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EGL Ref: 9702

MATAKANUI GOLD LIMITED
BENDIGO-OPHIR GOLD PROJECT
EROSION AND SEDIMENT CONTROL REPORT

Prepared for: 08 August 2025

Matakanui Gold Limited

EXECUTIVE SUMMARY

Erosion and sediment effects of the Bendigo-Ophir Gold Project (BOGP) on watercourses can be managed using the controls detailed in relevant guidance documents summarised in this report such that the effects on the watercourses will be less than minor. This report outlines the proposed works, the types of erosion and sediment controls required and suitable design criteria for sizing sediment control structures.

An Erosion and Sediment Control Management Plan (ESCMP) for the BOGP is required, outlining the site management, procedures and practices for the site. Site specific Erosion and Sediment Control Plans (ESCP) will be developed for key earthworks or mining areas including detailed design of erosion and sediment controls for all stages of the BOGP.

Initially for establishment of the site, the key areas which will require ESCPs are:

- Administration and work camp area, including the access road;
- Process plant and infrastructure area;
- Rise and Shine pit, haul road, Shepherds Engineered Landform (ELF), Shepherds silt pond, and Shepherds Tailings Storage Facility (TSF); and
- Western ELF.

As the site is further developed, ESCPs will also be required for:

- Come in Time pit and backfill; and
- Srex pit, Srex East pit, and Srex ELF.

The BOGP ESCMP will include regular monitoring of the erosion and sediment controls and discharge water quality to confirm the controls are effective.

It is recommended the consent conditions require the following general items:

1. The approved ESCMP is in place and is complied with.
2. Substantive changes to the ESCMP require approval by the Regional Authority.
3. Site specific ESCPs are prepared for each key area of the site.
4. A Suitably Qualified Experienced Professional (SQEP) is approved for the BOGP by the Regional Authority. The SQEP role is to review and approve the site specific ESCPs for the BOGP.
5. Site specific ESCPs meet the site-specific design criteria and referenced guidance in the ESCMP.
6. Site specific ESCPs prepared are approved by the SQEP and submitted to the Regional Authority at least two weeks prior to earthworks proceeding.
7. Any substantive changes to the site specific ESCPs are approved by the SQEP and submitted to the Regional Authority within two weeks of the approval of the change by the SQEP. Substantive changes include changes to the catchment area reporting to a control by more than twenty percent, removal or addition of controls, or changes in sizing of controls by more than twenty percent. Minor adjustment of the position or alignment of controls are not substantive. ESCPs shall be kept up to date whether substantive or minor and reflect the controls in place onsite.
8. Site specific ESCPs are held onsite for the Regional Authority to inspect and review that the specified controls in the ESCPs are in place and effective.

9. Erosion and sediment control measures are effective, or are reviewed and revised, to meet the site water quality compliance limits.

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Document applicability and disclaimers

This report has been prepared by EGL (Engineering Geology Limited) solely for the benefit of Matakanui Gold Limited as our client with respect to the particular brief given to us for the Bendigo-Ophir Gold Project. If used by other parties and/or used in any other context or for any other purposes, no warranty or representation is given as to its accuracy and no liability is accepted for loss or damage arising directly or indirectly from reliance on the information in it.

This report shall only be read in its entirety.

Where this report is issued in draft the contents shall be for initial information and review only and are subject to change and shall not be relied upon.

The author of this report acknowledges that this report will be relied on by a Panel appointed under the Fast Track Approvals Act 2024 and these disclaimers do not prevent that reliance.

CONTENTS

FIGURES

APPENDICES

Geotechnical, Earthquake
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MATAKANUI GOLD LIMITED
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EROSION AND SEDIMENT CONTROL REPORT

1.0 INTRODUCTION

Engineering Geology Limited (EGL) was engaged by Matakanui Gold Limited (MGL) to provide an erosion and sediment control report for the Bendigo-Ophir Gold Project (BOGP). MGL are proposing to establish the BOGP, which comprises a new gold mine, ancillary facilities and environmental mitigation measures on Bendigo and Ardgour Stations in the Dunstan Mountains of Central Otago.

The BOGP involves mining the identified gold deposits at Rise & Shine (RAS), Come in Time (CIT), Srek (SRX) and Srek East (SRE). Both open pit and underground mining methods will be utilised within the project site to access the gold deposits. Infrastructure to support the project will be constructed in the lower Shepherds Valley.

The purpose of this report is to outline the proposed erosion and sediment control approach and mitigations with the purpose that that any effect from activities will be appropriately managed.

An BOGP Erosion and Sediment Control Management Plan (ESCMP) will be developed for the site. Site specific Erosion and Sediment Control Plans (ESCP) will be developed for key earthworks or mining areas.

2.0 LOCATION & PROJECT DESCRIPTION

2.1. Location

The project site is located approximately 20 km northeast of Cromwell. The Rise & Shine and Come in Time gold deposit is located within a ridge between Shepherds Creek to the northeast and Rise and Shine Creek to southwest. Shepherds Creek has a single named tributary know as Jean Creek. The Srex gold deposit is located on the southern slopes of Rise and Shine Valley. Watercourses in both valleys flow from a divide in the southeast to outlets in the northwest.

The general location of the proposed site is shown in Figure 1.

2.2. Project Description

The proposed mine site will comprise the following surface infrastructure:

- Worker accommodation and administration buildings,
- Access road into the mine site,
- Processing Plant and Infrastructure Area,
- Shepherds Creek realignment,
- Access tracks,
- Clean water diversion channels,
- Haul roads,
- Open pit mines,
- Portal for underground mine access,
- Topsoil stockpiles,
- Engineered landforms (ELFs – storing mined overburden rock),
- Tailing Storage Facility (TSF),
- Seepage Collection Sump, and
- Earth embankment dam forming a silt pond.

The general mine layout is shown on Figure 2. The mine is set within the Shepherds Creek Catchment, Rise and Shine Creek Catchment, and on the gravel terraces of The Lindis River Catchment. The Western ELF is set in a small gully of the Clearwater Creek Catchment.

Worker Accommodation and Administration buildings will be situated on the gravel terraces west of Shepherds Valley.

The Access Road is to enter the mine site through the bottom of Shepherds Valley. A short section of the road will pass a narrow section of the valley on fill. This requires realignment of Shepherds Creek.

The Processing Plant and Infrastructure Area are located in the lower section of Shepherds Valley. The area requires a cut fill platform. The cut is into the south slope of the valley and the fill platform extends across the valley floor to the north side. Shepherds Creek will be realigned to the north side of the valley in this area.

RAS Pit and CIT Pit are to be excavated in the ridge between the Rise & Shine and Shepherds Valleys. SRX Pit and SRE Pit are to be excavated in the upper Rise & Shine Valley on the south slope.

Haul roads will be cut from the Processing Plant and Infrastructure Area to RAS Pit. They will be formed into the south slope and floor of Shepherds Valley. The haul roads will connect with the Shepherds ELF and CIT Pit. An upper haul road will be formed from the initial pre-strip and mining of RAS Pit to Shepherds ELF area in Jean Creek and to the Western ELF. Later in the life of mine a haul road will be formed in cut and fill from the Shepherds ELF to SRX Pit, SRE East Pit and SRX ELF over the ridge line into the Rise and Shine Valley.

The Shepherds ELF, Western ELF, and CIT Pit Backfill will permanently store most of the overburden rock from mining of RAS Pit. Waste rock mined from the early stages of mining within the RAS Pit will be placed within the Western ELF and Shepherds ELF. A small proportion of overburden rock from RAS Pit will be used to backfill CIT Pit later in the RAS pit mining. Unmineralised waste rock from CIT Pit will be stored in Shepherds ELF. The CIT Pit backfill will form an engineered landform, within the pit. The overburden rock from SRX Pit will be stored adjacent in the SRX ELF.

The Shepherds TSF will store most process tailings. A small proportion will be used in paste backfill for the underground mining operation. Shepherds TSF will be a fully contained facility i.e. all supernatant water and flood events within the tailings impoundment will be managed on the TSF and in the mine water circuit back to the Process Plant.

Where required, clean water diversion channels will be formed around the Shepherds TSF and Shepherds ELF and remain for the duration of operation. These are long open channels formed in cut with an access track adjacent formed on fill. The diversion channel section past the Shepherds TSF will be decommissioned and rehabilitated at closure, with water flowing across the TSF surface. The section of the diversion channel around the Shepherds ELF will remain in closure. SRX Pit and SRX ELF will also require clean water diversions to direct water around these areas.

Shepherds ELF will require a large sediment retention pond at its toe. This will be formed as an earth embankment dam and will be called the Shepherd Silt Pond.

At the toe of Shepherds ELF will be the Shepherds Seepage Collection Sump, a lined pond used to manage seepage collected in the Shepherds TSF and Shepherds ELF underdrainage network.

Downstream of Shepherds Silt Pond, the Shepherds Valley floor will be filled in with rockfill to create a wider valley floor to manage clean and dirty water and for access to the site.

Topsoil stripped will be placed in stockpiles located around the site.

2.3. Stages of Development

The project will have three stages of development relevant for erosion and sediment control, these being:

- Establishment i.e. construction;
- Operations i.e. mining; and
- Closure.

During establishment, earthworks will be undertaken for the construction of the infrastructure/process plant area, creek diversion, construction of access and haul roads, topsoil stripping and stockpiling, pit pre-stripping, construction of the Shepherds Silt Pond, main diversion channels, and the starter dam for the TSF. Many of the erosion and sediment control measures will be temporary during this stage.

During operation more semi-permanent erosion and sediment control measures will be in place. This includes the clean water diversion channels around the TSF and ELFs and Process Plant, and Shepherds Silt Pond. Pits will be self-contained with pumping from their base. The Run of Mine (ROM) pad will likely require a sediment retention pond.

Closure will require alteration and rehabilitation of areas of the site to its final form. Temporary erosion and sediment controls will be required for parts of this stage including decommissioning of the Process Plant and establishment of closure water treatment measures. Once the Shepherd ELF is fully rehabilitated the Shepherds Silt Pond will be decommissioned and restored to a free draining landform. Temporary erosion and sediment controls will be required for this decommissioning.

2.4. Catchment and disturbed areas

The BOGP is located within the Shepherds Creek catchment, Rise and Shine Creek catchment, and a small gully of the Clearwater Creek catchment. The area of Shepherds Creek catchment and the Rise and Shine Creek catchments to the edge of the project area are summarised in Table 1. Clearwater Creek receives the RAS Creek. The catchment area of Clearwater Creek taken at the confluence point of the Western ELF gully includes RAS Creek area in Table 1. The disturbed areas are also reported for each catchment. The disturbed area for RAS Creek is included with the Western ELF area to make up to the total Clearwater Creek disturbed area in Table 1. Figure 3 shows the topography, indicating the general run-off directions. Figure 4 notes the catchment areas split into parts for reference.

3.0 EROSION AND SEDIMENT CONTROL GUIDANCE

Relevant erosion and sediment control guidance documents include:

- Auckland Council (2016), *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region*, June 2016, Guideline Document 2016/005, Incorporating Amendment 1 (Ref. 2)
- ICEA (2018), *Best Practice Erosion and Sediment Control*, International Erosion Control Association (Australasia Chapter), Picton NSW. Including 2018 Appendix B update. (Ref. 3)
- NZTA (2014) "Erosion and Sediment Control guidelines for State Highway Infrastructure" (Ref. 4)

The Auckland guidance (Ref. 2) is referenced by the Otago Regional Council for earthworks in the Otago Area (Ref. 5). The Auckland guidance (Ref. 2) was developed for Auckland conditions where annual rainfall is typically 1.2 m and where exposed soils can often have a notable clay fraction (i.e. fraction less than 0.002mm).

The ICEA guidance (Ref. 3) provides detailed methods which allow for specific selection and sizing of sediment retention ponds based on site-specific soil types and run-off flows. The BOGP site is much drier than Auckland with an annual rainfall of approximately 0.45m to 0.55m. The site soils at BOGP have a low clay fraction and sediment is expected to readily drop out of suspension without the need for chemical treatment. The ICEA guidance (Ref. 3) provides a useful reference for site-specific design of sediment retention ponds for different soils. The ICEA guidance (Ref. 3) terms these retention ponds as "sediment basins".

The NZTA guidance (Ref. 4) provide useful background on erosion and sediment controls where space and options may be tight, and therefore provides a useful reference for the mine site which has long linear structures like haul roads and moderately steep terrain.

4.0 EROSION AND SEDIMENT CONTROL PURPOSE AND OBJECTIVES

The purpose of erosion and sediment control (ESC) approach and mitigations is to limit effects to an acceptable level beyond the site activities.

Site specific erosion and sediment controls shall achieve the following objectives:

- Water discharged will be suitable without further sediment treatment, and;
- The receiving water is such that a mass discharge of sediment laden water will be acceptable, except during very high rainfall events.

The report provides high level recommendations on site specific erosion and sediment controls for the protection of the receiving waters from sediment.

Geochemical controls related to water quality are to be covered elsewhere by others.

5.0 EROSION AND SEDIMENT CONTROL PRINCIPLES

To reduce the amount of erosion and sediment the following principles shall be followed where earthworks are undertaken onsite (Ref. 4):

- Control upper catchment water;
- Separate clean water from dirty water;
- Protect land surface from erosion; and
- Prevent sediment leaving the catchment.

Erosion and sediment controls work together in a treatment train (or chain) (Ref. 4) to minimise erosion and sediment, and minimise effects on the receiving environment.

Operational risk management and review processes are important to the successful implementation of erosion and sediment controls onsite. Structure, practices and procedures need to be defined for the site to drive effective erosion and sediment control. This is to be outlined in the site ESCMP. See Section 14.0.

Site-specific ESCPs shall be prepared and actioned for each work area. Each work area is unique and requires a detailed plan and sizing of elements. See Section 15.0.

6.0 CLIMATE AND RAINFALL ESTIMATES

The site is in the lower South Island of New Zealand, at approximately 450 to 1000 m above sea level. New Zealand lies in the mid-latitude zone of westerly winds, in the path of a succession of anticyclones, which move eastwards (Ref. 6). The presence of the Southern Alps extending the length of the South Island and to the west of the site has a major effect on the climate of Central Otago region, producing distinct contrasts from west to east across the South Island. Mean annual rainfall in the South Island ranges from over 8000 mm west of the Southern Alps to as little as 300 mm in parts of Central Otago (Ref. 6). The study area is approximately the most inland area of New Zealand and has a far more continental tendency than other parts of the country (Ref. 7). Site monitoring demonstrates an increase in rainfall depth with elevation from the gravel terraces up into the Dunstan Mountains. Annual rainfall at the site is estimated to be approximately 450 mm on the gravel terraces and approximately 550 mm in the upper catchment (Ref. 7). The New Zealand High Intensity

Rainfall Database (HIRDS, Ref. 8) provides estimates of rainfall depths and intensities for different average recurrence intervals (ARI) or annual exceedance probabilities (AEP). Table 3 and 4 summarise the historical estimates. Historical estimates are suitable for erosion and sediment controls up to 2030. Estimates for climate change are available for the period 2031 to 2050 online via the New Zealand HIRDs (Ref. 8).

7.0 RECEIVING ENVIRONMENT

7.1. Shepherds Creek

Surface water discharges from mining areas in Shepherds Valley will be to Shepherds Creek. Shepherds Creek is a tributary of the Lindis River. There is no wet connection between Shepherds Creek and the Lindis River.

Flow gauge measurements of Shepherds Creek within the Shepards Creek valley indicate average base flow rates of approximately 17 l/s. The flow is derived from a catchment of approximately 12.0 km². The base flow is fed all year by springs on the slopes middle to upper catchment. The creek bed is formed on alluvial gravels over schist in the valley and over gravels across the terraces. High rainfall events notably increase the flow. Daily Mean Flows up to 0.14 m^3/s (140 l/s) have been recorded over an approximately 2 year period. These measured flows are notably less than flows predicted from runoff type analysis for flood conditions. The 1 in 2 year, 1 in 10 year, and 1 in 100 year peak flood flows are estimated to be 18 m^3/s, 28 m^3/s and 61 m^3/s at the valley outlet from schist rock onto the terrace gravels. Estimates use the simplified rational method. Run-off coefficients are summarised in Table 5.

Review of historical aerial photographs and visual inspection onsite indicates that the water course between the outlet of the Shepherds Valley and the Lindis River is ephemeral, typically dry. The water course has been modified by agricultural activities and the construction of water storage ponds and pivot irrigation. A downstream irrigation scheme takes much of the base flow from Shepherds Creek before the valley outlet onto the gravel terraces. Beyond the valley outlet any remaining base flow infiltrates into alluvial and till and outwash gravel terraces. Under normal rainfall conditions, no surface water reaches the Lindis River. Water flowing from the Shepherds Creek catchment is likely to only reach the Lindis River under very high rainfall events, and anecdotally, according to the Ardgour Station owner, has never occurred in the past 40 years.

7.2. Rise and Shine Creek

Surface water discharges from mining areas in Rise and Shine Valley will be to Rise and Shine Creek. Rise and Shine Creek flows into Clearwater Creek, which flows into Bendigo Creek. Bendigo Creek is a tributary of the Clutha River. Under normal flows there is no wet connection between Bendigo Creek and the Clutha River.

Flow gauge measurements of Rise and Shine Creek within the valley indicate base flow rates of approximately 3.5 l/s (median value). The flow is derived from a catchment of approximately 4 km². Flows up to 0.2 m^3/s (200 l/s) have been recorded over an approximately 2 year period. These measured flows are notably less than flows predicted from runoff type analysis for flood conditions. The 1 in 2 year, 1 in 10 year, and 1 in 100 year peak flood flows are estimated to be 6.4 m^3/s, 11 m^3/s and 24 m^3/s, where Rise and Shine Creek joins Clearwater Creek. Estimates use the simplified rational method. Run-off coefficients are summarised in Table 5.

Based on the observed 2 year peak flows in Shepherds Creek and Rise and Shine Creek, it is possible that the peak flood flows are significantly less than estimated using simplified assessment methods for intense rainfall events. This means the runoff coefficients are likely conservative for this site. Continued monitoring in operation and calibration of more detailed estimation approaches will continue to develop this knowledge. Standard methods for assessing run-off coefficients are recommended initially.

8.0 DISCHARGE WATER QUALITY

In normal base flows the creeks at the BOGP run clear. Some natural sedimentation can be expected in high rainfall events. There is no fish life in Shepherds Creek and Rise and Shine Creek and under normal conditions there is no wet connection from the creeks to the Lindis River and Clutha Rivers.

No method of sediment control is 100% efficient. NZTA's guidance document (Ref. 4) provides indication of the sediment reduction that can be provided by various sediment control devices:

Practice	Performance for sediment reduction
Sediment retention pond (no chemical treatment)	50-80%
Sediment retention pond (w/chemical treatment)	75-95%
Silt fence	40-75% depending on type of fabric, overflow rate and detention time (Barrett et al., 1995)
Super silt fence	No data available
Filter socks	62% - 87% depending on sock fill material (straw, compost, PAC)
Storm drain inlet protection	No information available. When filter fabric is used, performance could be similar to silt fence performance
Decanting earth bund	60% depending on sizing of device and rainfall intensity
Sump/sediment pit	No data available

Both erosion controls and sediment controls shall be utilised, following the principles in Section 5.0, to reduce sediment in discharge water as much as possible.

Requirements for water quality in receiving watercourses are set by environmental specialists and are monitored at compliance points. Compliance monitoring points for watercourses will be downstream of the sediment retention ponds and not be at the location of discharge at the sediment retention ponds. The performance of sediment retention ponds will be monitored to check that they are effective at dropping sediment, such that the majority of sediment is dropped out of suspension.

9.0 POTENTIAL FOR EROSION AND SEDIMENT GENERATION

Soils and rock materials expected to be encountered during the site development comprise the following:

- Topsoil
- Loess
- Colluvium
- Alluvium
- Terrace gravels (till and outwash gravels)
- Weathered schist, and
- Unweathered schist.

The topsoil, loess, colluvium and alluvial deposits have the greatest potential for erosion and sediment generation where exposed. Table 2 summarises laboratory testing on bulk site samples. Topsoil is indicated to be the finest. Loess soils also require care as they can be highly erodible, however are generally found in isolated pockets onsite reducing the risk. At BOGP loess material appears to be coarser silt potentially due to the close location of the site to glaciation (i.e. coarser material fell closer and the finer material was transported further from the glacial area). In areas of the BOGP site loess may be mixed in with weathered rock as colluvium on slopes or alluvium in the valley floor. Topsoil, loess, colluvium and alluvial deposits will predominantly be encountered during the site establishment phase of works when surficial soils are being stripped and stockpiled.

Weathered and unweathered schist rock at the BOGP site has less finer grained material than the surficial soils. Weathered schist by nature has a higher portion of fines than the unweathered schist. The depth of weathered schist is generally shallow, extending no more than a few metres from surface.

Weathered schist will be stockpiled in selected areas of the Shepherds ELF for use as rehabilitation capping material (along with topsoil). The generation of fines from schist rock is primarily from the mining process breaking the rock down through blasting, excavation, hauling, tipping and trafficking of surfaces. Some shear zones within the schist may be clay altered and be finer. Generally tipped and un-trafficked schist rockfill will not generate sediment as surface water readily infiltrates the surface and the fines are coarser silts and sands. Truck running surfaces on ELFs, Haul Roads and ROM Pad have potential to generate sediment as the material breaks down and the surface becomes tight. Water can then concentrate on the surface under heavy rainfall. The mine running surfaces which will be formed using schist materials will be the primary source of sediment generation during mine operations. Windrows of schist rock are effective as perimeter controls for surface water management, as they themselves are not sediment generating. Generally, schist derived sediment will readily drop out of suspension where appropriate controls are in place.

Representative photos of these materials and their particle size distribution (PSD) curves are presented in Appendix A and B.

10.0 PROPOSED SITE-SPECIFIC EROSION AND SEDIMENT CONTROL PRACTICE

10.1. General

Prior to commencement of construction an ESCP will be prepared for each work area. See Section 14.0.

The site-specific ESCPs will include the specific erosion and sediment control measures required. These plans require detailed information on the staging of construction. In general they will include:

- Clean water diversion channels and bunds to divert run-on clean water away from disturbed areas. Such diversion channels and bunds will be protected from erosion. Energy dissipation will be provided at high energy locations (i.e. at the bottom of steeper sections of the drains where velocities are high). They will be sized for the site-specific design criteria in Section 13.0 and Table 6.
- Dirty water diversion channels and bunds to manage water from disturbed areas. Such diversion channels and bunds will be protected from erosion. Energy dissipation will be provided at high energy locations (i.e. at the bottom of steeper sections of the drains where velocities are high). They will be sized for the site-specific design criteria in Section 13.0 and Table 6.
- Sediment retention ponds and decanting earth bunds to allow time for settlement of suspended solids associated with dirty water runoff from disturbed areas. They will be sized for the site-specific design criteria in Section 13.0 and Table 6.
- Staged stripping of ELF and TSF footprints to minimise disturbed areas, in particular of topsoil and loess soils, before rockfill and tailings are placed which provides detention and minimises runoff.
- Stripping of topsoil and loess soils is undertaken in dry weather conditions.
- Placement of stockpiles at top of catchments or with appropriate diversions and progressive stabilisation.
- Management of water on the working surface of the ELF to specific diversion channels and bunds to shed runoff to sediment retention ponds or pits.
- Dust suppression using water on un-stabilised surfaces.
- Progressive rehabilitation of the ELF and TSF embankments consisting typically of brown rock, topsoil and grassing.
- Typical final ELF slopes of maximum of 1V:3H to minimise erosion of the rehabilitation layer. Local areas can be steeper however generally less than 1V:3H.
- Monitoring of water quality compliance points as required by consent conditions.
- Monitoring of turbidity of inflows and outflows from sediment retention ponds to confirm they are effective at dropping sediments out of suspension.
- Regular inspections of sediment retention ponds and diversion channels and bunds to check condition and undertake maintenance if required.

ESCPs will include monitoring, review and reporting of the performance and recommend additional measures that can be implemented if the discharge water quality is not suitable. See Section 15.0.

The erosion and sediment control philosophy is discussed below for the first two stages. A BOGP Mine Closure Plan has been developed and adopts the same erosion and sediment control philosophy of this document. Appropriate ESCPs will be prepared specifically for closure works at the required time.

10.2. Establishment Stage

During site establishment most erosion and sediment control measures will be temporary to allow the initial construction of the site infrastructure. The following construction activities will be undertaken along with general erosion and sediment controls. The ESCPs will document the details of the controls. A description of key areas is provided below:

<u>Earthworks for Administration Building and Non-Mine Infrastructure</u>

General flat site with little runoff water. Windrows to provide perimeter controls. Promote surface infiltration where possible. At discharge locations provide decanting earth bunds and sediment retention ponds prior to discharge. Dust control using water. Stabilise surfaces for operation.

<u>Earthworks for Access and Haul Roads</u>

Construction of culverts and clean water diversion where practical to bypass earthworks, localised erosion controls including table drains, check bunds, and sediment control measures such as silt fences, super silt fences, windrows, decanting earth bunds and sediment retention ponds.

<u>Earthworks for Processing and Infrastructure Area and Shepherds Valley Infill</u>

Construction and stabilisation of the realigned and raised Shepherds Creek channel prior to diversion of flow in the valley floor and past the Process Plant and Infrastructure area. Construction of clean water and dirty water diversion channels and bunds with temporary sediment retention ponds for the earthworks for the Process Plant and Infrastructure Area platforms until stabilised or where running surface require, sediment retention ponds for operational purposes.

<u>Earthworks for Shepherd Creek Silt Pond</u>

Construction of clean water diversions channel and bunds, and where required culverting of flow to excavate foundation for earth embankment and construct dam. Manage sediment from earthworks within site. As required provide for sediment retention pond.

<u>Shepherds Engineered Landform</u>

Initial material maybe be placed in Jean Creek. Construct clean water diversions channel and bunds. Strip topsoil and weathered brown rock for rehabilitation in stockpile or in top area of ELF. Control water initially on ELF initially on surface with windrows and sumps (note operational strategy is to shed water off ELF to minimise infiltration). Provide temporary sediment retention ponds at toe of initial area and on working surfaces until Shepherds Silt Pond is established.

<u>Western Engineered Landform</u>

Initial material to be placed in Western ELF. Construct clean water diversions channel and bunds. Strip topsoil and weathered brown rock for rehabilitation in stockpile or in top area of ELF. Control water initially on ELF initially on surface with windrows and sumps (note operational strategy is to shed water off ELF to minimise infiltration). Provide sediment retention pond at toe of ELF controlling discharge to tributary of Clearwater Creek.

Starter Embankment for TSF

Culverting of flows past construction area to excavate foundation for earth embankment and construct dam. Manage sediment from earthworks within site. As required provide for temporary sediment retention ponds. Follow New Zealand Dam Safety Guidelines (NZDSG, Ref. 1) for construction of dams.

Rise and Shine (RAS) Pit Pre-strip

Develop RAS pit to be self-contained. On initial stripping develop a sump within the pit footprint to manage dirty water runoff. During initial stages diversion of run-on clean water from up catchment may be beneficial. Use water collected in pit for dust suppression on ELF and haul roads.

10.3. Mine Operations

Haul Roads

During operation perimeter control of water on the haul roads will be provided by windrows and table drains. Within the running surface check dams shall be used to limit flow velocities and erosion. Sediment generated from haul roads will be directed to decanting earth bunds spaced at regular intervals with water discharge to slope. Generally, these decanting earth bunds will comprise of single or dual decanting bunds. Discharge from the decanting bunds will be by the construction of a stabilised earth weir to discharge laminar flow to the slope below. Small clean water diversion bunds shall be provided above the haul road cuts to direct water to the natural gully features. Clean water from upstream gullies will be culverted past the haul roads.

Engineered Landforms

For water quality of seepage from ELFs, surface water on the ELF is to be drained to the sediment retention ponds to minimise infiltration. Surface water drains will be located around the perimeter of the ELF, to direct runoff to sediment retention ponds. Clean water diversion channels will minimise run-on water.

RAS Pit

RAS Pit to be self-contained. Dirty water will collect in sump in bottom of pit. Use water collected in pit for dust suppression on ELF and haul roads.

Shepherds TSF

Shepherds TSF in operation is fully self-contained. The TSF is designed to retain all rainfall. Water on the TSF will either be pumped back to the Process Plant or will be lost through evaporation.

The site layout, with contours, and the mine operation erosion and operation erosion and sediment controls are shown on Figure 5 to 8.

11.0 CLEAN AND DIRTY WATER DIVERSION SIZING

Clean and dirty water can be diverted using channels, bunds and culverts. The Auckland guidance (Ref. 2) and ICEA guidance (Ref. 3) shall be referenced for suitable details for specific engineering design. Open channel and culvert calculations are required to size individual elements. See Section 13.0 and Table 6 for sizing design criteria. See Table 5 for runoff coefficients.

12.0 SEDIMENT RETENTION POND SIZING

In a significant rain event, dirty water from earthwork areas will flow to a sediment retention bund or pond prior to discharge to a watercourse.

Sediment retention ponds shall be sized using the ICEA guidance (Ref. 3). Using this guidance, a "Type C sediment basin" is suitable based on nature of the soils in Table 1. The requirement for Type C sediment basin is the soils are:

Type C Sediment Basin Soil Criteria	Less than 33% of soil finer than 0.02mm and no more than 10% of soil is dispersive.

The calculation approach allows sufficient settling time for the sediment to drop out of suspension. The settling zone is required to be limited to 0.6 m to 2.0 m depth to achieve laminar flow across the pond.

The performance on Type C sediment basins will be reviewed as part of the monitoring and review process. If water quality on discharge is found to not be suitable then alternative sediment retention ponds using either the ICEA guidance (Ref. 3) or Auckland guidance (Ref. 2) are available.

Shepherds Silt Pond will require specific engineering design due to its size and volume. It may require design as a large dam following the NZDSG. See the Shepherds Silt Pond Technical Report for more information (Ref. 10).

See Section 13.0 and Table 6 for sizing design criteria. See Table 5 for runoff coefficients.

Conventional chemical treatments coagulate the suspended solids can greatly increasing the settlement velocity. Chemical treatments are not required at the BOGP site due to the low proportion of material with a particle size below 0.02 mm.

13.0 DESIGN CRITERIA

For the establishment stage, the erosion and sediment controls will be temporary while construction is ongoing. The establishment stage duration depends on the area. However, generally it is less than 2 years or 24 months. Where controls are only required for less than 12 months, the clean and dirty water diversions and sediment retention ponds or bunds shall be designed for a 1 in 2 year rainfall event. Where controls are only required for 12 to 24 months, the clean and dirty water diversions and sediment retention ponds or bunds shall be designed for a 1 in 5 year rainfall event.

For the mining operation stage erosion and sediment controls will be semi-permanent and will be in place until the site is closed. For erosion and sediment controls that are required for a period greater than 2 years or 24 months, the clean and dirty water diversions and sediment retention ponds or bunds shall be designed for a 1 in 10 year rainfall event.

Culverts and ford crossings shall be designed for 1 in 2 year rainfall event as a minimum.

The selected design criteria are informed by the ICEA (Ref. 3) guidance. Table 6 summarises the design criteria for the BOGP site.

The critical duration of a rain event will depend on the size of the area.

Rainfall depths and intensities shall be determined using the New Zealand HIRD (Ref. 8).

14.0 BOGP EROSION AND SEDIMENT CONTROL MANAGEMENT PLAN

An Erosion and Sediment Control Management Plan (ESCMP) has been developed for the BOGP site. The ESCMP covers the:

- Required site erosion sediment control management structure, practices and procedures.
- Required weather monitoring.
- Required erosion and sediment controls design standards (as indicated in Table 6).
- Required site-specific ESCPs and timing of these.
- Required erosion and sediment control monitoring and review.
- Required reporting.
- Required record keeping.

15.0 SITE SPECFIC EROSION AND SEDIMENT CONTROL PLANS

Site-specific ESCPs are required for each main operational area of the site. Initially for establishment of the site, the key areas which will require ESCPs are:

- Administration and work camp area, including the access road;
- Process Plant and Infrastructure Area;
- Rise and Shine Pit, Haul Road, Shepherds ELF, Shepherds Silt Pond, and Shepherds Tailings Storage Facility; and
- Western ELF.

As the site is further developed, ESCPs will be required for:

- Come in Time Pit and Backfill; and
- Srex Pit, Srex East Pit, and Srex Engineered Landform.

ECSPs require details of the design and construction sequencing of each area to be worked through. ESCPs will also need to be updated for each project stage. ESCPs are to document details of the proposed controls required for a specific area and are to be live documents. ESCPs for each area are to include:

- Overview of the site ESCMP and ESCP structure and responsibilities
- Description of the proposed works
- Summary of any relevant consent and methods to ensure compliance with the conditions
- Details of the erosion and sediment controls, including:
  - Detailed layout plans of the proposed erosion and sediment controls. Layout plans shall cover progressive construction, stabilisation and rehabilitation of each area;
  - Detailed design of any specific diversion channels or bunds;
  - Detailed design of any sediment retention ponds or decanting earth bunds;
  - Details of any stabilisation works required; and
  - Details of dust control approach (where site-specific approach is required).
- The requirement to:
  - Monitor the weather;
  - Inspect the site pre and post a significant rainfall event;
  - Monitor and review the effectiveness of erosion and sediment controls;
  - Report on ESC controls and discharge water quality;
  - Update ESCP and implement revised controls as required; and
  - Maintain records of monitoring results and any updates made.

16.0 RESOURCE CONSENT CONDITIONS

The resource consent conditions will refer to the ESCMP.

It is recommended that between the consent conditions and the ESCMP the following items for ESCP are required:

1. The approved ESCMP is in place and is complied with.
2. Substantive changes to the ESCMP require approval by the Regional Authority.
3. Site specific ESCPs are prepared for each key area of the site.
4. A Suitably Qualified Experienced Professional (SQEP) is approved for the BOGP by the Regional Authority. The SQEP role is to review and approve the site specific ESCPs for the BOGP.
5. Site specific ESCPs meet the site-specific design criteria and referenced guidance in the ESCMP.
6. Site specific ESCPs prepared are approved by the SQEP and submitted to the Regional Authority at least two weeks prior to earthworks proceeding.
7. Any substantive changes to the site specific ESCPs are approved by the SQEP and submitted to the Regional Authority within two weeks of the approval of the change by the SQEP. Substantive changes include changes to the catchment area reporting to a control by more than twenty percent, removal or addition of controls, or changes in sizing of controls by more than twenty percent. Minor adjustment of the position or alignment of controls are not substantive. ESCPs shall be kept up to date whether substantive or minor and reflect the controls in place onsite.
8. Site specific ESCPs are held onsite for the Regional Authority to inspect and review that the specified controls in the ESCPs are in place and effective.
9. Erosion and sediment control measures are effective, or are reviewed and revised, to meet the site water quality compliance limits.

17.0 CONCLUSION

Erosion and sediment effects at BOGP can be managed using the erosion and sediment controls detailed in relevant guidance documents summarised in this report, such that the effects on the watercourses will be less than minor. The report outlines the proposed works and the types of controls required and suitable design criteria for sizing. A BOGP ESCMP is required, outlining the site management, procedures and practices required for the site. Site-specific ESCPs are required, providing detailed design for erosion and sediment controls for the establishment stage through to the operation stage.

REFERENCES

1. NZSOLD (2024), *New Zealand Dam Safety Guidelines*
2. Auckland Council (2016), *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region*. June 2016, Guideline Document 2016/005, Incorporating Amendment 1. www.aucklandcouncil.govt.nz
3. ICEA (2018), *Best Practice Erosion and Sediment Control*. International Erosion Control Association (Australasia), Picton NSW. www.austieca.com.au
4. NZTA (2014), *Erosion and Sediment Control Guidelines for State Highway Infrastructure, Construction Stormwater Management*. www.nzta.govt.nz
5. Otago Regional Council (2023), *Residential Earthworks in Otago, A guide for developers, landowners, contractors, and service providers*. March 2023
6. Metservice (2023) "New Zealand Climate" metservice.com
7. Charter. M (2023), *Development of synthetic rainfall time series, Bendigo Project*. Memo. 19 February 2023
8. NIWA (2024) *High Intensity Rainfall Database, Version 4.* hirds.niwa.co.nz
9. Texas Department of Transportation. (2019). *Hydraulic Design Manual*. Texas DOT, September 2019.
10. EGL (2025) *Matakanui Gold Limited, Bendigo Ophir Gold Project, Shepherds Silt Pond, Technical Report*. EGL Ref. 9702

TABLES

TABLE 1: CATCHMENT AND DISTURBED AREAS

Catchment	Catchment Area*	Disturbed Area
Shepherds Creek	1,265 ha	303 ha
Rise and Shine Creek	456 ha	53ha
Clearwater Creek	769 ha	86 ha

*To edge of project area

TABLE 2: SOIL CHARACTERISTICS

Sample / ID	Laboratory Soil Description	Percentage % between 0.02mm (medium silt) and 0.002mm (clay)	Percentage % less than 0.002mm (clay)	Dispersiveness
Topsoil / MG41757	Sandy SILT with some gravel & some clay, organics present	18	12	10%
Loess / MG41754	SILT with some sand, trace of clay & trace of gravel	18	4	7%
Alluvium or colluvium / MG41765	Silty Sandy GRAVEL with trace of clay	14	4	6%
Weathered Brown Schist / MG41755	GRAVEL with some cobbles, minor sand & trace of silt	0	0	0%

TABLE 3: HIGH INTENSITY RAINFALL DEPTHS

Rainfall depths (mm)		Rainfall Event Duration									
ARI	**AEP**	**10m**	**20m**	**30m**	**1h**	**2h**	**6h**	**12h**	**24h**	**48h**	**72h**
1.58	**0.633**	3.1mm	4.6	5.8	8.4	12.3	21.9	30.7	42.1	55.8	64.8
2	**0.5**	3.6	5.2	6.5	9.5	13.7	24.2	33.8	46.1	60.8	70.4
5	**0.2**	5.2	7.5	9.2	13.3	19.0	32.6	44.8	60.0	78.0	89.4
10	**0.1**	6.7	9.4	11.5	16.4	23.2	39.2	53.3	70.7	90.9	104.0
20	**0.05**	8.3	11.6	14.2	20.0	27.9	46.5	62.5	82.1	104.0	118.0
30	**0.033**	9.4	13.1	15.9	22.3	31.0	51.0	68.3	89.1	113.0	127.0
40	**0.025**	10.2	14.2	17.2	24.0	33.2	54.4	72.5	94.2	119.0	134.0
50	**0.02**	10.9	15.1	18.3	25.4	35.1	57.1	75.9	98.3	123.0	139.0
60	**0.017**	11.5	15.9	19.2	26.6	36.6	59.4	78.7	102.0	127.0	143.0
80	**0.013**	12.5	17.2	20.7	28.6	39.2	63.1	83.3	107.0	134.0	150.0
100	**0.01**	13.3	18.2	21.9	30.2	41.2	66.1	87.0	111.0	139.0	155.0
250	**0.004**	17.1	23.0	27.5	37.4	50.4	79.2	103.0	130.0	160.0	177.0

Source: HIRDS V4 - Historical Data

TABLE 4: HIGH INTENSITY RAINFALL INTENSITIES

Rainfall intensities (mm/hr)		**Rainfall Event Duration**									
ARI	**AEP**	**10m**	**20m**	**30m**	**1h**	**2h**	**6h**	**12h**	**24h**	**48h**	**72h**
1.58	**0.633**	18.8mm/hr	13.8	11.5	8.4	6.2	3.7	2.6	1.8	1.2	0.9
2	**0.5**	21.4	15.6	13.0	9.5	6.9	4.0	2.8	1.9	1.3	1.0
5	**0.2**	31.4	22.4	18.5	13.3	9.5	5.4	3.7	2.5	1.6	1.2
10	**0.1**	39.9	28.2	23.0	16.4	11.6	6.5	4.4	2.9	1.9	1.4
20	**0.05**	49.8	34.8	28.4	20.0	14.0	7.8	5.2	3.4	2.2	1.6
30	**0.033**	56.4	39.3	31.8	22.3	15.5	8.5	5.7	3.7	2.4	1.8
40	**0.025**	61.2	42.6	34.4	24.0	16.6	9.1	6.0	3.9	2.5	1.9
50	**0.02**	65.4	45.3	36.6	25.4	17.6	9.5	6.3	4.1	2.6	1.9
60	**0.017**	69.0	47.7	38.4	26.6	18.3	9.9	6.6	4.3	2.6	2.0
80	**0.013**	75.0	51.6	41.4	28.6	19.6	10.5	6.9	4.5	2.8	2.1
100	**0.01**	79.8	54.6	43.8	30.2	20.6	11.0	7.3	4.6	2.9	2.2
250	**0.004**	102.6	69.0	55.0	37.4	25.2	13.2	8.6	5.4	3.3	2.5

TABLE 5: RATIONAL METHOD RUNOFF COEFFICIENTS

Surface	**Event – Average Recurrence Interval (ARI)**	
	10 year ARI*	**100 year ARI**
Grassed or exposed earth surfaces	0.56	0.69
Rockfill surfaces	0.45	0.56

*For a 2 year ARI use the 10 year coefficients.
Coefficients based on the Hydraulic Design Manual Ref. 9

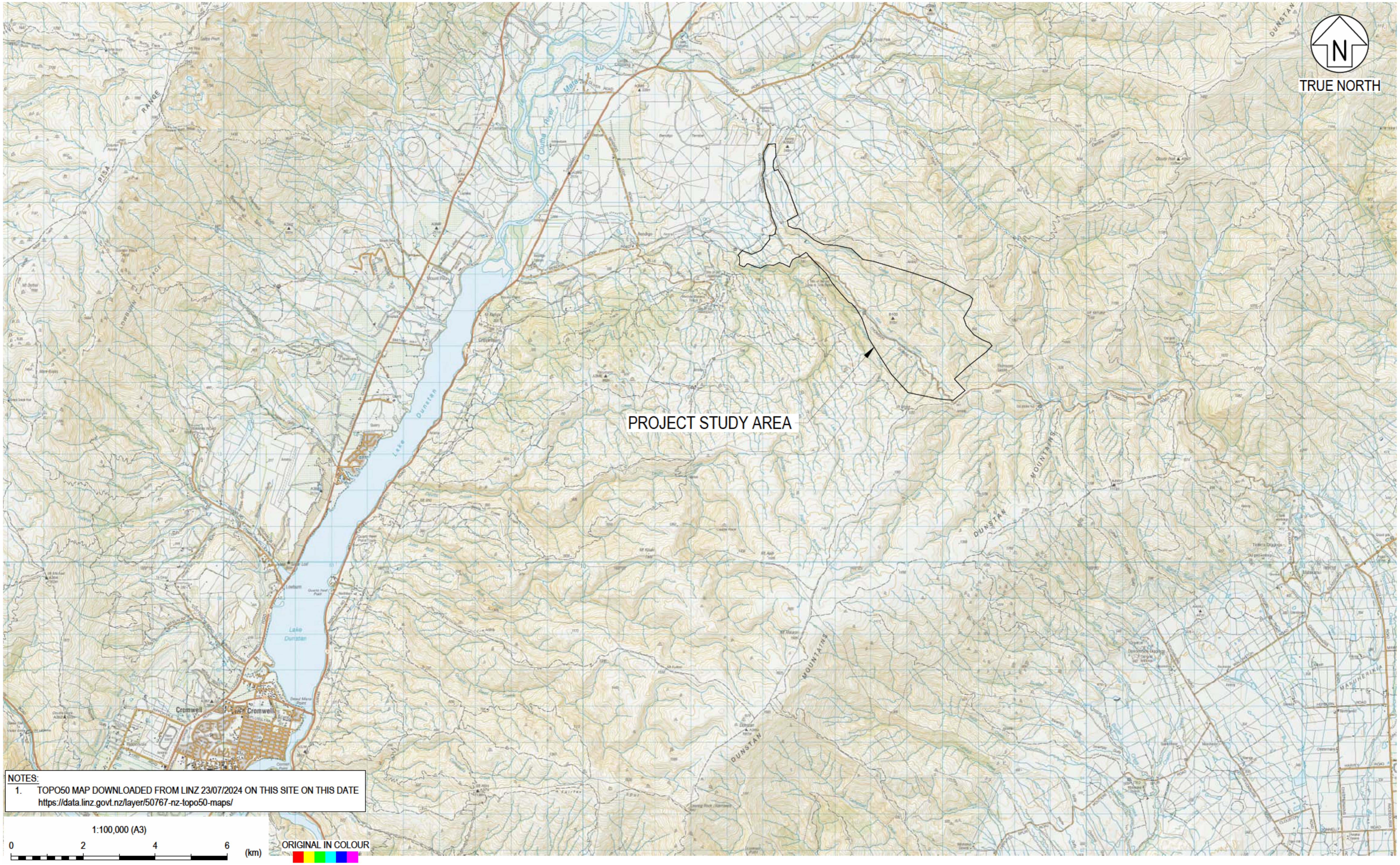
TABLE 6: DESIGN CRITERIA OF TEMPORARY EROSION AND SEDIMENT CONTROLS

Controls requiring sizing	**Disturbed Areas < 12 months** (i.e. generally during site establishment until stabilised)	**Disturbed Areas 12 to 24 months** (i.e. generally during site establishment until stabilised)	**Disturbed Areas > 24 months** (i.e. semi-permanent measures during operation)
Clean and dirty water diversion bunds and channels	Size for 1 in 2 year rainfall event. Passing peak flows for critical duration with freeboard allowance.	Size for 1 in 5 year rainfall event. Passing peak flows for critical duration with freeboard allowance.	Size for 1 in 10 year rainfall event. Passing peak flows for critical duration with freeboard allowance.
Culvert and ford crossings	Size for 1 in 2 year rainfall event. Passing peak flows.		
Sediment retention ponds and bunds.	Size for 1 in 2 year rainfall event using ICEA (Australasia) Type C Sediment Basin for peak flows. Size emergency spillway for 10 year ARI flow as a minimum.	Size for 1 in 5 year rainfall event using ICEA (Australasia) Type C Sediment Basin for peak flows. Size emergency spillway for 50 year ARI flow as a minimum.	Size for 10 year ARI event using ICEA (Australasia) Type C Sediment Basin for maximum peak flow. Size emergency spillway for 100 year ARI flow as a minimum.

***Notes:**

1. Estimation of run-off flow and specific sizing of diversions and culverts required.
2. Freeboard allowance shall be 150mm when flows are less than 20 l/s and otherwise 300 mm unless specific calculation for energy head undertaken.
3. Refer to ICEA (Ref. 3) Type C Sediment Basin using "Appendix B – Sediment Basin Design and Operation" Ref. 2
4. Under design flow conditions sediment retention ponds or decanting earth bunds shall be capable of capturing and holding at least 90% of material larger than 0.045mm in equivalent diameter.
5. Sediment retention ponds and decanting earth bunds shall have a minimum 1 month sediments storage from runoff under average annual conditions.
6. Table is not for the design of permanent stormwater controls. Permanent stormwater controls may require higher design standards.

FIGURES



NOTES:

1. TOPO50 MAP DOWNLOADED FROM LINZ 23/07/2024 ON THIS SITE ON THIS DATE https://data.linz.govt.nz/layer/50767-nz-topo50-maps/

1:100,000 (A3)

0 2 4 6 (km)

ORIGINAL IN COLOUR

FIGURE 01

EGL Geotechnical, Earthquake and Dam Engineers
Engineering Geology Ltd www.egl.co.nz

MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
EROSION AND SEDIMENT CONTROL
LOCALITY PLAN

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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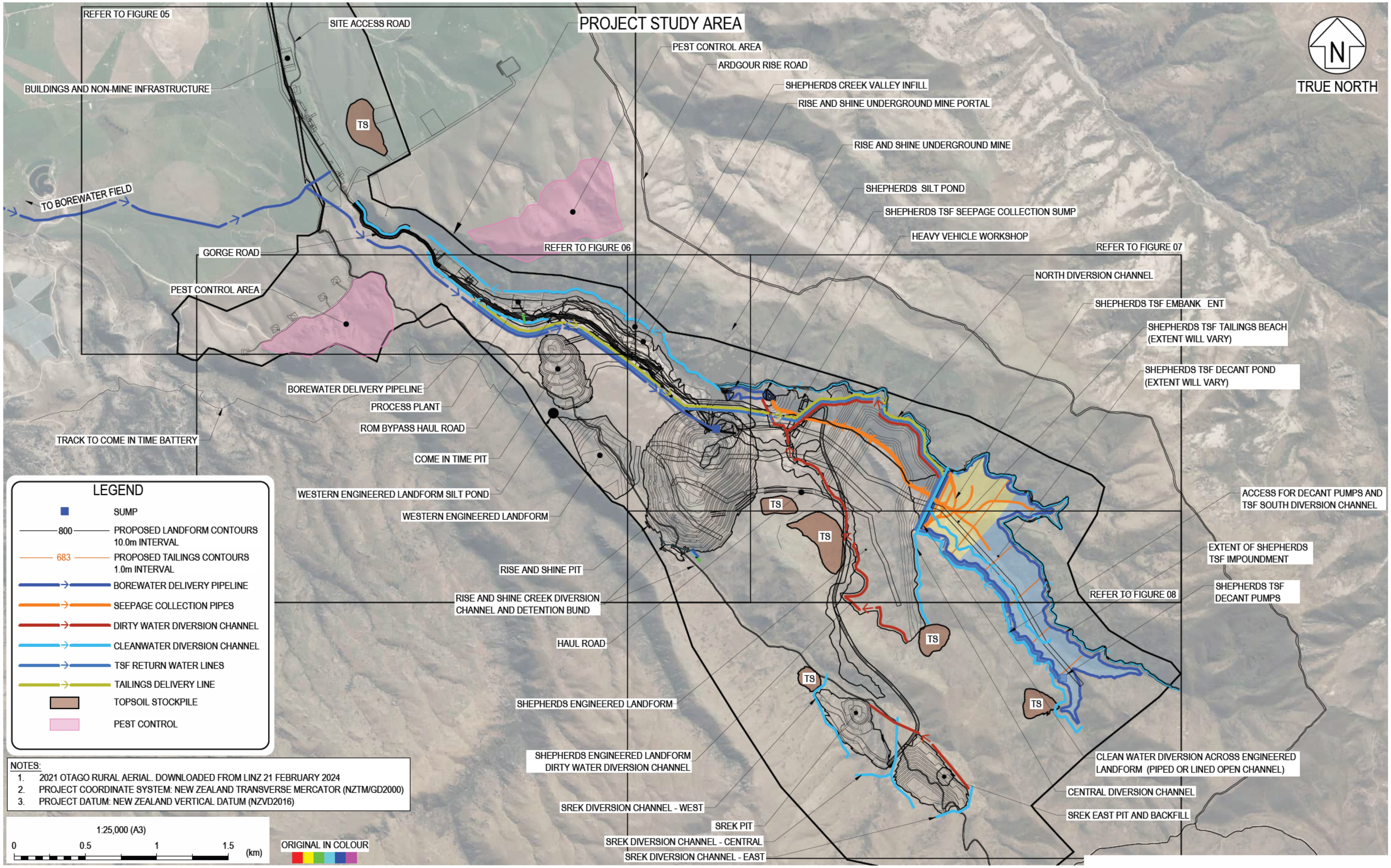

FIGURE 02

EGL
Geotechnical, Earthquake and Dam Engineers
Engineering Geology Ltd www.egl.co.nz

MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
EROSION AND SEDIMENT CONTROL
SITE PLAN

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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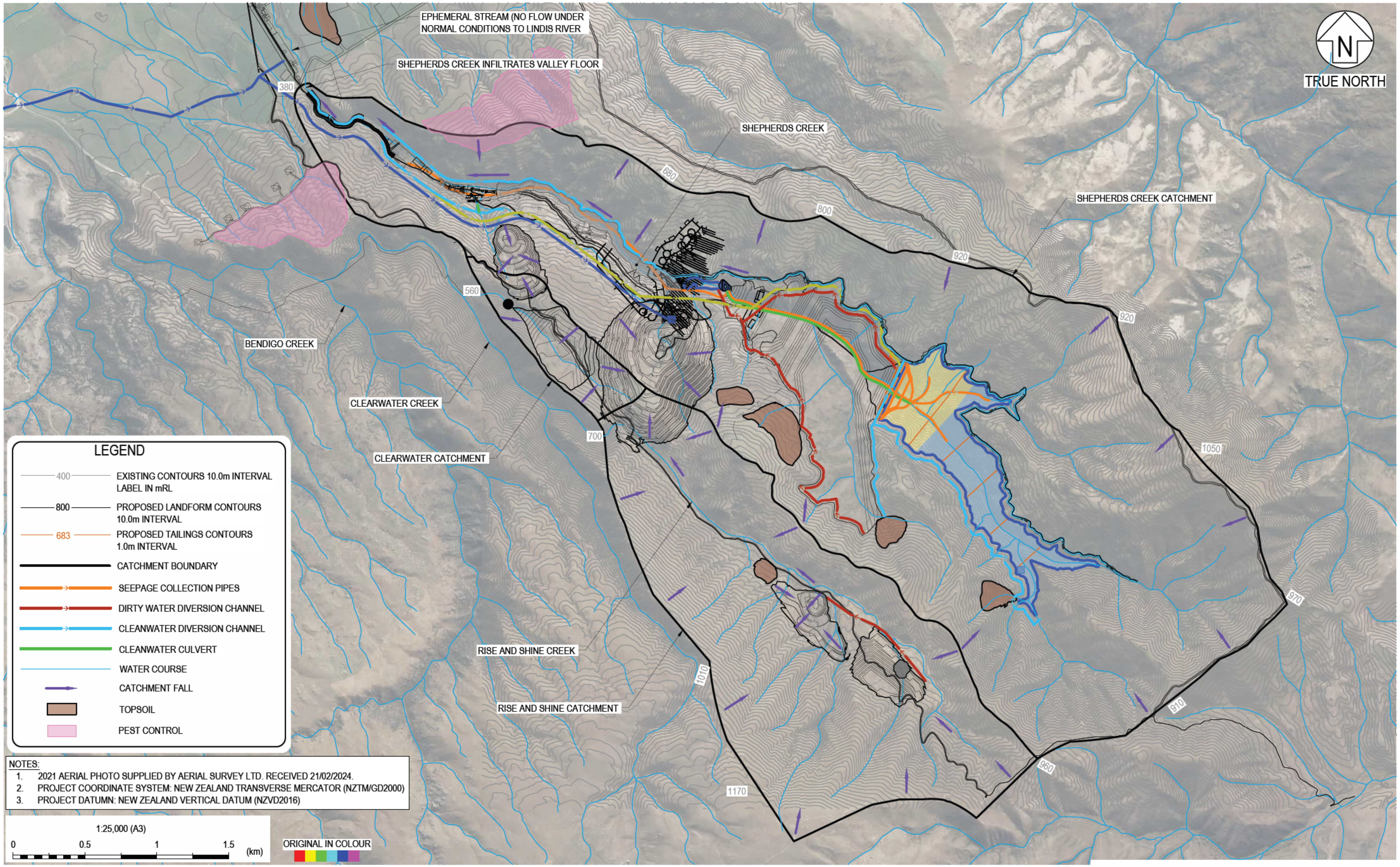

FIGURE 03

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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
EROSION AND SEDIMENT CONTROL
TOPOGRAPHY PLAN

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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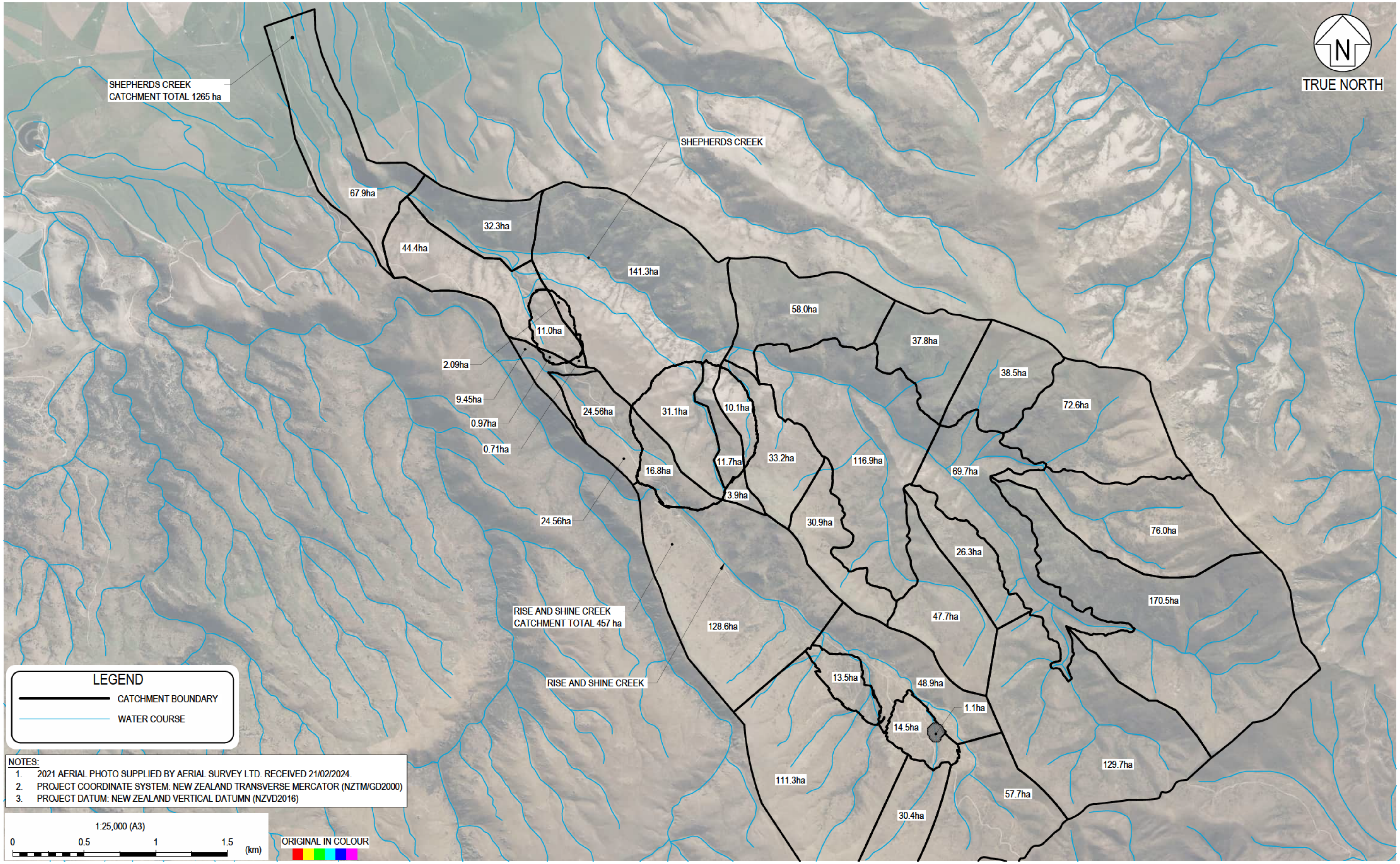

NOTES:

1. 2021 AERIAL PHOTO SUPPLIED BY AERIAL SURVEY LTD. RECEIVED 21/02/2024.
2. PROJECT COORDINATE SYSTEM: NEW ZEALAND TRANSVERSE MERCATOR (NZTM/GD2000)
3. PROJECT DATUM: NEW ZEALAND VERTICAL DATUMN (NZVD2016)

FIGURE 04

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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
EROSION AND SEDIMENT CONTROL
CATCHMENT PLAN

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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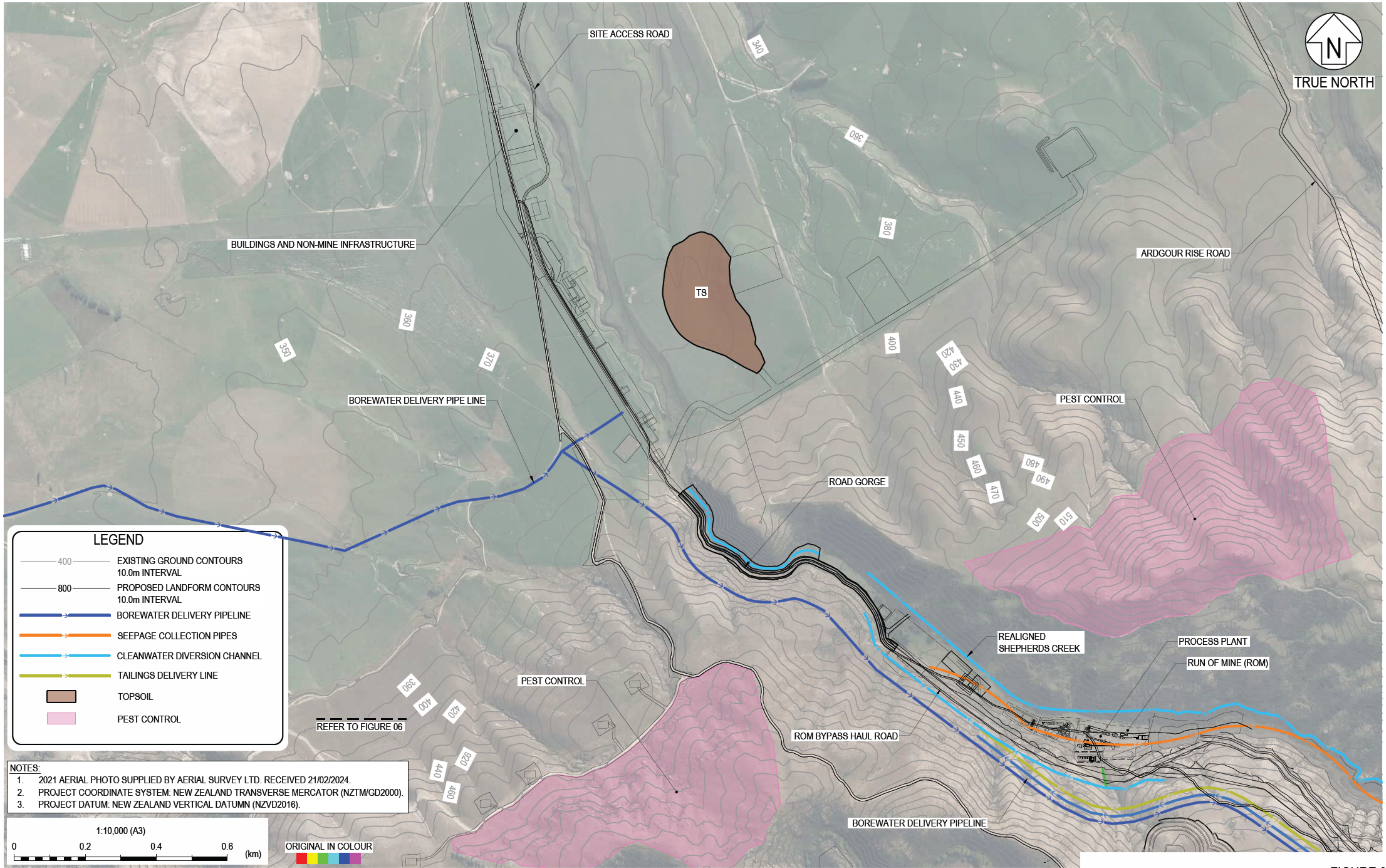

FIGURE 05

EGL
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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
LOWER SHEPHERDS CREEK AREA
OPERATIONAL ESC LAYOUT

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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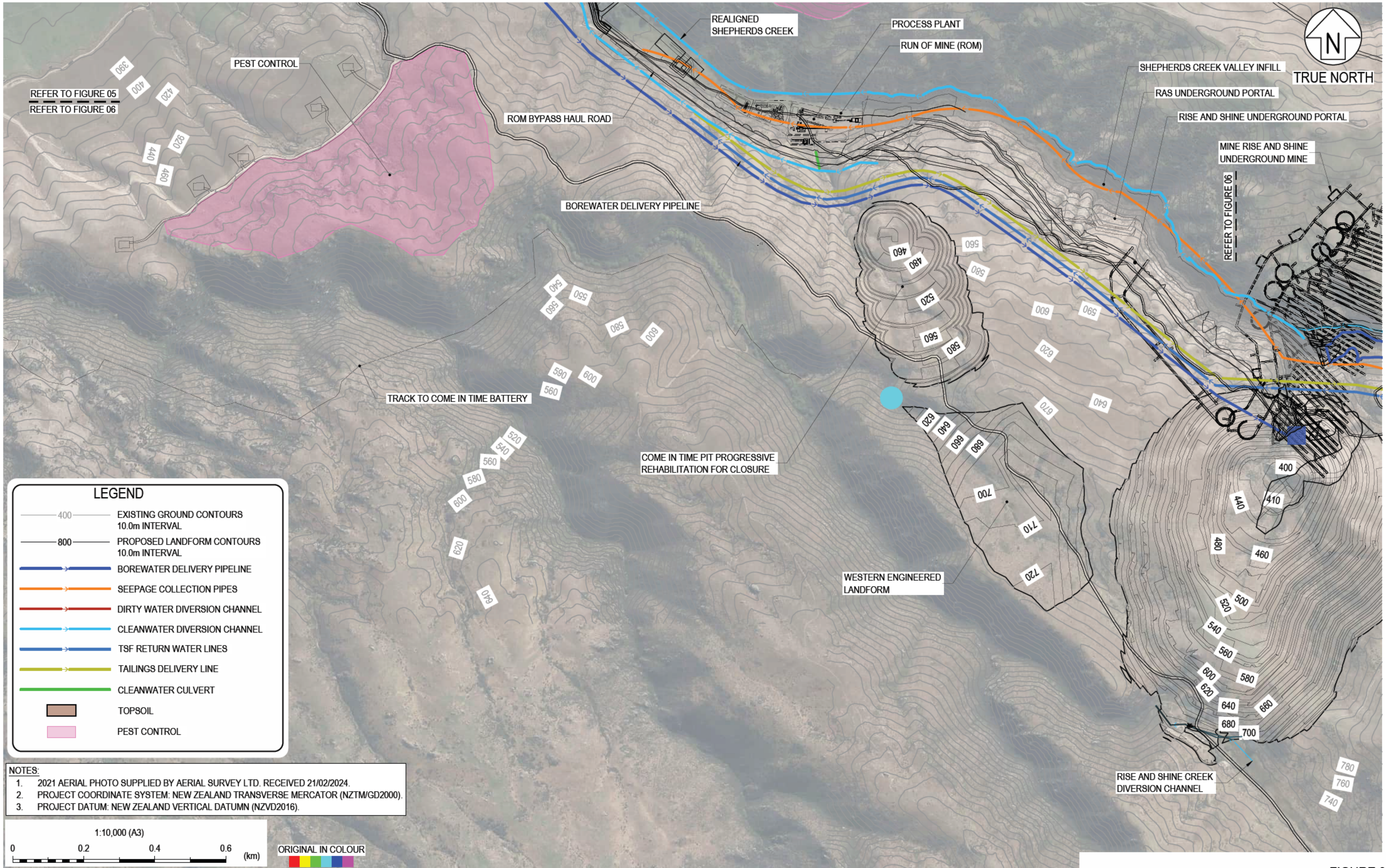

FIGURE 06

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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
MIDDLE SHEPHERDS CREEK AREA
OPERATIONAL ESC LAYOUT

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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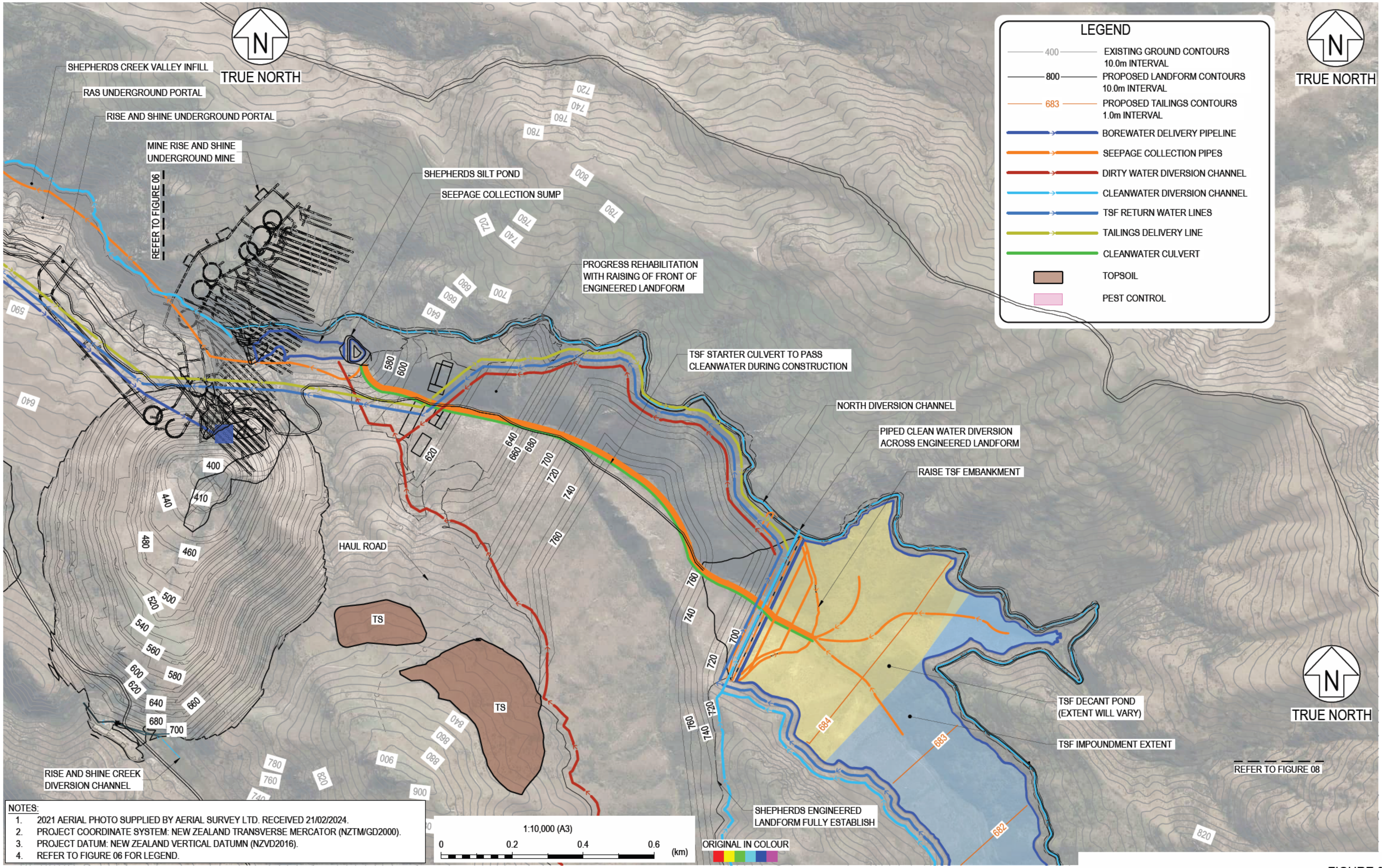

NOTES:

1. 2021 AERIAL PHOTO SUPPLIED BY AERIAL SURVEY LTD. RECEIVED 21/02/2024.
2. PROJECT COORDINATE SYSTEM: NEW ZEALAND TRANSVERSE MERCATOR (NZTM/GD2000).
3. PROJECT DATUM: NEW ZEALAND VERTICAL DATUM (NZVD2016).
4. REFER TO FIGURE 06 FOR LEGEND.

FIGURE 07

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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
UPPER SHEPHERDS CREEK AREA
OPERATIONAL ESC LAYOUT

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
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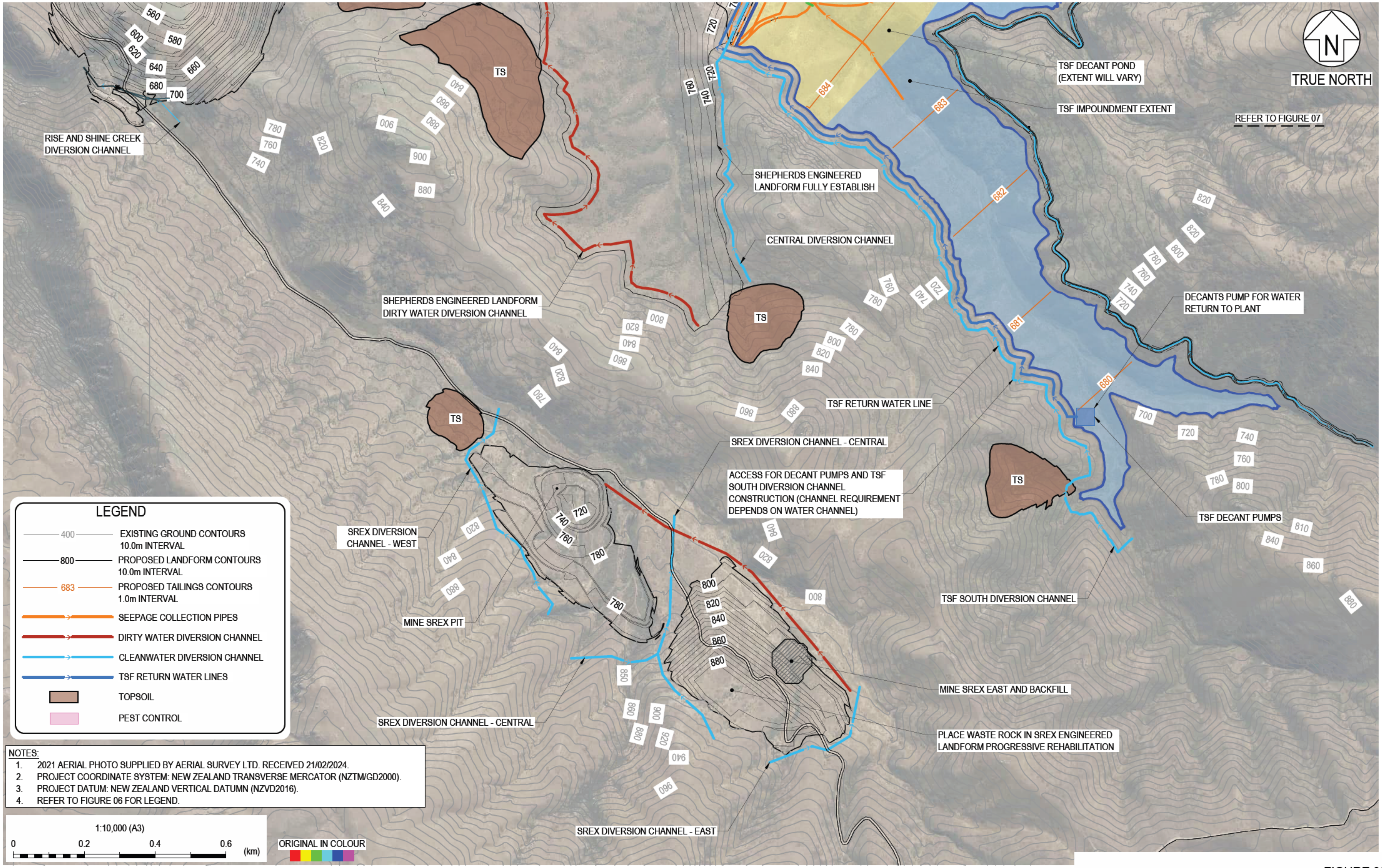

LEGEND

400 EXISTING GROUND CONTOURS 10.0m INTERVAL

800 PROPOSED LANDFORM CONTOURS 10.0m INTERVAL

683 PROPOSED TAILINGS CONTOURS 1.0m INTERVAL

SEEPAGE COLLECTION PIPES

DIRTY WATER DIVERSION CHANNEL

CLEANWATER DIVERSION CHANNEL

TSF RETURN WATER LINES

TOPSOIL

PEST CONTROL

NOTES:

1. 2021 AERIAL PHOTO SUPPLIED BY AERIAL SURVEY LTD. RECEIVED 21/02/2024.
2. PROJECT COORDINATE SYSTEM: NEW ZEALAND TRANSVERSE MERCATOR (NZTM/GD2000).
3. PROJECT DATUM: NEW ZEALAND VERTICAL DATUMN (NZVD2016).
4. REFER TO FIGURE 06 FOR LEGEND.

1:10,000 (A3)

0 0.2 0.4 0.6 (km)

ORIGINAL IN COLOUR

FIGURE 08

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MATAKANUI GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
UPPER SHEPHERDS CREEK AREA
OPERATIONAL ESC LAYOUT

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
CHECKED	E.T.	11/07/2025	9702	1:10,000	C

APPENDIX A
EXAMPLE OF SITE MATERIALS

	EGL Job No.:	9702
	Location:	Bendicog Ophir Gold Project
	Date:	March 2025

Representative photos of surfical materials

Topsoil overlying clayey silt alluvial deposits within valley floor.

Coarse silty sand overlying coarse medium gravel (Alluvial deposits) within valley floor.

Loess over sandy gravel alluvial deposits

Weathered TZ3 schist with very thin overlying colluvium deposits

Slightly weathered TZ4 Schist

APPENDIX B
PARTICLE SIZE DISTRIBUTION OF SITE MATERIALS

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1705-8

Date: 25 November 2024

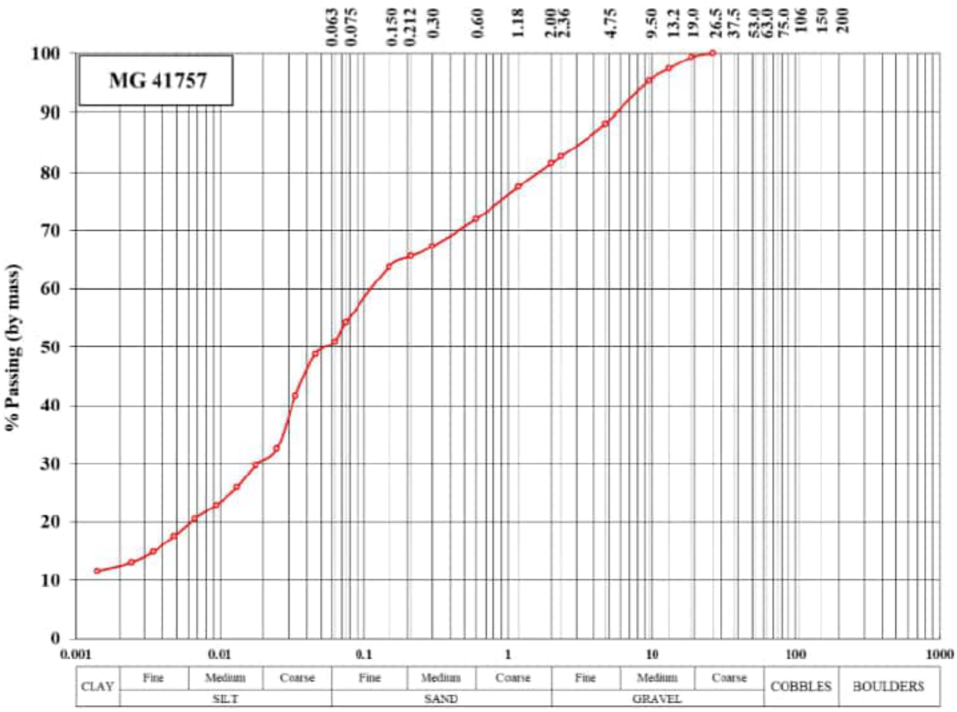
TEST REPORT – SANTANA MINERALS INVESTIGATIONS

Client Details:	Santana Minerals Limited, P.O. Box 11, Hokitika	Attention:	R. Redden
Job Description:	Santana Minerals Investigations		
Sample Description:	Sandy SILT with some gravel & some clay, organics present	Sample No: (cs)	MG 41757
Sample Source: (cs)	Topsoil x3	Sample Location: (cs)	5017501 - 1317967
Date & Time Sampled:	Unknown	Sampled By:	Unknown
Sample Method:	Unknown	Date Received:	30-Aug-24

PARTICLE SIZE ANALYSIS (NZS 4402:1986, Test 2.8.1 & 2.8.4)

Test Sieve (mm)	% Passing (by mass)
53.0	
37.5	
26.5	100
19.0	99
13.2	97
9.50	95
4.75	88
2.36	83
2.00	82
1.18	77
0.60	72
0.30	67
0.212	66
0.150	64
0.075	54
0.063	51

Fraction Size	Interpolated % Passing
60 μm	51
20 μm	31
6 μm	19
2 μm	12



The sample was received in a natural state. The percentage passing the 63μm test sieve was obtained by difference. The pH of the hydrometer suspension was 9.5. Sodium hexametaphosphate was used as a dispersant.

PARTICLE SIZE ANALYSIS & HYDROMETER ANALYSIS RESULTS - NZS 4402:1986, Test 2.8.1 & 2.8.4

Description	Fraction Range	% Within Range	Description	Fraction Range	% Within Range
Coarse Gravel	60.0 mm to 20.0 mm	1	Fine Sand	200 μm to 60 μm	14
Medium Gravel	20.0 mm to 6.0 mm	9	Coarse Silt	60 μm to 20 μm	20
Fine Gravel	6.0 mm to 2.00 mm	8	Medium Silt	20 μm to 6 μm	12
Coarse Sand	2.00 mm to 600 μm	10	Fine Silt	6 μm to 2 μm	7
Medium Sand	600 μm to 200 μm	7	Clay	< 2 μm	12

WATER CONTENT, SOLID DENSITY & ORGANIC CONTENT RESULTS - NZS 4402:1986, Test 2.1, 2.7.1 & 3.1.2

Water Content: ("All In" As Received)	20.7 %
Solid Density:	2.61 t/m^3
Organic Content:	1.66 %

Note: The sample was received in a natural state.

Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample description based on NZ Geotechnical Society Guidelines 2005, the client supplied information (cs) and sampling.*
- *This report may not be reproduced except in full.*

Tested By: K. Hedges, V. Fawcett, L.T. Smith & C. Henderson Date: 6 to 14-Nov-24

Checked By: [redacted]
Approved Signatory

[redacted]

L.T. Smith
Key Technical Personnel

ACCREDITED IANZ TESTING LABORATORY №434

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Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: CTS24W1705-6

Date: 15 November 2024

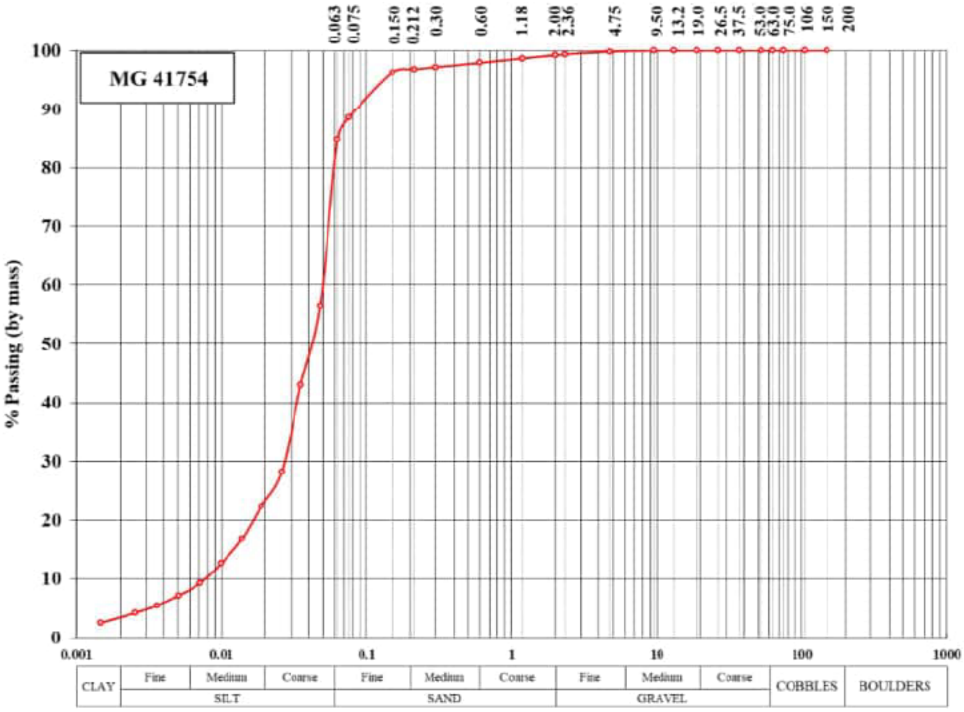
TEST REPORT – SANTANA MINERALS INVESTIGATIONS

Client Details:	Santana Minerals Limited, P.O. Box 11, Hokitika	**Attention:**	R. Redden
Job Description:	Santana Minerals Investigations		
Sample Description:	SILT with some sand, trace of clay & trace of gravel	**Sample No:** (cs)	MG 41754
Sample Source: (cs)	Loess	**Sample Location:** (cs)	5016805 - 1317923
Date & Time Sampled:	Unknown	**Sampled By:**	Unknown
Sample Method:	Unknown	**Date Received:**	30-Aug-24

PARTICLE SIZE ANALYSIS (NZS 4402:1986, Test 2.8.1 & 2.8.4)

Test Sieve (mm)	% Passing (by mass)
53.0	
37.5	
26.5	
19.0	
13.2	
9.50	
4.75	100
2.36	99
2.00	99
1.18	99
0.60	98
0.30	97
0.212	97
0.150	96
0.075	89
0.063	85

Fraction Size	Interpolated % Passing
60 µm	79
20 µm	23
6 µm	8
2 µm	3



The sample was received in a natural state. The percentage passing the 63µm test sieve was obtained by difference. The pH of the hydrometer suspension was 9.5. Sodium hexametaphosphate was used as a dispersant.

PARTICLE SIZE ANALYSIS & HYDROMETER ANALYSIS RESULTS - NZS 4402:1986, Test 2.8.1 & 2.8.4

Description	Fraction Range	% Within Range	Description	Fraction Range	% Within Range
Coarse Gravel	60.0 mm to 20.0 mm	-	Fine Sand	200 µm to 60 µm	18
Medium Gravel	20.0 mm to 6.0 mm	-	Coarse Silt	60 µm to 20 µm	56
Fine Gravel	6.0 mm to 2.00 mm	1	Medium Silt	20 µm to 6 µm	15
Coarse Sand	2.00 mm to 600 µm	1	Fine Silt	6 µm to 2 µm	5
Medium Sand	600 µm to 200 µm	1	Clay	< 2 µm	3

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4402:1986, Test 2.1, 2.2, 2.3 &2.4

Water Content: ("All In" As Received)	2.0 %
Liquid Limit: (LL)	Not Applicable (NA)
Plastic Limit: (PL)	Non - Plastic (NP)
Plasticity Index: (PI)	Non - Plastic (NP)

Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.

Notes:

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- *This report may not be reproduced except in full.*

Tested By: T. S, K.H, M.D, V.F & L.T.S **Date:** 24-Oct-24 to 14-Nov-24

Checked By: [redacted]

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Reference No: CTS24W1705-9

Date: 25 November 2024

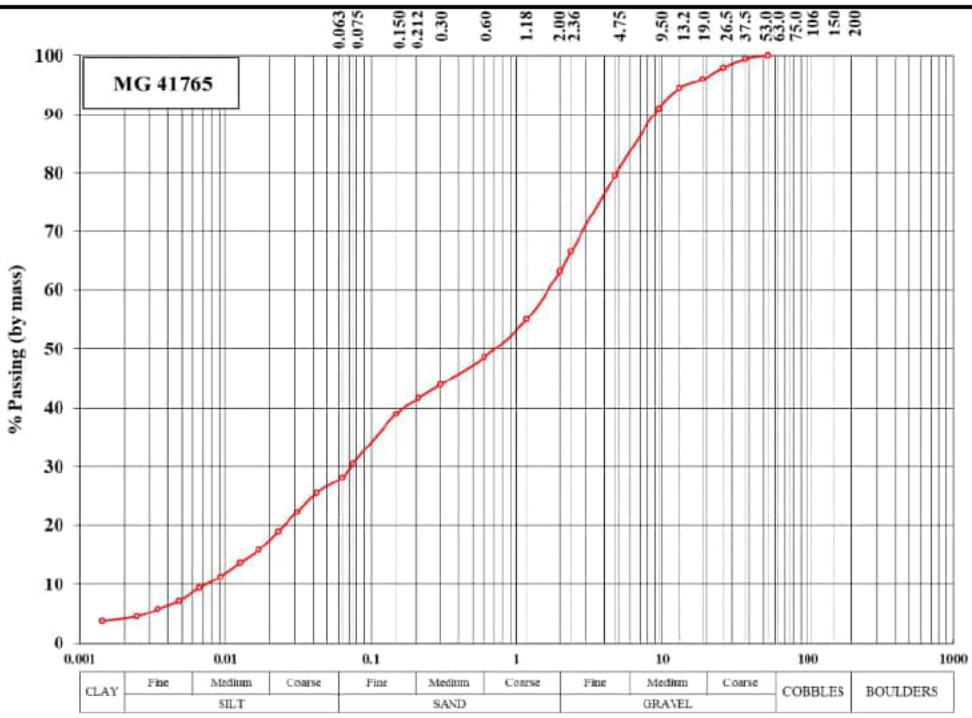
TEST REPORT – SANTANA MINERALS INVESTIGATIONS

Client Details:	Santana Minerals Limited, P.O. Box 11, Hokitika	**Attention:**	R. Redden
Job Description:	Santana Minerals Investigations		
Sample Description:	Silty Sandy GRAVEL with trace of clay	**Sample No:** (cs)	MG 41765
Sample Source: (cs)	Alluvium / colluvium	**Sample Location:**	Not Stated
Date & Time Sampled:	Unknown	**Sampled By:**	Unknown
Sample Method:	Unknown	**Date Received:**	30-Aug-24

PARTICLE SIZE ANALYSIS (NZS 4402:1986, Test 2.8.1 & 2.8.4)

Test Sieve (mm)	% Passing (by mass)
53.0	100
37.5	99
26.5	98
19.0	96
13.2	94
9.50	91
4.75	80
2.36	67
2.00	63
1.18	55
0.60	49
0.30	44
0.212	42
0.150	39
0.075	30
0.063	28

Fraction Size	Interpolated % Passing
60 µm	28
20 µm	17
6 µm	9
2 µm	4



The sample was received in a natural state. The percentage passing the 63µm test sieve was obtained by difference. The pH of the hydrometer suspension was 10.0. Sodium hexametaphosphate was used as a dispersant.

PARTICLE SIZE ANALYSIS & HYDROMETER ANALYSIS RESULTS - NZS 4402:1986, Test 2.8.1 & 2.8.4

Description	Fraction Range	% Within Range	Description	Fraction Range	% Within Range
Coarse Gravel	60.0 mm to 20.0 mm	4	Fine Sand	200 µm to 60 µm	13
Medium Gravel	20.0 mm to 6.0 mm	13	Coarse Silt	60 µm to 20 µm	11
Fine Gravel	6.0 mm to 2.00 mm	20	Medium Silt	20 µm to 6 µm	8
Coarse Sand	2.00 mm to 600 µm	14	Fine Silt	6 µm to 2 µm	5
Medium Sand	600 µm to 200 µm	8	Clay	< 2 µm	4

PLASTICITY INDEX RESULTS - NZS 4402:1986, Test 2.2, 2.3 &2.4

Liquid Limit: (LL)	43
Plastic Limit: (PL)	34
Plasticity Index: (PI)	9

Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.

Notes:

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Tested By: K. Hedges, V. Fawcett & L.T. Smith **Date:** 8 to 14-Nov-24

Checked By: [redacted]

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Reference No: CTS24W1705-7

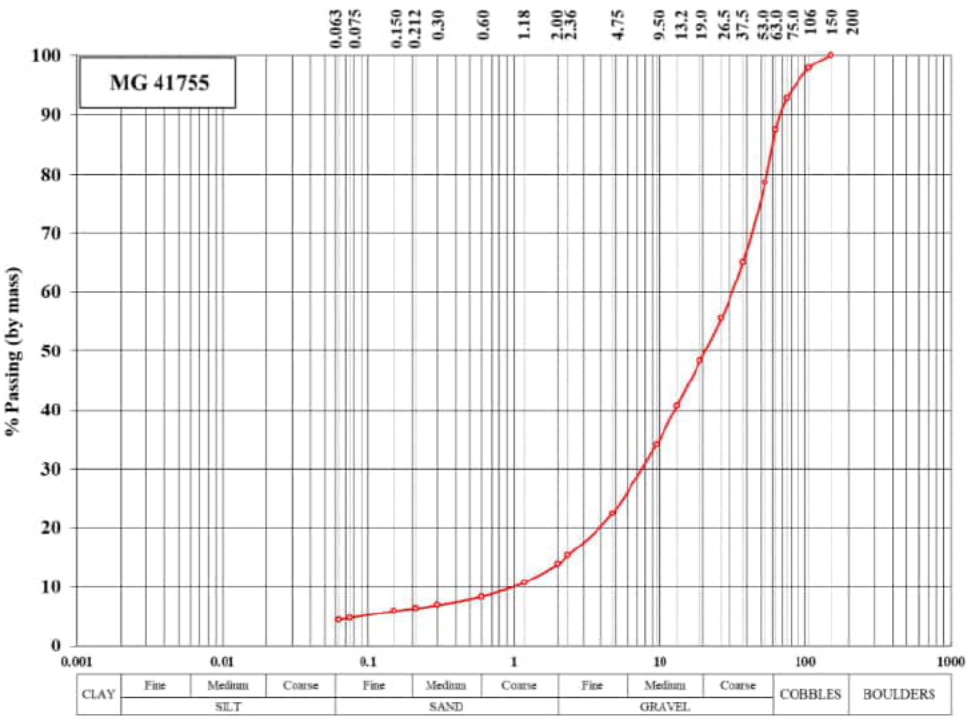
Date: 25 November 2024

TEST REPORT – SANTANA MINERALS INVESTIGATIONS

Client Details:	Santana Minerals Limited, P.O. Box 11, Hokitika	**Attention:**	R. Redden
Job Description:	Santana Minerals Investigations		
Sample Description:	GRAVEL with some cobbles, minor sand & trace of silt	**Sample No:** (cs)	MG 41755
Sample Source: (cs)	Weathered brown schist x2	**Sample Location:** (cs)	5017377 - 1317920
Date & Time Sampled:	Unknown	**Sampled By:**	Unknown
Sample Method:	Unknown	**Date Received:**	30-Aug-24

PARTICLE SIZE ANALYSIS (NZS 4402:1986, Test 2.8.1)

Test Sieve (mm)	% Passing (by mass)
150.0	100
106.0	98
75.0	93
63.0	88
53.0	79
37.5	65
26.5	56
19.0	48
13.2	41
9.50	34
4.75	22
2.36	15
2.00	14
1.18	11
0.60	8
0.30	7
0.212	6
0.150	6
0.075	5
0.063	4



The sample was received in a natural state. The percentage passing the 63µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4402:1986, Test 2.1, 2.2, 2.3 &2.4	
Water Content: ("All In" As Received)	1.2 %
Liquid Limit: (LL)	31
Plastic Limit: (PL)	27
Plasticity Index: (PI)	4
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Notes:

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Tested By: T. Shaw, K. Hedges, L.T. Smith & V. Fawcett **Date:** 6 to 18-Nov-24

Checked By: [redacted]

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