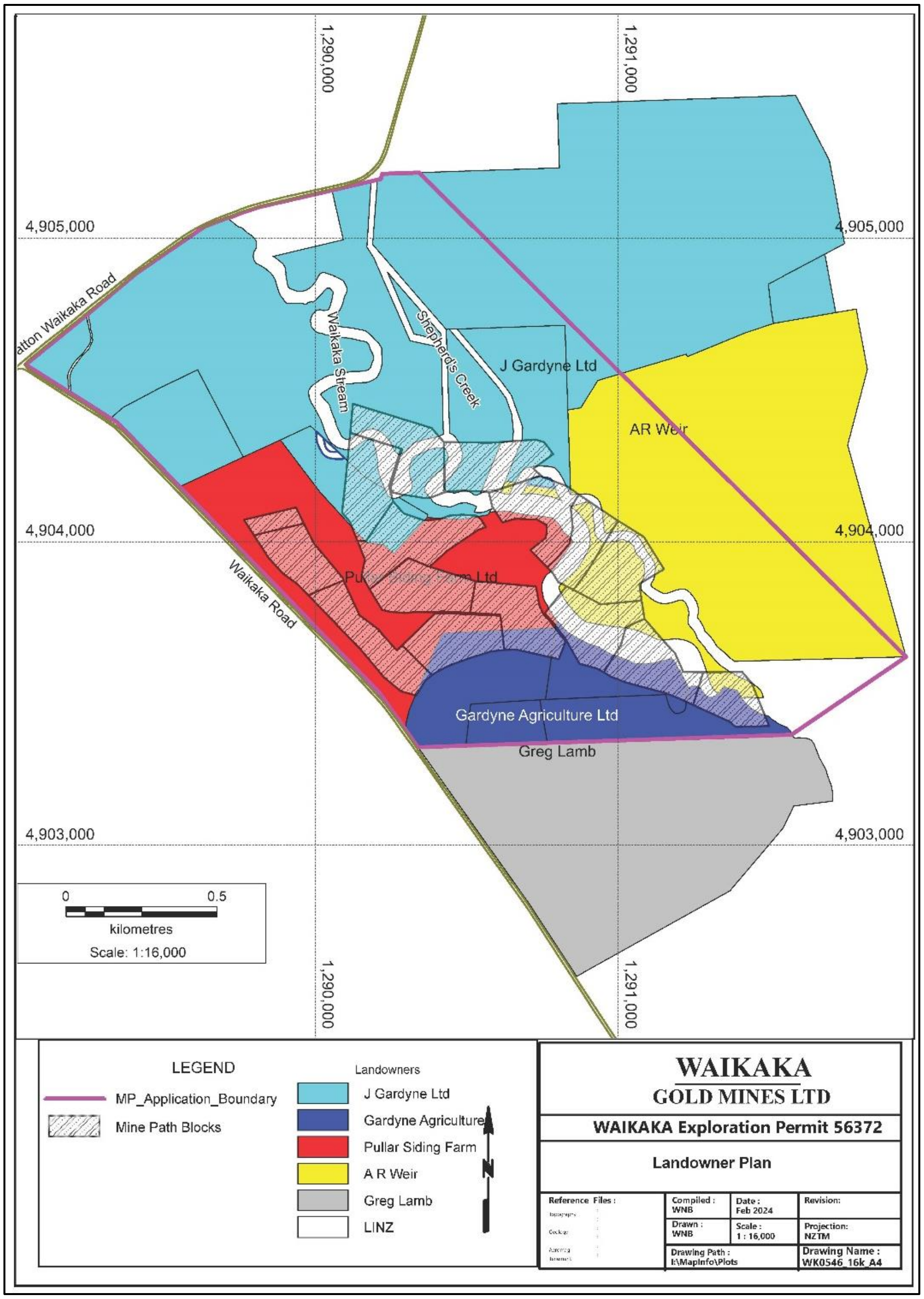

Figure 2 Mine Site Plan with Landowner areas

The area of land disturbed by the proposed mining project is 85 hectares along the mine path and a further 10 hectares occupied by settling ponds, gold plant and associated mine infrastructure. The disturbed land on the four privately owned farms and Crown and Gore District Council ("**GDC**") land along the Waikaka Stream, Shepherds Creek, paper roads and reserves is shown in **Figure 2**.

The Waikaka Stream that crosses the planned mine path will require four temporary diversions around the working mine path blocks, combined with a temporary diversion of Shepherds Creek. The temporary diversions have been planned in lieu of a longer permanent diversion design around the east side of the alluvial resource area. The construction of the temporary diversions is scheduled progressively from Year 3 to Year 7 of operations with reinstatement to the current Waikaka Stream alignment following completion of mining and backfilling of the mine void through each diverted section of the stream.

2 RESOURCE

2.1 Site Geology

The Waikaka alluvial gold deposit is hosted by the 5-million-year-old Waikaka Quartz Gravels (WQG) which overly the late Oligocene to early Miocene Gore Lignite Measures (GLM) of the East Southland Group. Regionally the WQC is folded into an asymmetric syncline inferred to trend east-west (Figure 3).

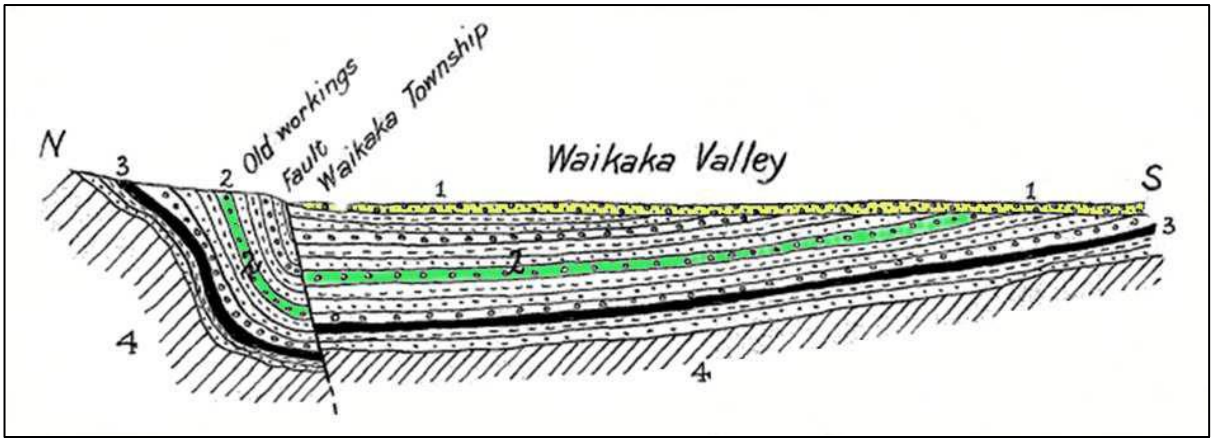

Figure 3 A Cross-section through the Waikaka Syncline; basement greywackes (4 - hachured) unconformably overlain by GLM (3), WQC (2 – green) at base of UWS (uncoloured).

Recent alluvial deposits (yellow) unconformably overly older rocks within modern valleys in the proposed mine area, the WQG varies between 1 and 5 metres thick (averages 2.8 metres) and dips gently (1-2 degrees) northwards under 20 to 40 metres of overburden on the southern limb and is gently folded in a north plunging open syncline (**Figure 3**). **Figure 4** shows the basement contours on the contact between the WQG and the GLM at Waikaka.

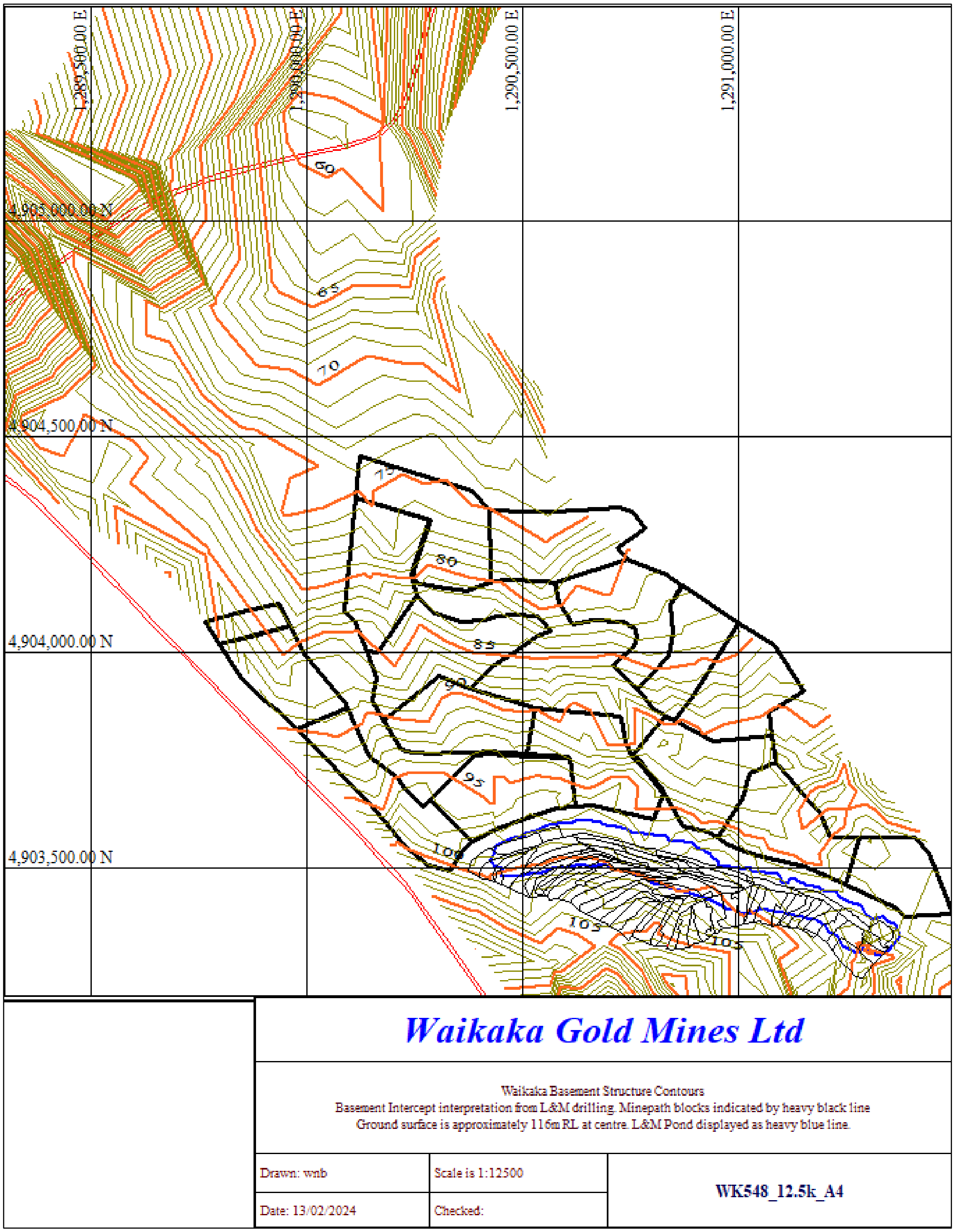

Figure 4 Basement Contours on the Contact of the WQG with the GLM at Waikaka

The overburden comprises interbedded clays, sands, gravel lenses and minor carbonaceous layers forming the Upper Waikaka Sequence ("**UWS**") (**Figure 5**). The sequence is capped by

Recent alluvium within the Waikaka Stream valley which has been dredged and replaced by the dredge tailings.

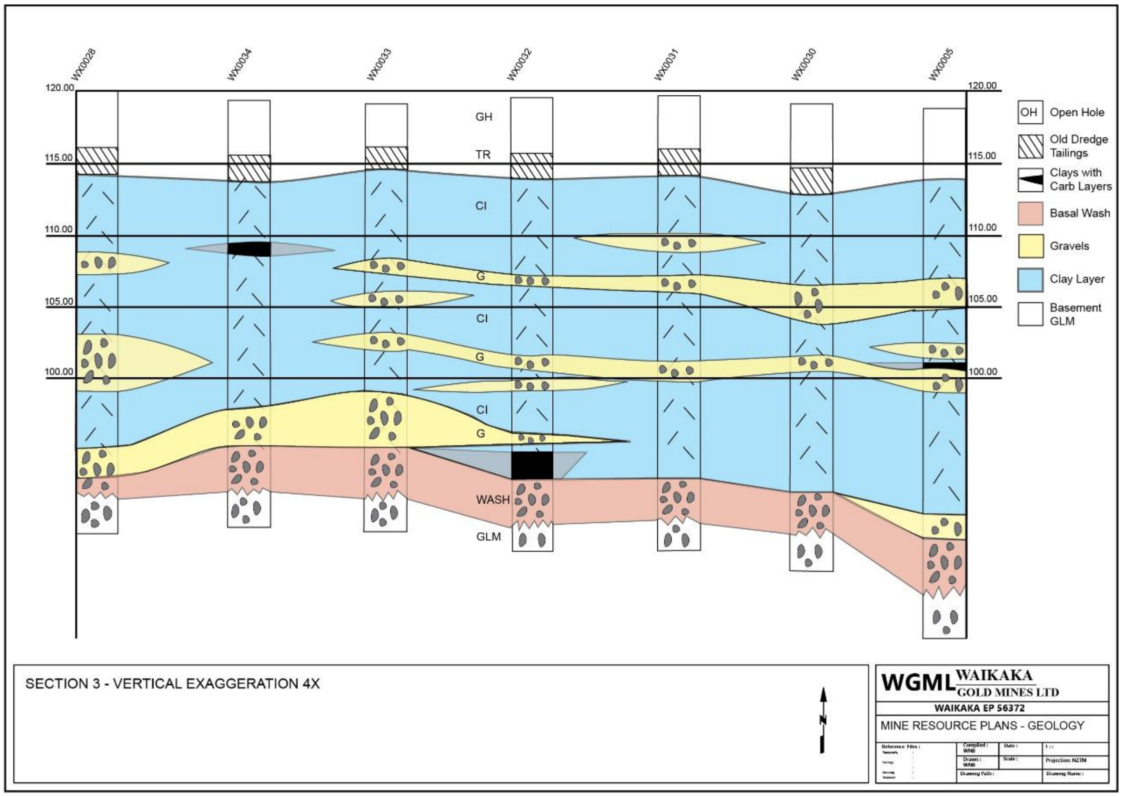

Figure 5 Typical Cross-section through UWS and WQG showing Gravel Layers and Discontinuous Carbonaceous Clay Pockets

The Waikaka Quartz Gravels ("**WQG**") form the gold bearing wash overlying clay-rich lower Gore Lignite measurers ("**LGLM**"). The WQG comprises clayey sandy pebbly to cobbly quartz gravels averaging 3.0 m thick (range of 2.5 to 3.8 m) within the mine path. Basement dilution of 0.2 m is added to the WQG to increase diluted mine thickness to 3.2 m.

The maximum cobble size is about 100 mm with an average 70 percent of the wash passing 10 mm. Twelve percent of the WQG is minus 63 microns and 4 % clay size (minus 2 microns). Minimisation of dilution of the wash by clay rich basement and overburden will be critical to wash extraction operations.

2.2 Mine Site History

The younger valley fill alluvial deposits in the Waikaka valley were extensively dredged between 1902 and 1927. The dredges generally worked to a maximum depth of 6 metres although the McGeorge No. 3 dredge worked ground as deep as 15 metres where the buried WQG sub-cropped on the valley floor. Historical production is reported to be greater than 100,000 ounces.

In 2001 L&M Mining commenced mining the WQG at the southern end of the proposed mine area, immediately north of where the McGeorge No.3 dredge worked but ceased mining after 15 months having produced only 6,000 ounces of gold at a substantial loss. The L&M open pit alluvial mine utilised a method in which the overburden was pre-stripped and moved around and across the working pit by conveyor systems fed by bucket wheel excavators. The gold-bearing wash zone was bulk excavated below the dredge pond water and fed to a floating gold recovery plant at the advancing mining face. Excavation from below the pond water included zones of fine clays and lignite measure materials which then adversely affected the pond water quality and the gold recovery process. The remnant dredge pond at Waikaka is referred to as the L&M Pond.

This current Waikaka alluvial mining proposal is based on utilising an open pit method of pre-stripping to expose the dewatered basal wash layer and to allow for selective wash excavation to minimise gold losses and to separate process contaminants which may affect the gold recovery such as fine clays and lignite measures with carbonaceous zones.

2.3 Resources and Reserves

The Waikaka database and global resource estimate has been updated and defines a global resource of 4.3 M bcm of gold bearing gravel overlain by 49.529 M bcm of overburden with a waste to ore ratio of 11.5. This geological estimate is based on an undiluted inverse distance squared laminar block model with a specified cutoff grade and is constrained by a 20 m buffer inside limits defined by the Waikaka Road to the west and north, the high terrain terrace along the eastern side and the L&M pond to the south.

When the economic resource model using updated mining costs and gold price and an allowance for 10 percent wash dilution is run and interrogated, a mine path (**Figure 6**) has been determined to maximise the extraction of high grade domains and minimise the diversion of the Waikaka Stream, the resource estimate is modified to 2.118 M bcm of gold bearing gravel overlain by 20.729 M bcm of overburden with a waste to ore ratio of 9.8. **Figure 7** shows the interface of the proposed mine path with the Waikaka landowner areas.

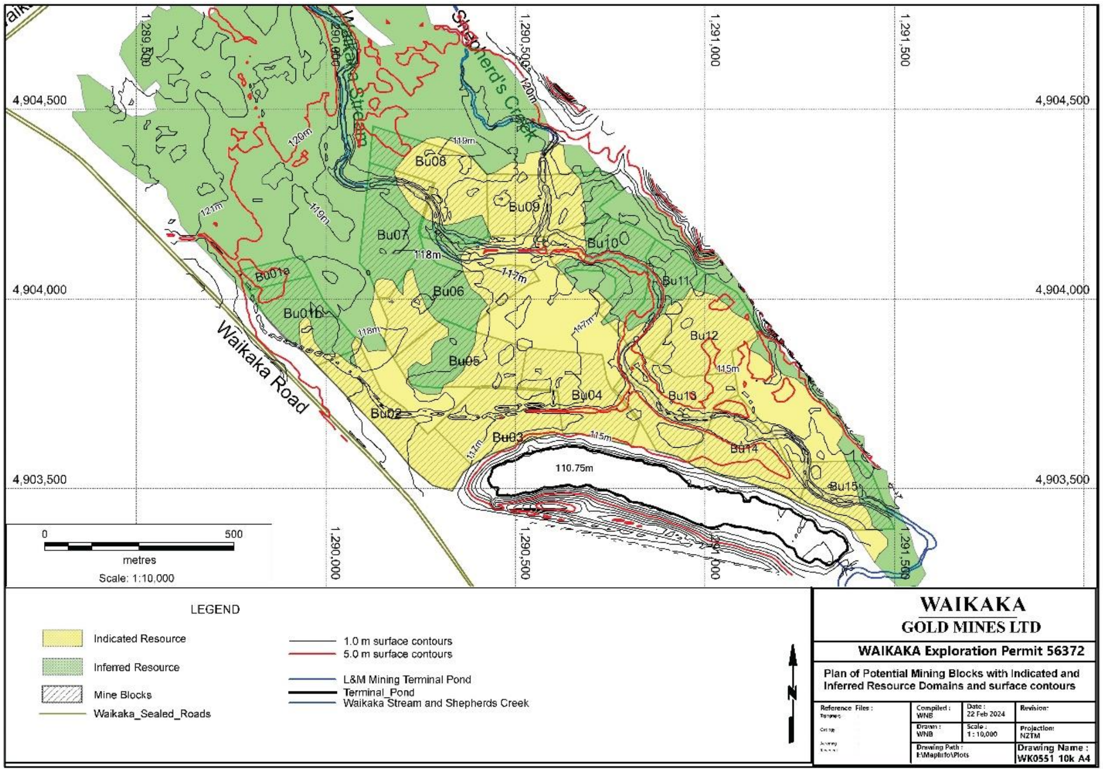

Figure 6 Potential Mining blocks with Resource Domains

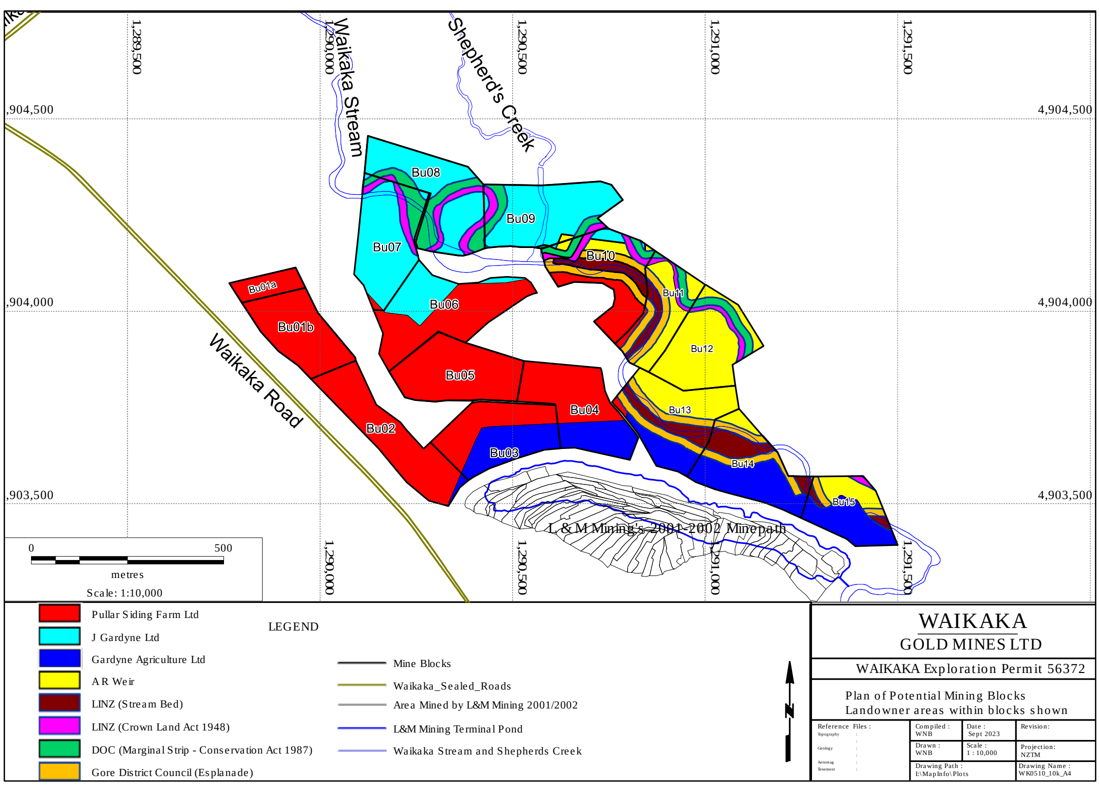

Figure 7 Potential Mining Blocks interface with landowner areas

3 OPERATING PARAMETERS

3.1 Hours Of Work

The hours of work have been determined to meet the proposed production schedules over a nominal mine life of 7 years, utilising a Gold Recovery Plant ("**GRP**") with an operating capacity of 95 bcm per hour. The GRP wash plant will operate on a one 12-hour shift per day for 6 days per week with a planned shutdowns over the Christmas-New Year break and a 4-day break over Easter. Public holidays will not be worked.

Wash extraction and overburden removal and replacement is planned as a single 12-hour shift for 5 or 6 days per week.

Routine maintenance of both the gold plant and mining equipment will be undertaken on Sundays and over planned shutdowns, with the objective of maximizing the daily productive capacity. The proposed operating hours minimise light spill and noise at night and on Sundays and public holidays, and potentially improve the quality of life and well-being of employees when compared with double shifting and extended weekly working hours.

3.2 Production Rates

The proposed alluvial mining operation will mine and process on average 75,000 bcm of gravel wash per quarter. The wash will be mined and hauled to the GRP ROM pad at the rate of 115 bcm/hour and processed at the rate of 95 bcm/hour. The higher mining rate is based on a 10-hour day and 90 percent availability to allow for disruption by weather events and other operating requirements whereas the gold plant will be continuously feed from the ROM pad.

The basal wash zone is generally a consistent thickness but because of the basement dip slope at the Waikaka site the overlying overburden varies in depth from 15 – 20 m at the south end beside the L&M pond and extends to 40 m and greater depths to the north. The depth of overburden and the open pit strip ratio varies along the mine path following the planned block sequence.

The working open pit will be dewatered by portable pumps with the water delivered by pipeline to the process settling ponds from which it would be recovered with pumps for use in the gold recovery plant (GRP) and or disposal into the site drainage system after treatment.

The scheduled overburden movement to meet the gravel wash processing requirements will increase from an average 940 bcm/hour in the first year of operations to 1,600 bcm/hour in year 4 then reducing to 640 bcm/hour in the last year, including any residual rehandle of material from stockpile SP1 to the open pit towards the end of operations. Production rates have been based on 90 percent availability of the operating plant and equipment and 44 days lost per year to weather events.

Overburden stripping ratios will increase from about 8:1 in the first two years increasing to 14:1 in the 4th year before falling to less than 6:1 in the final two years of mine operations.

3.3 Production Schedule

The reserves and mineable resources of wash have been subdivided into 15 resource blocks (**Figure 8**), which form the basis for scheduling, with the scheduled volumes proportioned across the block boundaries (**Figure 8**). The basis of mine scheduling is the amount of wash required to be mined and hauled to the GRP each quarter which sets the yearly area of basal wash to be exposed for mining.

At an average thickness of 3.2 m the basal WQG area to be uncovered for an annual rate of 300,000 bcm is 94,000 m2 (9.4 ha) per year or 30 m2 per hour.

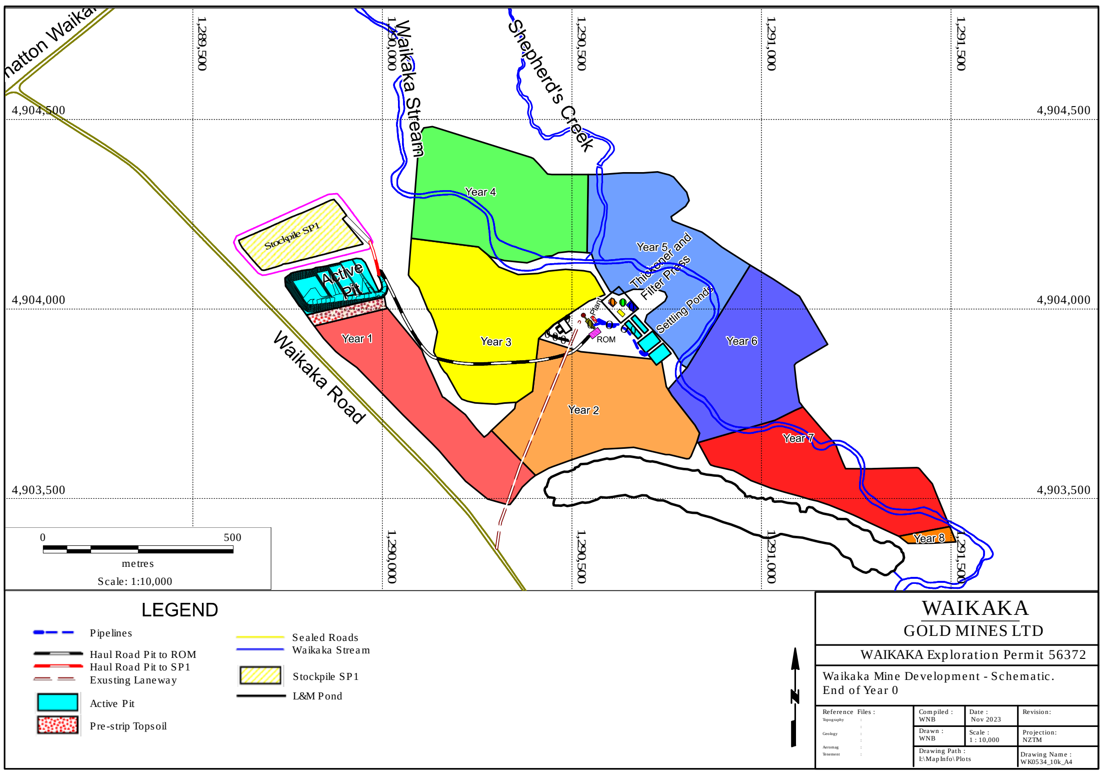

Figure 8 Waikaka Mine Development – schematic for start of Year 1

Total overburden mined over the planned seven years is 20.73 million bcm starting at an average rate of 2.5 Mbcm per year but increasing to 4.25 Mbcm per year then decreasing to 1.70 Mbcm per year following the changes in overburden depth.

The production schedule allows for 44 days per year lost to weather based on days when rainfall exceeds 6.00 mm (0.24 inches), when it is probable that trafficking by off-highway dump trucks on the overburden and backfill will be impaired and the risk of damage to the surface of the ramps and haul roads will be high. The time lost is based on the Gore rainfall statistics for the 45 years to the end of 2016. The days lost to adverse weather will be affected by the daily duration of the rainfall and time of the year with higher drying rates in summer.

The local climate is oceanic temperate with lowest average monthly temperatures of 5-9°C in July and highest of 10-17°C in January-February. The average rain fall is 863 mm per year with rain falling on average 18 days per month. The wettest months are October-November and January and the driest are June–August.

3.4 Personnel Requirements

The proposed alluvial mine is planned to be owner-operated with WGML undertaking mining of both wash and overburden without recourse to mobile plant contractors. While it is proposed that the mining fleet will be owner operated it may be necessary for mining contractors to be utilised during start up and to supplement the main equipment fleet to meet peak demands on overburden handling in the years 3 to 5.

The total number of people employed by the mine will be 26 to 30 as in Table 1.

Table 1 Proposed Staff and Operators Required for Waikaka Mining Operation

Category	Function	Year 1 & 7	Year 2, 3, 4, 5, 6
Management	General management & Operations/Mining Manager, financial management	3	3
Administration	Office & services	2	2
Technical Services	Geologist/Surveyor	1	1
Wash plan & Gold room	Senior Operators & Operators, Gold Room Technician	4	4
Mining	Mining Supervisor, Senior Operators and Operators	4	5
Surface Works	Plant and Dayworks Supervisor, Operators & labourers	4	5
Workshop	Mechanics and Trade Assistant	3	3
Total		**26**	**30**

The mining supervisor will be an experienced operator with a sound understanding of mine operations in particular overburden materials handling with bulk mining equipment. The proposed mine will require a high level of operator competence and may have limited demand for unskilled workers. Senior operators will be employed to operate large excavators and bulldozers with onsite training and multi-tasking planned to allow cost-effective utilization of the workforce and for operators to upgrade their operating competency.

The gold recovery plant (GRP) will be operated on a one shift per day basis with a single supervisor or foreman responsible for both overseeing the gold plant, slimes recovery plant and the associated surface works.

Two mechanics and a trade assistant will be employed to service and undertake routine repairs and maintenance of mobile plant and equipment with support from external contractors as required. Plant operators will be used to undertake routine maintenance on the gold plant including changing of trommel screens and pump liners, with major works scheduled for Sundays or shutdown periods.

4 MINING METHODOLOGY

4.1 Preferred Mining Methodology

The open pit mining method will be utilised at the Waikaka site to excavate overburden benches and uncover the basal gold bearing wash which will then be selectively excavated to minimise dilution. After removal of the basal wash the pit void will be progressively backfilled with overburden sourced either direct from the advancing benches or from an overburden stockpile.

The overburden excavation process is a sequence of advancing cut benches which vary in height for the size of equipment and the working bench stability provided by the variable geotechnical and geological ground conditions. The bench height will generally vary between 3.0 m and 10.0 m with a minimum 15 – 20 m working width along the benches. Working face drainage and efficient bench dewatering will be essential for maintaining stable working conditions for the equipment.

Overburden will be removed by excavators loading rear dump trucks. Where possible the overburden will be hauled directly from the excavation benches to backfill the mine void behind the wash extraction bench. At the commencement of mining, overburden will be stockpiled until there is sufficient void space to start backfilling. Additional material will go to a stockpile during years 3-5 as the mine progressively deepens and when the void space behind the mine bench is insufficient to take all the overburden removed as backfill.

The high production rates for the relatively high overburden depth at Waikaka require the use of large sized excavators in the 120 to 180 tonne weight range and 70-100 tonne capacity rigid dump trucks as the preferred option for the overburden mining equipment. The number and size of plant units required will vary according to the planned overburden removal rate which reaches a peak in Year 4.

The wash exposed on the mine bench will be mined with a 40-tonne excavator, either by top or bottom loading one or two 40-tonne All Terrain Dump (ATD) trucks. These ATD trucks would also be used to backload tailings from the GRP to the alluvial pit for disposal with the backfill. The GRP tailings consisting of screen oversize, dewatered jig sands and cyclone underflow, comprising approximately 88% of the plant feed by weight will be loaded out from the GRP by either a wheeled loader or a backhoe excavator and backhauled by the wash mining truck fleet for disposal with the backfill.

The volume of gold bearing concentrate extracted in the wash processing by the GRP is relatively small, hence, the total volume of overburden and wash tailings can be returned to the mine void with due allowance for backfill slope stability, materials bulking effects and any additional compaction requirements to achieve the final post mining landform surface.

A supplementary fleet including medium sized excavators, dump trucks, bulldozers, graders, water truck and other support equipment for the ancillary activities is required. Additional small excavators and trucks maybe required for soil removal, pit and surface drainage and pumping activities, slimes removal from the settling ponds and other general site works.

4.2 Mine Site Layout

4.2.1 Mining Site

The mining site is within the area of the Mining Permit Application shown in Figure 1. The area to be mined flows a sinuous mine path covering 85ha after allowance for batters (**Figure 9**). The mine path is constrained by buffer zones with a minimum width of 30 metres between the top of batters and the Waikaka Road reserve, the L&M Pond and the Waikaka Stream (except where it is diverted) and any diversion channel alongside which current mining is taking place. The mine working face advances between 300 and 800 metres per year depending on the width and shape of the mine blocks.

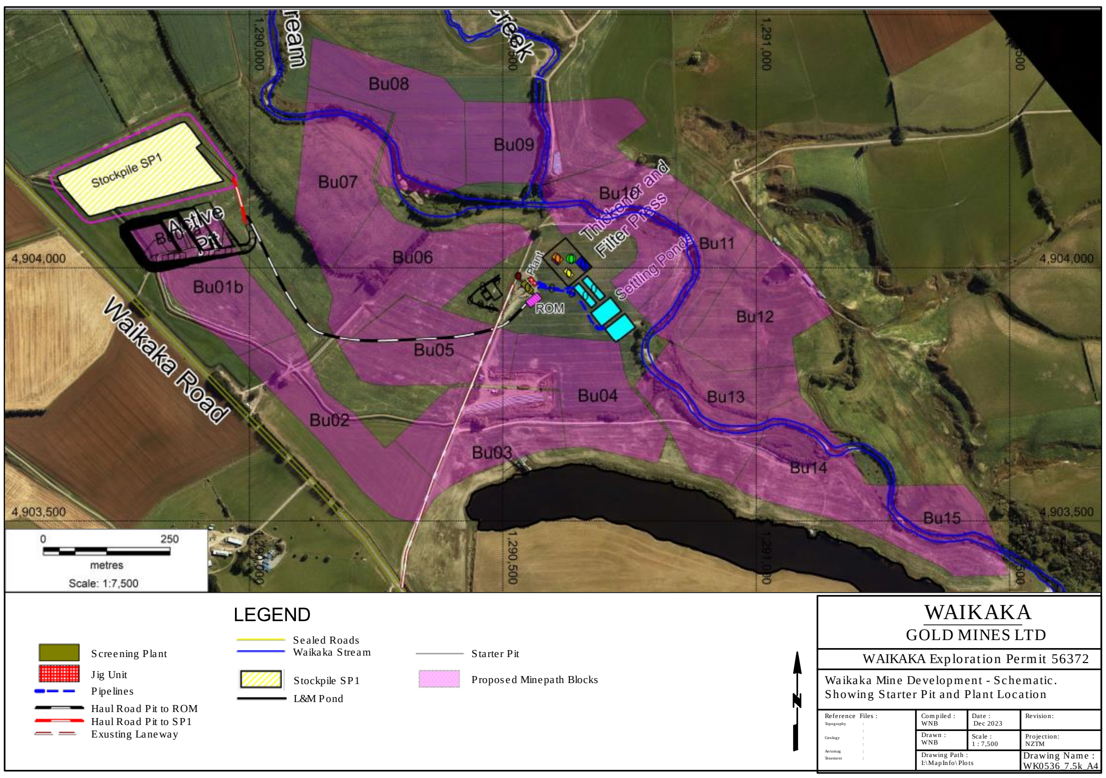

Figure 9 Mine Site Plan General Layout of Starter pit and plant location

4.2.2 Infrastructure, Settling Ponds and Gold Recovery plant location

Initially all the mine infrastructure will be centrally located over low grade ground on the Pullar Siding Farm. The total area required for infrastructure is about 3.5 ha and includes the gold recovery plant, ROM pad, tailings bin, workshop and hardstand area for plant and equipment, fuel storage, office and employee amenities, car parking, settling ponds and slimes processing. **Table 2** & **Figure 10**.

Table 2 Footprint of Infrastructure, Settling Ponds, and Gold Recovery Plant in Figure 10

Description	Dimensions	Area (ha)
Office, Amenities & Parking	60 m x 10 m	0.60
Workshop Area & fuel storage	55 m x 60 m	0.32
GRP, ROM Pad & Tailings Bin	95 m x 70 m	0.67
Settling Ponds & fines treatment	240 m x 60 m	1.44
Roads, drains, services parking	Remnant area within zone	0.97
Total Infrastructure		**3.45**

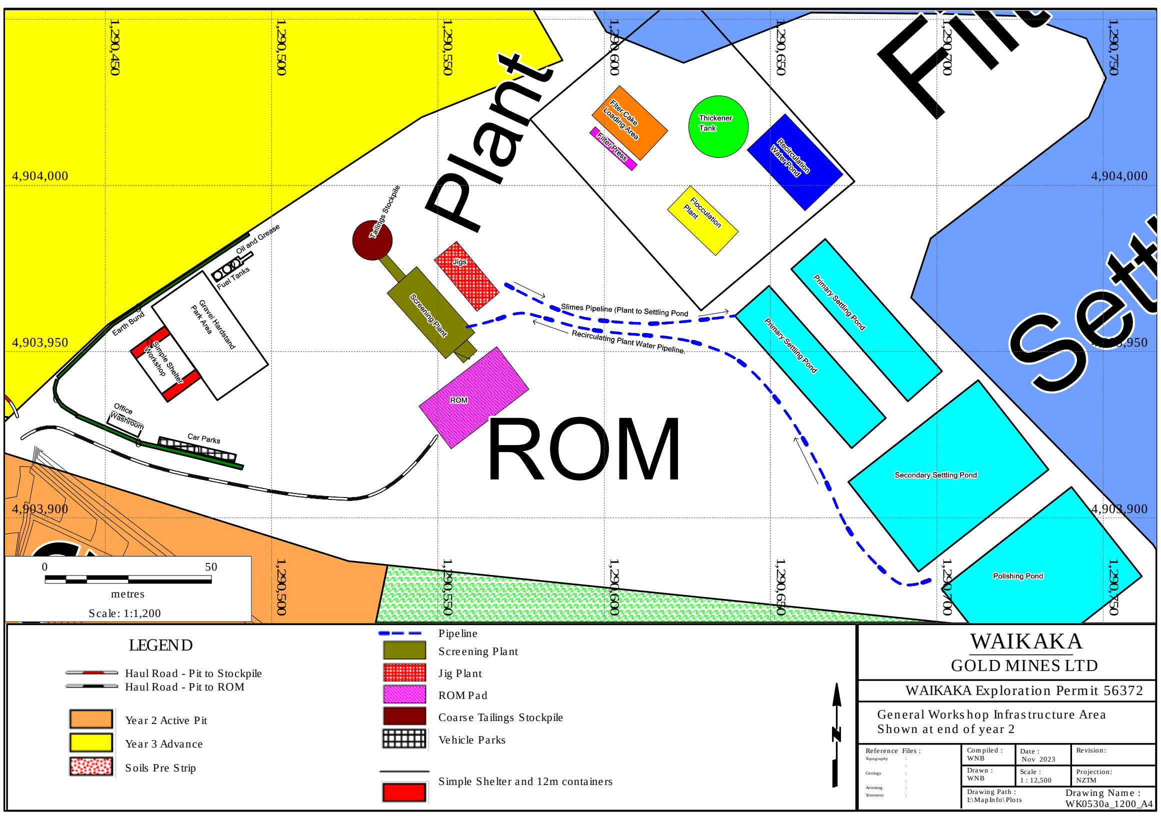

Figure 10 Infrastructure Plan with Settling Ponds to SE, GRP and water processing plant

Access will be from the Waikaka Road in the SW corner of the property following the old railway reserve. The access road will be rerouted over backfill around the working open pit towards the end of Year 1 and during Year 2 of operations.

The project planning includes provision during Year 4 or 5 to completely relocate the infrastructure (**Figure 11**) including the gold recovery plant, workshop & office, SP1, settling ponds and slimes processing plant to the SE corner of the mine site outside the planned mine path on Weirs land, although this will be reviewed closer to the time of the required shift with an alternative location being on the backfill in Year 5.

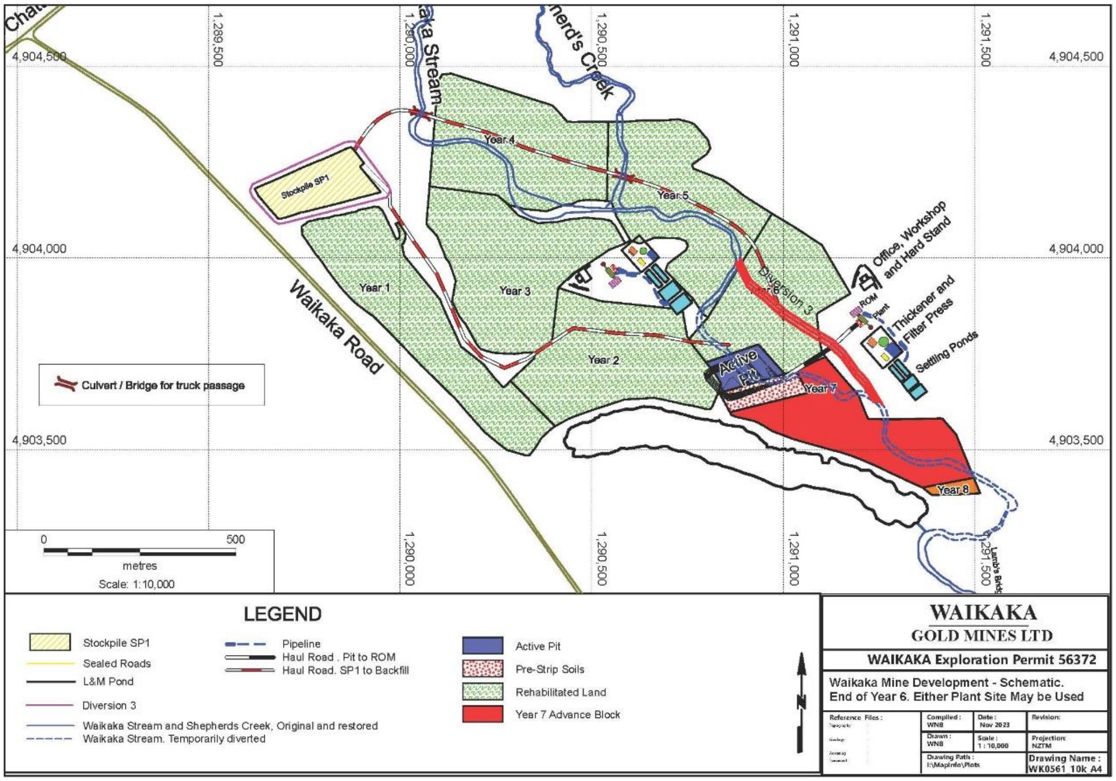

Figure 11 Waikaka Mine Development showing infrastructure in SE location, Year 6

The four settling ponds cover an area of approximately 2 ha and will require 34,000 m3 of material to construct the walls. The pond walls will be compacted clays and built to a height of 2.5 m above ground level with 1:2 batters and 5 m wide surrounding berms to give access to pumps and for cleaning the ponds. The pond base will be unlined and the berms on top of the walls will be capped with gravels to maintain trafficability.

The gold plant and STP pads will require another 9,000 cubic metres of suitable overburden gravels and sands to compacted to form construction pads.

Wherever possible suitable overburden material excavated from the starter pit will be used for construction of civil works including haul roads and settling ponds, supplemented by imported crushed aggregate, if necessary. Most of the overburden from the starter pit will go to the Stockpile SP1 which will cover an area of 4.5 ha and have a capacity of 446,000 cubic metres to a height of 10 m. Total overburden to be mined from the starter pit is 301,000 bcm of which initially 258,000 bcm will go to stockpile.

The starter pit will expose a 30m bench of wash that will be used to build the ROM pad for the GRP which will provide a stockpile to buffer plant feed if mining of wash is interrupted by adverse weather events

Before construction of civil works commences soils in the area will be pushed and stockpiled in bunds surrounding the infrastructure sites to provide flood protection.

Mine development is expected to take 3 months including assembly and construction of the gold plant, STP and the supporting infrastructure.

4.2.3 Haul and Light Traffic Roads

An all-weather haul road will be established from the starter pit in the northwest corner of the mine site to the GRP and SP1 (**Figure 12**). The average haul distances from the centroids of the mine blocks to the ROM pad is 450 metres but the haul distances will probably be longer utilizing trunk haul roads to which temporary lateral haul roads will be connected as the mine advances along the mine path. The trunk haul roads will be designed to be in service as long as possible before being relocated as haul distances become too long. Wherever practical separate light traffic roads will be constructed connecting the office, the workshop area, GRP, settling ponds with the active mining area.

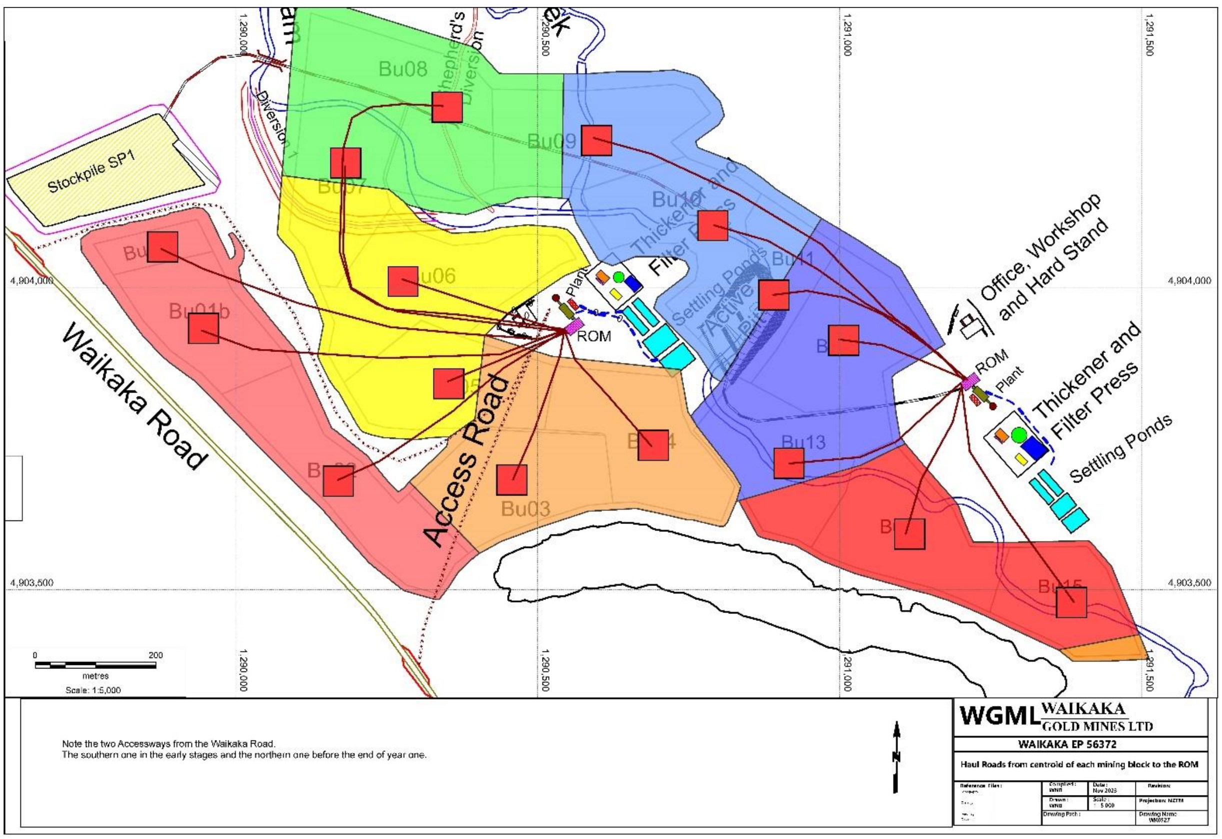

Figure 12 Haul Road Layout with resource Block centroids to the ROM areas

4.3 Resource Materials and Mine Design

4.3.1 Material Classification

Mining of the WQG involves removing 15 to 40 metres of overburden in a series of working slices or benches to expose the basal gold-bearing wash. The sequence to be mined comprises:

4.3.1.1 Soils

The thin surface soils across the site are old dredge tails enriched by organic material accumulated since dredging ceased in 1935, and more especially from fodder cropping and intensive winter grazing over the last 20 years. The McGeorge Bros. were early dredging pioneers in stacking fines over coarse tailing while dredging although the soils remain stoney. The average thickness of the soils is 20 - 30 centimetres with very limited subsoil development.

4.3.1.2 Old Dredge Tailings (Overburden)

The dredge tailings average 3-6 metres thick and extend across the entire mine area. They are comprised of pebble to cobble size material derived from Recent alluvium and the sub-cropping WQG. Within the dredge tailings there are pockets and layers of “Waikaka Blue” which are the clay slimes from historical dredge operations which accumulated in dredge ponds and under the coarser tails. These have thixotropic properties and are difficult to handle with earthmoving equipment although they stand in working faces reasonably well when dry and undisturbed.

4.3.1.3 Upper Waikaka Sequence (Overburden)

The UWS comprises clays with intercalated sand and gravel layers and lenses, and thin discontinuous pockets of lignite and carbonaceous clays. The clays are blue-grey and very stiff and cohesive when dry. Locally there are massive clay units up to 15 metres thick. Quartz-rich pebbly gravel beds vary between 1 and 5 metres thick. Quartz sands lenses are generally less than 2 metres thick and have less continuity than the gravel beds. Lignitic and carbonaceous clay beds form less than one percent of the stratigraphic column overall. There is significant lateral facies variation from clay dominated facies in the south to more sandy and gravelly facies in the north (**Figure 13**, **Figure 14**).

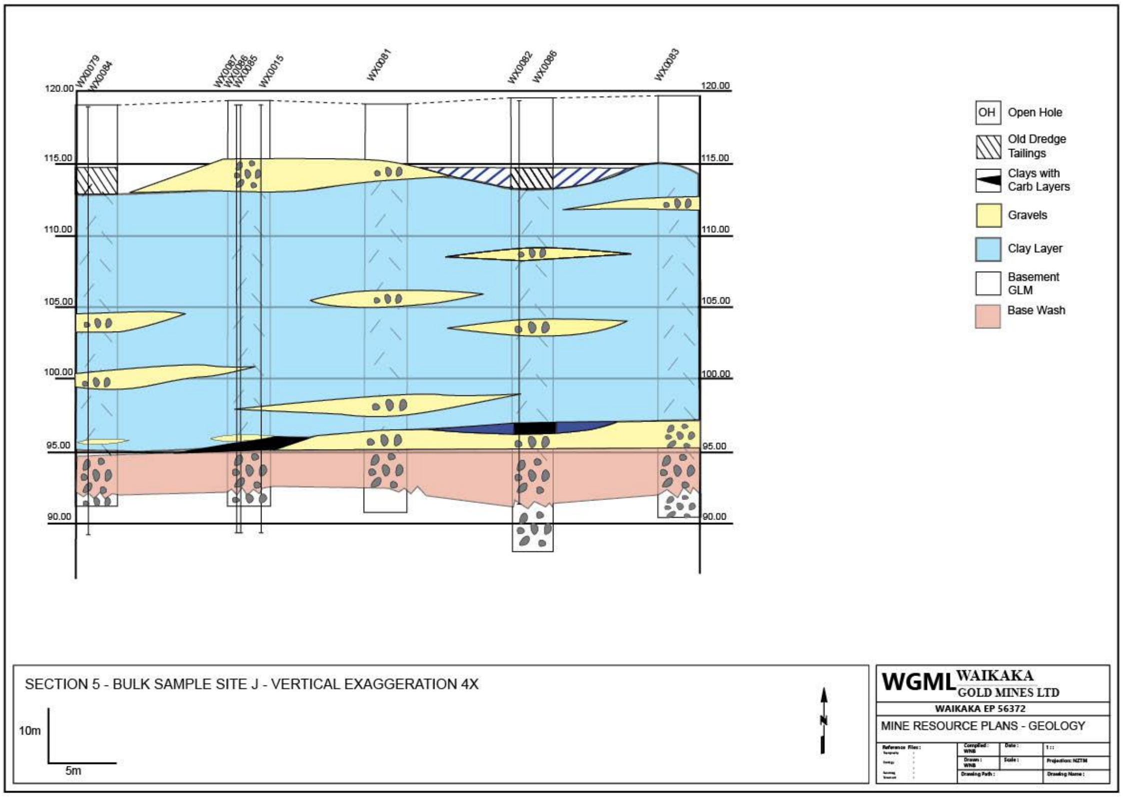

Figure 13 Schematic Section through UWS and WQG at Site 5 in southern Mine Area

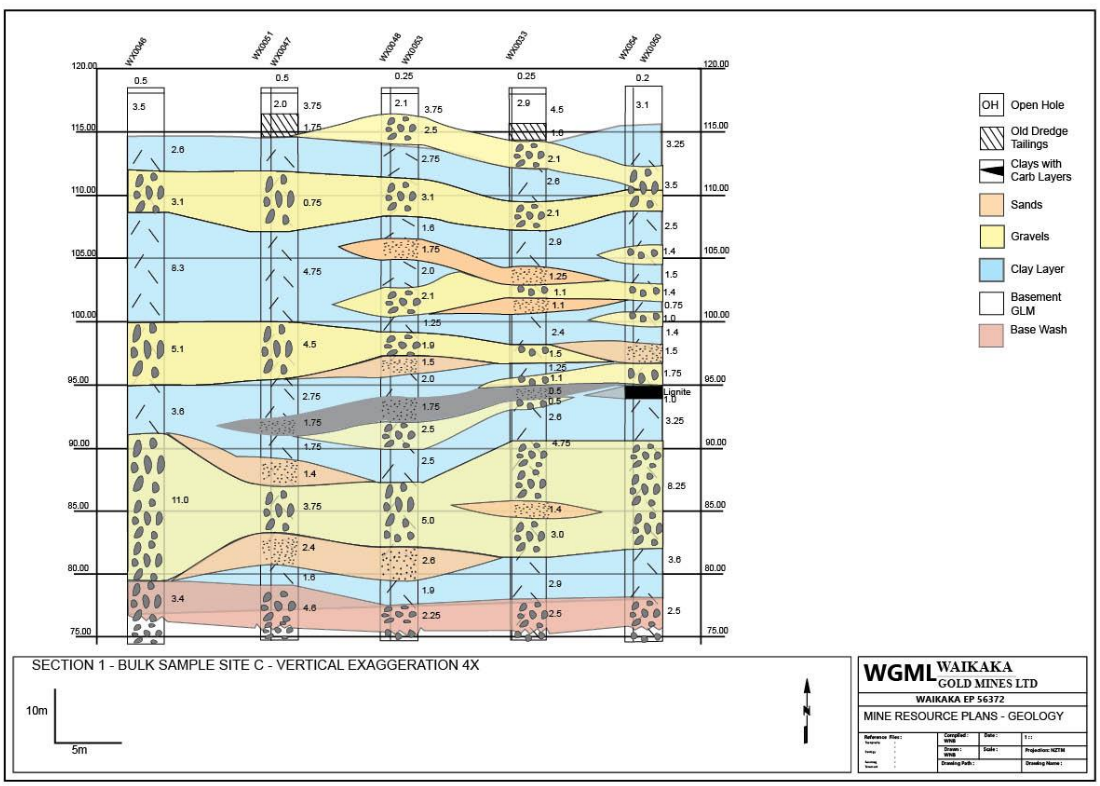

Figure 14 Schematic Section through UWS & WQG at Site 1 in northern Mine Area

4.3.1.4 Waikaka Quartz Gravels (Wash)

The sandy quartz pebble-cobble conglomerates forming the WQG have a clay content of approximately 4 percent. The average thickness of the WQG is 2.8 metres but it varies between 2 and 5 metres. The gravels are unconsolidated and readily disaggregate. In places the basal wash merges upwards into gravel beds of the UWS with little to distinguish them except the WQG generally carries gold with a grade greater than 100 milligrams per cubic metre.

4.3.1.5 Basement

The WQC sits unconformably or disconformably on a clay-rich weathered lithic quartz conglomerate forming the top of the Gore Lignite Measures ("**GLM**"). On disaggregation and washing the material is indistinguishable from the WQG. The basement forms the floor of the open pit, which is also the dewatering surface for drainage sumps and pumping installations.

4.3.2 Mine Development

4.3.2.1 Mine Design

The mine will be developed as an open pit mining operation commencing from a starter pit in the northwest corner of the mine path area and advancing south as in **Figure 15**. The initial pit void forming the starter pit for the mining operations is approximately 170 x 100m at the pit base.

Figure 16 shows a general arrangement for a starter open pit with access ramps from the ground surface extending to the basal alluvial wash. The working bench heights of the overburden removal will be varied depending on the geotechnical characteristics of the overburden.

Backfilling and progressive rehabilitation will follow the mine face advances along the mine path from the starter pit, after the wash extraction is completed.

The general sequence of mine path advances with sequential excavation and backfill placement on an annual basis is illustrated in **Figures 17 – 23**.

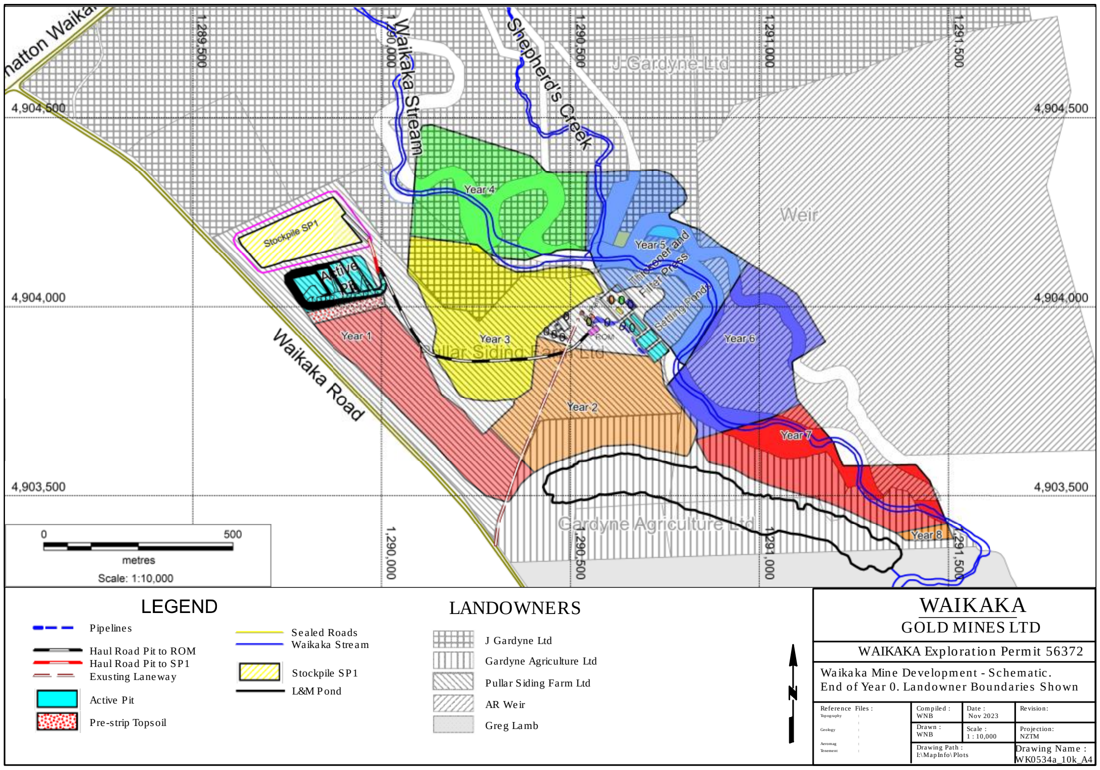

Figure 15 Initial Mine Footprint in NW Corner of Mine Area. Overburden hauled to SP1 or used in construction of Settling Ponds and Haul Roads.

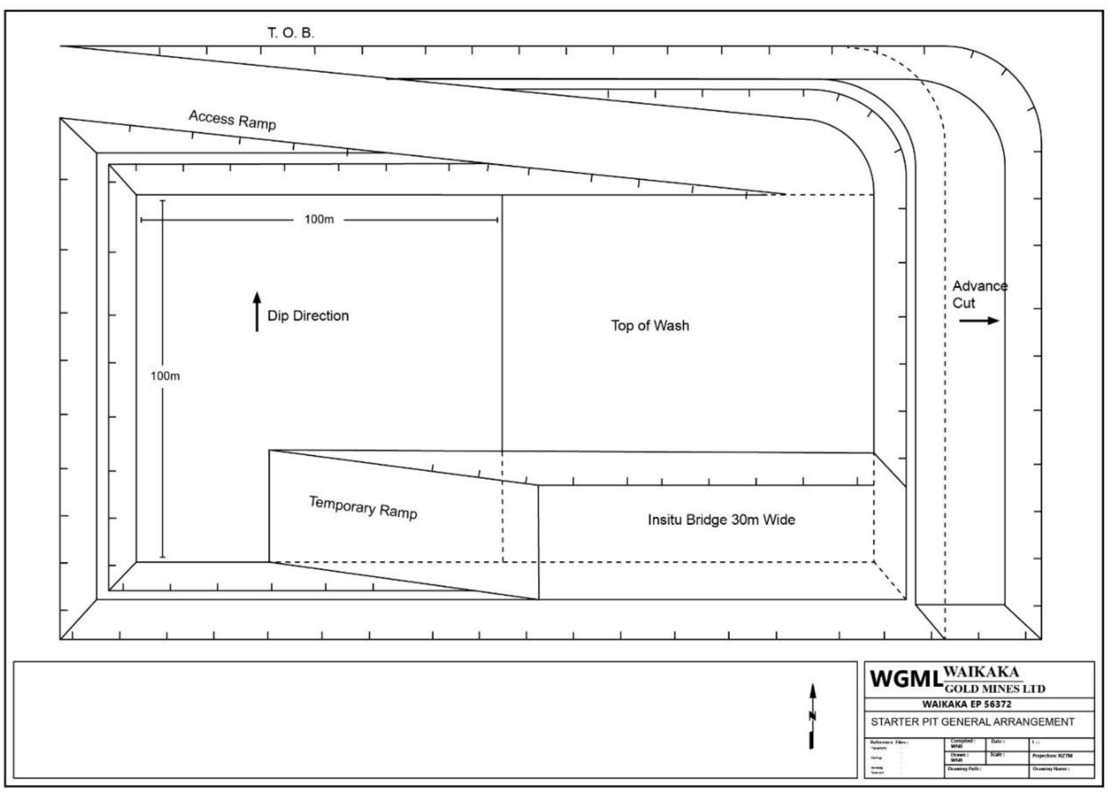

Figure 16 Waikaka starter pit general arrangement with overburden bridge concept

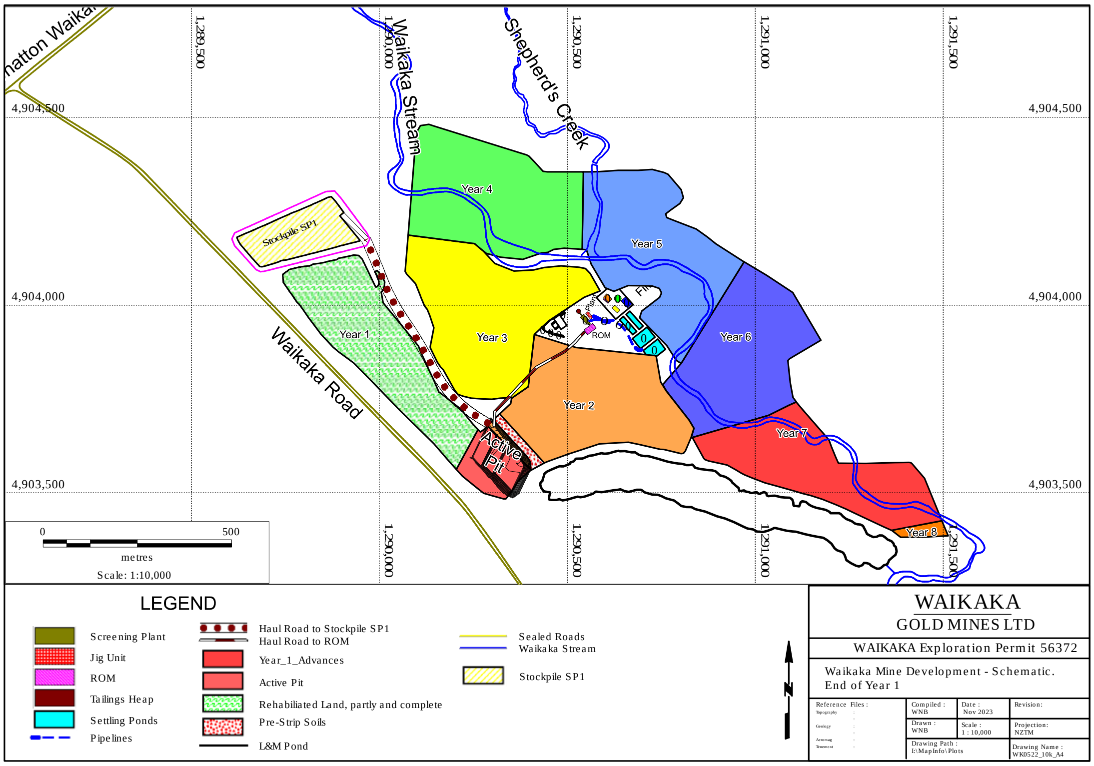

Figure 17 Waikaka Mine Development – Schematic End of year 1 with the active pit at SW corner

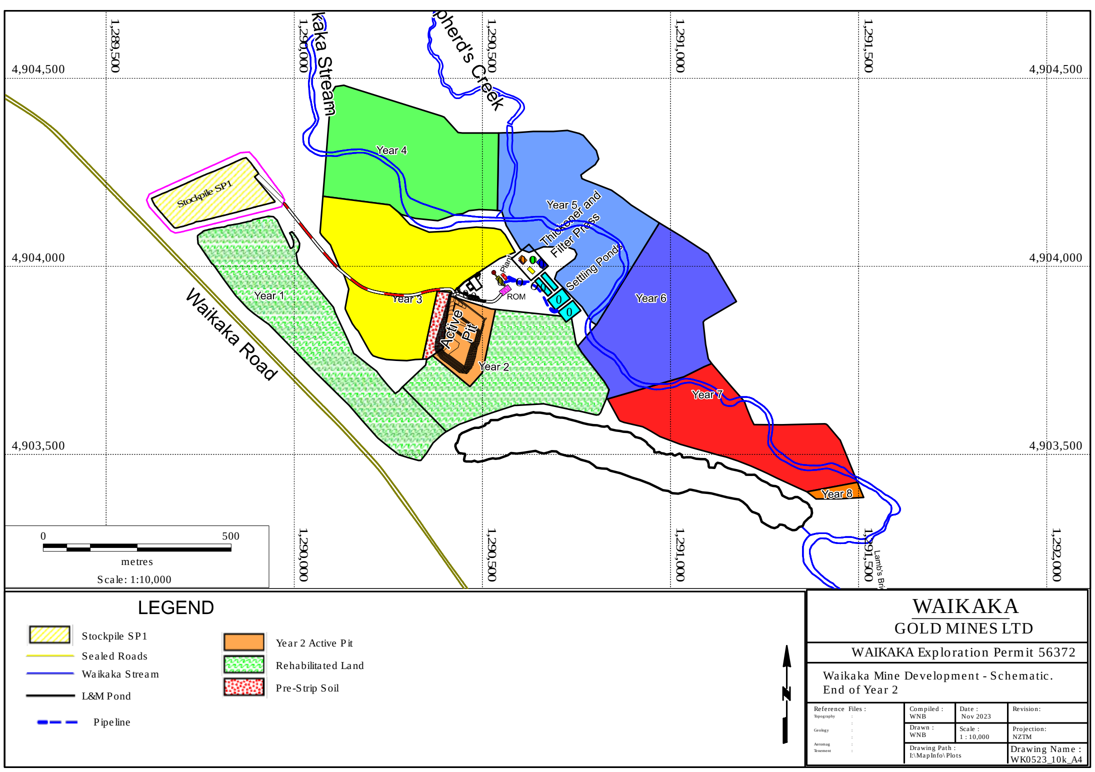

Figure 18 Waikaka Mine Development – Schematic End of year 2 showing active pit location

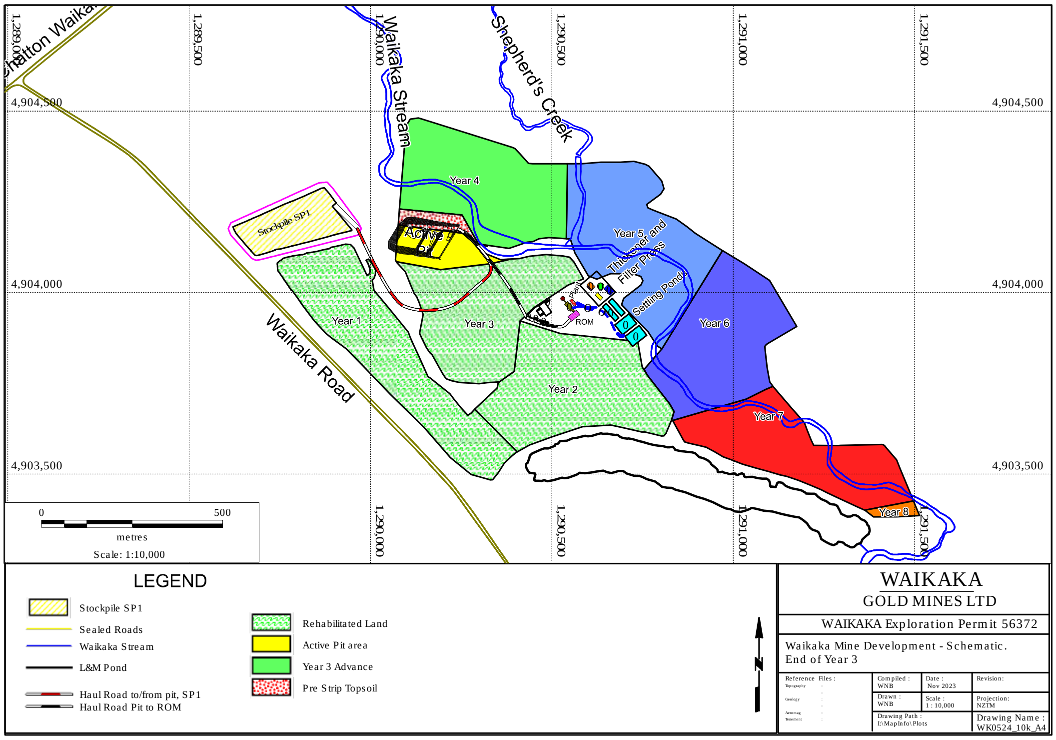

Figure 19 Waikaka Mine Development – Schematic End of year 3 showing active pit location

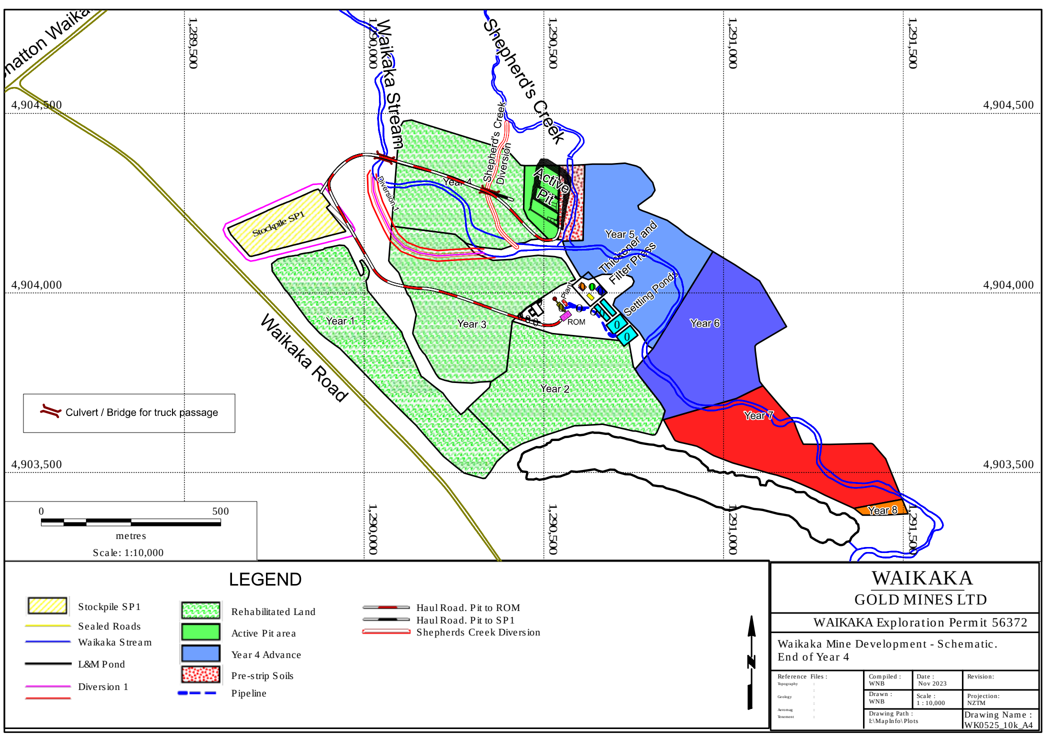

Figure 20 Waikaka Mine Development – Schematic End of year 4 showing active pit location and Diversion 1 across the Year 3 backfill

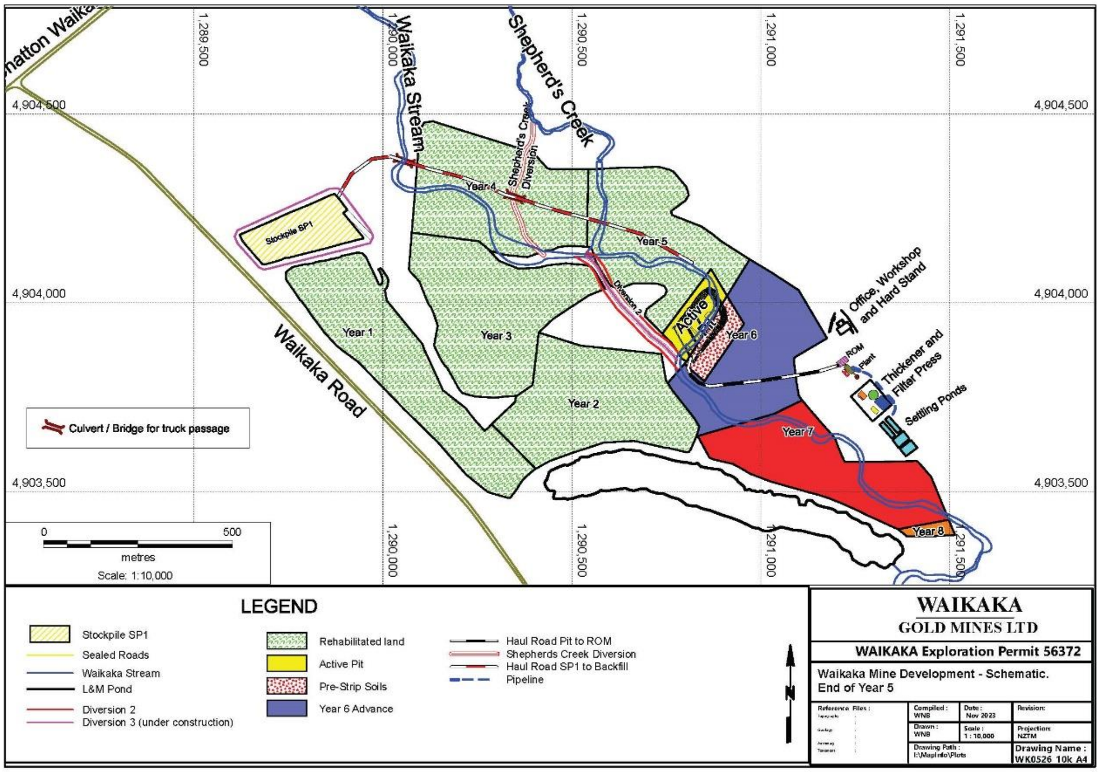

Figure 21 Waikaka Mine Development – Schematic End of year 5 showing active pit location and Diversion 2 across the redundant infrastructure site.

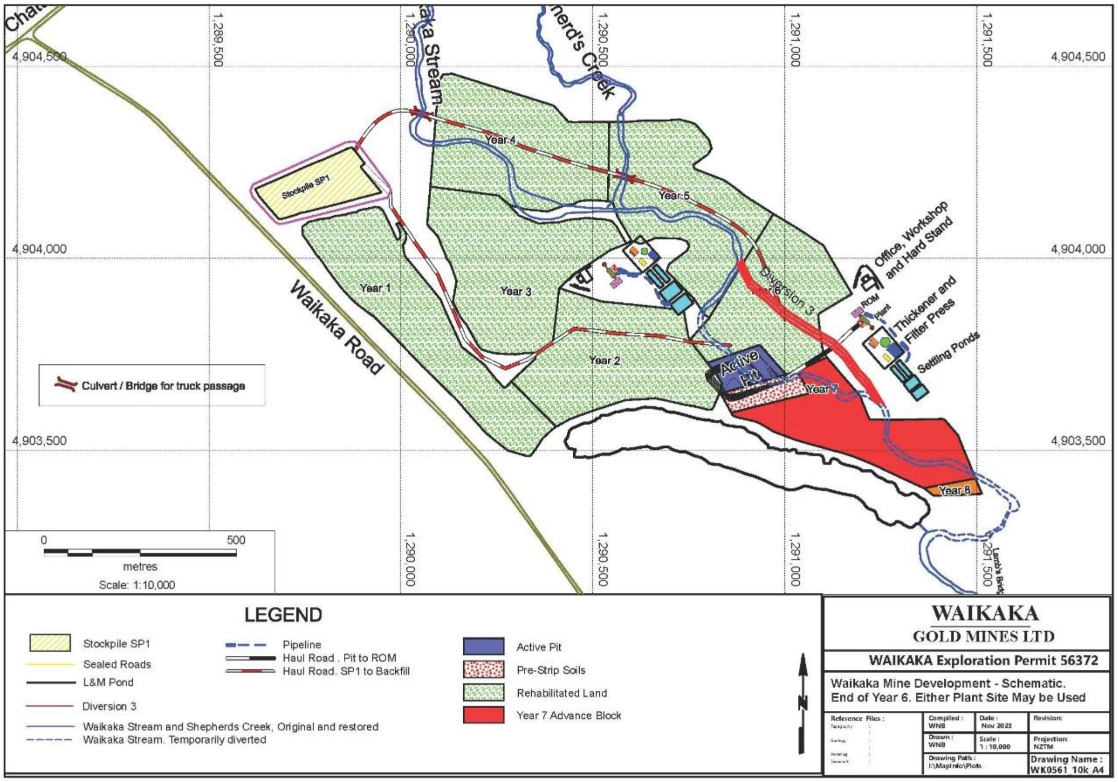

Figure 22 Waikaka Mine Development – Schematic End of Year 6 showing active pit location and Diversion 3 into the L&M pond across the backfilled mine voids.

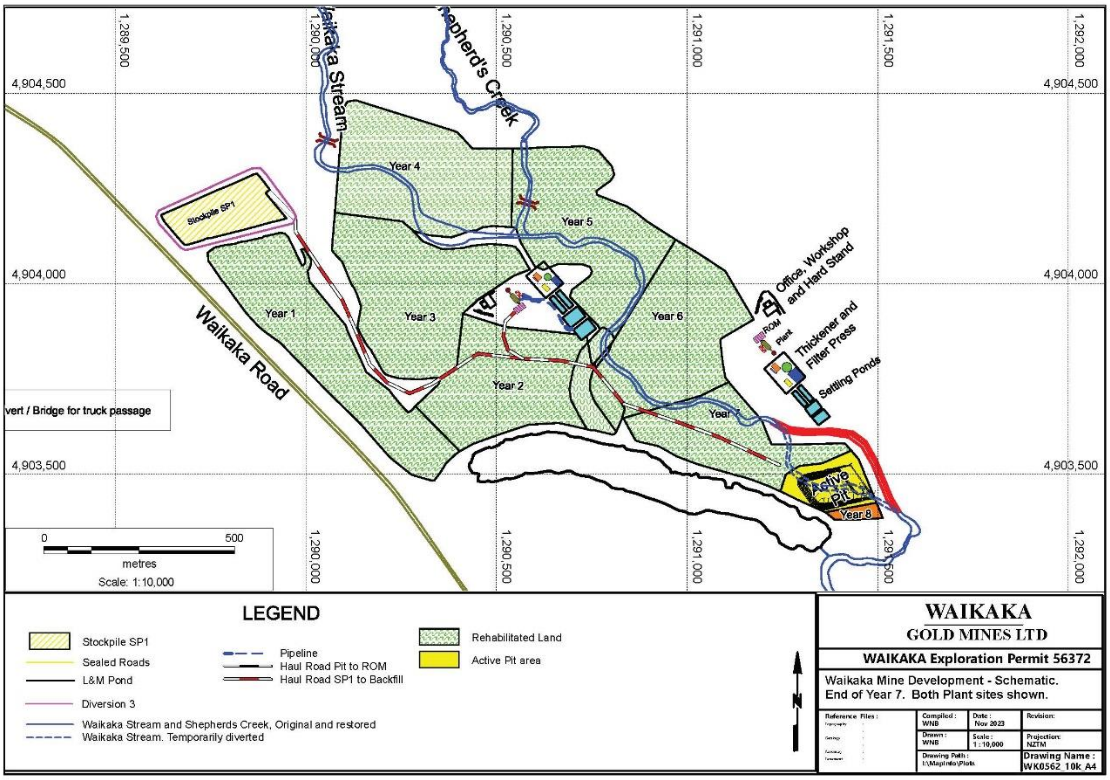

Figure 23 Waikaka Mine Development – Schematic End of Year 7 showing active pit location and Diversion 3 into the L&M pond across the backfilled mine voids.

4.3.2.2 L&M Pond

The elongated pond referred to as the L&M Pond (**Figure 24**) is located at the south end of the potential Waikaka mining area and is a remnant of the previous L&M alluvial mining activity. The pond contains settled fine mud to a depth of about 8 metres below the pond water level which is at an RL of 110.75 m.

The pond receives water from the surface drains at its western end and has an outlet into the Waikaka Stream via culverts at its eastern end.

The NW drain will be diverted to the pond at the start of mining operations. If an overflow channel is required it will be constructed along the southern boundary of the GAL property to take flow in excess of the capacity of the culverts (2.8 m3/s) at the eastern end of the pond.

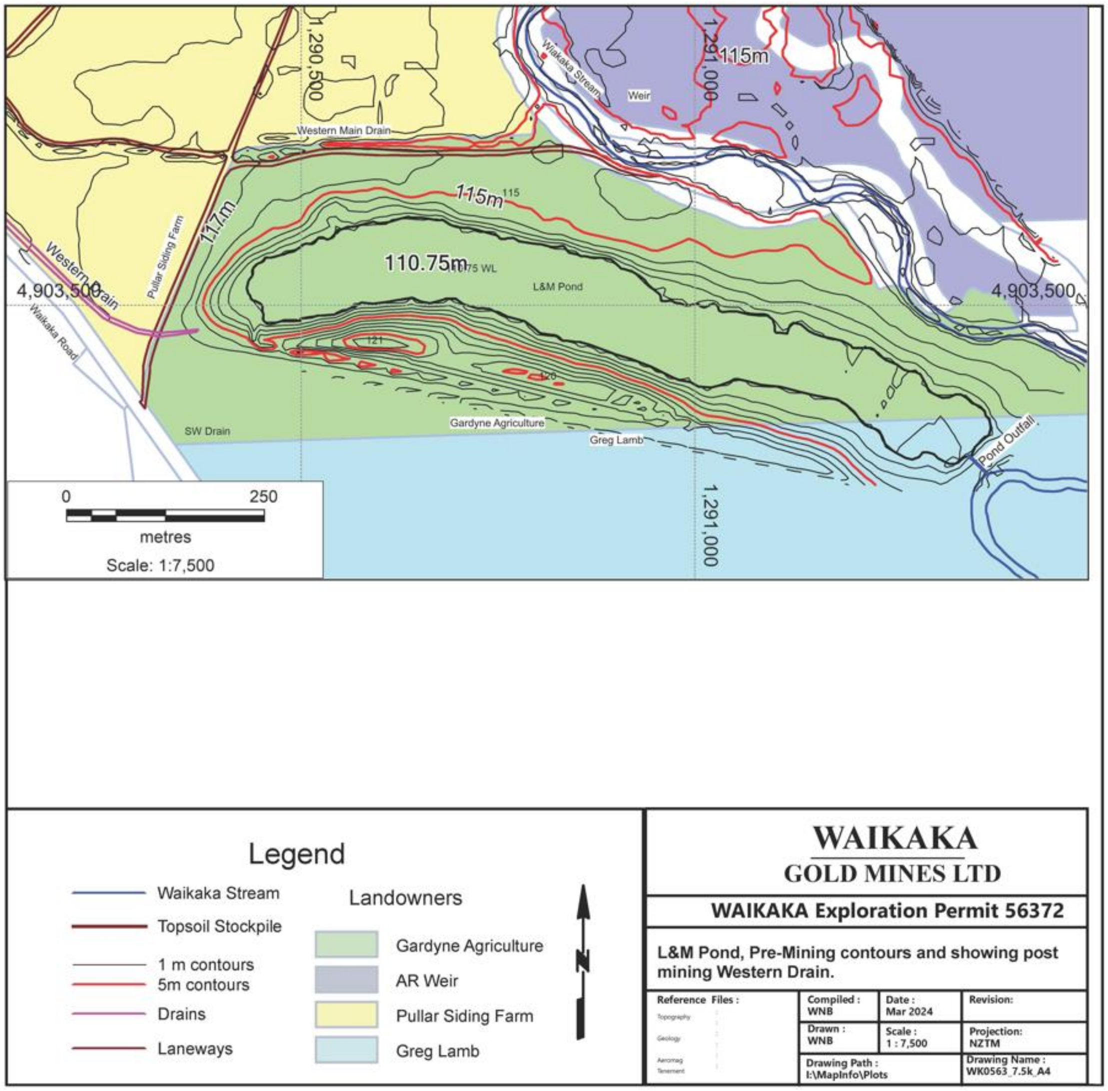

Figure 24 L&M Pond Pre-mining

4.3.2.3 Overburden stockpiles

It is estimated that approximately 667,000 bcm of overburden (excluding soils) will need to be stockpiled over the life of the mine (Table 3). In addition, up to 63,000 bcm of suitable overburden will be used in construction of civil works (settling ponds, plant pads, haul roads, hardstand areas). Any excess overburden that cannot be accommodated by the designated stockpiles will go to temporary stockpiles built on the backfill behind the active mine face.

The starter pit will require excavation of 301,000 bcm of overburden of which at least 238,000 is expected to go to SP1 stockpile immediately north of the pit, the balance being used for civil construction. Another 261,000 bcm is expected to go to stockpiles during excavation of overburden ahead of mining from startup until sufficient mine void space has been created to commence backfilling. Once sufficient mine void has been established to accommodate all overburden as it is mined, the backfill capacity will increase as the mine advances southwards up-dip and the stripping ratio reduces. There will be overburden stripped ahead to take up all the capacity and the mine void will increase. As the mine advances northwards down-dip in late year 2 and year 3 the trend will reverse as stripping ratios increase until there is no surplus back fill capacity and excess overburden will have to be stockpiled. This maybe in temporary stockpiles built on the backfill which could assist consolidation.

From Year 5 onwards the mine again advances southwards with decreasing stripping ratios with sufficient backfill capacity to accommodate all overburden as it is excavated. Once stockpiling is no longer required material from the stockpile can be progressively returned to the pit as capacity and time allow, with all stockpiled material finally being returned to the mine void during years 7 and 8.

Table 3 Requirements over Life of Mine ('000 bcm)

Year	0	1	2	3 to 5	6	7	Total
Civil Works	63						63
SP1	238	208	0				446
CSP & WSP		53	0	92			145
Additional SP’s				13			13
WSP							
Total	**301**	**261**	**0**	**105**			**667**

The stockpiles will be constructed in a number of lifts to a maximum height of 10.0 m utilizing both paddock dumping and / or end tipping techniques. The topsoil will be removed from the stockpile footprint before stockpiling the overburden on land outside the mine path and placed either in a stockpile or used as a bund around the base of the stockpile to collect surface water runoff. A collector drain will be formed inside the bund. Stockpile SP1 will have a footprint of about 300 x 150 metres covering 4.5 hectares with perimeter slopes of 1:2.

A haul ramp at 1 in 10 gradient will be used to access the upper lifts of the stockpile and wash plant gravel will be used as required for sheeting the truck working areas. A 10 m wide strip for the drainage collection and roading access will remain around the stockpile base.

4.3.3 Open Pit Batter Slopes

4.3.3.1 Overburden

The batters formed along the sides of the open pit and at the overburden working faces are temporary until they are buttressed with backfill as in **Figure 25**. The design batter angles can also be maintained or altered as experience dictates. The working benches will migrate rapidly in the direction of the mine path. The operational batter slopes will be formed in the layered mix of overburden clay, sand, gravel, and tailings. These materials may be subject to localized slumps and toppling failures. Batter angles will depend on the materials excavated and are to be established with geotechnical advice.

A slope monitoring programme will be detailed in the Management Plans and a geotechnical consultant will be engaged to monitor and assess the working slopes as required.

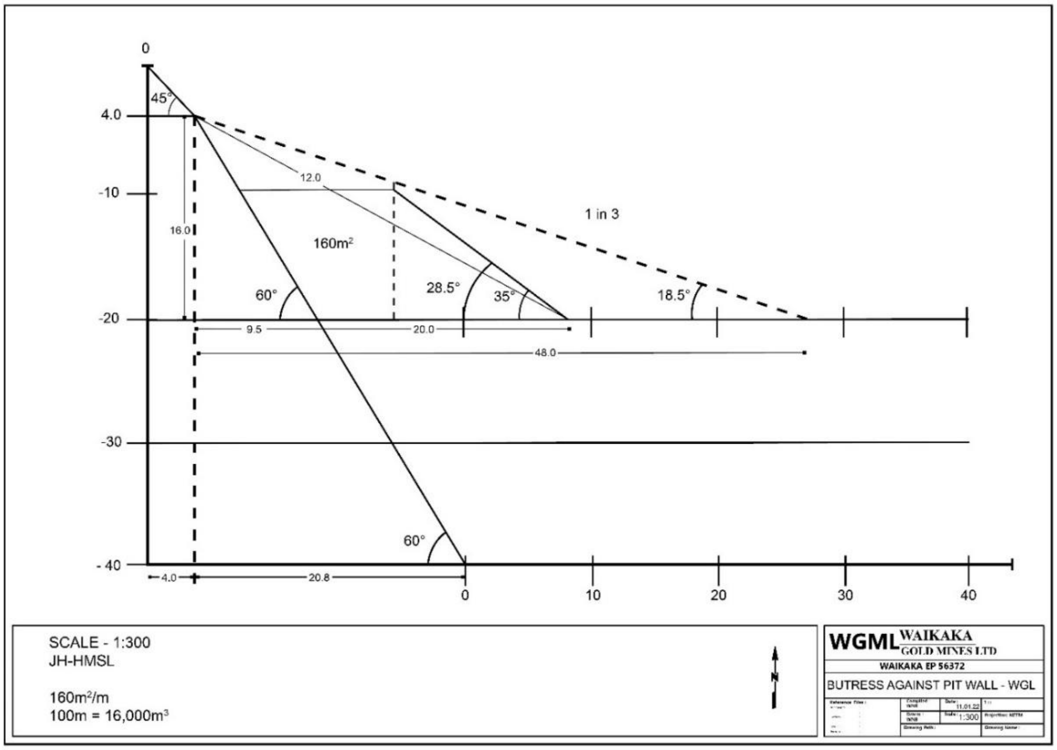

Figure 25 Buttress shown against Pit Wall

4.3.3.2 Backfill

The backfill slopes of placement will depend upon the thickness of the layers placed, the degree of machinery compaction, the type of material and the moisture content of the materials.

Placing the overburden in layers of nominal 3.0 to 5.0 m thickness depending upon the type of material will assist both the compaction and the stability of the working slopes on the backfill.

The formation slopes of the backfill placement will be monitored and the backfill working procedures may be altered if the backfill is observed to slump to angles below 30 – 36 degrees. The wide range of materials available from the overburden will be sufficient to blend clay, sands and silts with higher strength clays and gravels to achieve the planned degree of slope stability.

4.3.3.3 Buffer Zones

A bund of in-situ overburden and old dredge tailings will form a buffer zone between the L&M pond and the working open pit along the south wall of the year 2 mine path traverse. The crest width and the north facing slope dimensions will be confirmed with geotechnical assessment. A nominal crest width of 30 m and 2:1 batter has been assumed in the planning, but final width and slope will be informed by experience gained from the starter pit.

There will be a buffer zone with a minimum width of 20m between the pit edge and the Waikaka Road on the western side of the mine area. The width of the buffer zone may be changed as the depth of the pit alters depending on the observed pit wall stability.

4.3.4 Terminal Pond

Although a terminal void is not planned however on completion of mining a void may remain after return of the all the material from the stockpiles and civil works (settling pond walls, haul roads, etc.) to the backfill due to material lost to recontouring the mine path and other unknowns such as “negative” swell. Any remnant void will be allowed to flood, fenced off and riparian areas planted.

4.3.5 Flood Protection

Flood risk arises from high flows in the Waikaka Stream. Flood protection of the pit will be incorporated into the mine plan utilizing traffic bunds along the haul roads, temporary stockpiles and temporary bunds where necessary to prevent egress of surface run-off water into the open pit. No additional stop banks are proposed along the Waikaka Stream.

The flood channels of the Waikaka Stream diversions are designed to carry a 1 in 25 year flood and the flood risk is considered to be relatively low. A flood management plan will be prepared to provide early warning of severe weather events and potential flooding, to provide trigger points for movement of personnel and equipment from the mine pit to higher ground and securing of the mine site.

The infrastructure site (gold plant, slimes treatment plant, workshop and offices) will be protected by a perimeter bund built from soils pushed to the edge of the site, contoured and planted for the duration of the site use.

4.4 Soil Management

Mine development will be timed to commence in spring after the winter grazing season has been completed and before sowing of fodder crops for the next season on land to be affected by mine development and operations in the first year of operations. Ground conditions will be drier and weather events are less likely to disrupt development.

One of the initial development activities is to pre-strip the existing topsoil for the site establishment and the starter pit excavation. Soils pre-stripped from the SP1, the starter pit, the infrastructure and settling pond areas will go to long term stockpiles acting as noise bunds, limiting light spill, flood protection and providing a visual break between mine development and public roads and adjoining properties. These soil stockpiles shown in **Figure 26**, will be formed to a maximum height of 3 metres and will be grassed for the duration of their existence.

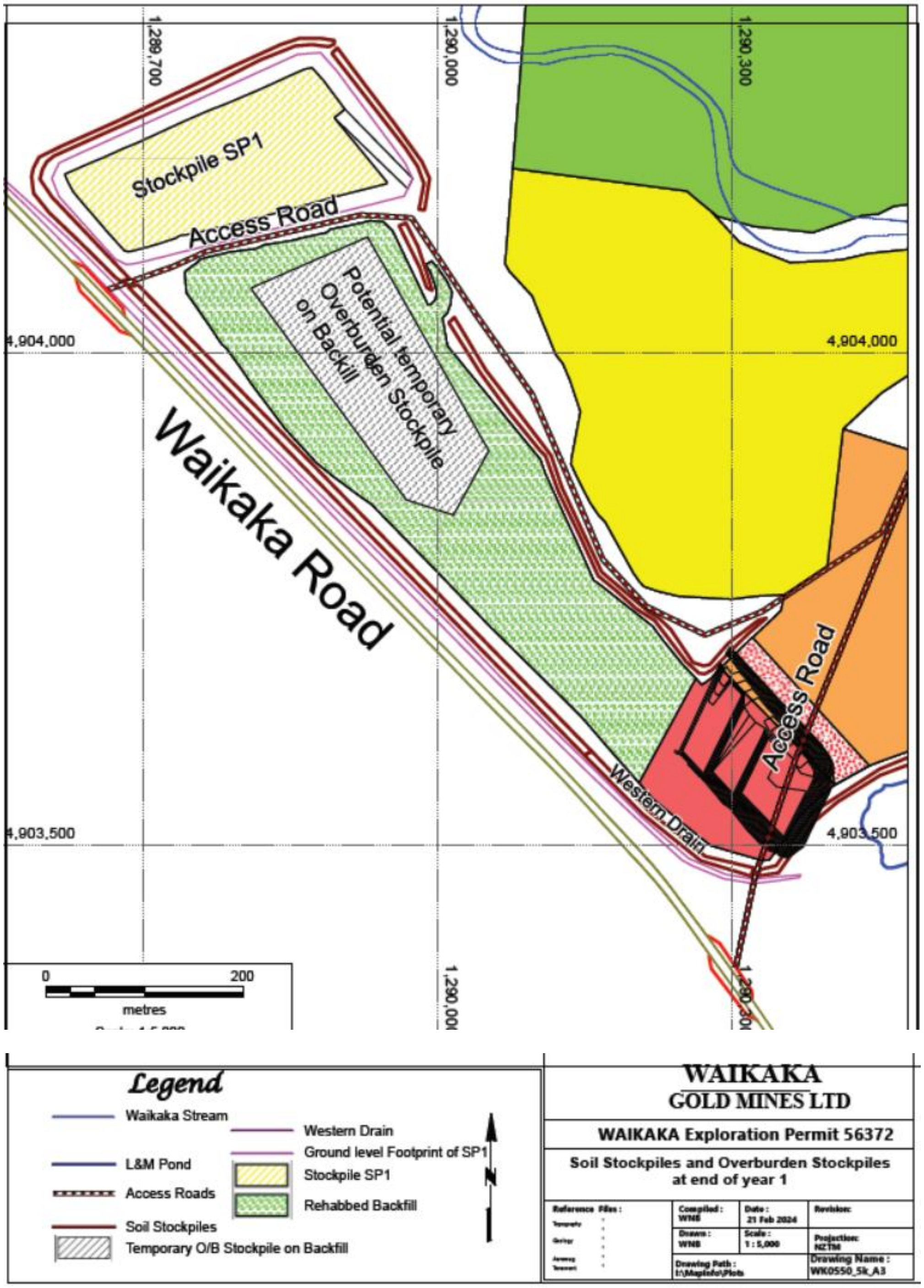

Figure 26 Plan showing the position of topsoil stockpiles and temporary overburden stockpiles.

After mining ceases and the SP1 stockpile, infrastructure, settling ponds and slime plant have been removed the stockpiled soils will be respread in the areas from which they were removed. After completion of the first mine blocks, soils within the mine path which are stripped ahead of pit development can be taken directly to the pit backfill once it is returned to the final land profile to better retain soil quality and minimise rehandling cost. However, soils removed from the starter pit, excess soil pre-stripped during the first traverse, and soil pre-stripped seasonally in quantities greater than the backfill can accommodate may go to short term stockpiles which would be generally less than a year.

The mine path traverses several farms with different ownership and every effort will be made to maintain separate “topsoil owner” stockpiles and to replace the topsoil on the designated owner’s land to minimise movement of soils across property boundaries.

Soils will be reinstated to a minimum thickness of 200 millimetres subject to onsite availability. It may be possible to utilize the sand and fine gravel from the overburden as a subsoil and agricultural advice will be taken on this aspect of the rehabilitation.

Removal, stockpiling, and rehandling will be carried out in accordance with best industry practice for preserving the soil quality, including:

- Managing the moisture content by not handling wet soils
- Limiting the height and size of soil stockpiles
- Following the advice of any Agricultural advisory consultants
- Sealing the topsoil stockpile surface by compacting with a track machinery.
- Keeping accurate records of the areas stripped and the topsoil both in stockpiles and as spread on the reclaim areas.
- Topsoil compaction will be avoided by minimizing the equipment trafficking on the rehabilitation areas.

Stripping of soils will be avoided between June and September to minimise the risk of handling wet soils.

4.5 Overburden Mining

The starter pit will be excavated initially using either 80 tonne or 120 tonne excavators loading to ADT40 trucks hauling overburden materials to the stockpile SP1. When production commences the starter pit wall will advance laterally with overburden benches nominally 30 metres wide and up to a nominal 5.0 m in height to the full width of the mine path. Overburden will continue to be hauled to stockpile SP1 until there is sufficient pit void space to commence backfilling.

The starter pit and production pit are planned to use a pit wall batter angle of 60 degrees reducing to 45 degrees in the old near surface dredge tailings. The planned backfill batter angle of repose is 36 degrees. Pit batters will be monitored, and batter angles steepened if ground conditions permit and flattened if unstable batters are encountered.

The overburden removal sequence will generally work a system of three sub-blocks with overburden excavation in benches between 3.00 and 5.0 m in height or higher up to 10.0 m, depending upon the type of overburden. The rear dump trucks will generally haul the overburden across or around the second sub-block from which wash is being actively mined and into the third sub-block where the backfill placement will take place.

The backfill will fill the width of the mine void when the mine is advancing down the length of a mine block less than 200 m wide, but the mine void may be open on two sides in larger more complex shaped areas of mine blocks which would then be mined in a series of interlocking sub blocks. The crest of the back fill along the mine path will be raised to allow for settlement and profiled to provide for surface water runoff. The backfill will be sheeted with tailings from the gold plant which will be compacted and contoured before the final covering with topsoil.

The backfill placement after alluvial wash extraction will be in layers nominally 3.0 to 5.00 m in thickness, but these could be thicker layers depending upon the backfill stability. The overburden placement into the backfill area will be by end tipping from the dump trucks and bulldozing the spoil while maintaining a windrow as a back stop for the trucks. Other methods such as building up the backfill in layers by successive paddock dumping then spreading by bulldozing may also be utilised.

Overburden, which is all the material excavated from above the basal wash zone will be mined using a fleet of 100 tonne and 60 tonne capacity rear dump trucks (Komatsu model 785 & 605 or similar), loaded with 120 tonne or 180 tonne excavators (Hitachi ZX1200 and 1800 or similar models). The size of the fleet will grow progressively as the stripping ratio increases over the life of mine peaking in year 4 (**Table 4).** The size and combination of trucks and excavators may be varied depending on the availability of plant and equipment optimisation as mining advances.

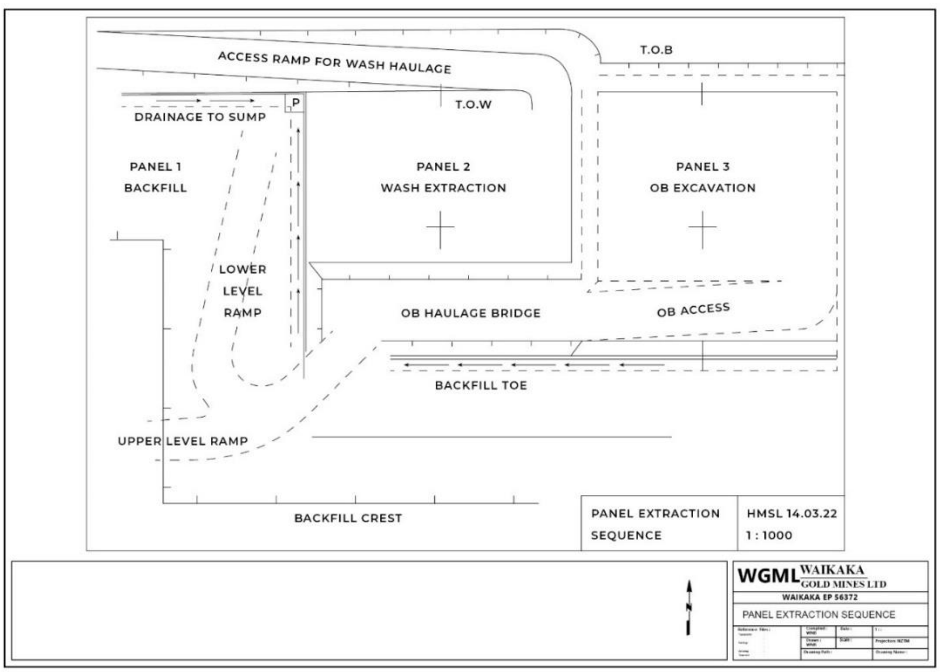

Figure 27 Panel Extraction sequence shows the general arrangement of the overburden handling methodology for an open pit alluvial mine.

The overburden stockpiles are to be returned to the mine void in the final years of operations as backfill capacity allows, with the bulk of the material being returned in the last quarter of mining or the quarter following the end of wash extraction operations.

Table 4 WGL Equipment Deployment

Function	Type	Model or equiv.	kw each unit	From	To	Hrs /day	Starter pit Year 0	Year 1	Year 2	Year 3, 4 & 5	Year 6	Year 7 & 8
	Key productivity	bcm/hr		OB benches	In-pit / SP1			940	1,200	1600	640	640
OB	Large Excavator	EX 1800 - 7	746	OB benches	Loading trucks	12	1	1	1	1	1	1
OB	Large Excavator	ZX 1200 - 7	567	OB benches	Loading trucks	12			1	1		
OB	Rear dump truck	HD 785-7	879	OB benches	Stockpile SP1 & inpit disposal		2	2	2	2	2	2
OB	Rear dump truck	HD 605-7E0		OB benches	Stockpile SP1 & inpit disposal	12	2	2	2	3	2	2
OB	Large Bulldozer	D10 N or L	425	Pit	Backfill & OB benches	12	1	1	1	1	1	1
OB/Wash	Medium Bulldozer	D8 N or L	230	Pit	OB & Wash benches	< 12	1	1	1	1	1	1
OB & misc	Excavator	ATD 40	340		Assist production	< 12				2 to 3		
Wash	Med excavator	ZX 400 -		Wash bench		12	1	1	1	1	1	1
Wash	Rear dump Truck	ATD 40	340	Wash bench	ROM GRP infeed return tailings	12	2	2	2	2	2	2
Wash	Wheeled loader	Cat 966 M	232	ROM & Tailings	Load ROM to infeed - 12 hrs & Load tailings to ATD 40	12	1	1	1	1	1	1
Wash	GR Plant		Electric			12	1	1	1	1	1	1
Topsoil	Excavator	PC200	107	Pit & s/ponds	Topsoil & slimes handling	< 12	1	1	1	1	1	1
Topsoil & OB	Rear dump Truck	ATD 30	242	Pit area	Topsoil & backfill & stockpile	< 12	1	1	1	1	1	1
Topsoil & OB	Bulldozer	D7LGP	170	Pit area	Topsoil & backfill & stockpile	< 12	1	1	1	1	1	1
Services	Fuel truck	Izuzu ?				< 12	1	1	1	1	1	1
Roads	Grader	Cat 16G	200		Haul roads and work areas	< 12	1	1	1	1	1	1
Roads	Water Truck	Isuzu Truck	100		Haul roads and work areas	< 12	1	1	1	1	1	1

4.6 Wash Mining

The wash will be selectively mined by a 40 tonne backhoe excavator loading out to a fleet of two 40 tonne ADT's (Volvo model ADT40 or similar). Wash will be mined at the rate of 300,000 bcm per year or 1030 – 1200 bcm/day depending on the workdays lost due to inclement weather.

The average haul distance over the life of the mine is 450 m (range of 250 m to 690 m) (**Figure 12**).

The wash will be hauled to the land-based GRP located in the infrastructure area. The wash averages 2.8 metres thick but dilution of 0.3 metres of basement and 0.2 metres of low-grade material above wash increases the average thickness of wash mined to 3.3 metres. Some basement dilution is necessary to ensure gold concentrations at the base of the WQG on the basement contact are mined but all dilution will be closely controlled to minimise the amount of clay, soil and coal measures being fed with the wash to the GRP. This will be supervised by the mine geologist until both operator and supervisory experience is sufficient for the operators to be able to mine to the boundaries of payable wash with minimal dilution.

The wash will be hauled from the pit to the ROM pad at the GRP via all-weather haul roads. The trucks will dump on the ROM pad from which a 20 tonne excavator will directly feed the plant from an elevated gravel platform. Sufficient wash will be stockpiled on the ROM pad to allow continuous plant feed for at least a day if mining operations are interrupted by a weather event.

When the trucks have dumped their load of gold bearing wash at the ROM pad, they will proceed to the tailings load out area to be loaded with tailings discharged from the GRP for backhauling this material to the pit.

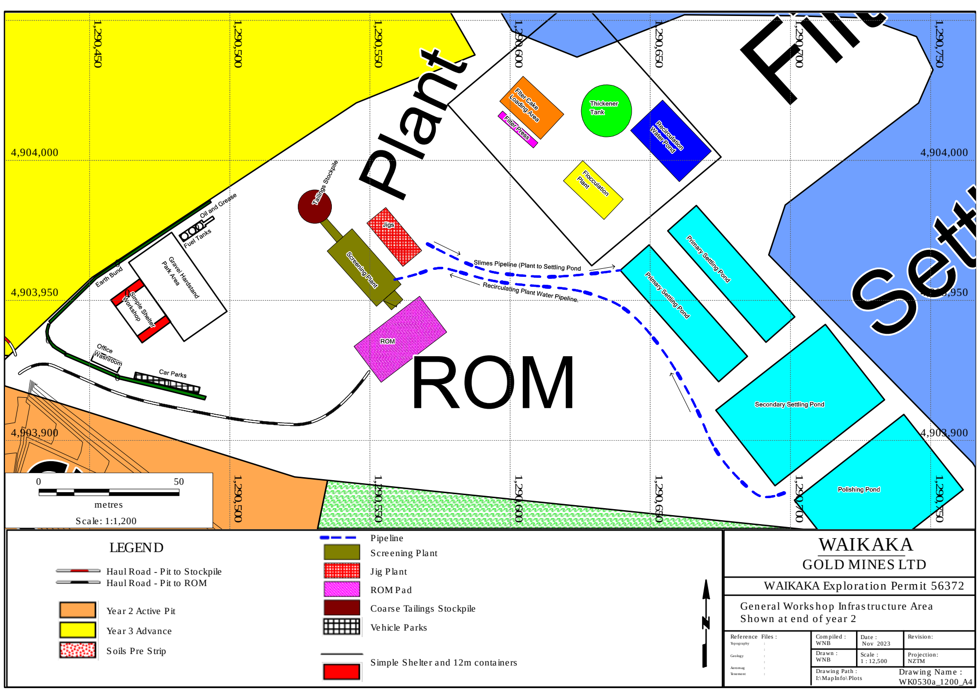

Figure 28 Infrastructure area 1 with GRP and ROM area

The backhauled tailings will be used to sheet roads, ramps, working benches and backfill as required to improve trafficability.

The expected quantity of tailings to be backhauled to the pit is 92% of the wash production or approximately 87 m3 per hour. Based on the percentage slimes (minus 63 microns) there will be 9 backloads of tailings for every 10 truckloads of wash delivered to the ROM. The spare truck backload capacity will be utilised to haul filter cake from the slimes treatment plant to the mine backfill area. Between truckloads of tailings, the wheeled loader will be used to push up the wash stockpile and maintain the ROM area.

The tailings will comprise:

- the trommel oversize;
- dewatered jig tails (sands) fed onto the conveyor carrying the trommel oversize; and
- sands and coarse silts recovered from the plant discharge water by a sand cyclone mounted above the tailings stockpile.

Figure 29 Alluvial gold processing plant

The gravel and sand tailings will be discharged from the conveyor to a conical stockpile.

The minus 20-micron fraction of the wash (silts and clays) amounting to 8 percent of the wash feed to the GRP will go to the settling ponds and slimes treatment plant.

4.7 Slimes Management

About 72,000 tonnes of suspended solids in the cyclone discharges will be pumped annually from the GRP to the settling ponds with an average suspended solid density of 6 %. The cyclone overflow discharge from the GRP will be pumped to settling ponds located to the south of the GRP at the rate of approximately 310 cubic metres per hour with a suspended load of 6%V/W suspended solids, equivalent to 220 tonnes of minus 63 micron solids per day.

Modelling indicates natural gravitational settling of the clay-rich slimes over time is not a viable option for slimes management. Measurement of slimes settling rates after addition of flocculants indicates very limited concentration of suspended solids. The surface area of containment ponds required to receive the slimes from the settling ponds is potentially greater than the mine area and high management input is required to dewater the clays with drying beds and by admixture of sands.

A slimes processing plant is proposed utilizing a packaged plant such as that supplied by Matec (**Figure 30**) as an alternative on site slimes management system. There are similar plants in use at some NZ quarries. The standard plant comprising a flocculant mixing tank, thickener (cone or rake) and filter press would be located adjacent to the settling ponds and be connected to the site power supply.

Figure 30 Matec Slimes Processing plant

Provision has been made for handling 10 percent of the coarser slimes solids settling in the receiving ponds. The supernatant would be pumped to the slimes treatment plant with a suspended solids load of about 5.4% and dosed with flocculant before thickening and batch feeding to the Matec or a similar design of filter press.

The filter press will produce about 80,000 tonnes of filter cake annually with a moisture content of 20 % (80 percent solids). This will be loaded out and hauled to the mine pit and encapsulated in the overburden and tailings backfill at the rate of 172 tonnes per day, using the spare haul capacity of the wash mining fleet. Clean water recovered from the filter press will be pumped back to the central recirculating pond (CRP).

Slimes are expected to accumulate in the receiving settling pond at the rate of about 750 m3 per 24 day cycle. After 24 days, discharge will be diverted to the second receiving pond while slimes in the first pond are allowed to consolidate before being cleaned out and hauled to the back fill area. There will be about six fill and consolidation cycles per year for each receiving pond. The ponds will be constructed in such a way that allows for cleanout with a 20 tonne excavator.

The overflow from the STP thickener tank and the filtrate from the filter press will be recycled into the process water supply as in **Figure 31** Preliminary Flowsheet.

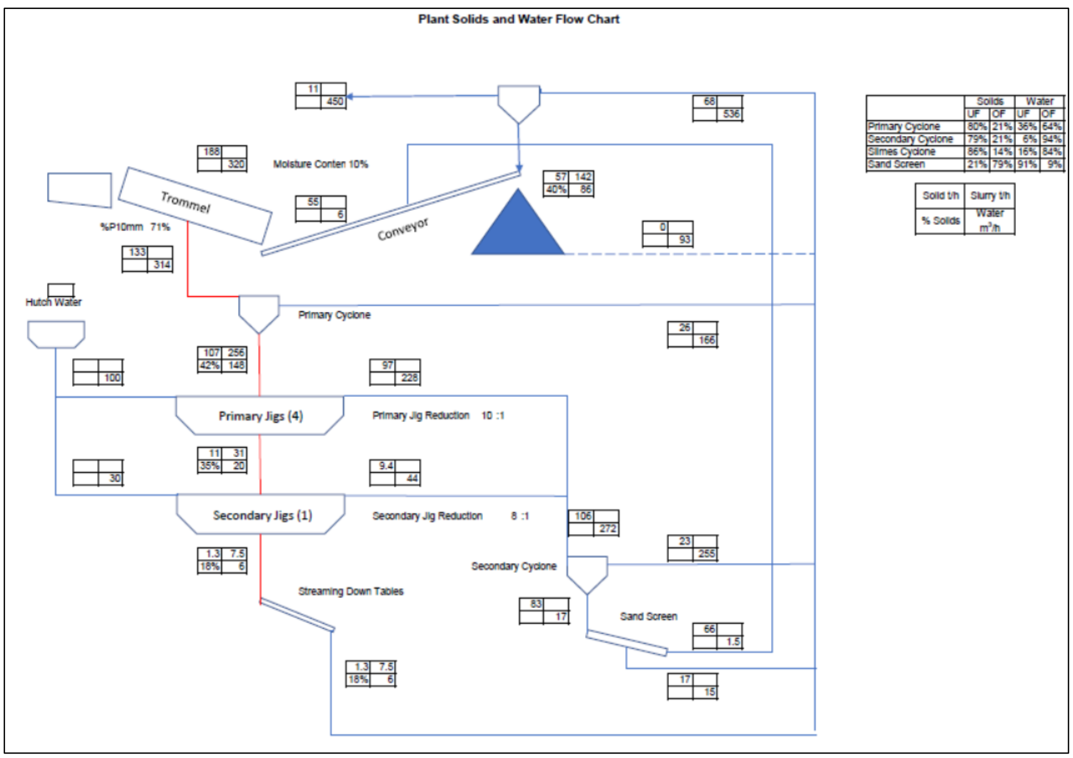

Figure 31 Preliminary flowsheet

4.8 Haul Roads

4.8.1 Main Haul Road

The main haul road will link the starter pit with the infrastructure area and SP1 stockpile. It will be an all-weather road maintained to a high standard to ensure all-weather trafficability for laden ADT40's carrying wash to the GRP. Provision is made for 20,000 tonnes of AP30 and AP40 crushed aggregate to be brought in for construction of the road if sufficient suitable material is not available from the starter pit. The road will be 15 metres wide with a nominal half metre thick base and side windrows built to half wheel-height of the 60 tonne trucks for safe operations. The haul road will be progressively relocated as the mine face advances. All the haul roads will be initially rolled and routinely graded with special attention to drainage.

The rapid changes in the advancing mine face will require an adaptive approach to optimising the location of haul roads for both overburden removal, backfill placement and wash haulage to the GRP – ROM area. Generally, materials used for the road foundations will be recovered from redundant haul roads and utilised to form new roads where required.

4.8.2 Light Traffic Separation

Where practical a separate road will be constructed from the infrastructure area to the open pit along the side of the main haul road to separate light traffic from the heavy haulage trucks. The road base will be a nominal 8 - 10 metres wide and the road will also connect with the office and workshop areas.

Site access from the Waikaka Road to the infrastructure site will be along roads constructed to carry light traffic and the diesel fuel and goods delivery trucks. Initial access for Year 1 will be from the SW corner of the mine site along the old railway reserve and via a second access between the starter pit and stockpile SP1 for the Years 2 to 5.

From year 5 onwards access may be from the northeast along the public road reserve down the eastern side of the mine site. The bridge over Shepherds Creek on the eastern public road which is only rated for 2 tonnes will require upgrading.

5 TEMPORARY STREAM DIVERSIONS

The Waikaka Stream and Shepherds Creek (a tributary of the true left of the Waikaka Stream) traverse the proposed mine path. Four temporary diversions of the Waikaka Stream and one of the Shepherds Creek are proposed. Each diversion will be active for a period of approximately one year followed by returning the relevant stream section to its Waikaka alignment.

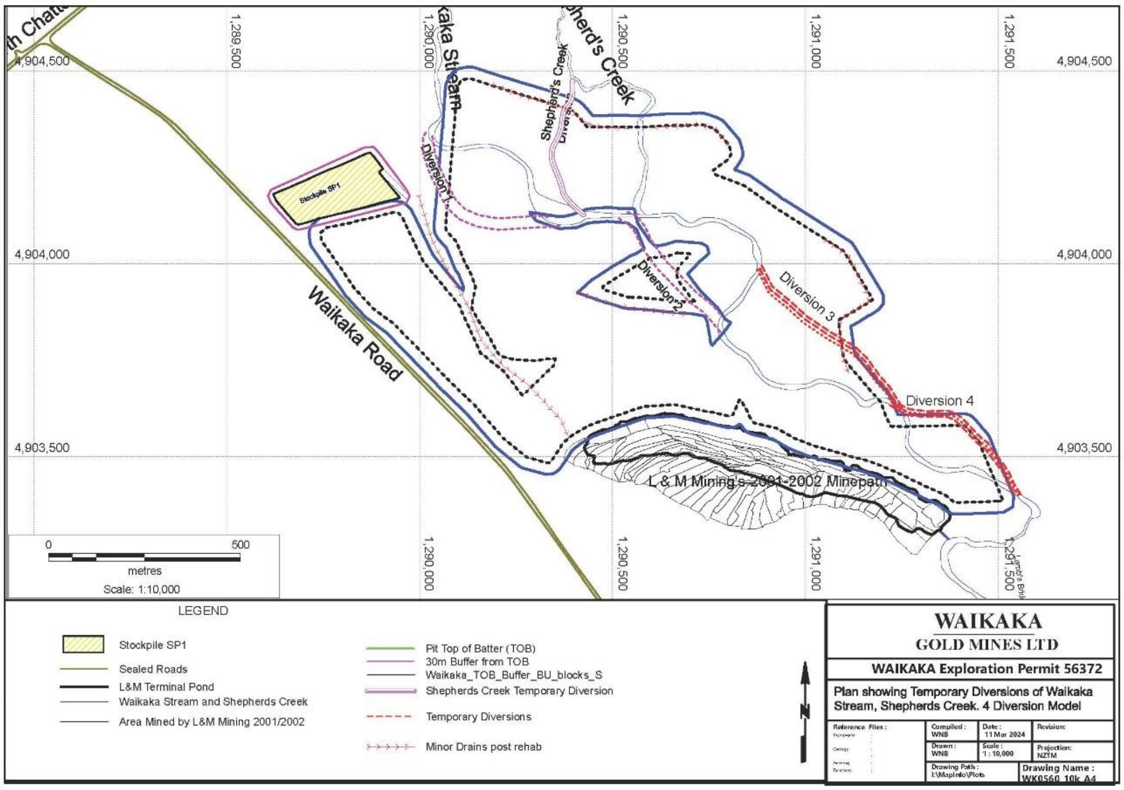

Figure 32 Plan showing Temporary Diversions of the Waikaka Stream and Shepherds Creek.

Refer to **Figure 32** which shows the diversion locations and the rehabilitated ground surface.

The first Waikaka Diversion channel (Diversion 1) will be constructed in the backfill while mining block 7 towards the end of Year 3. A temporary culvert will be built in the channel to allow wash to continue to be hauled to the centrally located gold plant and to provide access to the workshops. Once mining has advanced across the original stream channel a new stream channel will be constructed across the completed backfill following the course of the current Waikaka Stream channel.

The second Waikaka Diversion channel (Diversion 2) will be constructed during Year 4 before mining of Block 10 commences in Year 5. This diversion channel will be excavated in virgin ground along the eastern margin of the central infrastructure area.

The third Waikaka Diversion channel (Diversion 3) will be constructed late in Year 6.

The 4th Waikaka Stream diversion channel will be constructed during Year 7 and will be utilised to complete the mining works in Year 8 before returning to the original alignment across the back filled mine area.

The Shepherds Creek diversion will be required during Year 4 while mining block 9 and re-instated the following year. Although 590 metres of the existing channel is affected only 280 m will be physically disturbed by mining. The Creek will be reinstated to its old channel over this 280 m.

The diversion channels will generally be constructed across backfill and be designed to carry 1:25 year flood flows. For design and technical details of the stream diversion channels refer to the consultant's report to WGML. The stream diversion channels have a total alignment length of about 1,870 m (Table 5). Where the stream diversions are crossing backfill the broad shape will be incorporated into the backfill contours and side slopes will be trimmed to their design profiles with a small sized excavator and LGP bulldozer. Diversion cuts across undisturbed ground will be excavated with the mine excavator and rear dump trucks as an advancing cut followed by progressive excavation and formation of the sinuous low flow stream bed. Where the spoil excavated is suitable it will be placed in stream edge bunding and adjacent flood levees and stockpiled for backfilling the redundant Diversion channels.

Unsuitable spoil from the cuts, including any sands and thixotropic fine dredge tailings known as Waikaka Blue, will be excavated and hauled to impoundment areas at the allocated stockpile area for storage and subsequent blending with the mine overburden to render it suitable for backfill handling.

After mining has passed through a diversion the stream or creek will be reinstated in either its original channel (upper Shepherds Stream and lower Waikaka Stream) or in a channel constructed across the backfill. The latter will be incorporated into the backfill contours and trimmed to final design as for the diversion channels, except that they will be aligned with the original watercourse of the Waikaka Stream. Each diverted section of the streams will be reinstated as soon as practical after mining has advanced across or through the diverted section. After reinstatement of all diversions the original length and broad meanders and sinuosity of the streams will be retained. Rock & gravel will be used to replicate the existing stream beds.

The design of constructed channels allows for a high flow section with 20 m wide flood plain inside the side batters and side embankments. The surface width to the crests of these side slopes is 56 m. The low flow channel is cut into the base of the high flow channel with sinuosity of 1.5 so that it meanders along the base and is no closer than 1.5 m to the side of the high flow channel. The low flow channel has a 200 mm depth of quarry or alluvial gravel rock lining. At intervals along the diversion the design allows for riffle and pool structures formed as elongated rock structures to the consultant's design.

The riparian margins of the reinstated streams will be fenced and planted with a mixture of native and exotic plants in consultation with ecological advisors and other project stakeholders.

A permanent bridge is planned across the Waikaka Stream once Diversion 1 is reinstated. The bridge is required for:

- continued haulage of wash to the central GRP location and access to workshops and offices until the infrastructure is relocated to the SE corner of the mine site;
- haulage of material from overburden stockpiles on the western side of the stream back to the mine void in the years 4 to 8.

The bridge will be retained to provide farm access across the stream on completion of mining activities. It will span the low flow channel and be accessed by a road across the high flow channel. The bridge is designed as a pair of 2.4 m x 6 m precast beams sitting on precast embankment beams which will be mounted on 6 m deep piles. The bridge and temporary culvert across Diversion 1 will be designed to carry loaded 100 tonne dump trucks.

Table 5 Waikaka Stream Diversion Channel lengths

Diversion	**Diversion Length(m)**	**Diverted Length(m)**	**Year Diverted**	**Year Reinstated**
Waikaka Stream				
Diversion channel 1	420	470	3	4
Diversion channel 2	500	630	4	6
Diversion channel 3	230	700	6	7
Diversion channel 4	450	550	7	8
Sub-total Waikaka	1870	2350		
Shepherds Creek	400	590	4	5
Total	**2250**	**2940**		

6 LAND REHABILITATION

A total area of 96 ha will be disturbed by the Waikaka alluvial mine. The land will be progressively returned to pasture or fodder crops on a seasonal basis as the mine face advances. The maximum amount of unrehabilitated land disturbed by mining at any one time is expected to be about 20 ha.

The post mining landform will be constructed by backfilling the mining void in layers with the overburden materials including topsoil, clay, silt, gravel, sand and slimes plant residues. An assumed allowance for swelling of the excavated material from in situ solid volume to bulk volume has been considered for designing the final rehabilitation surface and subsequent post mining settlement.

The final post mining ground surface will be spread with the topsoil from the numerous site stockpiles after the subbase has been contoured to the final levels.

A combination of swale and deep drains will be used to restore drainage from the mined area.

The post mining land surface proposed has a western drainage channel and backfill profile that permits continued surface water run off to the reinstated Waikaka Stream. The southern edge of the post mining landform will match the bund around the L&M pond at about RL 115 m.

The western edge of the completed mine path will interface with the western drain.

The rehabilitation surface is shown in **Figure 33**.

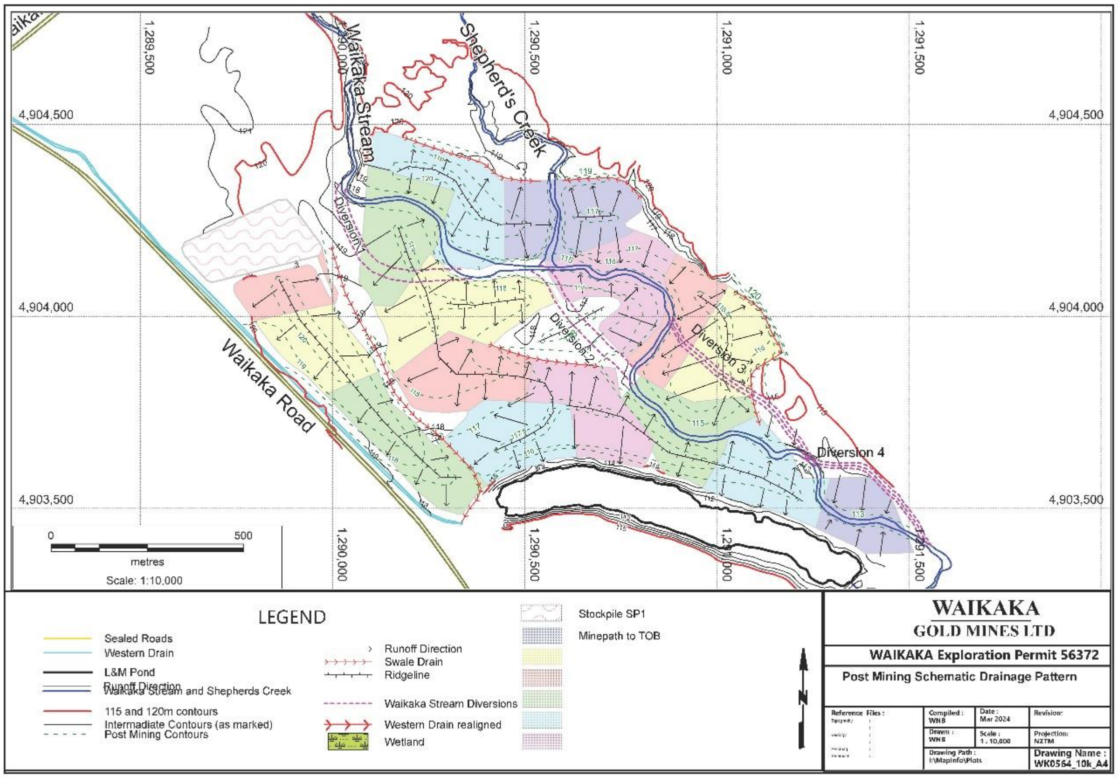

Figure 33 Schematic Rehabilitation Contour Plan

7 ACID MINE DRAINAGE

No special requirements are required for acid mine drainage at the Waikaka mine site. Any carbonaceous or sulphidic material in the overburden will be directed to the backfill and encapsulated below the restored water table. Placement of material with AMD potential in stockpiles will be avoided. Any drainage from stockpiles and backfill while the pit void remains open will be monitored and directed to the settling ponds for treatment where necessary before discharge to the environment.

Summary from AMD consultant's report as follows:

Mineralogical examination of wash concentrates from bulk samples taken by WGML identified significant amounts of authigenic marcasite and pyrite (iron sulphides) which are formed in situ in proximity to carbonaceous layers within the UWS immediately overlying the wash. The iron sulphides can potentially breakdown to environmentally damaging acids when exposed to air resulting in acid mine drainage (AMD). Mine Waste Management have assessed the AMD potential arising from sulphides in the overburden and wash, especially within stockpiles, and advised on how to best manage and mitigate AMD risk which is very low.

8 WATER MANAGEMENT

8.1 Pit Dewatering

A ground surface network of drainage channels will be utilized to minimize the surface water run off entering the open pit excavation. These drains will generally form part of the surface drainage network directing surface water down slope and to the western drain and southern pond where it can then be discharged from the site.

Groundwater inflows into the mine pit are expected to be 35 litres per second falling to 20 l/sec after initial draining of the perched aquifers.

The open pit or dry pit will collect a significant surface run off water flowing from the access ramps, the overburden benches, and the pre-strip and overburden disposal areas which will then combine with the perched aquifers draining from the dewatered overburden benches.

The open pit will require efficient dewatering of the overburden removal layers by drainage along the working benches and down access ramps to the pit floor. The pit floor drainage will be a combination of drains across the top of wash and around the perimeter of the in-situ wash to permit access to the wash zone for gold grade assessment and then excavation.

The backfill will drain into a 5 to 10 m wide basement channel left around the toe of the working excavation for the wash excavation. This minimum 5 m offset will be used for the drainage connection to the pumping sump.

The mine path will follow undulations in the basement, and it may be necessary to have a transfer pump or provide in pit culverts to keep the drainage flowing to the main pit floor pumping sump. The planned mine path has sections of extraction on up dip slopes and down dip slopes on the basal wash.

The drainage and pumping system from the pit floor will require continuous maintenance and relocations of the drains and pumping sump along the mine path. The pump will deliver the water to the process water pond system.

The water will be pumped from the pit to the central recirculating pond on a continuous 24 hr/day and 7 day per week basis through 150 mm lay flat hose (for easy handling & flexibility) using a diesel driven mobile pump located on or near the lowest points on the pit floor. The average pumping distance will be about 450 m with a maximum of 800m.

8.2 Storm Water and Surface Drainage

The site is generally flat and sloping to the south and a network of surface drainage is planned to control the surface drainage and stormwater flows. The mine site is traversed currently by the Western Drain which runs down the western side before turning and crossing the area to discharge to the Waikaka Stream north of L&M pond. This drain will be permanently realigned to run parallel to the Waikaka Road and discharge into the western end of the L&M pond.

Runoff from the primary stockpile (SP1) will be diverted via sediment traps to the Western Drain.

An interim sediment settling pond will be required during excavation of the starter open pit before construction of the settling ponds is completed as material sourced from the starter pit will be required for the site construction.

Surface drainage points of significance are;

- A main western drain with length 1,550 m alongside the Waikaka Road boundary extending to the L&M pond
- A ring drain around the stockpile SP1
- A ring drain around the settling ponds
- Water table drains along each side of the haul roads
- Includes culverts as required around the infrastructure area for vehicle access across surface drains
- Includes 14 m length of drain culvert at any new main entrance of Waikaka Road
- Includes an overflow drain from the settling and process water ponds
- A network of surface dish drains around the office and workshop areas

The proposed network of surface drains will minimize the effects of any site flooding. The risk of high flows entering the wash extraction pit via the haul road will be controlled by designing the pit access haul roads with a drive over mound and cut off drains near the pit exit haul road to prevent flood flow down the inclined haul roads. In addition, the pit will have up slope surface bunding as required to divert surface water and prevent it flowing into the operating pit.

8.3 Water Treatment System

Central to the water treatment system are the settling ponds which will provide process water to the gold plant and receive all discharges from the gold plant, slimes treatment plant, mine dewatering and any contaminated site drainage. The settling ponds comprise 4 separate ponds: 2 smaller ponds receiving water and slimes discharged from the gold plant, a central recirculating pond (CRP) and a final polishing pond (FPP). The settling ponds will be located close to the gold plant and slimes treatment plant (STP) to minimise process water and return water pumping distances.

The settling ponds will be built above ground with a wall height of 2.5m and cover an area of approximately 70 m x 150 m site (to be confirmed). Wall slopes will be 1:2 and the width of the embankment upper surface will be 5m to allow access by excavators and trucks for cleaning and servicing weirs and the water treatment system. Where possible, the settling ponds will be constructed with 0.5 metre vertical steps between the receiving ponds and CRP, and the CRP and FFP to allow flow between the ponds without pumping between these steps.

The ponds will be constructed by forming the floor and the bund walls with clay overburden from the pit. It may be necessary to remove any soft tailings areas and replace these with clay or a clay and gravel blend. The bund walls will be capped with gravels.

It may be necessary to construct internal low bund walls in the settling ponds as flow restrictions to improve the deposition and retention of slimes.

Skimmer outlets and pipes will be installed between the ponds for water transfer and concrete or rock aprons used to minimize erosion of any bund walls.

The finishing pond will have an overflow spillway system and discharge drain which will be directed to the main western drain, or surface drainage network.

Discharge of return water and slimes from the gold plant will alternate between the two receiving ponds. Some sedimentation of silts is expected in the receiving ponds which will be periodically cleaned out by a 20-tonne excavator and truck. The sediment excavated from the ponds is expected to have a moisture content of about 35 percent and to be thixotropic. It will be hauled to the mine pit for encapsulation within the back fill. The supernatant will be pumped to the STP for treatment. Any overflow from the receiving ponds will be skimmed to minimise suspended solids flowing into the CRP.

The GRP will receive the deslimed water back from the STP and water discharged from the mine pit in addition to any discharge, if required, from site drainage sumps. Plant process water will be taken from the CRP at the rate of 125 l/sec (450 m3/hr). Assuming 90 percent of the process water is returned via the STP to the GRP after allowing for overflows & spillage on the gold plant and moisture retained in the filter cake, make up water of 10 l/s will be required to maintain processing water supply. The mine water discharge (20 - 35 l/s) is expected to meet this shortfall. Although the mine discharge water will be “dirty” the suspended clay content is expected to be low and the water to be suitable for gold recovery.

Excess water in the system will flow through to the final polishing pond (FPP) after addition of flocculants at the point of discharge into the FPP if required. The net outflow from the FPP to the CRP is expected to average about 18 l/sec over a 24 hour day. The intent is that the suspended solids in any discharge from the FPP are less than 20 micrograms per litre

The flow from the site drainage network off haul roads, backfill, and other working areas will be either discharged to the mine pit or to a series of small sediment retention ponds which will be detailed in an Erosion & Sediment Control Management Plan. If contaminated by suspended clays these may require collection and transfer by pumping to the treatment ponds.

At the end of the mine life the settling ponds will be decommissioned with removal of the water and slimes followed by removal of the pumping equipment, pipelines, weirs, and bund walls and then reclaiming the area with backfill and finally the topsoil.

9 INFRASTRUCTURE

9.1 Site Access

Initial access to the site will be by the existing farm access gates off Waikaka Road in the SW corner of the property following the old railway reserve which has been used as a farm access track.

A new site entrance may be constructed from the adjacent public road into the project infrastructure site. The entrance and will be developed to the appropriate GDC standard civil design requirements with an off-road merging zone. A drain culvert will be required for the access road to cross the western boundary drain.

The infrastructure site will be protected from flooding by constructing soil bunds around the perimeter and raised consolidated pads for the GRP and the STP.

9.2 Offices and Support Services

The site office buildings for short term projects are generally a Portacom type with a meeting room and office space for staff. The site buildings and services will allow for the following;

- Office block nominal 10 m x 3 m
- Amenities – lunchroom, nominal 10 m x 3m
- Amenities – toilets and shower facilities for male and female
- A wastewater and sewerage disposal system or alternatively a collection service
- Drinking water supply by delivery or roof collection to tanks with pump and UV sterilization
- Four or more lockable containers for safety supplies, personal PPE supplies and small tools
- Site security alarms and camera system as required
- Communications via Wi-Fi and possibly a land line if available
- Site and safety lighting for key working areas
- Security fencing as required

9.3 Workshop Site

The workshop site includes the facility to service and maintain the site equipment with;

- Covered workshop area for equipment maintenance which will be formed using 40 FT containers as walls and an arched roof span between the containers.
- Hardstand area for equipment maintenance
- A tyre storage and tyre changing area
- A welding and tool bay with hand tools and work benches as required
- Administration office for the maintenance activities
- Lighting and security systems
- Storage facilities for maintenance equipment, spare parts and supplies

The large mining trucks require a suitable hardstand area adjacent to the workshop such that maintenance and routine servicing can be carried out.

A truck wash area will have a sediment pond, oil trap and drainage provisions.

Adjacent to the access road to the workshop a parking zone will be provided for up to 10 rubber tyred machines which is an area about 50 m x 10 m, as each park bay is a nominal 10 m x 5 m with a standard safe parking tyre trench and windrow.

The workshop will be used for maintenance on the mobile plant fleet and support for the GRP which requires at least the basic welding and steel fabrication equipment.

A small mobile crane may be utilised as required to assist the workshop, pumping and GRP activities.

Adjacent to the workshop there will be a set of containers or similar buildings as storage for tools, spare parts and supplies.

9.4 Fuel and Lubricants

No petrol will be stored on the site as it is available at the Waikaka township.

A diesel fuel storage facility on the site will be set up with a 60,000 litre tank which will be supplied as required by a fuel supply contractor.

A hardstand area will be required around the fuel storage facility where the trucks will be checked and re-fuelled daily with both diesel and oils as required.

The site fuel use will vary between 5200 and 7700 litres per day, peaking in year 4.

A mobile refuelling tank will be required for re-fuelling the in-pit excavators. The rear dump truck fleet will re-fuel at the fuel station located near the site truck parking bays.

Engine oil, hydraulic oil and other oils, grease and other related materials and tools for the mobile plant maintenance require a suitable lockup storage container. In addition, there will be provision for the waste oils and materials to be disposed of to an approved site. The site management plans will specify the provision of hazardous materials handling and storage procedures and provide for oil spill kits. Oil spillage with mobile plant can arise from handling while servicing and hydraulic hose and component failure while operating on the site.

9.5 Gold Recovery Plant

The gold recovery plant will operate at 95 bcm per hour for 90% of the available 12 hours per day which is 10.8 hours per day. The daily production rate of basal wash required is then 1,030 bcm.

The planned dry open pit method requires that this plant be established in two positions on the Waikaka mining project area and serviced with access roads, process water supply, and electricity supply.

The gold plant will be constructed as land based modular units. The modules may be designed as skid mounted to facilitate plant shifts. The Waikaka process flow sheet will be similar to that for the Waikaia plant process but with lower capacity. The wash will be screened at 10 mm by either trommel or shaking screens with the oversize discharged to the tailings. The screen undersize will be pumped to a primary cyclone and the underflow distributed to primary and secondary jigs with gold bearing concentrates recovered on tables. Sands will be separated from the jig and table overflows via a secondary cyclone and added to the tailings. The overflows from the secondary and primary cyclones will be combined and discharged as slimes to the settling ponds.

The plant will require about 1.2 M m3 of processing water per year or 450 m3 per hour which will be recycled from the settling ponds with makeup water pumped from the mine pit. Two 8/6 sized pumps will be required to supply the process water and return cyclone overflows to the settling ponds.

Table concentrates will be taken from the Gold Recovery plant to a gold room where gold will be further concentrated by the processes of screening, tabling and panning before smelting into gold dore for shipment to a gold refinery.

9.6 Site Power Supply

A power supply proposal has been received from the supply authority, Powernet. Overhead powerlines will be linked to the two proposed infrastructure areas. **Figure 34** shows the possible route from the North Chatton – Waikaka Road to the second (No 2) infrastructure and GRP site. The northern half of this route would be used with an additional section to the first (No 1) position of the infrastructure and GRP.

Power will be connected to a transformer at a site to be finalised and distributed to the gold plant and pumps, STP and pumps, workshop and offices. The average power requirement is estimated to be 600 kw with a peak power demand of 820 kw.

The pit pumps will be powered by a nominal 150 kw generator set. Mine pumps powered by electricity from the main grid have been considered but rejected because of the high frequency of relocating the pumps with power supply and pipelines to follow the progress of the pit wash extraction.

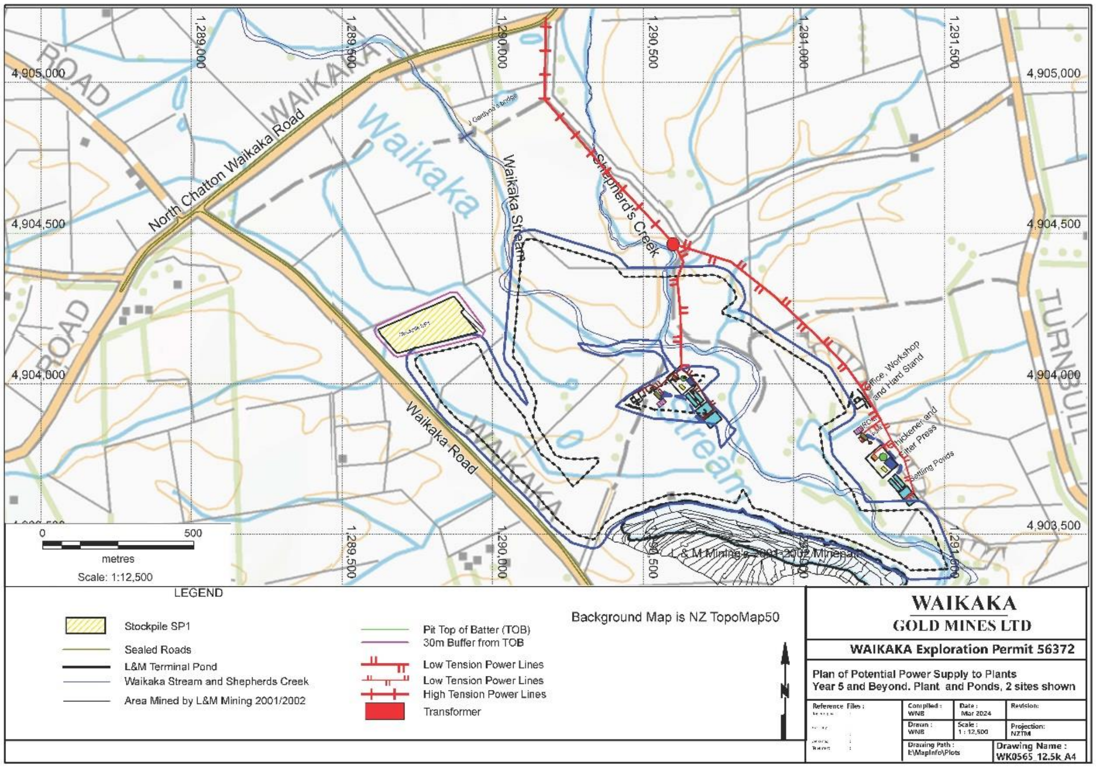

Figure 34 Shows the power supply route to the both positions of the GRP & infrastructure

10 MINE CLOSURE

At the end of the mine life the land disturbed by mining will be fully rehabilitated during a three-year restoration period and returned to farm productivity levels as good as or better than those pre-mining. Rehabilitation of backfill and spreading of soils will be completed in conformance with the rehabilitation plan (Figure 32) with emphasis on good drainage. The rehabilitated land will be cultivated and sown in consultation with the landowners and in accordance with the farm management plan.

The Waikaka stream will be restored to the pre-mining alignment across the mine backfill with the required stream bed formation and stream bank restoration.

Haul roads and access tracks will be removed where these are not required by the landowners.

All mobile mining plant and equipment and the fuel station will be removed from the site for disposal. Any site contamination from diesel fuel and hydraulic oils will be remedied.

The Gold Recovery Plant and slimes plant will be removed from the site, including any residual concrete foundations, electrical cabling and service pipelines for water and drainage. The fixed plant working area will be reclaimed to match the rehabilitation surface and topsoiled.

The settling ponds will be decommissioned after processing of residual water and fine silts/clays through the slimes plant with discharge of treated pond water to the environment. Pumping equipment, pipelines, weirs, and bund walls will be removed, and the area contoured and recovered with soils to conform with the overall rehabilitation surface.

The western drain outflow will be directed into the L&M pond area.

Stockpile footprint areas will be levelled to conform with the rehabilitation plan and covered by soils.

If there is a terminal void it will be contoured to form a stable riparian margin and batters and flooding the void by natural groundwater and surface water flows to form a terminal pond

The last items to remove from the mine site would be the HV power supply, office, workshop and all items in the storage areas such as old tyres, including the site gate entrance which would all be removed from the mine site and the land rehabilitated to an agreed profile and topsoiled.

Following completion of surface rehabilitation and cultivation the farm infrastructure (fencing, electric fence reticulation, stock water reticulation, local drainage and farm tracks) will be replaced in accordance with the farm management plan and monitored for 3 years during the Restoration Period.

11 LIST OF MANAGEMENT PLANS

The Waikaka gold project will require a number of site management plans to be prepared for the consented mine operations and the following is an indicative list only as some plans may be combined.

1. Health & Safety Management Plan
2. Traffic Management Plan
3. Hazardous Goods Management Plan
4. Acid Mine Drainage Management Plan
5. Flood Alerts Management Plan
6. Settling Pond Management Plan
7. Soil Management Plan
8. Environmental Management Plan
9. Mine Operations & Pit Slope Control Management Plan
10. Noise Control Management Plan
11. Dust Control Management Plan
12. Erosion & Sediment Control Management Plan
13. Contaminated Land Management Plan
14. Site Archaeology Management Plan
15. Waikaka Stream Diversions Management Plan
16. Waikaka Stream Reinstatement Management Plan
17. L&M Pond Management Plan
18. Rehabilitation Management Plan
19. Other MP's that may be specified in the Consents

12 LIST OF FIGURES

13 LIST OF TABLES