

**MATAKANUI GOLD LIMITED
BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS, WESTERN, AND SREX ENGINEERED LANDFORMS, AND,
COME IN TIME PIT BACKFILL
TECHNICAL REPORT**

Prepared for:

Matakanui Gold Limited

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EXECUTIVE SUMMARY

Unmineralised waste rock generated by mining of the Bendigo-Ophir Gold Project (BOGP) open pits and a small amount of material from the development of an underground mine will be stored in Engineered Landforms (ELFs). The ELF's will be designed, constructed, operated and rehabilitated to provide safe long-term storage of waste rock generated by mining activity during BOGP operation.

Four ELFs are proposed:

- Shepherds ELF (85Mm³ capacity);
- Come in Time Pit Backfill (3.9Mm³ capacity);
- Western ELF (5.2 Mm³ capacity); and
- Srex ELF (4.2Mm³ capacity).

Shepherds ELF is the largest of the proposed ELF's and will contain the majority of unmineralised waste rock excavated from Rise and Shine Open Pit. Shepherds ELF is located immediately downstream of, and will buttress, the Shepherds Tailings Storage Facility (TSF).

All ELF's will be constructed using the same design philosophy.

Geochemical stability will be achieved by construction methods that minimise oxygen advection within Bulk Fill Zones by successive layers of paddock dumping and / or end tipping from low height (typically a maximum of 5 m) tip heads. Outer Fill Zones (within 10 vertical metres of the final slope) will be constructed in successive paddock dumped layers. Clean water perimeter drains will reduce water flows into backfilled material.

Final ELF surfaces will be shaped to a maximum slope angle of 1 vertical: 3 horizontal (approximately 19°). 200 mm of previously reclaimed topsoil material will be placed on final ELF surfaces.

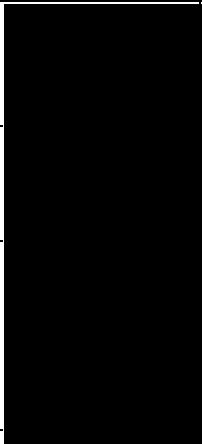
Preliminary static and seismic stability analyses confirm that BOGP ELFs constructed to the above design will be stable in closure and in a 1 in 2,500 year seismic event.

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TECHNICAL REPORT

1.0 INTRODUCTION

Engineering Geology Limited (EGL) was engaged by Matakanui Gold Limited (MGL) to provide this technical report on the Engineered Landform (ELF) design 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 the Bendigo and Ardour Stations in the Dunstan Mountains of Central Otago.

The BOGP involves mining the identified gold deposits at Rise and Shine (RAS), Come in Time (CIT), Srex (SRX) and Srex 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 ELF's that are covered by this report are the Shepherds ELF, Western ELF, Come in Time Pit Backfill, and Srex ELF. The purpose of this report is to inform and enable the resource consent application process by providing an outline the proposed civil and geotechnical design, construction, risks, and mitigations for these ELF's.

2.0 PROJECT LOCATION & DESCRIPTION

2.1. Location

The project site, which targets the RAS gold prospect, is located approximately 20 km northeast of Cromwell.

The RAS gold prospect is located within a ridge that is situated between Shepherds Creek to the northeast and RAS Creek to southwest.

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

2.2. Proposed mine

BOGP proposes to mine the identified gold deposits at RAS, CIT, Srex and Srex East. These four gold deposits, which are situated within approximately 4km of each other, are located within the Dunstan Mountain Range beneath the Shepherds Creek and RAS Creek Catchments.

MGL proposes to mine the RAS deposit using an open pit mine (RAS Pit) and extend mining at depth using an underground mine (RAS Underground). CIT, Srex, Srex East deposits are proposed to be mined using open pits (i.e. CIT Pit, Srex Pit, Srex East Pit). Figure 2 shows the proposed locations of these mine pits.

The proposed access to the RAS Underground is via two portals which are situated within Shepherds Valley, northwest of the RAS Pit. See Figure 2 for location details.

2.3. Proposed material production

RAS is the largest of the gold deposits discovered to date and the RAS Open Pit is the first development of the BOGP mine plan, followed by development of the RAS underground.

The CIT Open Pit is scheduled to be mined in conjunction with the later stages of the RAS Open Pit, with waste rock material from RAS available for CIT Pit backfill.

Mining of the SRE and SRX Open Pits is currently scheduled to occur late in the BOGP mine plan.

Unmineralised waste rock volume produced by the project is approximately 203.5Mt. The approximate tonnage of unmineralised waste rock material produced from each mining area is summarised in Table 1.

2.4. Proposed overburden rock storage

Unmineralised waste rock is proposed to be used and stored in a number of areas and facilities including:

- Shepherds ELF
- Western ELF
- Process Plant, ROM Pad, and Infrastructure Area platform
- Shepherds Valley Infill
- TSF Starter Embankment
- TSF Full Embankment
- CIT Backfill
- Srex ELF
- TSF closure capping

The proposed allocation of unmineralised waste rock storage is summarised in Table 2.

3.0 SITE SETTING

3.1. Site topography and catchments

The site footprint extends across geology comprising alluvial gravels of the Bendigo Terrace and Schist rock of the Dunstan Mountains.

The identified gold deposits are located within Schist rock that is situated between Shepherds Creek and RAS Creek, and beneath the southwest slopes above RAS Creek.

Both creek catchments start from a divide at approximately 950 mRL in the southeast and flow to the northwest. The creeks flow over Schist rock within the valleys and onto gravel terraces in the northwest. Shepherds Creek is approximately 150 m lower than RAS Creek. The ridge between the creeks is approximately 60 to 190 m above the floor of RAS Creek, and 200 to 350 m above the floor of Shepherds Creek. RAS Creek flows into Clearwater Creek at approximately 650 mRL which in turn flows into Bendigo Creek at about 570mRL. Shepherds Creek and Bendigo Creeks flow off the Schist rock and on to gravel terraces at approximately 350 mRL.

Shepherds Creek is a tributary to the Lindis River, which flows to the Clutha River. RAS Creek flows into Clearwater Creek, and then Bendigo Creek which is a tributary of the Clutha River. Under normal flows Shepherds Creek has no surface flow connection with the Lindis River with the surface water infiltrating the gravels. Both Bendigo Creek and Shepherds Creek have surface water takes related to agricultural activities which reduce flows across and into the gravels. Bendigo Creek also has no surface flow connection to the Clutha River for most of the year.

Shepherds ELF and CIT Backfill are located within the Shepherds Creek Catchment. The Srex ELF is located within the RAS Creek Catchment, which is part of the Clearwater Creek Catchment. The Western ELF is in an unnamed tributary of the Clearwater Creek Catchment. The creek flow paths relative to the proposed pit locations and arrangement is shown on Figure 2.

3.2. Site Climate and rainfall estimates

The BOGP site is located 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. 3). 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. The mean annual rainfall in the South Island ranges between over 8,000 mm west of the Southern Alps to as little as 300 mm in parts of Central Otago (Ref. 3).

The project area is approximately the most inland area of New Zealand and has a far more continental tendency than other parts of the country (Ref. 4). 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. 4). The New Zealand High Intensity Rainfall Database (HIRDS, Ref. 5) provides estimates of rainfall depths and intensities for different average recurrence intervals (ARI) or annual exceedance probabilities (AEP). Table 3 and 4 summarise these

estimates. Table 3 extends the estimates out to a 1 in 1,000 year AEP. 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. 5) and the data that is relevant to this report is reproduced in Table 4. The HIRDs estimates can be used for diversion channel sizing.

4.0 GEOTECHNICAL INVESTIGATIONS

Geotechnical investigations have been undertaken across the site footprint at the direction of EGL, with onsite supervision and logging undertaken by MGL geologists. The results of these investigations are presented in the site wide geotechnical factual report (Ref. 6).

The above investigation comprised field mapping and the drilling of seven machine boreholes and the excavation of 68 test pits. A total of 21 vibrating wire piezometers were installed in the geotechnical boreholes as part of this investigation. In-situ testing comprised standard penetration tests (SPT's), acoustic televiewer and full sonic wave form testing. Selected material recovered from the test pits were tested in an appropriately experienced specialist laboratory to assist with characterisation of site materials.

5.0 GEOLOGY

5.1. Regional geological setting

The following assessment of the regional geological setting for the BOGP is based on a review of the currently available site-specific investigation results, information shown on the Geological and Nuclear Science (GNS) 1:250,00 scale geological map and descriptions contained in the memoir "Geology of the Wakatipu Area" by Turnbull et al (Ref. 7). A geological map which is based on the GNS QMAP is presented as Figure 19.

The regional topography is dominated by mountains and glacially carved valleys.

The site is located within the Dunstan Mountain Range, with the valleys shaped to the north by glaciation while near the BOGP site the valleys appear cut by river erosion.

The wider site area is underlain by Otago Schist and appears to span the boundary of two textural units recognised within the schist: Textural Zones III (TZ3) and IV (TZ4).

The protolith for the Schist is sedimentary mudstones and sandstones, deposited in the Permian to Triassic time period (300Mya to 200Mya). Metamorphism occurred in the Cretaceous time period between 140Mya and 75Mya, undergoing greenschist facies pressures and temperatures, with the TZ3 experiencing lower pressure and temperature than TZ4.

Orogenic gold mineralisation occurred in the schist during metamorphism in the axis of a fold creating the Rise-and-Shine Shear Zone. The boundary of TZ3 and TZ4 is along the Thomson Gorge Fault (TGF), a reverse fault dipping to the NE at approximately 25°, with an estimated vertical offset of approximately 8km. Movement along the TGF occurred in the Late Cretaceous, ending by approx. 82 Mya. The TGF is part of a large fold system across the southern end of the Dunstan Mountains, with the Cromwell Gorge Faults matching the TGF at the southern arm of the fold.

The Otago region has experienced oblique compression relating to initiation of the Alpine Fault (the surface expression of the Australia and Pacific tectonic plate boundary) which commenced approximately 25Mya. These events have formed the Pisa Range, Dunstan Mountains and Rock and Pillar Range. Recent glaciation has occurred in the area, with a series of glacial advances and retreats leaving tills and moraines along the Clutha Valley north of the site. The site is located at the historic junction of the Lindis and Wanaka glaciers. The western extent of the site is shown as having been glaciated during the last maximum glaciation which occurred approximately 650kya.

Gold was found on the site in 1862, with gold prospecting occurring until 1913, restarting in 1935-1942. Sluicing in RAS Creek took place during 1864-1899. Hard rock mining in RAS Shear zone was undertaken in the years 1872 to 1890, and 1932 to 1939.

5.2. Local Geological Setting

The bedrock beneath the site is TZ3 and TZ4 Otago Schist, separated by the Thomson Gorge Fault (TGF). The fault is generally a consistent plane, which runs along RAS Creek from Thomsons Saddle to the point where the stream cuts westward to join Clearwater Creek. There the TGF continues northwest and joins Shepherds Creek which follows TGF until the end of the valley.

Fault activity on the TGF is dated to 82 ± 3 Mya, (Turnbull, Ref. 7) at the end of the metamorphism of the schist. At the surface, the TGF outcrops as a clay rich zone. In core recovered from the rotary cored borehole investigation the TGF is observed as a cataclastic clay gouge, with blocks of Schist up to 50 mm diameter present within the gouge.

Both TZ3 and TZ4 schist outcrops in many locations within the project area. MGL geologists have measured the dip and dip direction of joints, foliation and shear zones on outcrops. Fault shears and folds have been mapped and interpreted within the TZ3 on site by MGL geologists during exploration activity (Figure 21).

Historic landslide features have been identified on the site within TZ3 Schist, mainly associated with steep slopes within the Shepards Creek catchment. Landslide movement appears to be controlled by structural elements within the underlying bedrock. Many are block slide type features. Many of the landslide features which have been identified to date are assessed as being ancient landslides, present as displaced masses without debris fields. This indicates the displaced masses are generally at rest without rapid type instability mechanisms. The significant general landform features which have been identified to date are annotated on Figure 20.

5.3. Geological Units

A description of the geological deposits that have been encountered on site to date is provided in the following sub-sections,

5.3.1. Topsoil

A veneer of topsoil covers much of the site. The topsoil is an organic rich silty soil that tends to be thicker towards the base of valley floors. On valley slopes the topsoil comprises an organic stained loess deposit.

5.3.1. Tailings and sluiced gravels (Q1n)

Historic mine workings are identified mostly within the RAS Creek valley. Some historic workings are also present around CIT on the slopes above Shepherds Creek. Historic mine tailings comprised material generated by either hard rock mining or by sluicing surficial materials. Non-gold bearing rock from hard rock mining is observed as unweathered Schist cobbles and boulders piled into rock stacks 2 to 3 m in height.

Gold bearing alluvium was washed downslope and sluiced to extract gold. Sluicing was mainly done in the upper catchment of the RAS Creek valley. Some tailings are present on the slopes at CIT.

Water used in historic gold mining activity was brought into the RAS Creek valley via a series of channels carved into the hillside. Sluicing of the southwest slopes of the RAS Creek valley and the creek alluvium occurred with sluice tailings washed further down the valley. Tailings from sluicing is difficult to identify as it is similar in appearance and deposition style to alluvial sediments. This being said, the investigation results generally indicate that the sluice tailings are variable in thickness, are less than about 3 m thick, and are primarily located adjacent to and beneath the stream in the RAS Creek Valley. Worthy of note, in part of the RAS Creek valley, sluicing's were identified as a lens within a swamp deposit of organic clay that was up to 1.5 m thick.

5.3.2. Alluvial deposits and fans (Q1a & Q1af):

This unit is typically described in published references as being undifferentiated, typically unconsolidated, variable weathered gravels with interbeds of sands, silts and clays. This unit was generally observed in the site-specific geotechnical investigations as being located in the valley floor and comprising clays, silts, sands and gravels derived from parent materials upstream of the deposition location.

Organic-rich clays, with infrequent lenses of variable material from other sources, may be encountered where low energy environments existed as part of the stream or river historic flow path (e.g. swamps),

5.3.3. Loess

These deposits are not mapped on the relevant geological maps of the area and are described in the geological memoir as “*too thin, diffuse and complex to be shown on a map*”. Locally, on the lower flatter valley slopes, loess may have been deposited as a 1 to 3 m thick ‘blanket deposit’ while on steeper slopes it has been remobilised and forms a thin loess / colluvium slope wash unit containing material from the underlying rock. Outside of the site footprint, outcrops that contain loess deposits up to 3 m thick have been observed in some areas. The site-specific test pit and borehole investigations did not encounter any deposits of loess.

5.3.4. Holocene landslide deposits (Q11)

For the Holocene landslide deposits silt and gravel sized materials are dominant, and such deposits are loose and unsorted, coming from weathering and erosion of the Schist. These materials are typically deposited at the base of slopes or on the lower slopes of the river valleys.

The above deposits were observed to range from shattered rock to clay and boulder breccias. These materials are typically derived from underlying adjacent rocks. It may be described in some references as colluvium and slope wash deposits.

5.3.5. Undifferentiated Quaternary landslide deposits (uQ1)

These deposits are older than the Holocene deposits but have a similar composition. In some locations they may have been overlain by more recent Holocene landslide deposits. The indicative extent of the landslides which have been identified to date are shown on Figure 20.

5.3.6. Schist

Within the study area the Otago Schist basement rock has been divided into the following three (3) zones:

Torlesse TZ3 Schist (*Rakaia Terrane, Whakatipu Group*) (Yt3): Permian to Triassic era undifferentiated pelitic and psammitic schist and greenschist sequences. This unit may be locally weathered to a silty gravel.

Torlesse TZ4 Schist (*Rakaia Terrane, Whakatipu Group*) (Yt4): Permian to Triassic era undifferentiated pelitic and psammitic schist and greenschist sequences. This unit may be variable segregated, veined and foliated.

Thomson Gorge Fault Gouge: It typically comprises a band of material up to 2m thick, and sometimes associated with brecciation up to 10m thick, both of which are derived from movement on the Thomson Gorge Fault. In general, this material comprises clays with some angular gravel. The fault gouge forms a ‘marker bed’ separating the TZ3 and TZ4 schist within the project area.

The TZ4 schist is a higher metamorphic grade and is stronger and more resistant to weathering and erosion than TZ3 schist. Foliation in TZ4 is generally consistent, dipping northwest at around 20 degrees. Slopes in the TZ4 are roughly parallel to the foliation, and steeper than foliation where the foliation dips into the slope.

TZ3 schist is a lower metamorphic grade and is weaker and more erodible than TZ4 schist. Foliation planes in TZ3 vary greatly with folds and angular contacts between different planes. The surface topography slope in TZ3 Schist material is variable, typically relating to the changes in foliation and the presence of structures antithetic to foliation.

Weathering of the schist is generally thin, but variable, with the depth of the weathering profile increasing along defects and in more micaceous layers. The same weathering processes are at work within TZ3 and TZ4 schist, with the greatest weathering occurring along defects and mica-rich layers. The weathering profile is deeper in the TZ3 than TZ4, due to a weaker starting condition and more defects present. Weathered TZ3 and TZ4 material is physically similar, consisting of clays from weathered micas with more competent schist blocks from less micaceous zones of the original rock. Weathered schist products eventually forming a slope wash of clays and blocks where the weathering profile establishes.

5.4. Shepherd ELF – Basement Geology

The Shepherd ELF is expected to be underlain by TZ3 Schist. Figures 19, 20 and 21 shows the inferred geology and geomorphology of the area. Within the vicinity of the Shepherd ELF, the foliation of the underlying TZ3 Schist has a relatively uniform dip to the northeast on the northern side of the Shepherds Creek valley. On the southern side of the valley the Schist foliation dips slightly more to the north with an apparent change in dip directions near the valley floor (Figure 21).

Shear zones and non-active faults are interpreted to cross the Shepherds ELF area and excavations in the rock for underdrains of diversion channels will cut these structures.

5.5. Come in Time Pit Backfill – Basement Geology

It is anticipated that the Come in Time Pit will be primarily excavated within a combination of TZ3 and TZ4 Schist rock material with the TGF trace exposed in the western pit wall. Figures 20, 21 and 22 shows the geology and geomorphology of the area. The north-eastern pit wall will be cut mostly within TZ3 Schist rock. Mapping within this area indicates that the TZ3 rock foliation dips north and northeast.

The geomorphology map (Figure 20) indicates slightly hummocky terrain which is typical of the TZ3 slopes and is indicative of potential ancient deep or shallow displacement of TZ3 material by as yet unidentified landslides in the area of the CIT.

5.6. Western Engineered Landform – Basement Geology

The Western ELF will be located within a small valley of an unnamed tributary of Clearwater Creek. The footprint of this pit will be located southwest of the CIT Pit and to the west of the RAS Pit.

The Western ELF overlies the surface trace of the TGF and it is to be constructed over TZ4 (south) and TZ3 (north) Schist basement rock (refer to Figure 19, Figure 21).

5.7. Srex Engineered Landform – Basement Geology

The Srex pit is the smallest of the three mined areas and it is located where the TGF is crosscut by the younger Norms Fault (Figures 23 & 24). Both faults are non-active. Mapping of Norms Fault indicates that it is a normal fault with movement offsetting the TGF by approximately 150 to 180m.

The Srex ELF overlies the surface trace of both the TGF and Norms Fault and it is to be constructed over TZ4 and TZ3 schist basement rock. Portions of the Srex ELF may be constructed over alluvial material (Figure 19). The Srex ELF includes backfill of the Srex East pit.

6.0 GROUND AND SURFACE WATER CONDITIONS

6.1. Surface Water

The Central Otago region has low precipitation and is the driest region in New Zealand. Water flow is present across the surface with gullies present on the sides of the valleys. Frequently the streams lose their surface expression and go underground, reappearing at the surface further downstream, and feeding into the aquifer systems.

A historic man-made water race is present along the southern side of RAS Creek, and another from the northern end of RAS Creek along a gully and into the Shepherds Creek catchment. Both were constructed as part of the historic sluicing and gold mining activity which occurred in the area during the late 1800s.

6.2. Groundwater

Groundwater flow within the Schist basement rock occurs through defects in the rock mass, with the flow rate dependent on the aperture, infill, and geometry of the defects. Borehole Packer testing and piezometric readings indicating a groundwater level that is elevated in the ridges and draining into the valleys. Piezometer readings indicate artesian pressures in the valley floors.

Groundwater is also transmitted through the alluvial and colluvium deposits within the Shepards Creek and RAS Creek valley floors and was present in some test pits. Based on experience it is anticipated that there will be a perched water table within the alluvial deposits.

7.0 PROPOSED ENGINEERED LANDFORM DESIGNS (ELF)

7.1. General

The unmineralised waste material from the open pits and a small amount of material from the development of the underground mine will be stored in the ELFs. The ELFs are the permanent storage location for the unmineralised waste rock created from open pit mining.

The four proposed ELFs are:

- Shepherds ELF,
- Western ELF,
- Come in Time Pit (Backfilled), and
- Srex ELF.

The proposed tonnage of unmineralised waste rock to be stored in each of the above ELFs is summarised in Table 2.

In general, the final downslope engineered slope is proposed to be 3.0 horizontal to 1.0 vertical (3H:1V, or 18.4 degrees).

The current estimated duration of the operation and full rehabilitation of the site and ELF's is approximately 15 years. The ELF's will remain in place in perpetuity.

The ELFs will provide long-term geotechnically and geochemically stable storage of unmineralised waste rock.

7.2. Geochemical controls

Oxidation of waste rock materials when exposed to atmospheric oxygen and water can result in seepage at the toe which requires treatment prior to discharge. Limiting the ingress of water and oxygen into the ELFs minimises the water treatment required. The proposed controls are discussed below.

7.2.1. Bulk Fill Zone controls

The waste rock placed in the ELF will be paddock dumped and / or end-tipped with a low tip head height. Geochemical controls require limits on the end tipped heights to limit segregation of coarse waste rock from the finer fraction.

It is proposed that within the Bulk Fill Zone of ELFs, tip heights are initially limited to approximately 5 m. If positive results from site-based trials for segregation and oxygen ingress within completed Bulk Fill Zone layers is illustrated during initial ELF construction, tip head height may be increased provided continued trials confirm a suitable geochemical control is achieved.

When initially tipping into the valley floor of an ELF, tip head heights > 5 m may be required to enable vertical advancement of the ELF. Once out of the floor of the valley Bulk Fill Zone controls shall be applied at the earliest opportunity for successful closure outcomes.

7.2.2. Outer fill zone controls

Where material is placed within 10 m of the final surface a reduced layer thickness is required, with the objective to prevent any notable oxygen advection through coarse layers. This Outer Fill Zone shall be paddock dumped, spread in layers and be systematically trafficked with mining fleet trucks. The exact layer thickness is to be determined by field trials. This material will comprise of similar materials to the bulk fill but will be subject to a higher compactive effort and no segregation. Where possible, unmineralised waste material with low sulphide content will be placed to form the Outer Fill Zones.

7.2.3. Surface Drainage controls

A clean water cut off perimeter drain is proposed around ELF footprints. This will reduce water flows into the backfill material resulting in a reduction in seepage. The proposed Surface Water Diversion channel detail is shown in Figure 18.

7.2.4. Subsurface Drainage Controls

Generally, the ELFs do not require sub-surface drainage for geotechnical stability or geochemical controls where they are situated in existing dry catchments and of a small to moderate extent. This includes the Srex ELF and CIT Pit Backfill. Seepage will therefore occur out of the toe of the ELFs and this will be collected by the surface drainage controls as required.

Shepherds ELF is located within the main Shepherds Valley which currently has a constant base flow. It is proposed to have a sub-surface drain over a section of one to two hundred metres at the downstream toe to collect seepage and direct flows into the Shepherds Seepage Collection Sump and into the Process Plant Water Circuit.

Similarly, seepage from the Western ELF will be collected via a seepage underdrain over a section of one to two hundred metres at the downstream toe and flow into a small seepage collection sump where it will be directed to the Process Plant Circuit during the mining operation.

After mine closure, seepage water from the Western ELF and Shepherds ELF will be directed to the Water Treatment Plant before being discharged into the Shepherds Creek catchment. Eventually, as the water quality is improved post-closure, seepage water may discharge directly to the Shepherds Creek catchment.

7.3. Shepherd Engineered Landform

7.3.1. General

Shepherds ELF is the main ELF required to store the majority of the unmineralised waste rock from the RAS Pit. The Shepherds ELF is located in the valley formed by Shepherds Creek and the Jean Creek tributary. The footprint and final height contours for the Shepherds ELF is shown in Figure 3. Figure 4 and 5 shows areas of the Shepards ELF in cross section.

The proposed total storage volume of the Shepherds ELF is 85 Mm³ with a crest level of 770 mRL. Unmineralised waste rock will be placed at an assumed average density of approximately 2.2 t/m³ with the ELF storing up to approximately 187 million tonnes of material.

The Shepards ELF design allows some contingency volume, which enables staging of the ELF to allow for haul roads and minor variation in profile and extent if required.

Progressively during construction and on completion the Shepards ELF will have final slope profiles designed to blend into the natural surrounding environment. The final slope surface will be shaped to the target profile, rehabilitation material including topsoil placed, and the surface vegetated.

To minimise the ingress of oxygen into the completed ELF, Bulk Fill Zones will be constructed via paddock dumping as described above in Section 7.2.1. Material dumped within 10 m of the final outer slope (ELF – Outer Fill Zone) will be successively paddock dumped and truck compacted per Section 7.2.2. Bulk Fill and Outer Fill Zones are shown on cross section in Figures 4 and 5.

7.3.2. Shepherds Silt Pond

The Shepherds Silt Pond is proposed to provide back-up process water and sediment retention control for the Shepherds ELF and the adjacent disturbed area with haul roads and topsoil stockpiles. Its design is summarised in the separate Shepherds Silt Pond Technical Report (Ref. 13).

7.3.3. Shepherds Seepage Collection Sump

The Shepherds Seepage Collection Sump is to be formed at the toe of the Shepherds ELF (Figures 3,4,6, 8 & 9). The seepage collection sump provides management of the seepage from the TSF and Shepards ELF subsurface drainage. It will be constructed using Zone B (compacted TZ3 schist) and Zone A1 (compacted brown rock to 1x10⁻⁷ m/s permeability) embankment materials. The sump has a volume of 4,500 m³ to provide approximately 48 hours contingency storage for a potential underdrainage flow of 25 l/s. Final sizing is subject to detailed design. Lining of the sump with a 1.5 mm HDPE geomembrane is proposed. Underdrainage beneath the liner is proposed to mitigate any potential uplift of the liner if there is seepage behind the liner. The liner underdrainage flow will either:

- a) discharge to the silt pond if the water quality is suitable, or
- b) if not of a suitable water quality, be pumped back via a small submersible pump to the sump.

The seepage collection pipes will enter a concrete sump (manhole) prior to flowing into the HDPE lined sump. This will be the location for monitoring drain flows. The pipes will have a “goose neck” connection as they enter the manhole sump (Figure 9). Water in the pipes will back up in the pipes to the level of the goose neck forming an oxygen seal to prevent advection into the ELF underdrain and the TSF collection pipe trench.

Upstream of the Shepards Seepage Collection sump the Zone A1 fill will continue above the level of the goose neck by approximately 3 m to provide an oxygen advection barrier into the underdrain and to direct the seepage preferentially into the underdrain collector pipe (Figure 9).

7.4. Western ELF

7.4.1. General

Material from RAS Pit will be placed in the Western ELF early in the project development. The proposed volume of the Western ELF is up to 5.2 Mm³, corresponding to approximately up to 11.4 million tonnes of rock at 2.2 t/m³. The footprint and cross sections of the Western ELF are shown on Figures 10 and 13.

7.4.2. Western ELF Silt Pond

7.4.2.1. Design

The Western ELF Silt Pond is proposed to be constructed on fill material at the toe of the Western ELF bulk fill, with an invert level at approximately 610 mRL. The purpose of this pond is to provide sediment retention control of the surface water runoff from the Western ELF, and water storage for dust suppression. The general location of the Western ELF and Silt Pond relative to the Rise and Shine and Come in Time Pits are shown in Figure 25.

Sediment laden surface water from the Western ELF catchment will report into the Western ELF Silt Pond for sediment treatment before it is discharged into the Clearwater Creek catchment.

The scope of works and design has been based on the following criteria:

1. A silt pond is required for the management of sediment laden water flowing off the Western ELF. The catchment area allowed for is 27.5 ha. This includes the Western ELF footprint and the catchment to the edge of the Rise and Shine Pit.
2. Provide sediment retention control for up to a 1 in 10-year storm event with inflows from the Western ELF catchment.
3. Provide a minimum of 500 m³ of water storage for dust suppression purposes.
4. Minimum pond invert elevation at 610 mRL, 10 m above the water cart refill area.
5. Assess size of sediment control pond at Western ELF using parameters from the ESC Management Plan (Ref. 15).

The Western ELF Silt Pond sediment retention control function has been designed following the general principles set out in the ICEA Best Practice Erosion and Sediment Control for Type C sediment basins (Ref. 16). Details of this method is summarised in EGL's Erosion and Sediment Control Report (Ref. 14).

The minimum required pond surface area, as assessed using the ICEA Type C sediment basins calculation, is 3,209 m². This calculation assumes a 27.5 ha catchment, with a peak inflow of 1.4 m³/s, a minimum length to width ratio of 3 to 1, and concentrated overland inflow into the pond. See Table 11 for a summary of the design parameters for sediment retention.

Allowance for approximately 1,000 m³ of sediment storage is included in the design and in accordance with ICEA guidance. Separate to this, a minimum of 500 m³ water storage has been allowed for and serves to supply water for fill water trucks for dust control purposes.

The water supply for dust control will be drawn by a separate gravity outlet or using decant pumps. These details will be confirmed as part of detailed design.

The Western ELF Silt Pond design dimensions are a minimum of 33 m by 98 m at the water detention level, with a total pond depth of 2.5 m; comprising 0.6 m depth of settlement zone, 1.1 m combined depth for sediment storage and basin storage, a freeboard of 0.3 m above settlement zone and a 0.5 m thick loess and rockfill maintenance surface.

Final pond levels and dimensions will be confirmed in detailed design.

7.4.2.2. Earthworks

The Western ELF and Silt Pond location, proposed pond bund slope and cross sections are shown in Figures 25 and 26. The pond bund has a crest length of approximately 40 m and a maximum downstream height of 20 m. It can impound water up to a depth of 2 m to the crest. However, under inflow design flood levels the maximum depth of the water is approximately 1.7 m. Its invert level is proposed at 610 mRL.

The Western ELF Silt Pond is proposed to be constructed using Zone B1 (compacted TZ3 schist) and lined with 1.5 mm thick HDPE geomembrane. Geotextile (Bidim A64 or equivalent) overlying smooth rolled fill surface should be placed directly beneath the HDPE liner to protect the liner from puncture damage. A 5 m thick section of the upstream pond bund is proposed to be formed from Zone A1 (compacted brown rock to 1×10^{-7} m/s permeability) embankment materials to limit oxygen ingress into the Western ELF bulk fill via the underdrain. See Figure 27.

The proposed pond batter is 2.5H:1V, except at the inlet area where it should be kept at 4H:1V to allow maintenance equipment to access and remove sediment from the pond. A suitable maintenance platform should be constructed at the base of the pond, above the HDPE liner. It is anticipated that this should comprise, as a minimum, 200 mm of smooth rolled loess material atop the liner, with a 300 mm thick rockfill layer placed above the loess layer. Care should be taken during placement of fill to avoid damage to the HDPE liner. The maintenance platform is required to clean out sediment from the silt pond.

The pond bund has upstream and downstream shoulder slopes of no steeper than 2H:1V. The proposed bund and embankment slopes are lower in height and less critical than those assessed as acceptable in the stability analysis which is described in Section 10.0. A specific slope stability assessment will be undertaken as part of the detailed design stage.

7.4.2.3. Establishment

Initially, the toe area of the Western ELF Silt Pond will be stripped and sediment controlled via windrows during site establishment and construction. Once the Silt Pond has been constructed, the toe area should be rehabilitated and vegetated.

7.4.2.4. Closure

At closure the Western ELF Silt Pond will be decommissioned or repurposed following the NZDSG (Ref. 17).

7.4.3. Western ELF Seepage Sump

Seepage from the Western ELF will be collected via a seepage underdrain and flow into a small seepage collection sump where it will be directed to the Process Plant during mining operation. The expected seepage rate is in the range of 1 to 2 l/s.

The seepage collection sump is proposed to be located at the downstream toe of the Western ELF Silt Pond. The seepage collection underdrain will run beneath the silt pond to the sump. See Figure 27. The size of the sump and details of the seepage collection network will be developed during detailed design. However, is likely to be a concrete manhole type sump.

7.5. Come in Time Pit Backfill

Material from RAS Pit will be used to backfill the CIT Pit. The CIT Pit will be filled to a level at or below the original ground surface (refer to Figure 11 and Figure 12).

The proposed storage volume of the Come in Time Backfill is up to 3.9 Mm³, storing up to 8.6 million tonnes of rock at 2.2 t/m³. The footprint of CIT Backfill is located within the CIT Pit crest. The CIT Backfill final slope profile will be shaped to allow for long term surface drainage to fall away from the pit or will have a perimeter bund to avoid water flowing across the backfilled surface. Where topographic constraints require surface water to pass across the backfill surface, these drainage channels may require armouring with riprap to prevent scour. Cross sections of the CIT Backfill are shown on Figures 11 and 12.

7.5.1. Groundwater Levels within the Come in Time Pit

It is anticipated that groundwater levels within the CIT Backfill will rise over time, such that the level will reach equilibrium with the lowest excavated CIT Pit downslope lip (approximately 500 mRL – Figure 11). It is possible that groundwater will break out of the surface as springs or may flow within the more permeable surficial soils below 500 mRL. Initial water percolation through the waste rock backfill may require collection and treatment along with any water that daylights as springs along the downslope. If water quality is suitable, seepage daylighting can be discharged to the slope or will be required to be collected and treated prior to discharge.

7.5.1.1. Rockfill Below Water Table

Unmineralised waste rock fill below the final CIT Backfill water table will saturate with time. This will affect the stability of the backfill, with potential for some softening. This has been accounted for in the slope stability assessment for the CIT Backfill.

7.5.1.2. Waste Rock Above Water Table

Unmineralised waste rock fill above the final CIT Backfill water table will have similar properties to the drained materials placed in the Shepherds ELF. The waste rock placed above the water table will be placed with Bulk Fill and Outer Fill Zones to mitigate the advection of oxygen into the CIT Backfill.

7.6. Srex ELF

Unmineralised waste rock mined from Srex Pit will be placed within the Srex ELF. The proposed volume of the Srex ELF is 4.2 Mm³, storing 9.2 million tonnes of rock at 2.2 t/m³. The Srex ELF will be formed above existing ground levels on the lower southwest slope of the RAS Creek Valley. The footprint and cross sections of the Srex ELF are shown on Figures 14, 15 and 16.

8.0 IN-SITU ROCK AND WASTE ROCK STRENGTH CHARACTERISTICS

8.1. In-Situ Rock

Three sets of shear strength parameters have been adopted for the in-situ rock. They are based on EGLs experience of TZ3 schist rock at the Macraes Gold Mine in Otago, New Zealand. They are as follows:

1. The lower shear strengths for the shallow rock (less than 40 m depth below original ground level) to take account of weathering in the TZ3:

Rock shallower than 40m below original ground level.

Density (γ)	$\gamma = 26.0 \text{ kN/m}^3$
Effective cohesion	$c' = 50 \text{ kPa}$
Effective friction angle	$\phi' = 40 \text{ degrees}$

2. The deeper, less weathered rock of the TZ3, where the design parameters have been taken as:

Rock greater than 40m below original ground level.

Density (γ)	$\gamma = 26.0 \text{ kN/m}^3$
Effective cohesion	$c' = 150 \text{ kPa}$
Effective friction angle	$\phi' = 45 \text{ degrees}$

3. Where failure could potentially occur along shear zones within the TZ3:

Rock shear strength along shears zones

Density (γ)	$\gamma = 26.0 \text{ kN/m}^3$
Effective cohesion	$c' = 47 \text{ kPa}$
Effective friction angle	$\phi' = 23 \text{ degrees}$

8.2. Waste Rock

The shear strength function proposed is based on EGLs experience and testing of TZ3 schist rockfill materials at the Macraes Gold Mine in Otago, New Zealand.

Density (γ)	$\gamma = 21.5 \text{ kN/m}^3$
Shear strength (τ)	$\tau = 1.29 \sigma_v'^{0.91}$

where σ_v' is the effective vertical overburden pressure in kPa.

EGL is aware that waste rock tipping methods result in some degree of segregation of the coarse fraction from the fine fraction in the rockfill such that the upper layers can be supported by a matrix of silt, sand, and gravels which may be contractive under shear and susceptible to softening if pore pressures increase rapidly during an earthquake. This is not an issue for BOGP ELF's constructed to design as they will have low internal phreatic surfaces due to the low annual rainfall and natural drainage of the ELFs. The CIT Backfill will develop a water table within the bulk rock fill below the lowest level of the final CIT pit crest. Detailed design will check this case.

9.0 SEISMIC HAZARD

The site is in an area of moderate seismicity. The nearest active faults are the Dunstan Fault (~12km surface distance) and the Pisa Fault (~13km surface distance). The Alpine Fault is the largest and most active fault in New Zealand. It is located about 110 km (surface distance) northwest of the site. The region has undergone multiple faulting events related to oblique compression associated with evolution of the Australian and Pacific tectonic plate boundary (Alpine Fault) since 25 Mya, with glaciation shaping the valleys, leaving moraines and tills from the last glaciation (~650 kya). The Alpine Fault has an annual mean slip rate of 25 mm/year and is considered capable of producing earthquakes of up to Mw 8.3 (Ref. 8).

A site-specific seismic hazard assessment (SSSHA) for the site (Ref. 9) has been completed by EGL. Such assessment used the 2022 National Seismic Hazard Model (NSHM22, Ref. 10) and the OpenQuake Engine (Ref. 11). NSHM22 represents a fundamental revision of the National Seismic Hazard Model across all components, incorporating the latest developments in scientific understanding of seismic sources within New Zealand and state-of-art knowledge with respect to estimates of seismic hazard.

A Vs30 value of 1,000m/s has been adopted for the design of the ELF's. Probabilistic Seismic Hazard Analyses (PSHA) peak ground acceleration and spectral acceleration results for 1,000 m/s is summarised in Table 6. Mean magnitudes are provided in Table 7.

10.0 STABILITY ANALYSIS

10.1. General

EGL has completed preliminary static and seismic stability analyses to confirm that BOGP ELF's constructed to design will be stable in closure.

Seismic stability and shear deformation analyses have been undertaken for both 1 in 150 AEP and 1 in 2,500 AEP levels of ground motion. Under 1 in 150 AEP the design intent is that there is only minor damage and under a 1 in 2,500 AEP earthquake damage is permitted so long as the ELF's remain stable during and post-earthquake.

A summary of the design criteria for the ELF's is provided in Table 5.

Stability analyses have been undertaken for the Shepherds ELF slope through the main Shepherds Valley. From a geotechnical stability perspective this is expected to be the "worst case" location for all of the ELF's

It is considered the other BOGP ELF's have a lower final slope heights than Shepherds ELF but will adopt the same final geometry as that used for the slope stability analysis.

10.2. Stability

Stability analyses have been undertaken to confirm the Shepherds ELF profile is stable in closure. The analysis assumptions and results are summarised in the following sections.

10.2.1. Pore Pressures

The stability analyses for the ELF assume that the natural ground is saturated to the rock surface, and the ELF rockfill is fully drained. The ELF will be comprised of rockfill and the base of the ELF, particularly in the gullies will be coarser than the ELF rockfill mass and provide under drainage. Some localised perched groundwater may occur on the thin low permeability trafficked layers within the ELF Bulk Fill Zones. This is unlikely to significantly affect the overall stability of the ELFs.

In the CIT Backfill the ground water is expected to stabilise at the level of the lowest section of the pit rim. The stability analysis has assumed this situation.

10.2.2. Shear Strength Parameters

The design static shear strength parameters for the in-situ rock, and backfill zones are discussed above in Section 8. The parameters used in the stability analyses are also summarised in Table 8 and in the preliminary analysis output figures are presented in Appendix A.

10.2.3. Results of Stability Analysis

The results from the static and seismic analyses of the Shepherds ELF are summarised in Tables 9 and 10 with detailed results provided in Appendix A. The results of the stability assessments indicate:

1. Static limit equilibrium Factor of Safety (FoS) for the peak drained condition are all greater than the required 1.5.
2. Static limit equilibrium FoS for the post-earthquake softened condition are all greater than the required 1.2 for the downstream slope.
3. Estimated seismically induced displacements under a 1 in 150 year earthquake loading condition are unlikely or minor.
4. Estimated seismically induced displacements under a 1 in 2,500 year AEP earthquake loading are estimated to be less than 10 cm.
5. Estimated seismically induced displacements are small and the post-earthquake stability is considered adequate by EGL. Any post-earthquake cracking is expected to be easily repairable with conventional earthmoving equipment.

The final slope gradient modelled in the stability analysis is representative of all the ELF's. Each ELF will be subject to detailed design and the final profile should comply with the criteria presented in the ELFMP.

On closure of all ELF's it is recommend that the stability be reviewed by a Chartered Professional Engineer to confirm that the final slope profile is in compliance with the approved design.

11.0 EROSION AND SEDIMENT CONTROL

Erosion and Sediment Controls for the site are covered in the following reports:

- EGL (2025) Matakanui Gold Limited, Bendigo Ophir Gold Project, Erosion and Sediment Control Report. EGL Ref. 9702 (Ref. 14).
- EGL (2025) Matakanui Gold Limited, Bendigo Ophir Gold Project, Shepherds Silt Pond, Technical Report. EGL Ref. 9702 (Ref. 13).

The general principals of erosion and sediment control will govern the site works. Clean water will be diverted around the proposed footprint of each ELF, while dirty water will be captured and diverted to an appropriately sized sediment retention ponds. In Shepherds Creek, it is proposed to construct the Shepherds Silt Pond that will capture all dirty water from the Shepherds ELF footprint (Figure 3). The Western ELFs will also have a localised silt pond construction near the toe. Srex ELF the runoff will likely be managed in the pit.

As per the above reports, site specific Erosion Sediment Control Plans (ESCPs) will be developed for each structure and stage of work as appropriate for that structure.

12.0 CLOSURE

12.1. Rehabilitated Surfaces

Once the mine workings have been completed the following rehabilitation activities will be undertaken:

- All ELF surfaces will be rehabilitated by the placement of a 300 mm thick “brown rock layer” covered by a minimum of 200 mm of topsoil. The rehabilitation layer will be formed over the outer fill zone progressively as the ELF is filled to final surface levels. The surface rehabilitation detail is shown in Figure 17.
- Clean water diversions to be stabilised or relocated to permanent positions to ensure erosion of the ELF materials does not occur. Final ELF landforms will be proud of the diversions to promote surface water flowing back the drainage channel rather than over the rehabilitated surface. A typical clean water diversions channel is shown on Figure 18.
- Shepherds Seepage Collection Sump may remain or seepage from the TSF and ELFs will be piped to closure water treatment options.
- Jean Creek will flow via the central surface diversion channel to the TSF closure capping area.
- North Diversion Channel will take flows from the TSF cap in closure. A culvert will limit flows off the TSF capping. The detailed drainage post closure upslope of the TSF are presented in EGL’s TSF Technical Report.
- CIT Backfill maximum surface level is shown in Figure 11 to be the existing ground. However, final closure design may vary with the final surface level dependent on closure outcomes and scheduling. Regardless, the final landform will be rehabilitated to a natural looking surface.
- Srex ELF will be shaped to blend into slopes for desired closure outcomes.
- The Western ELF will be contoured to blend with the natural landscape.

13.0 CONSTRUCTION AND QUALITY CONTROL

Construction of the ELF's will be undertaken by MGL, or in part by Contractors working under the direct supervision of MGL employees. MGL is responsible for setting out the works, ensuring the rock stack is constructed to the design profile, that appropriate foundation stripping and preparation is carried out, the subsurface drainage material that is placed in gullies is appropriate and suitably placed, the surface drainage is properly constructed and maintained, and rehabilitation (i.e., topsoil and grassing) is completed to appropriately high standards.

Construction quality assurance will be the responsibility of MGL with assistance from the Design Engineer. It will include:

- Setout of the work by MGL,
- Approval of temporary erosion and sediment control works in accordance with the methodologies provided in the ESCPMP,
- Inspection and approval of stripped surfaces prior to placement of waste rock,
- Approval of the material and placement procedure of free-draining material in the gully floors by the design engineer
- Effective management of the Shepherds Silt Pond in accordance with the Ponds and Reservoir Management Plan,
- Geochemical stability will be achieved by construction methods that minimise oxygen advection within Bulk Fill Zones by successive layers of paddock dumping and / or end tipping from low height (max. 5 m) tip heads. Outer Fill Zones (within 10 vertical metres of the final slope) will be constructed in successive paddock dumped layers. Clean water perimeter drains will reduce water flows into backfilled material. See Section 7.2.
- Selection and control of placement of rehabilitation material (outer zone) and topsoil, and grassing,
- Survey of finished surface, and
- Preparation of a construction report summarising the works completed (refer Section 15).
- Where the ELF is intrinsic to the stability of the TSF, priority will be given placing waste rock materials to form a buttress fill at the direction of the TSF design engineer.
- Elsewhere the placement of waste rock shall be at the direction of the ELF construction manager so long as the minimum requirements of the ELFMP are implemented.

14.0 CONSENTING CONSIDERATIONS

Resource Consent approvals for the ELF's are being sort under the Fast-track Approvals Act 2024.

Building consent is not required for stockpiles or rock stacks such as the ELF's under the Building Act.

15.0 RESOURCE CONSENTS CONDITIONS

The resource consent conditions will refer to the ELFMP. It is recommended that between the consent conditions and the ELFMP the following items are required:

1. The approved ELFMP is in place and is complied with.
2. Substantive changes to the ELFMP require approval by the Regional Council.
3. Each ELF shall be subject to a detailed design approved by a Chartered Professional Engineer experienced in geotechnical and civil engineering.
4. Construction monitoring and as-built records shall be held on file by the Consent Holder.
5. At each year end, the work completed on the ELFs shall be summarised in the Annual Compliance Report, including:
 - a. A description of the works completed;
 - b. The actual material in volume and tonnage in each ELF and stockpile;
 - c. The balance of material volume and tonnage required and available for rehabilitation of the current site; and
 - d. Review of construction complete against the design by a Chartered Professional Engineer, noting any non-compliance items and recommendations.
6. For the year ahead, the proposed work on the ELFs shall be summarised in the Annual Work Plan, including:
 - a. A description of the works proposed;
 - b. The estimate material in volume and tonnage in each ELF and stockpile at year end; and
 - c. The estimate balance of material volume and tonnage required and available for rehabilitation of the site at year end.
7. At completion (closure of an ELF) the final construction is to be reviewed against the detailed design by a Chartered Professional Engineer experienced in geotechnical and civil engineering. Any remedial measures shall be recommended. The completion report shall be submitted to the Regional Council.

16.0 CONCLUSIONS

Unmineralised waste rock material from the open pits and a small amount of material from the development of the underground mine will be stored in the Engineered Landforms (ELFs).

Four ELFs are proposed as part of the Bendigo – Ophir Gold Project (BOGP):

- Shepherds ELF;
- Come in Time Pit Backfill;
- Western ELF; and
- Srex ELF.

The proposed ELF's will be designed, constructed, operated and rehabilitated to ensure the safe long-term storage of waste rock generated by mining activity during BOGP operation.

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Table 3	High Intensity Rainfall Database – Depths
Table 4	High Intensity Rainfall Database – Intensities
Table 5	Design criteria
Table 6	Design earthquake response spectra
Table 7	Mean Magnitude
Table 8	Material properties for stability analyses
Table 9	Summary of static stability analysis results
Table 10	Summary of seismic analysis results

Table 1: Waste rock production summary

Location	Estimated waste rock tonnage (Mt)
RAS Open Pit	193.8
RAS Underground	1.6
Srex	4.2
Come In time	3.9
Srex East	0.2
Total non-ore bearing rock produced	203.7

Table 2: Waste rock storage summary

Location	Estimated backfill tonnage (Mt)
Srex ELF	9.2
Back fill of Come in Time Pit	8.6
Back fill of Srex East Pit	2.0
Western ELF	11.4
Construction of Shepherds Creek TSF Embankment	4.9
Shepherds ELF	187
Total non-ore bearing rock stored	223.1

Note: Storage capacity exceeds production quantity

Table 3: High Intensity Rainfall Database – Rainfall Depths

AEP	Rainfall (mm) for Duration (hr)									
	0.17hr	0.33	0.5	1	2	6	12	24	48	72
1 in 2	3.9mm	5.7	7.1	10.4	14.9	25.6	34.9	46.3	59.2	67.1
1 in 10	7.4	10.5	12.8	18.2	25.4	41.9	55.6	71.6	89.2	99.6
1 in 100	14.9	20.4	24.5	33.5	45.4	71.0	91.1	113.0	137.0	149.0
1 in 1000	26.6	35.5	42.1	56.2	74.2	110.4	137.1	156.3	214.3	248.8

TABLE 4. High Intensity Rainfall Database (HIRDS V4) Historical and 2031 to 2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	3.14	4.57	5.72	8.36	12.1	21.3	29.6	39.8	51.6	59	64.2	68.2
2	0.5	3.57	5.18	6.45	9.38	13.6	23.6	32.6	43.6	56.3	64.1	69.6	73.7
5	0.2	5.23	7.47	9.22	13.2	18.8	31.8	43.2	56.9	72.2	81.4	87.8	92.6
10	0.1	6.67	9.41	11.5	16.3	23	38.3	51.5	67	84.2	94.4	101	106
20	0.05	8.33	11.6	14.2	19.9	27.7	45.4	60.3	77.8	96.7	108	115	121
30	0.033	9.44	13.1	15.9	22.2	30.7	49.9	65.9	84.4	104	116	124	129
40	0.025	10.3	14.2	17.2	23.9	33	53.2	70	89.3	110	122	130	135
50	0.02	11	15.1	18.3	25.3	34.8	55.9	73.2	93.2	114	126	134	140
60	0.017	11.6	15.9	19.2	26.5	36.3	58.1	76	96.4	118	130	138	144
80	0.013	12.6	17.2	20.7	28.5	38.9	61.7	80.4	102	124	136	144	150
100	0.01	13.4	18.3	22	30.1	40.9	64.7	83.9	106	128	141	149	155
250	0.004	17.2	23.1	27.6	37.2	50	77.4	99.1	123	148	161	170	175
Rainfall depths (mm): Climate Change Scenario Model RCP8.5 for the period 2031-2050													
ARI	AEP	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	0.633	3.45	5.04	6.29	9.21	13.3	23	31.6	42.2	54.2	61.5	66.8	70.8
2	0.5	3.94	5.71	7.12	10.4	14.9	25.6	34.9	46.3	59.2	67.1	72.6	76.7
5	0.2	5.8	8.28	10.2	14.6	20.7	34.7	46.6	60.6	76.3	85.7	92.1	96.9
10	0.1	7.41	10.5	12.8	18.2	25.4	41.9	55.6	71.6	89.2	99.6	106	112
20	0.05	9.28	13	15.8	22.1	30.7	49.7	65.3	83.2	103	114	121	127
30	0.033	10.5	14.6	17.7	24.7	34.1	54.6	71.4	90.4	111	122	130	136
40	0.025	11.5	15.8	19.2	26.6	36.6	58.3	75.9	95.7	117	129	137	142
50	0.02	12.2	16.9	20.4	28.2	38.6	61.2	79.4	99.8	121	134	142	147
60	0.017	12.9	17.8	21.4	29.6	40.3	63.7	82.4	103	125	138	146	151
80	0.013	14	19.2	23.1	31.8	43.2	67.7	87.2	109	132	144	152	158
100	0.01	14.9	20.4	24.5	33.5	45.4	71	91.1	113	137	149	158	163
250	0.004	19.1	25.8	30.8	41.6	55.6	85	108	132	157	170	179	185

Ref. <https://hirds.niwa.co.nz/>

Table 5 Design Criteria

Criteria	Value / Description / Control
Geotechnical Static Factor of Safety Interim Slopes	$FOS \geq 1.3$
Geotechnical Static Factor of Safety Closure Slopes	$FOS \geq 1.5$
Post Earthquake Factor of Safety Following a 1 in 2500 year Severe Earthquake	$FOS \geq 1.2$
Geotechnical Earthquake Performance Criteria 1 in 150 year Moderate Earthquake	Damage being minor and readily repairable following the event.
Geotechnical Earthquake Performance Criteria 1 in 2500 year Severe Earthquake	No catastrophic failure. Damage being moderate and repairable following the event.
Seismic Hazard	Site Specific Seismic Hazard Assessment (Ref. 9) based on National Seismic Hazard Model 2022.

Table 6 Design Earthquake Response Spectra, NSHM 2024 (Vs30 = 1,000 m/s)

Bendigo (Vs30 = 1,000 m/s)		
Period (s)	1 in 150 AEP	1 in 2,500 AEP
0	0.120	0.472
0.02	0.127	0.503
0.03	0.144	0.573
0.04	0.166	0.668
0.075	0.243	1.004
0.1	0.268	1.116
0.15	0.280	1.169
0.2	0.262	1.088
0.25	0.237	0.976
0.3	0.214	0.879
0.4	0.178	0.730
0.5	0.150	0.620
0.75	0.109	0.453
1	0.084	0.351
1.5	0.055	0.228
2	0.041	0.171
3	0.024	0.107
4	0.018	0.082
5	0.013	0.064
6	0.010	0.049
7.5	0.008	0.037
10	0.005	0.025

Table 7 – Mean Magnitude for Vs30 = 1,000 m/s

Design Earthquake	1 in 150 AEP	1 in 2,500 AEP
PGA (g)	0.120	0.850
M_w	6.4	6.8

Table 8 Material Properties for Stability Analyses

Material	Strength Function	Uniaxial Compressive Strength, UCS (kPa)	Geological Strength Index, GSI	Material Constant, mi	Disturbance Factor, D	Unit Weight (kN/m3)
Rockfill	$\tau = 1.29\sigma^{0.91}$	-	-	-	-	21.5
Foundation Rock (Adopted)	Generalised Hoek-Brown	35000	45	12	0	27

Table 9 Summary of Static Stability Analyses Results

Section	Potential Failure Surface	FoS	Figure
A-A'	Critical Failure Surface within ELF	1.56	A1
	Failure Surface through the ELF and Foundation	2.34	A2

Table 10 Summary of Seismic Stability Analyses Results

Section	Loading Condition (AEP)	Toe of Failure Surface below Crest	K_h (g) ⁽¹⁾	K_y (g) ⁽²⁾	Pseudostatic FoS	Seismic Displacement (cm) ⁽³⁾		Figure
						Bray and Macedo 2019 (84 th and 16 th Percentile)	Best Estimates	
A-A'	1 in 150	H	0.12	-	1.63	-	-	A3
	1 in 150	2/3H	0.22	-	1.02	-	-	A4
	1 in 150	1/3H	0.32	-	1.13	-	-	A5
	1 in 2500	H	0.85	0.40	-	1.2 – 9.9	1 – 10	A6
	1 in 2500	2/3H	0.82	0.23	-	9.9 – 42.9	10 – 43	A7
	1 in 2500	1/3H	0.80	0.39	-	5.9 - 26	6 – 26	A8

(1) K_h (g) - average acceleration within the potential failure mass for various return period earthquakes (for pseudostatic analysis only).

(2) K_y (g) - yield acceleration within the potential failure mass for an FoS = 1.0, determined using pseudostatic approach.

(3) Estimated seismically induced permanent displacement during an earthquake. The range given here represents the lower and upper estimates. For the B&M method, it is the 84% and 16% probability of exceedance. The range given for the M&S method is developed by engineering judgement as they do not present results in a probabilistic manner.

Table 11: IECA Type C Basin Design Parameters – Western ELF Silt Pond

Parameter	Value
Inflow catchment area	27.5 ha
Design run off coefficient	0.55
Design Rainfall AEP	1 in 10 year
IECA method design peak inflow	1.43 m ³ /s
IECA method 0.5 design peak inflow	0.715 m ³ /s
Settling zone depth	0.6 m
Pond length to width ratio at decant level	3 to 1
Minimum surface area at decant level	3,209 m ²

FIGURES

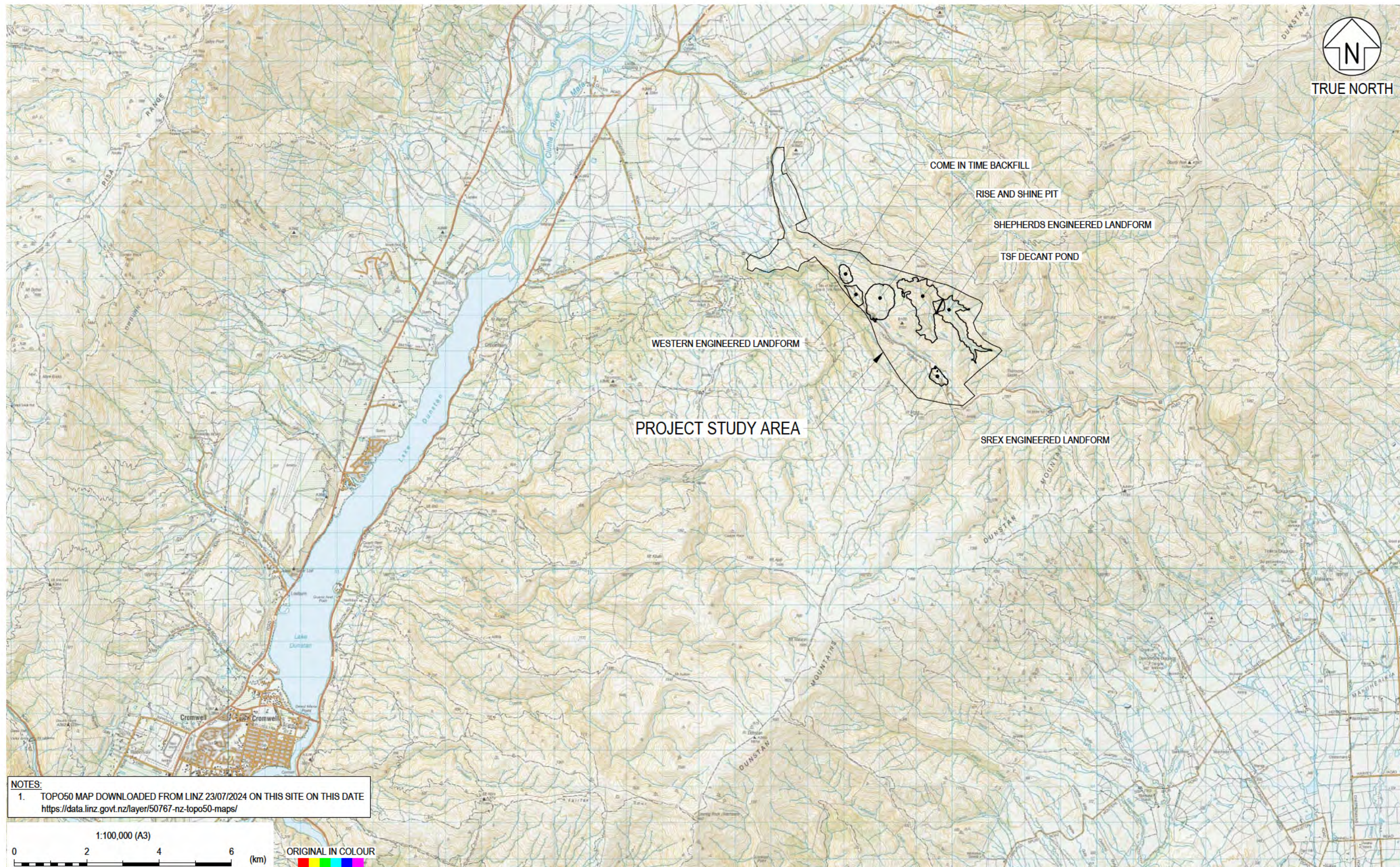
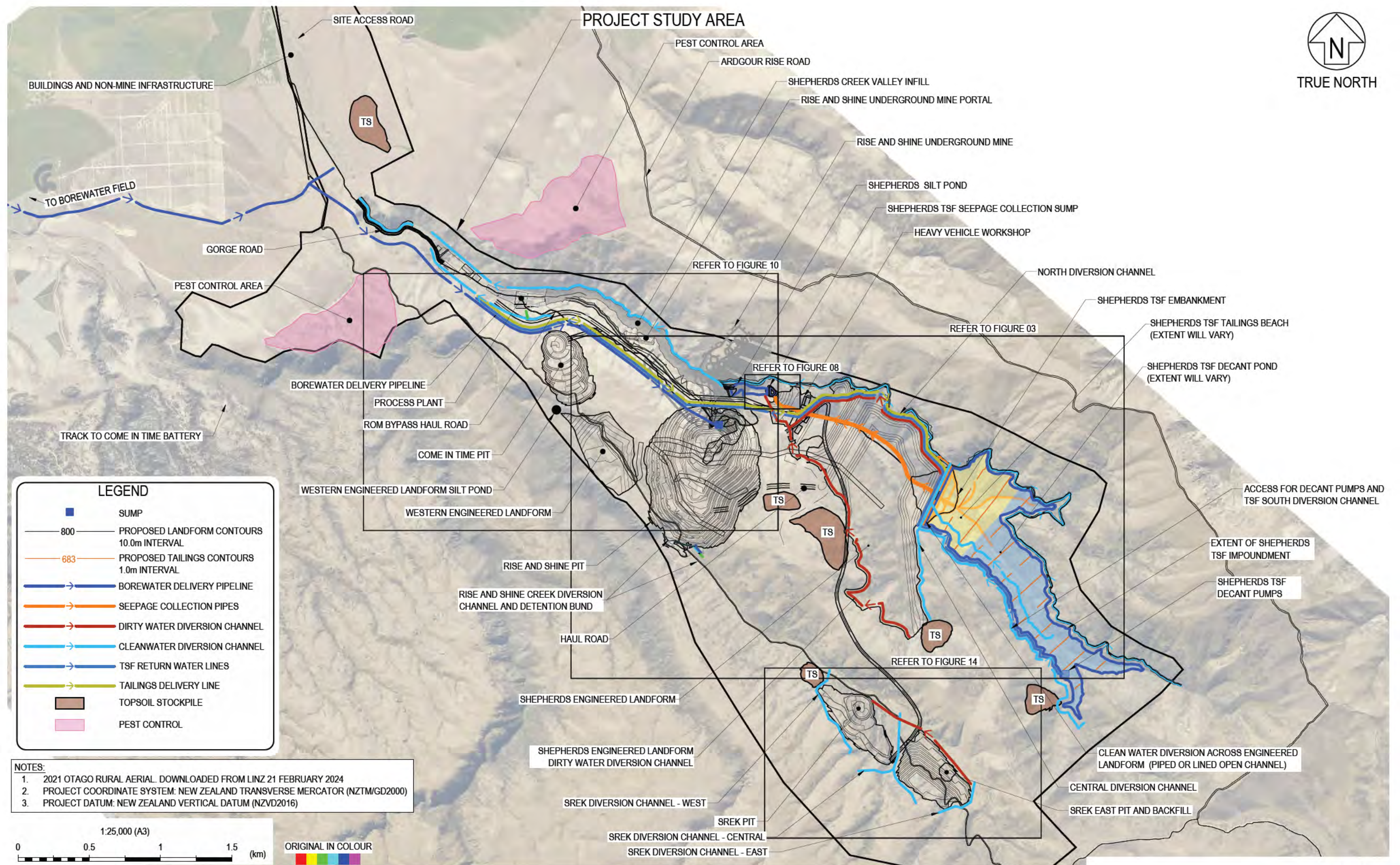
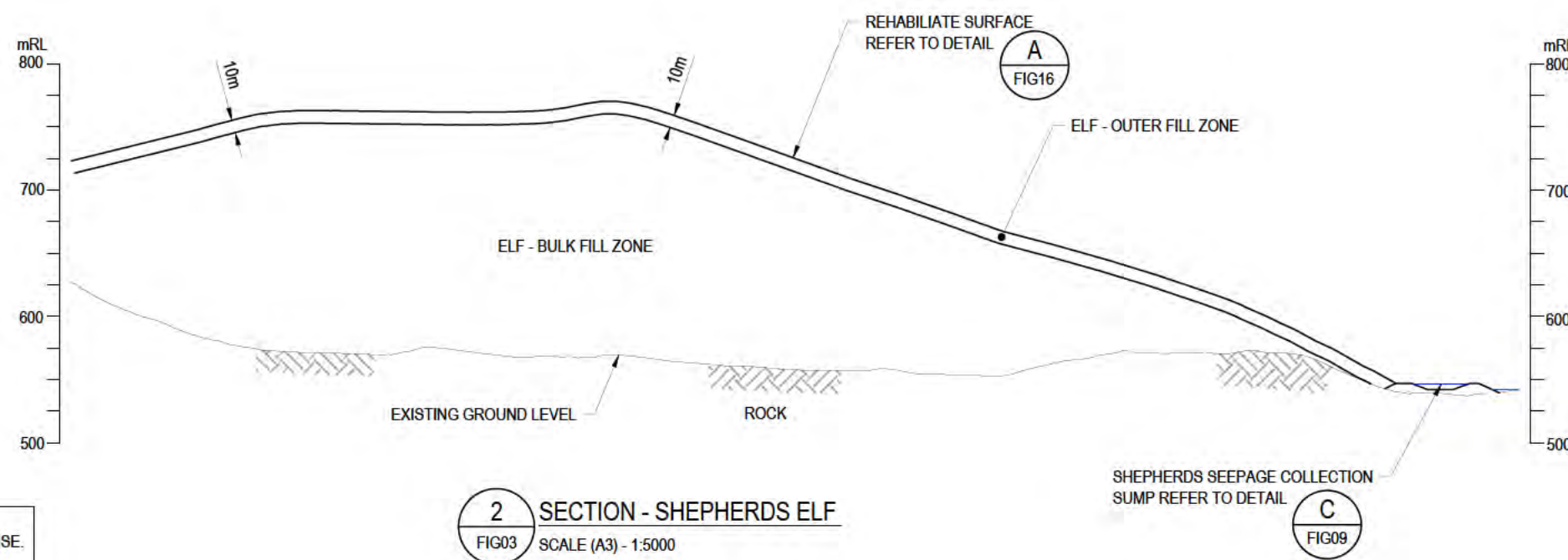
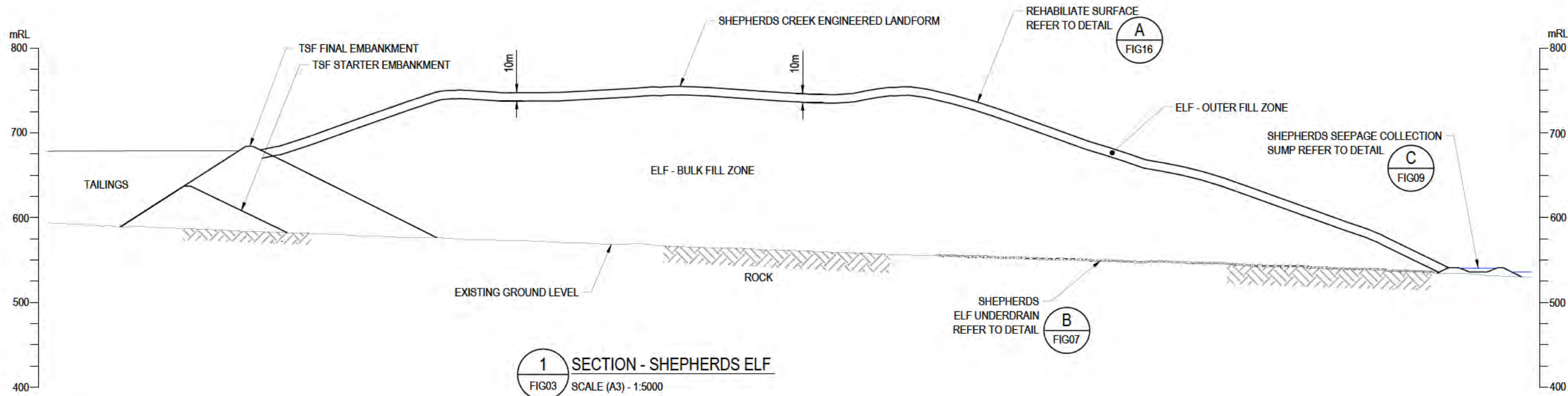


FIGURE 01

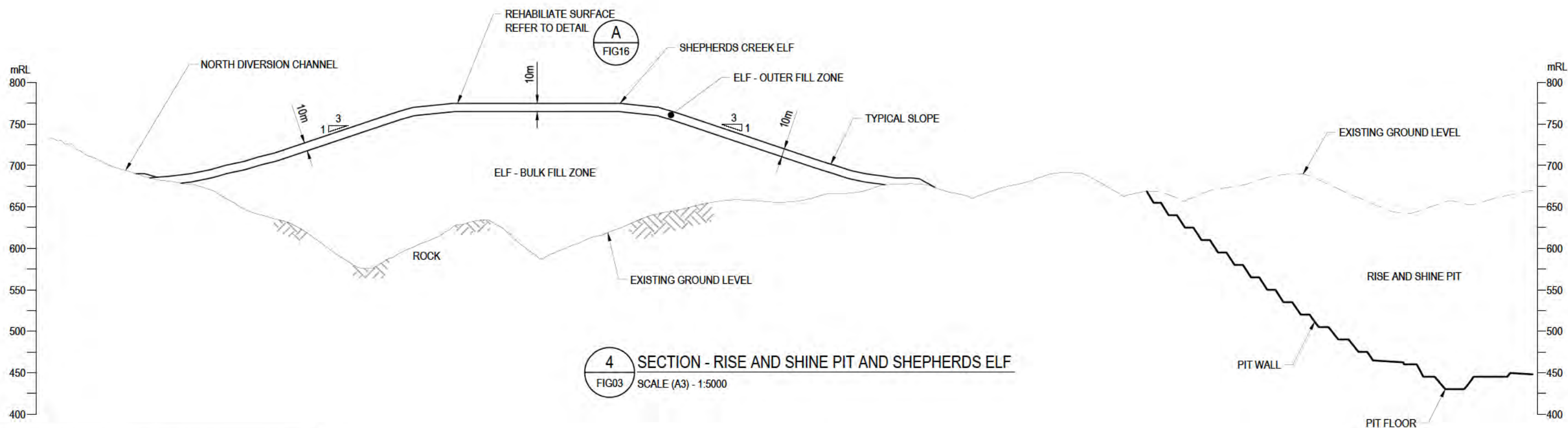
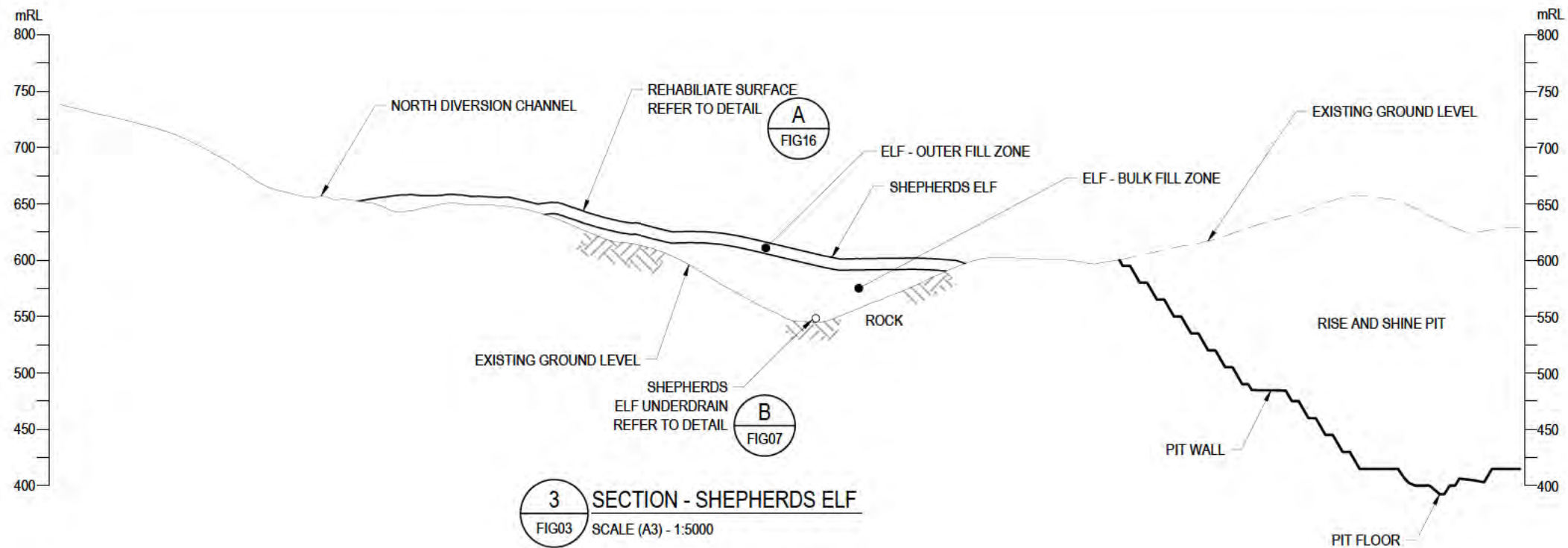




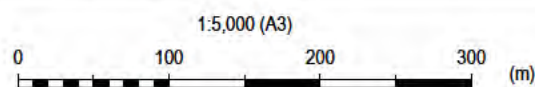
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. VERTICAL DATUM: NZVD 2016.



FIGURE 04



- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
 2. VERTICAL DATUM: NZVD 2016.



MATAKANUI
GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK
SHEPHERDS ENGINEERED LANDFORMS
CROSS SECTIONS SHEET 2

DRAWN	RM	DATE	JOB No	SCALE (A3)	REV.
CHECKED	E.T.	06/05/2024	9702	1:5,000	0

FIGURE 05

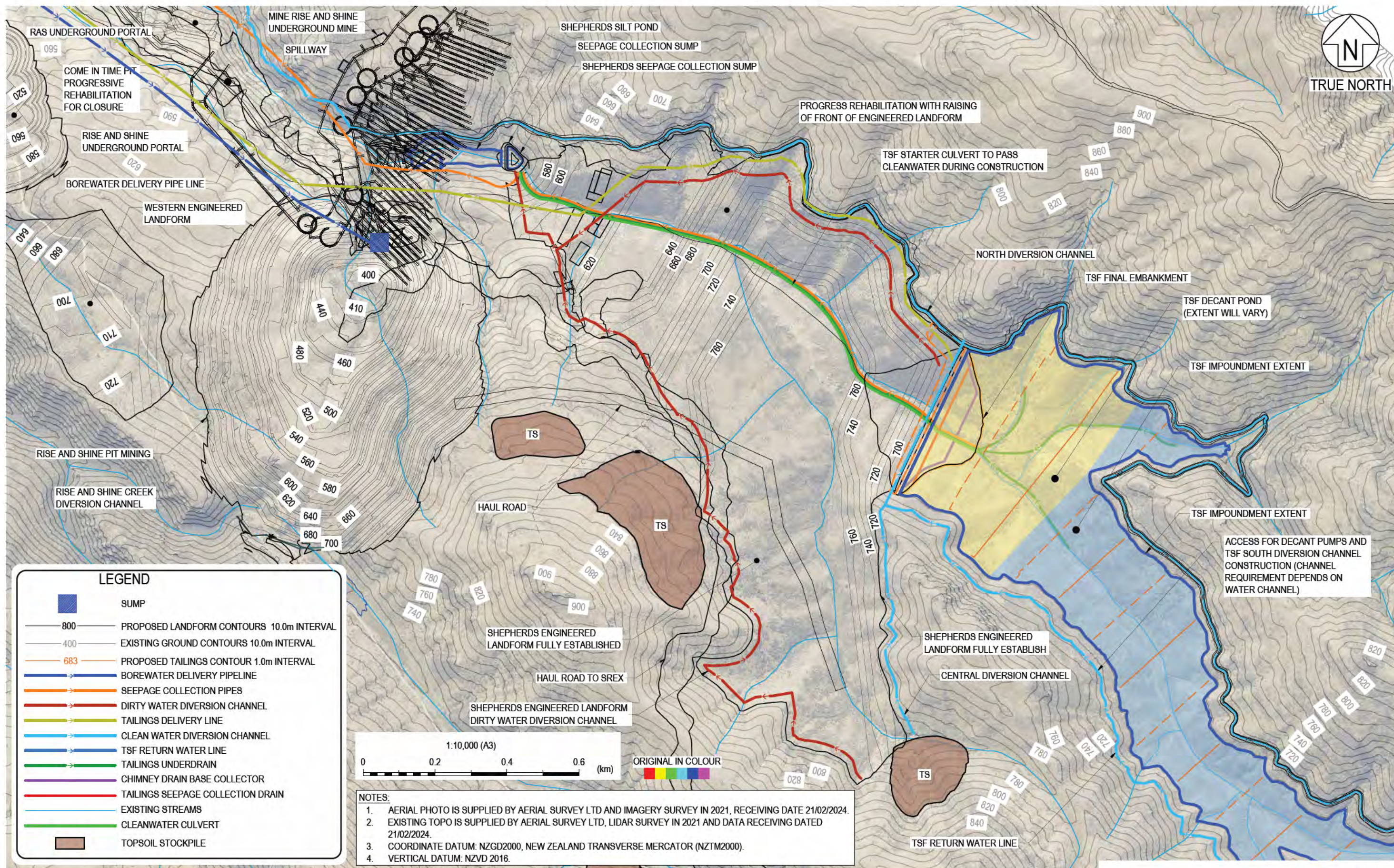
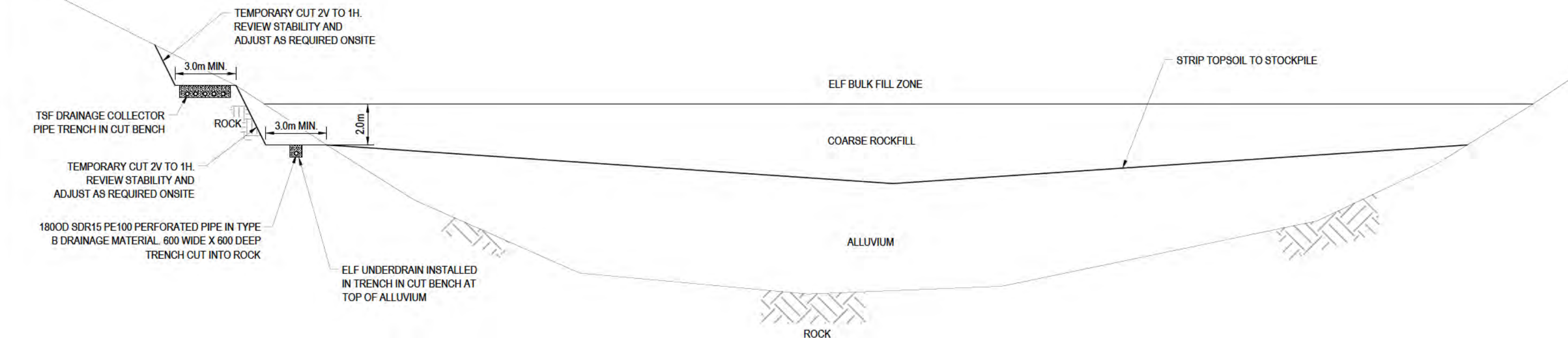


FIGURE 06



B
B
B
DETAIL- ELF UNDERDRAIN
 FIG04 FIG05 FIG06 SCALE (A3) - 1:200

NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.

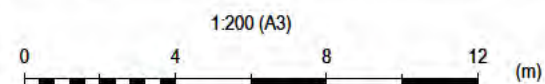


FIGURE 07

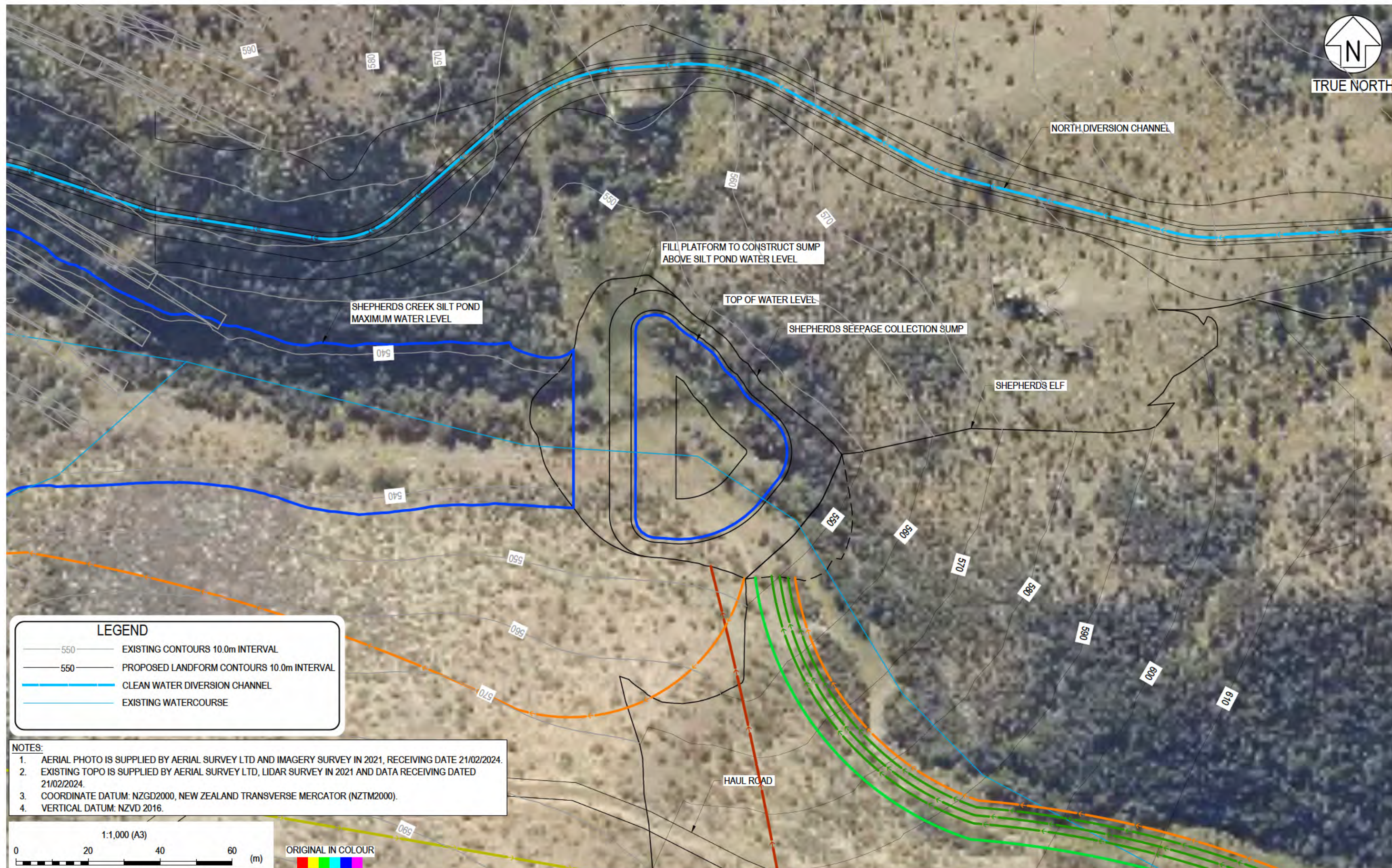
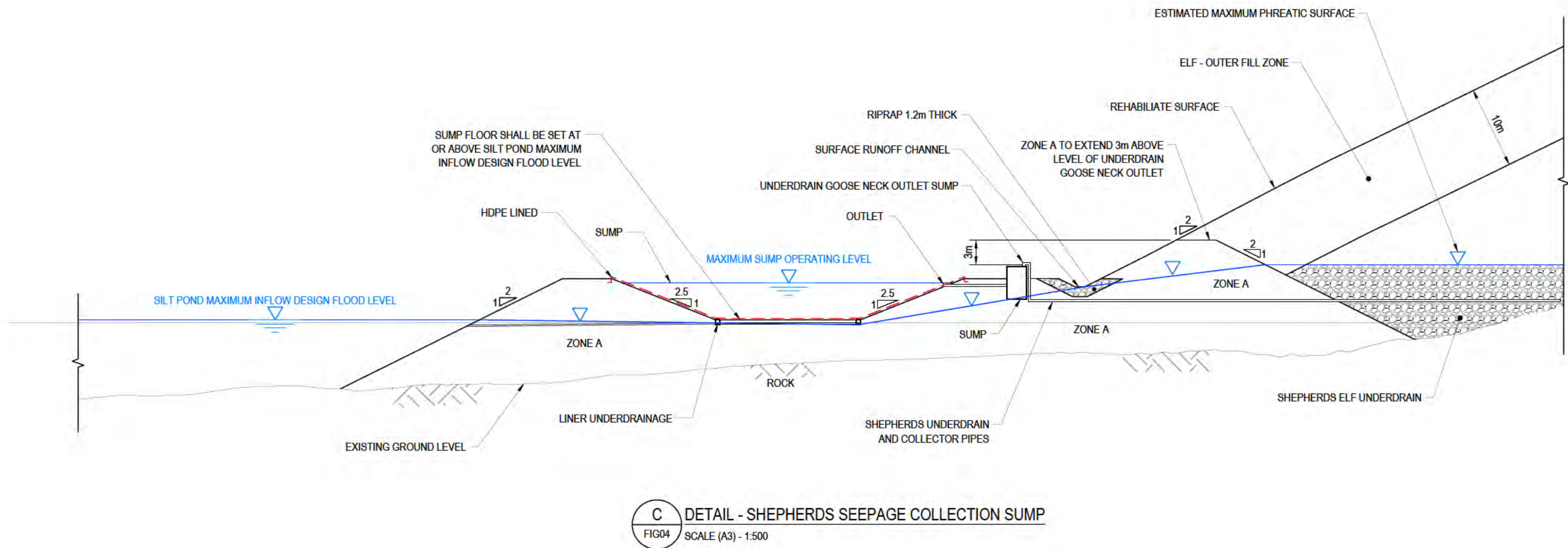


FIGURE 08



NOTES:
 1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.



FIGURE 09

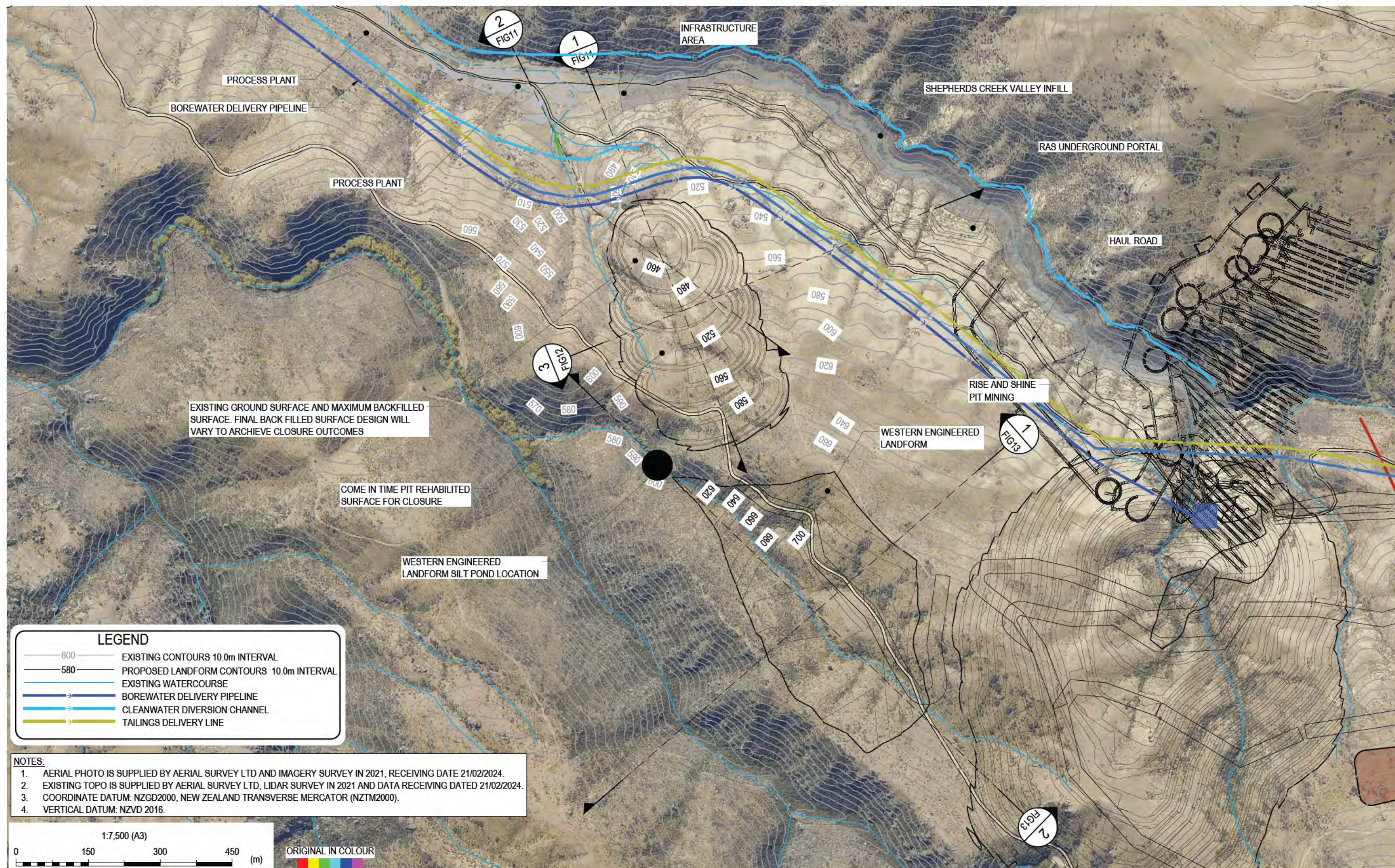
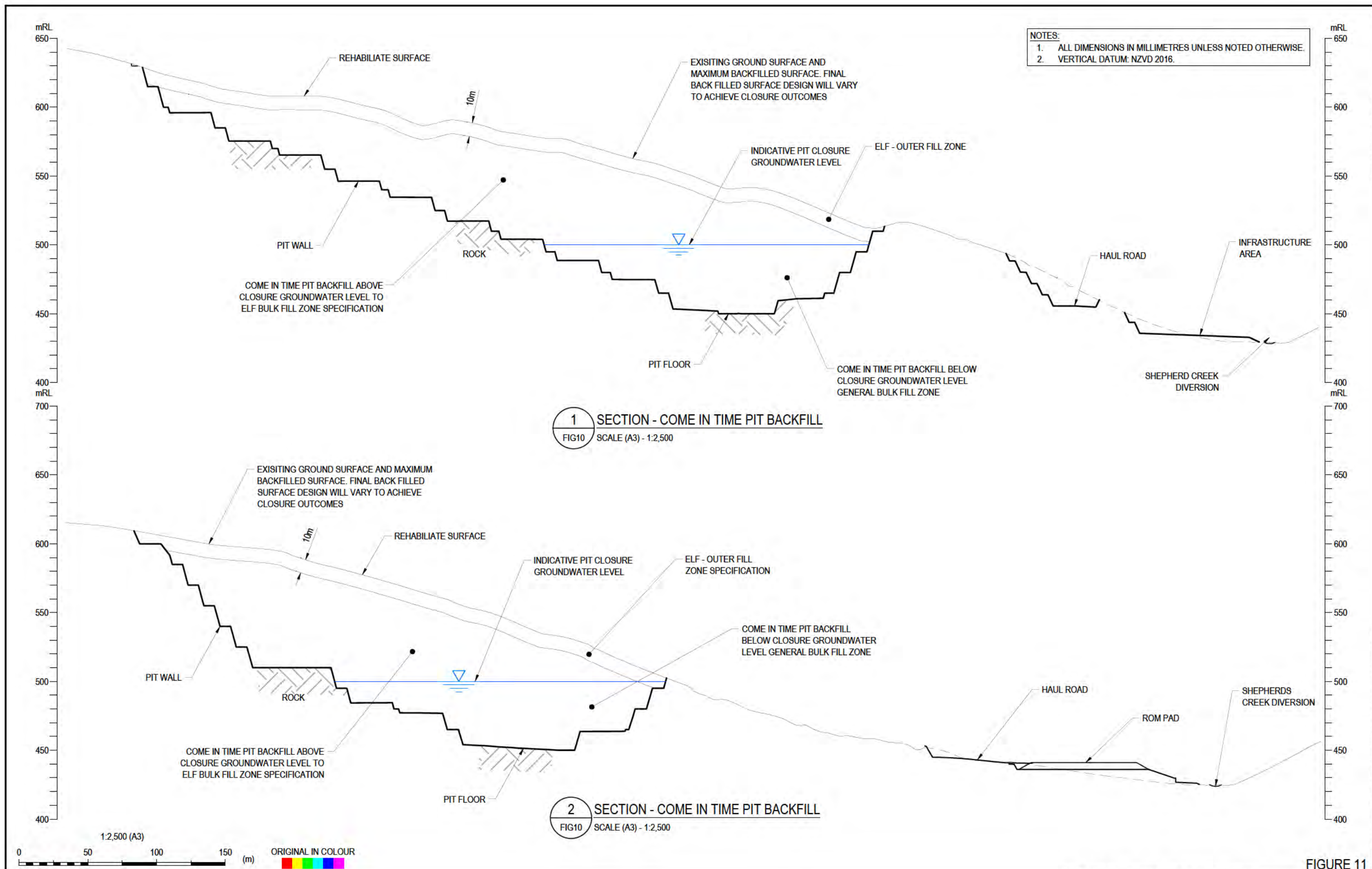


FIGURE 10

MATAKANUI
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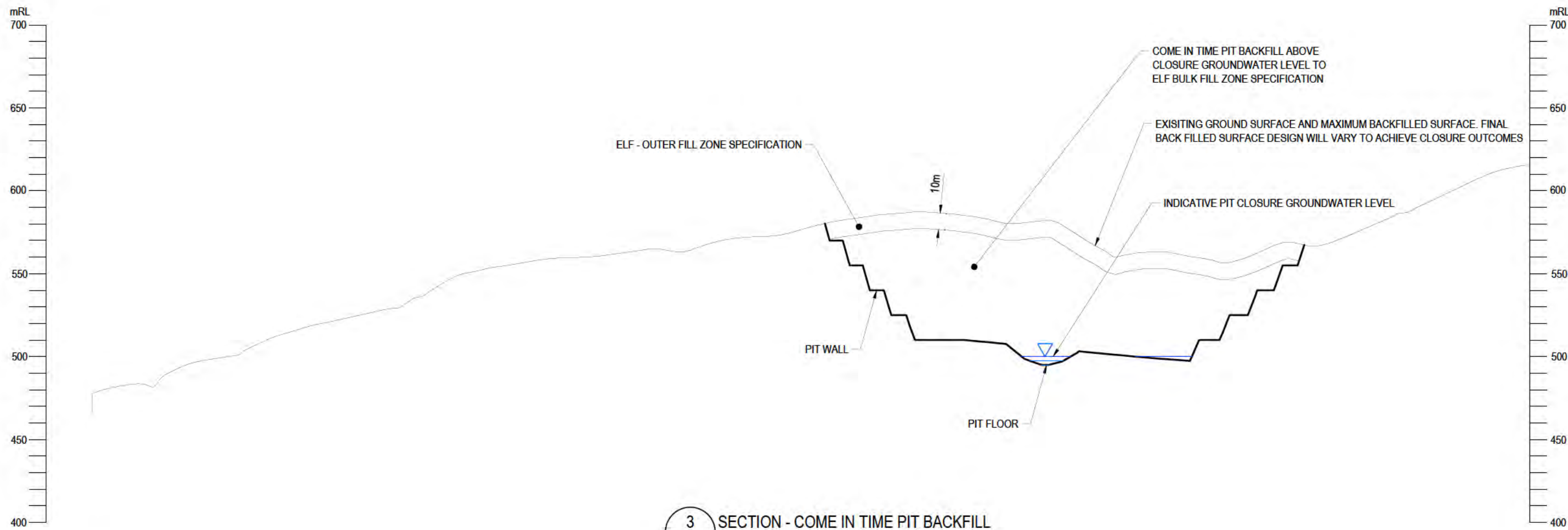
**BENDIGO-OPHIR GOLD PROJECT
SHEPHERD'S CREEK & RISE & SHINE CREEK AREA
COME IN TIME PIT BACKFILL & WESTERN ELF
LANDFORM - LAYOUT PLAN**

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
CHECKED	E.T.	10/07/2025	9702	1:7,500	1



- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
 2. VERTICAL DATUM: NZVD 2016.

FIGURE 11



3 SECTION - COME IN TIME PIT BACKFILL
FIG10 SCALE (A3) - 1:2500

NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. VERTICAL DATUM: NZVD 2016.



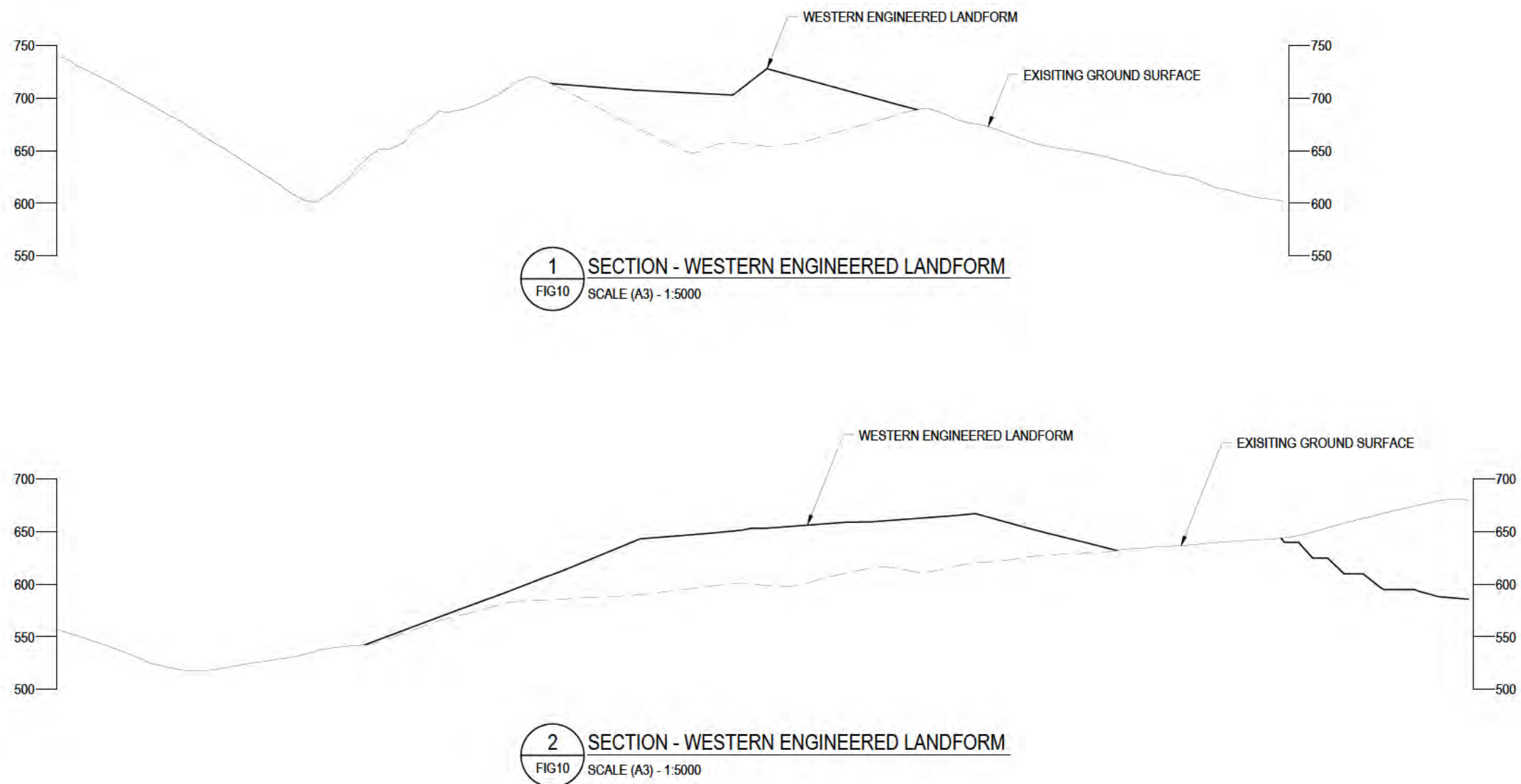
FIGURE 12



BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
COME IN TIME PIT BACKFILL
CROSS SECTIONS SHEET 2

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
CHECKED	E.T.	05/12/2024	9702	1:2,500	0

Z:\Mining Jobs\Bendigo\02 - Matakanaui Gold Ltd\016 CAD\FIG10-12.dwg Eng Landform Tech Rpt\02-FIG-12.dwg PRINTED: 2025-08-13 10:17:23



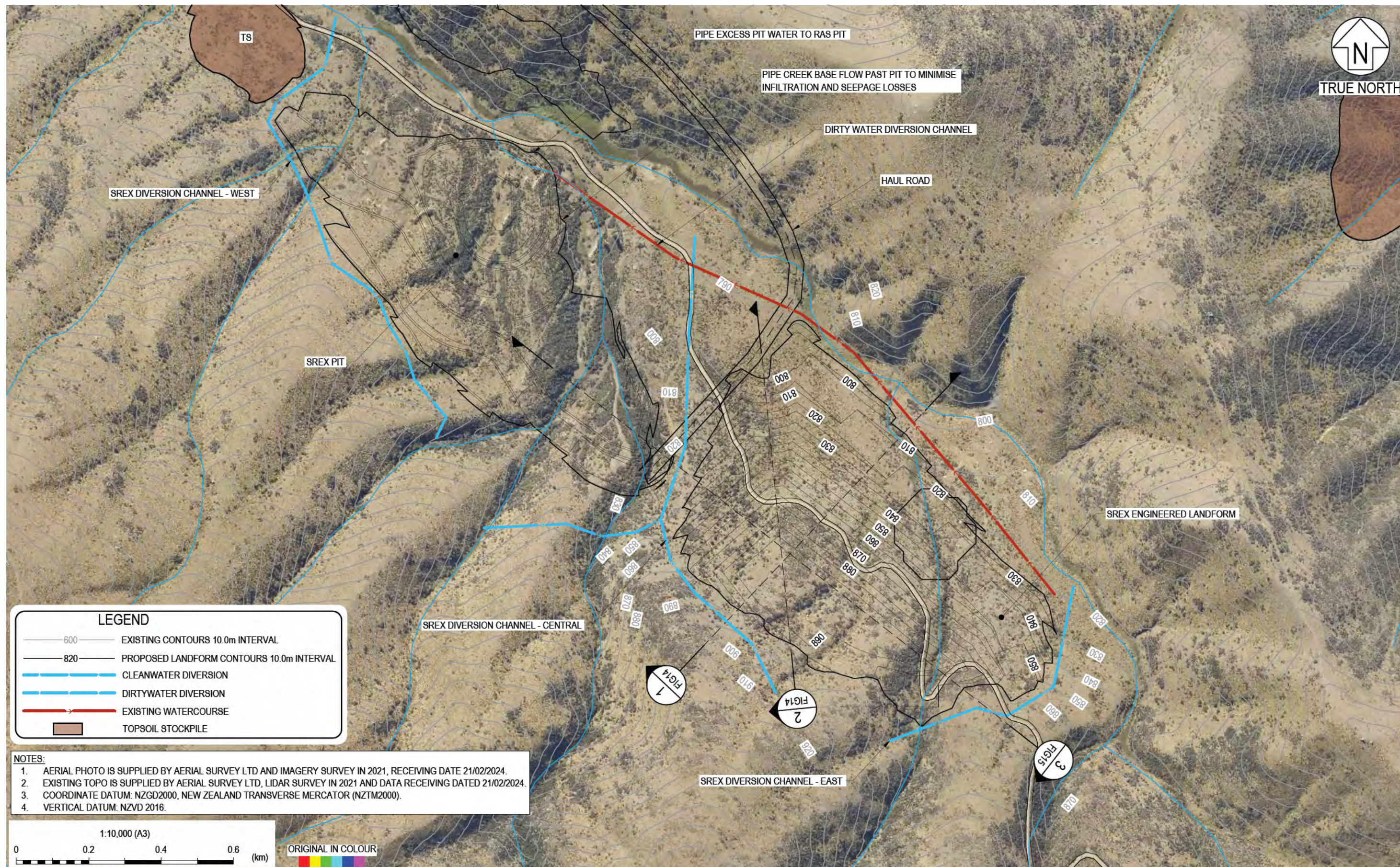
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. VERTICAL DATUM: NZVD 2016.



MATAKANUI
GOLD LIMITED

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
WESTERN ENGINEERED LANDFORM
CROSS SECTIONS

DRAWN	R.M.	DATE	JOB No	SCALE (A3)	REV.
CHECKED	E.T.	10/07/2025	9702	1:5,000	1



LEGEND

- 600 ——— EXISTING CONTOURS 10.0m INTERVAL
- 820 ——— PROPOSED LANDFORM CONTOURS 10.0m INTERVAL
- CLEANWATER DIVERSION
- DIRTYWATER DIVERSION
- EXISTING WATERCOURSE
- TOPSOIL STOCKPILE

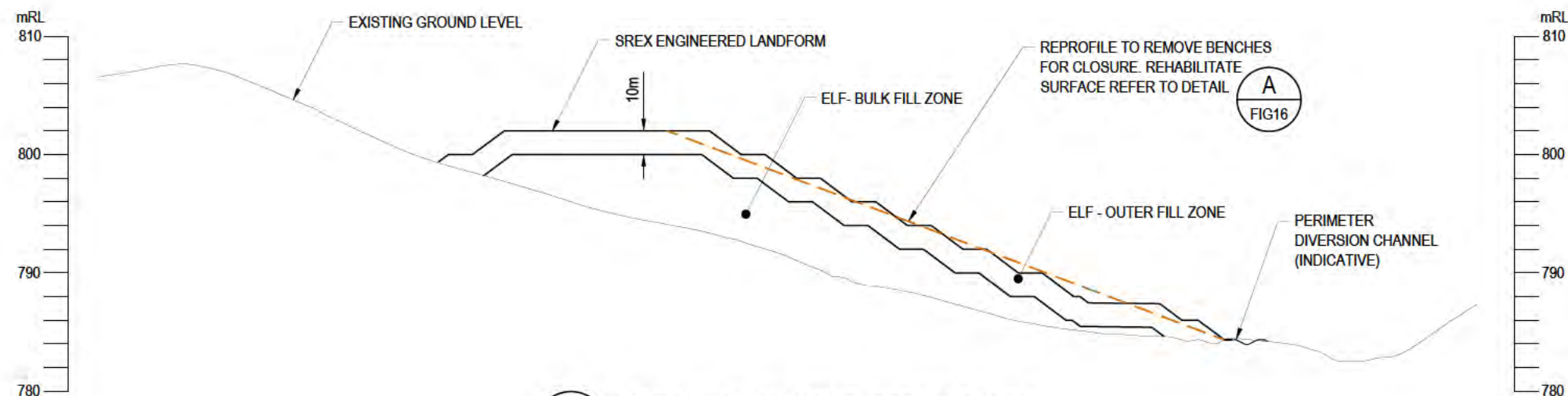
- NOTES:**
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 2. EXISTING TOPO IS SUPPLIED BY AERIAL SURVEY LTD, LIDAR SURVEY IN 2021 AND DATA RECEIVING DATED 21/02/2024.
 3. COORDINATE DATUM: NZGD2000, NEW ZEALAND TRANSVERSE MERCATOR (NZTM2000).
 4. VERTICAL DATUM: NZVD 2016.

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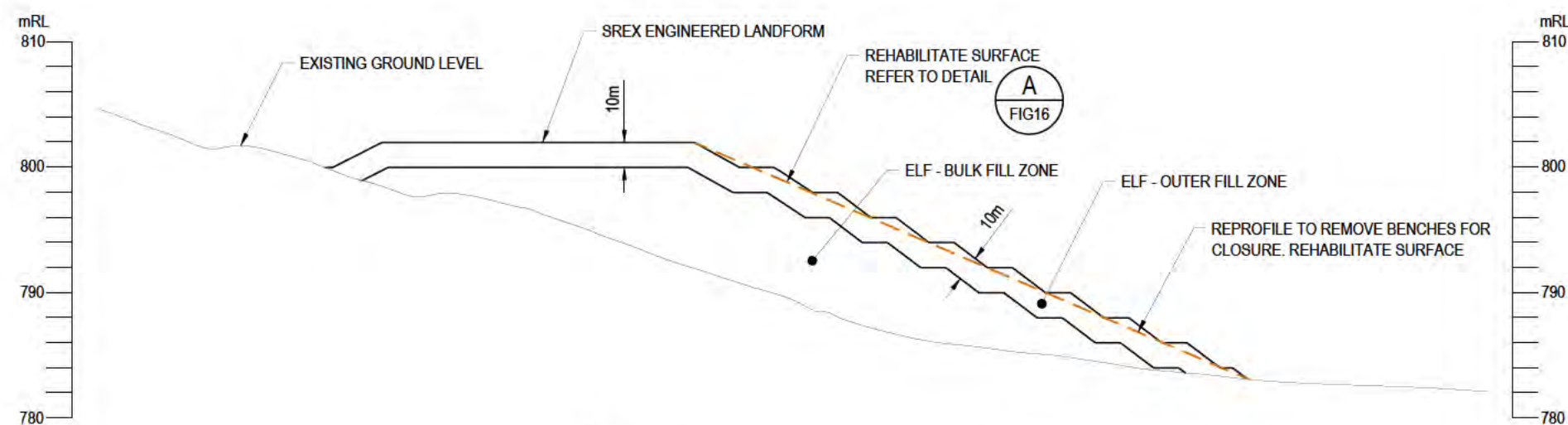
0 0.2 0.4 0.6 (km)

ORIGINAL IN COLOUR

FIGURE 14



1 SECTION - SREX ENGINEERED LANDFORM
FIG13 SCALE (A3) - 1:2500



2 SECTION - SREX ENGINEERED LANDFORM
FIG13 SCALE (A3) - 1:2500

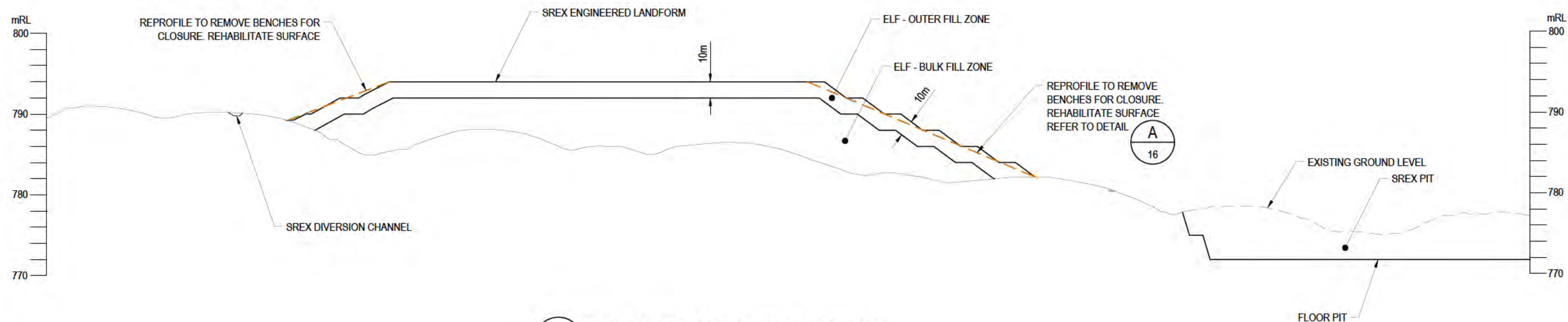
NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
2. VERTICAL DATUM: NZVD 2016.



MATAKANUI
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BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
SREXS ENGINEERED LANDFORM
CROSS SECTIONS SHEET 1

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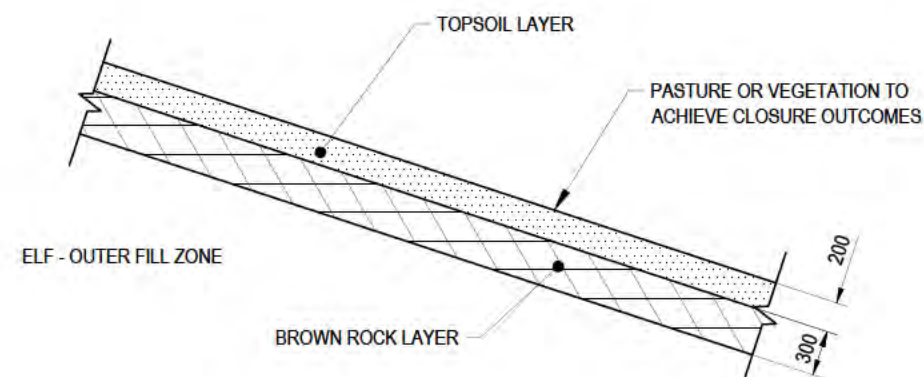


3 SECTION - SREX ENGINEERED LANDFORM
FIG13 SCALE (A3) - 1:2500

- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
 2. VERTICAL DATUM: NZVD 2016.



FIGURE 16



A A A A
 FIG15 FIG14 FIG05 FIG04

DETAIL - SURFACE REHABILITATION
 SCALE (A3) - 1:50

NOTES:
 1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.

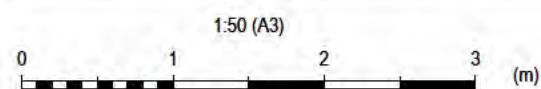
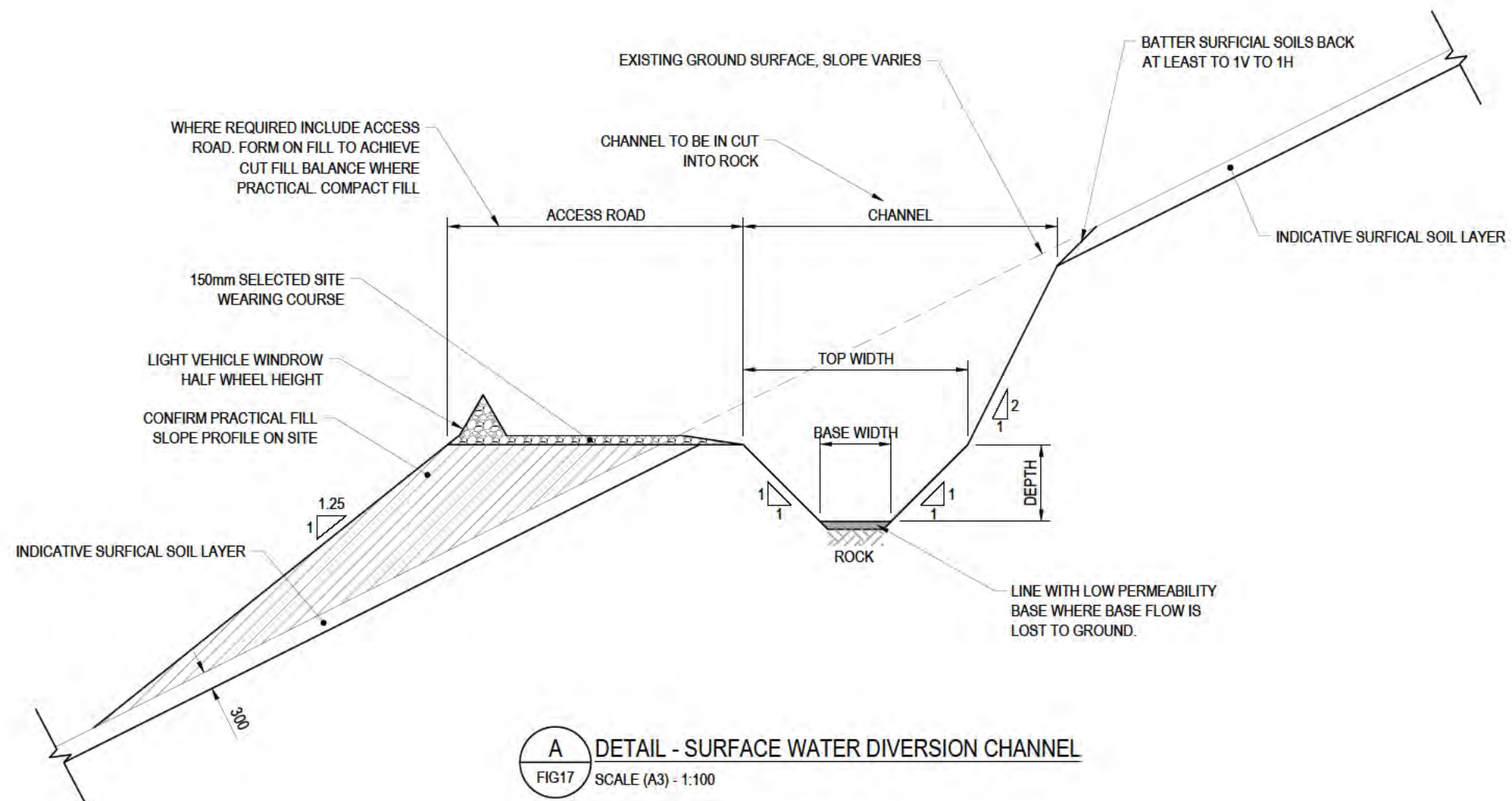


FIGURE 17



NOTES:
1. REFER TO ELF DESIGN REPORT FOR SIZING CRITERIA.

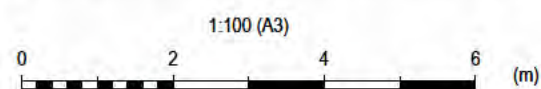
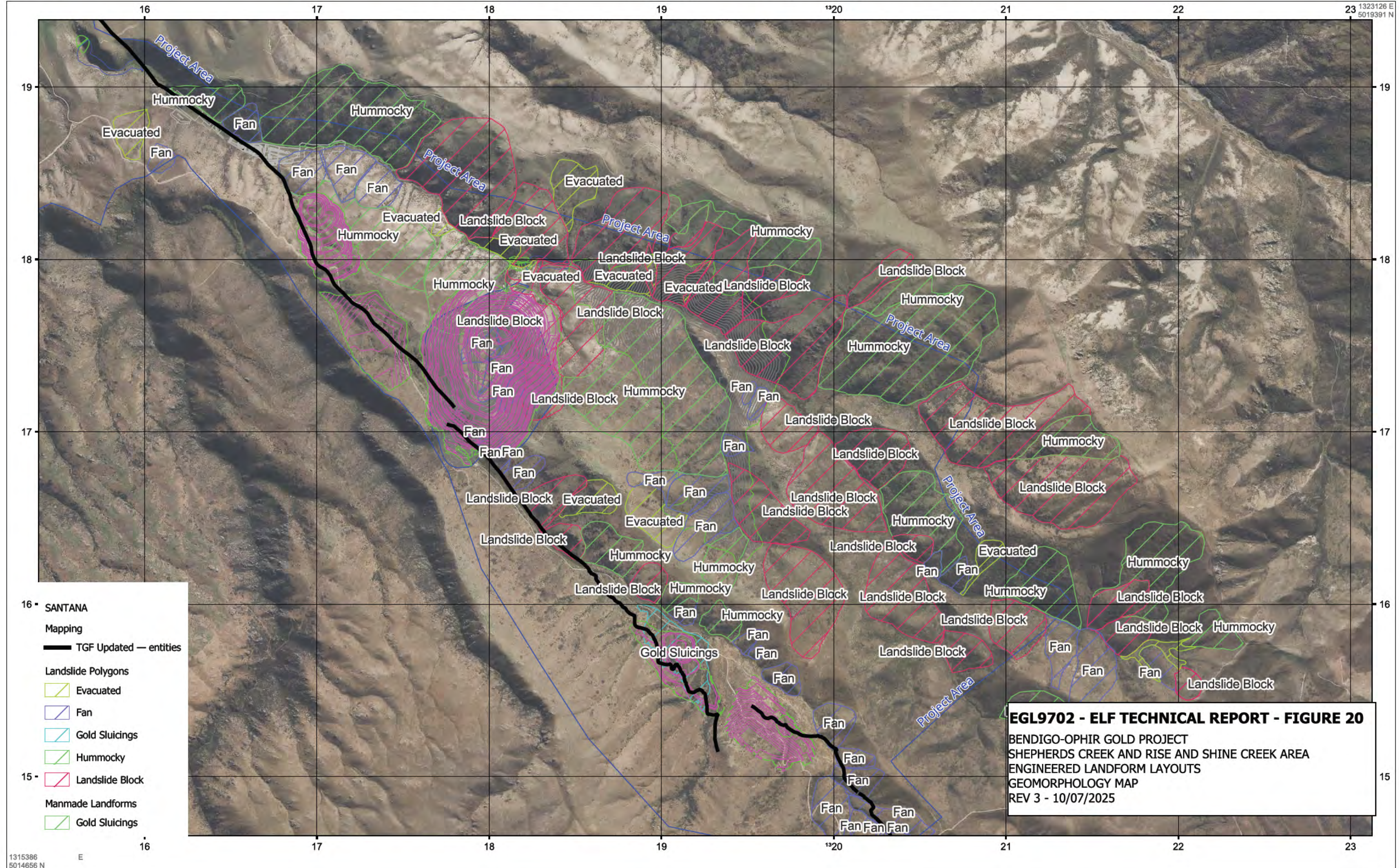


FIGURE 18



16 - SANTANA
Mapping
— TGF Updated — entities

Landslide Polygons

- Evacuated
- Fan
- Gold Sluicings
- Hummocky

15 -

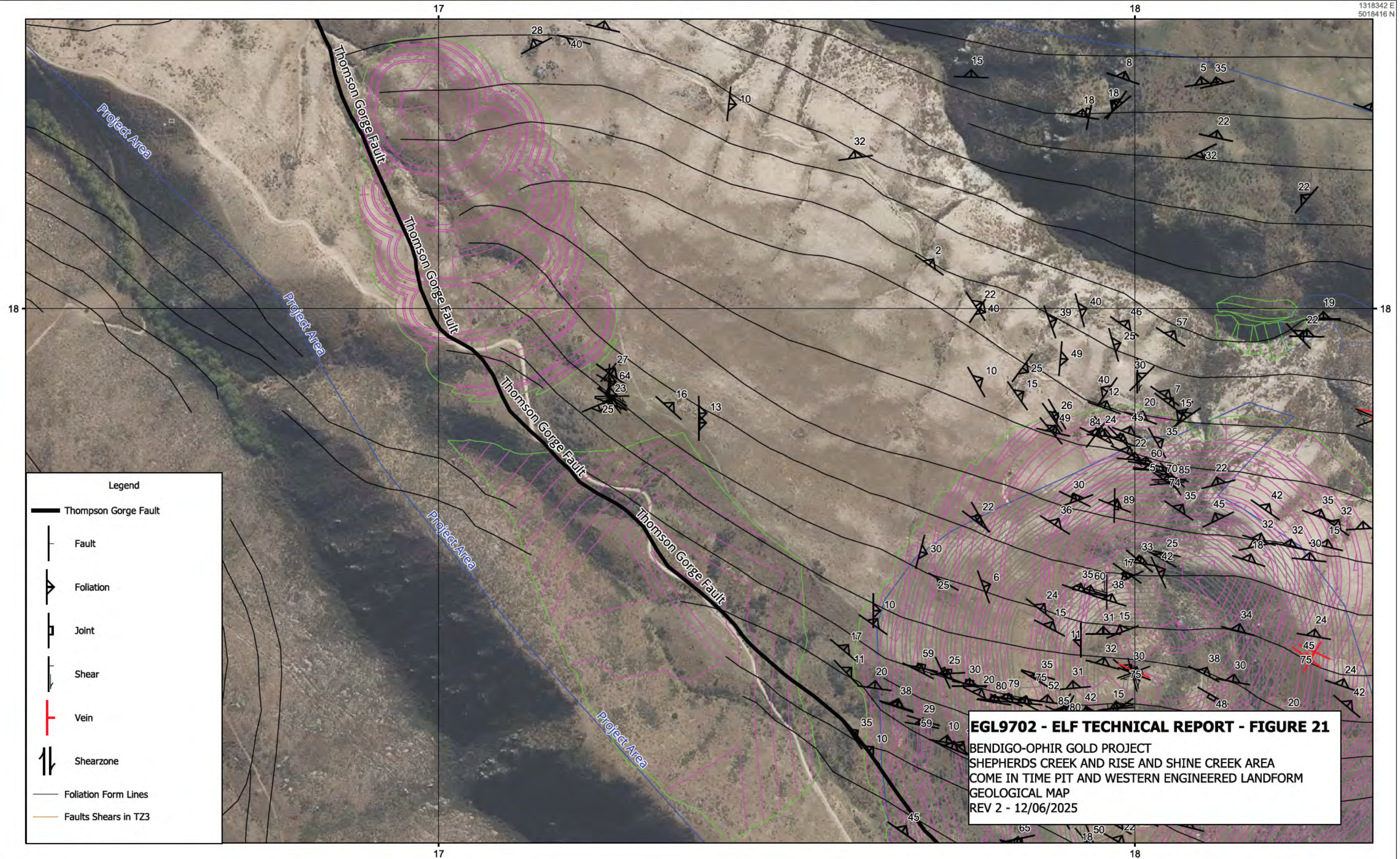
- Landslide Block

Manmade Landforms

- Gold Sluicings

EGL9702 - ELF TECHNICAL REPORT - FIGURE 20

BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK AND RISE AND SHINE CREEK AREA
ENGINEERED LANDFORM LAYOUTS
GEOMORPHOLOGY MAP
REV 3 - 10/07/2025

1316407
5017232 N

Map CRS: EPSG:2193
 Coordinate Units: Meters
 Map Scale: 1:5,000
 Project File: DATABASE.ggz
 Page Size: 420 x 297 mm
 Made with: QGIS 3.40 on Windows



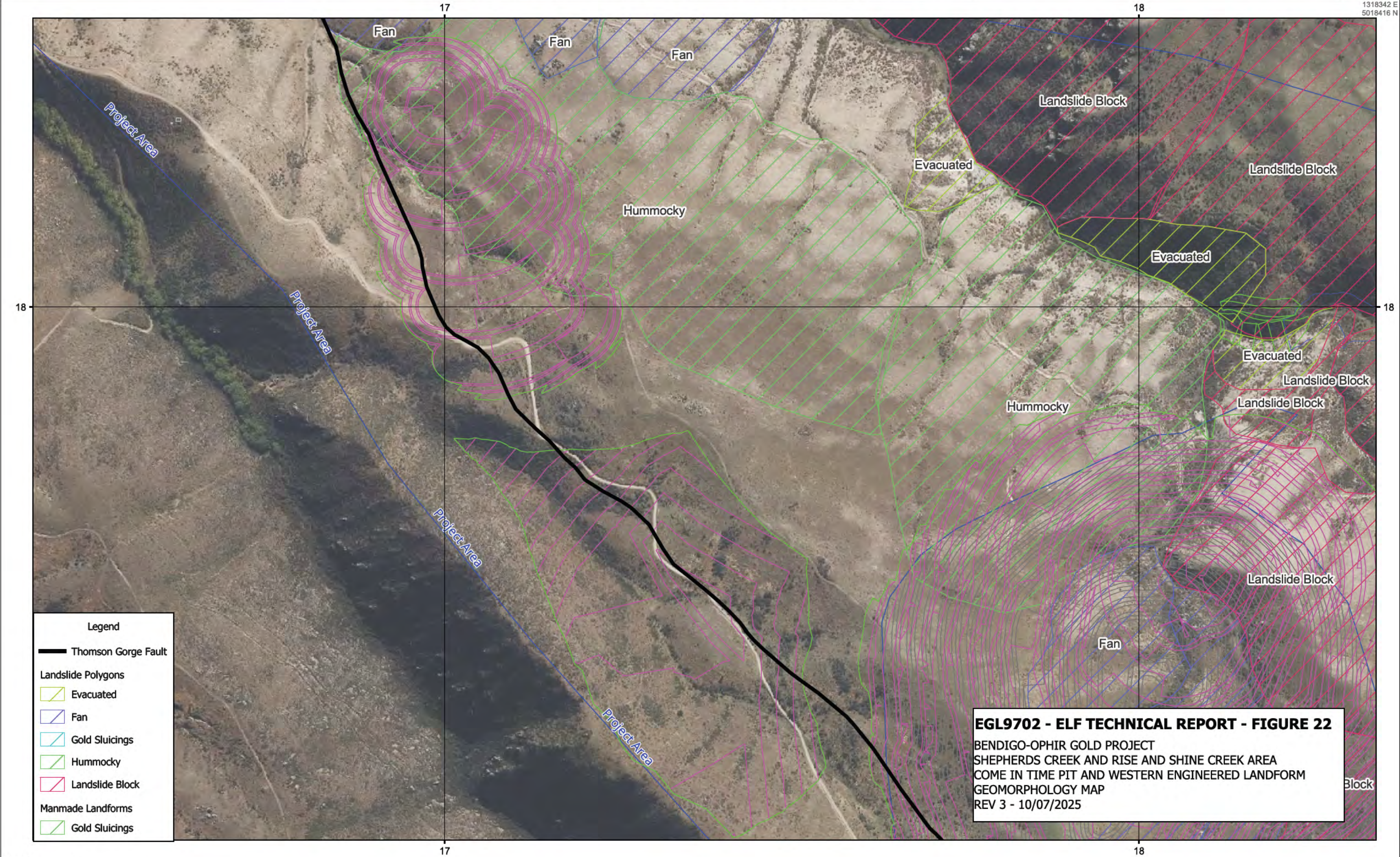
Engineering Geology Ltd
 +64 9 486 2546
 info@egl.co.nz
 Unit 7C, 331 Rosedale Road, Albany, Auckland
 PO Box 301054, Albany, Auckland 0752
 www.egl.co.nz

0 0.09 0.18 0.27 0.36 0.45
 kilometers
 Scale 1:5,000

CIT PIT AREA - 2025-06-12 - John Frengley

MATAKANUI
 GOLD LIMITED

Mapping information provided by Santana Minerals
 Limited.
 Aerials and Topography from LINZ.
 Projected in NZTM.



Legend

- Thomson Gorge Fault
- Landslide Polygons**
- Evacuated
- Fan
- Gold Sluicings
- Hummocky
- Landslide Block
- Manmade Landforms**
- Gold Sluicings

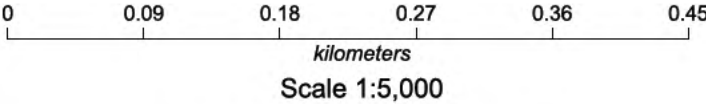
EGL9702 - ELF TECHNICAL REPORT - FIGURE 22
BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK AND RISE AND SHINE CREEK AREA
COME IN TIME PIT AND WESTERN ENGINEERED LANDFORM
GEOMORPHOLOGY MAP
REV 3 - 10/07/2025

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5017232 N

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Coordinate Units: Meters
Map Scale: 1:5,000
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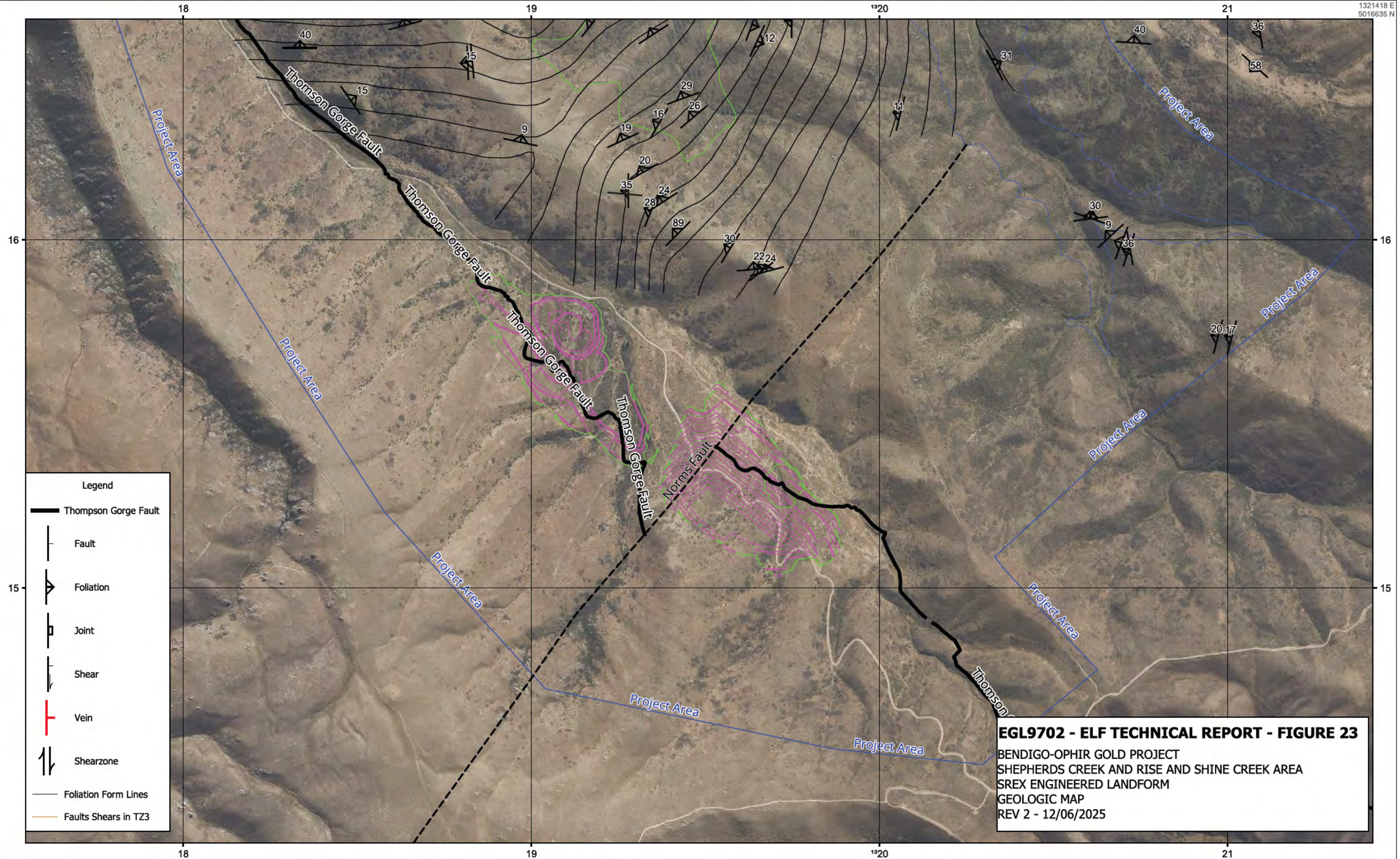
Engineering Geology Ltd
+64 9 486 2546
info@egl.co.nz
Unit 7C, 331 Rosedale Road, Albany, Auckland
PO Box 301054, Albany, Auckland 0752
www.egl.co.nz



CIT PIT AREA - 2025-07-10 - John Frengley



Mapping information provided by Santana Minerals Limited.
Aerials and Topography from LINZ.
Projected in NZTM.

1317548
5014267 N

Map CRS: EPSG:2193
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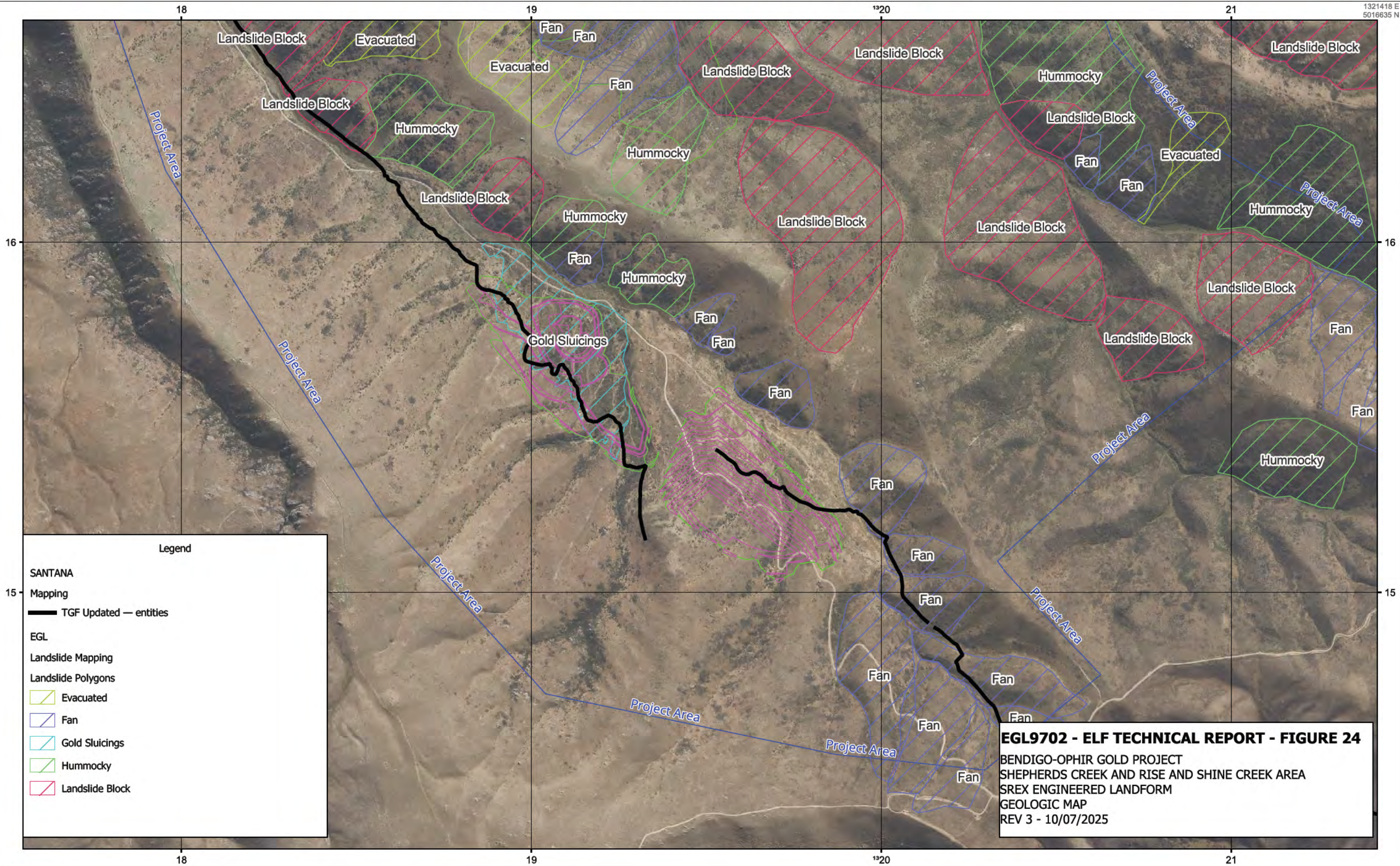
Engineering Geology Ltd
 +64 9 486 2546
 info@egl.co.nz
 Unit 7C, 331 Rosedale Road, Albany, Auckland
 PO Box 301054, Albany, Auckland 0752
 www.egl.co.nz

0 0.1 0.2 0.3 0.4 0.5
 kilometers
 Scale 1:10,000

SREX AREA - 2025-06-12 - John Frengley

MATAKANUI
 GOLD LIMITED

Mapping information provided by Santana Minerals
 Limited.
 Aerials and Topography from LINZ.
 Projected in NZTM.



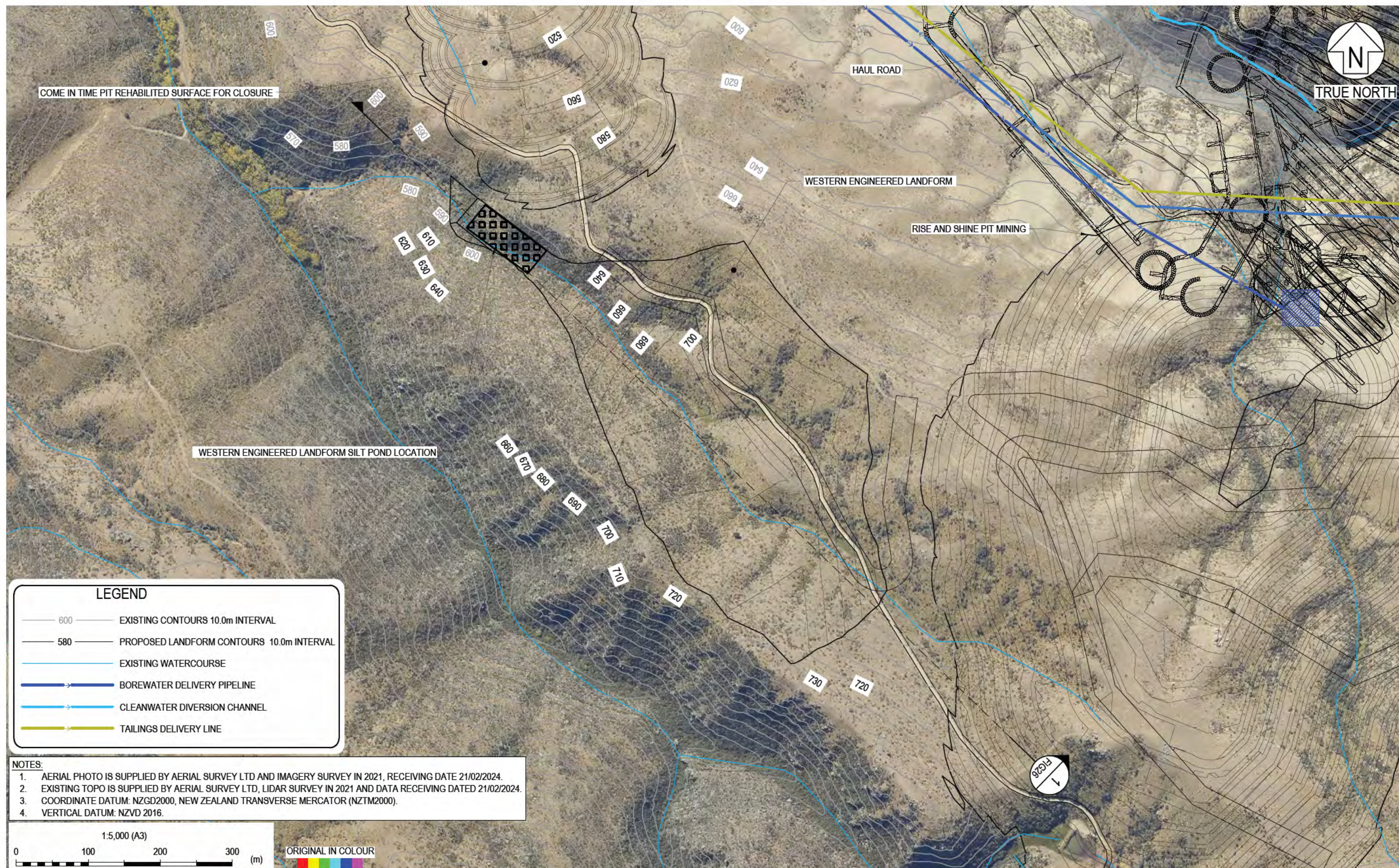
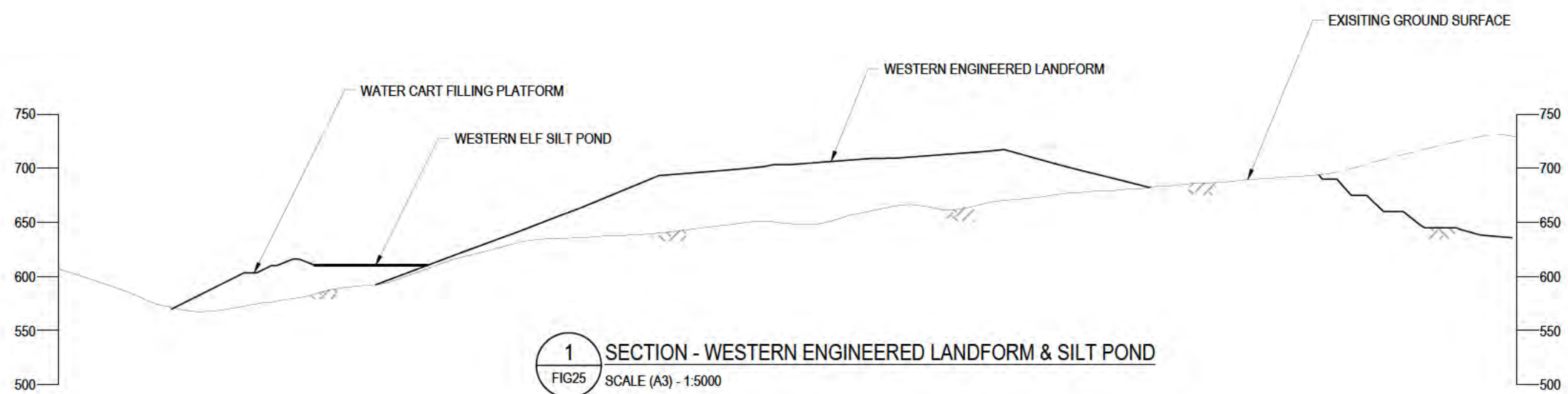


FIGURE 25

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BENDIGO-OPHIR GOLD PROJECT
SHEPHERDS CREEK & RISE & SHINE CREEK AREA
WESTERN ELF SILT POND
LAYOUT PLAN

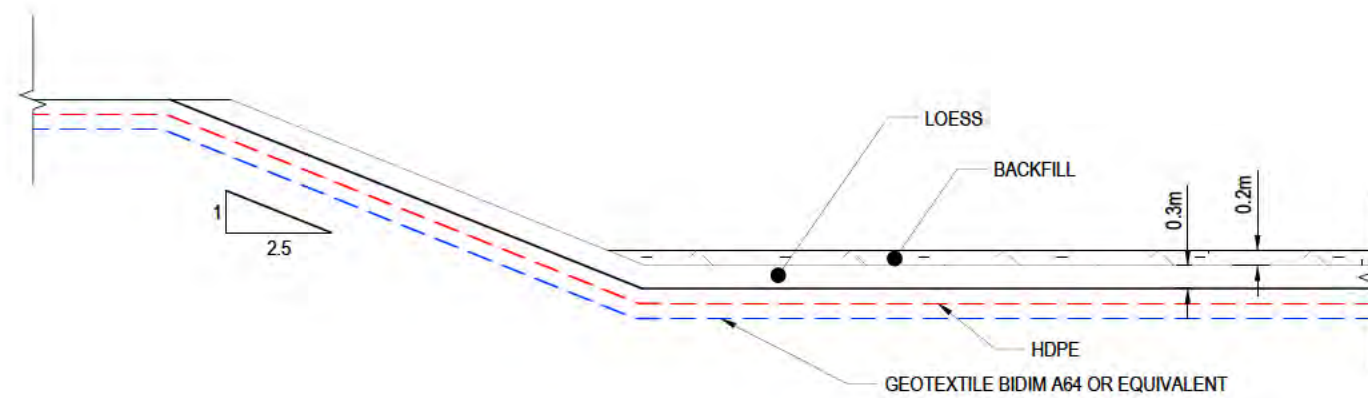
DRAWN	S.K.	DATE	JOB No	SCALE (A3)	REV.
CHECKED	J.Z.	20/08/2025	9702	1:5000	A



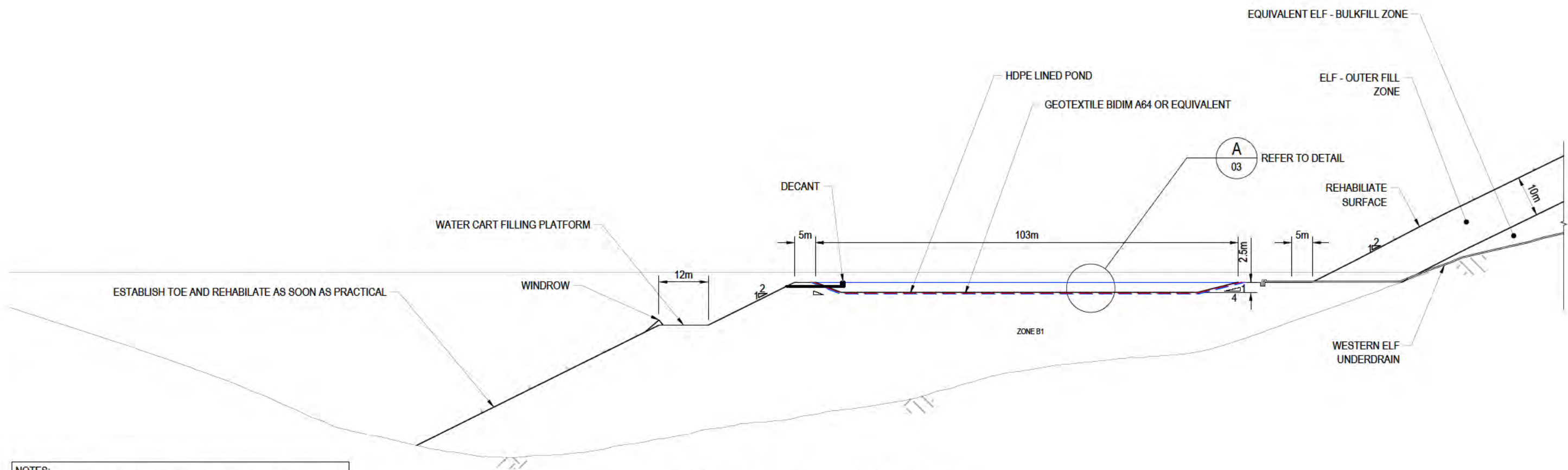
- NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.
 2. VERTICAL DATUM: NZVD 2016.



FIGURE 26



A DETAIL - ZOOM IN
03 SCALE (A3) - NTS



B DETAIL - WESTERN ELF SILT POND
FIG26 SCALE (A3) - 1:1000

NOTES:
1. ALL DIMENSIONS IN MILLIMETRES UNLESS NOTED OTHERWISE.



FIGURE 27

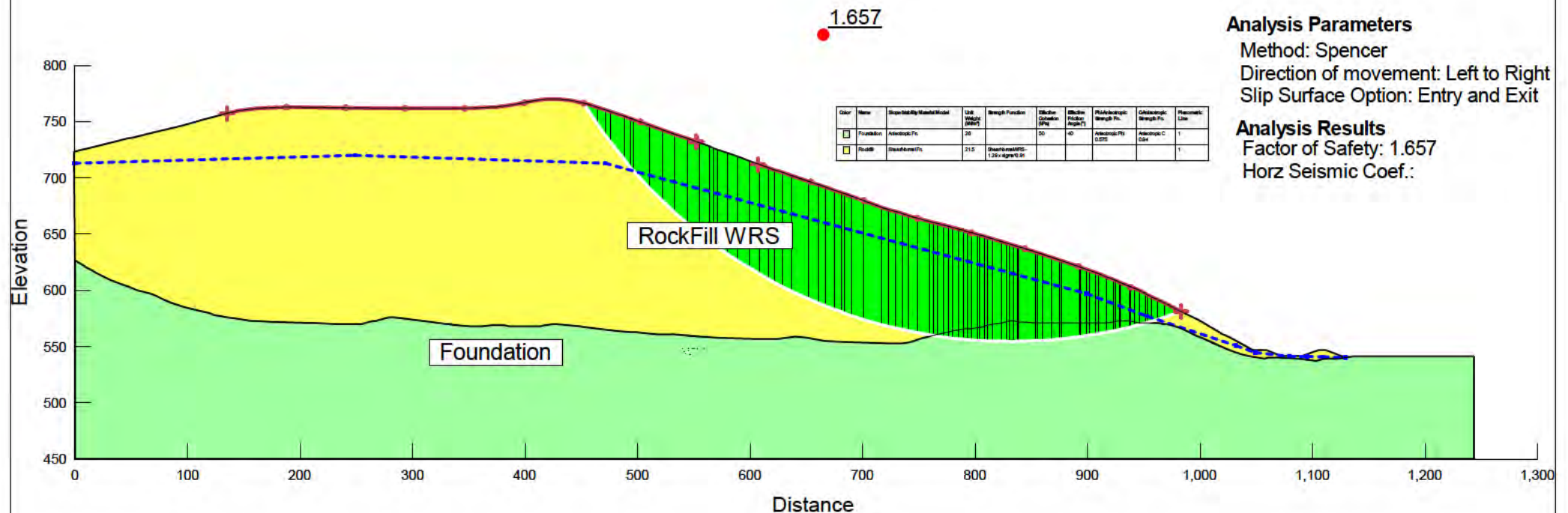
APPENDIX A

SLOPE STABILITY FIGURES

Appendix A List

Figure A1	Section A-A' - Static Analyses - Critical Failure Surface with WRS
Figure A2	Section A-A' - Static Analyses - Failure Surface through the WRS and Foundation
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Figure A5	Section A-A' - Seismic Analyses - OBE Pseudostatic FoS - Failure Surface located $1/3H$ below Crest
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Figure A8	Section A-A' - Seismic Analyses - Yield Acceleration - Failure Surface located $1/3H$ below Crest

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				



Critical Failure Surface within WRS

Figure A.1

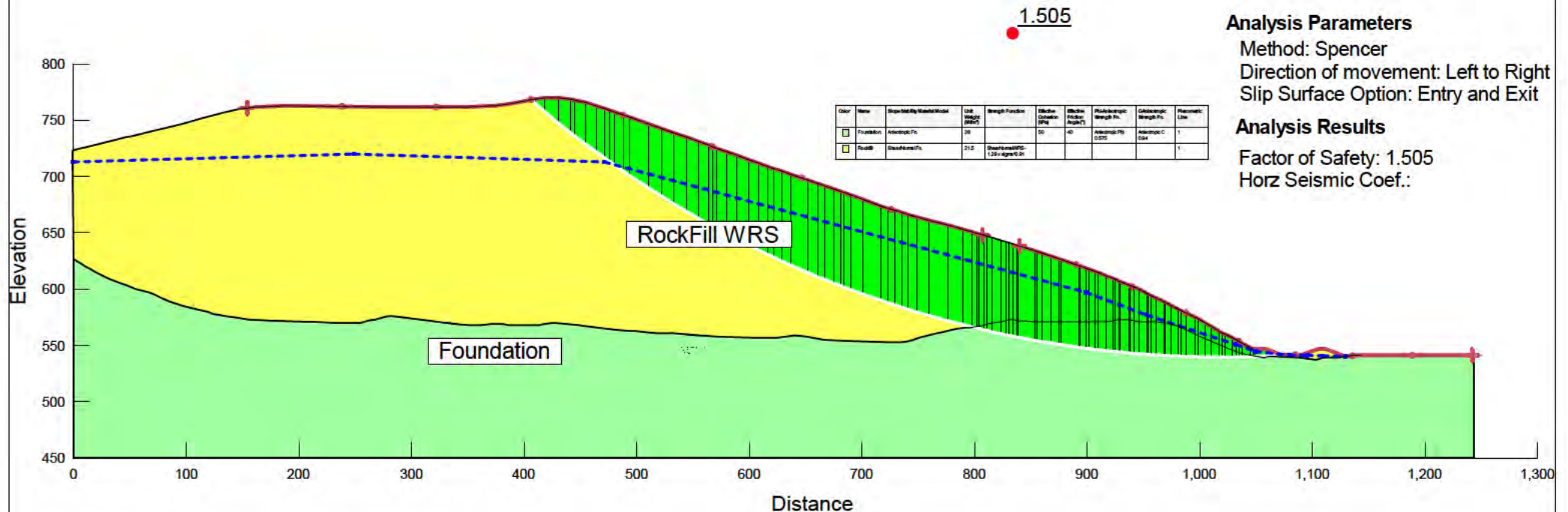


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MATAKANUI GOLD LIMITED
ELF Section A-A
Stability Analysis

Date: 16/04/2025
Ref: 9702
Drawn: RW

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^{0.91}$				



Critical Failure Surface through WRS and Foundation

Figure A.2



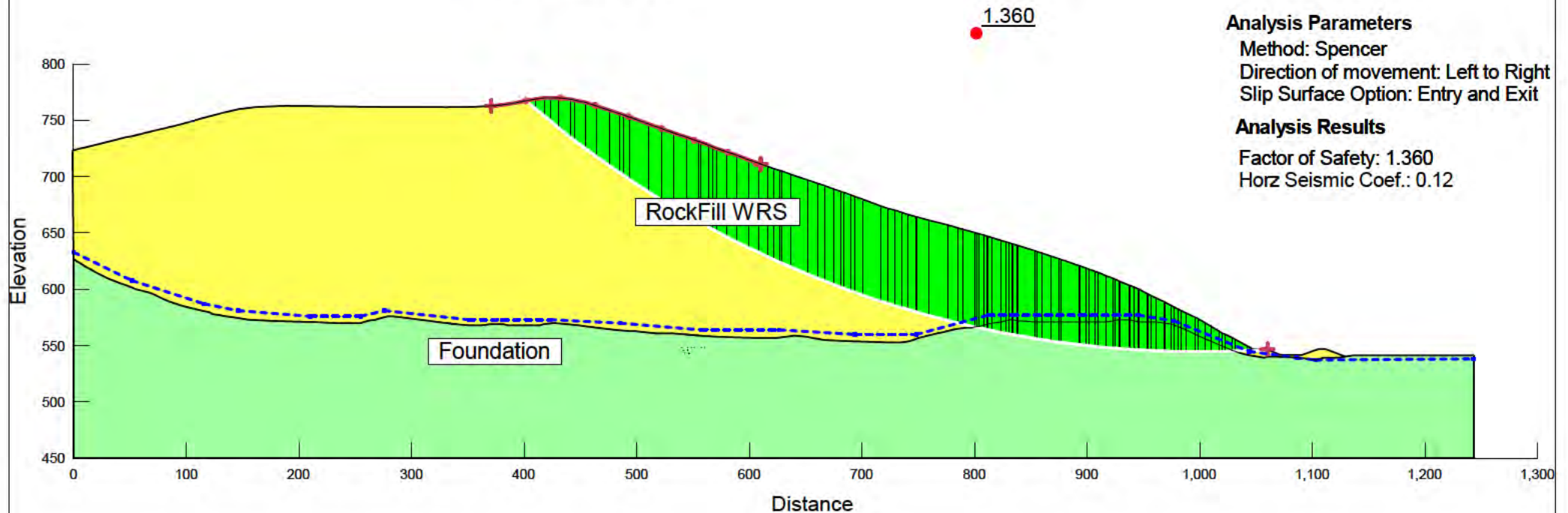
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Date: 16/04/2025
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Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				

Horz Seismic Coef.: 0.12



OBE - Full Depth Failure

Figure A.3



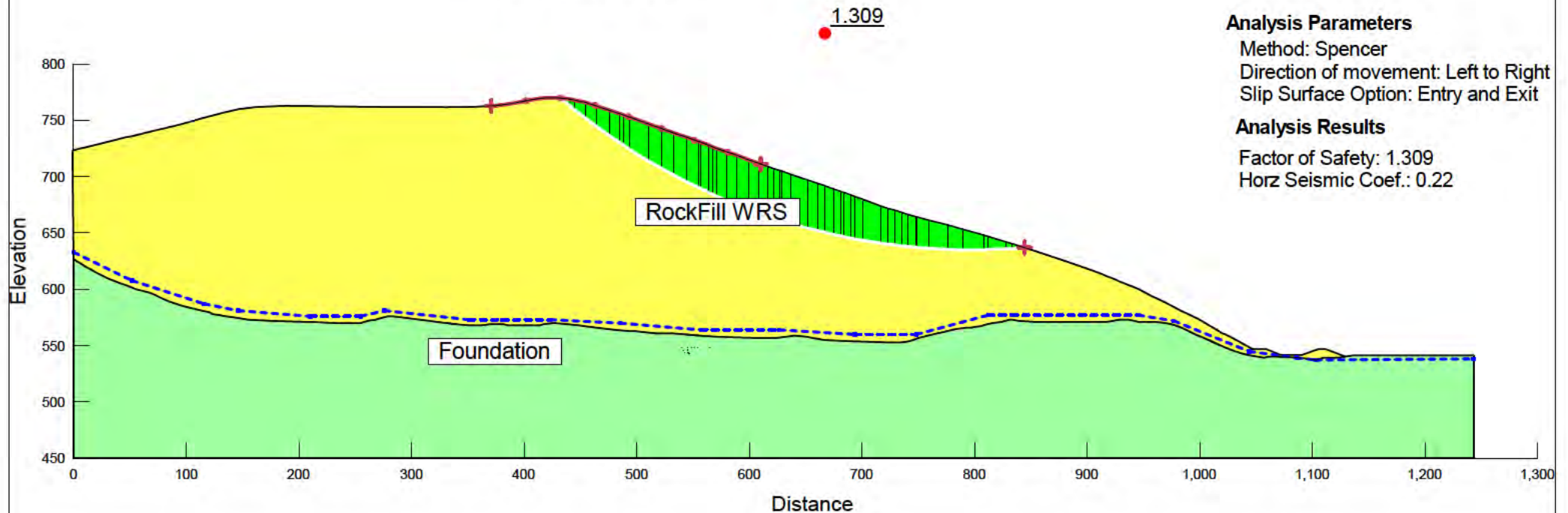
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Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				

Horz Seismic Coef.: 0.22



OBE - Failure 2/3H below Crest

Figure A.4



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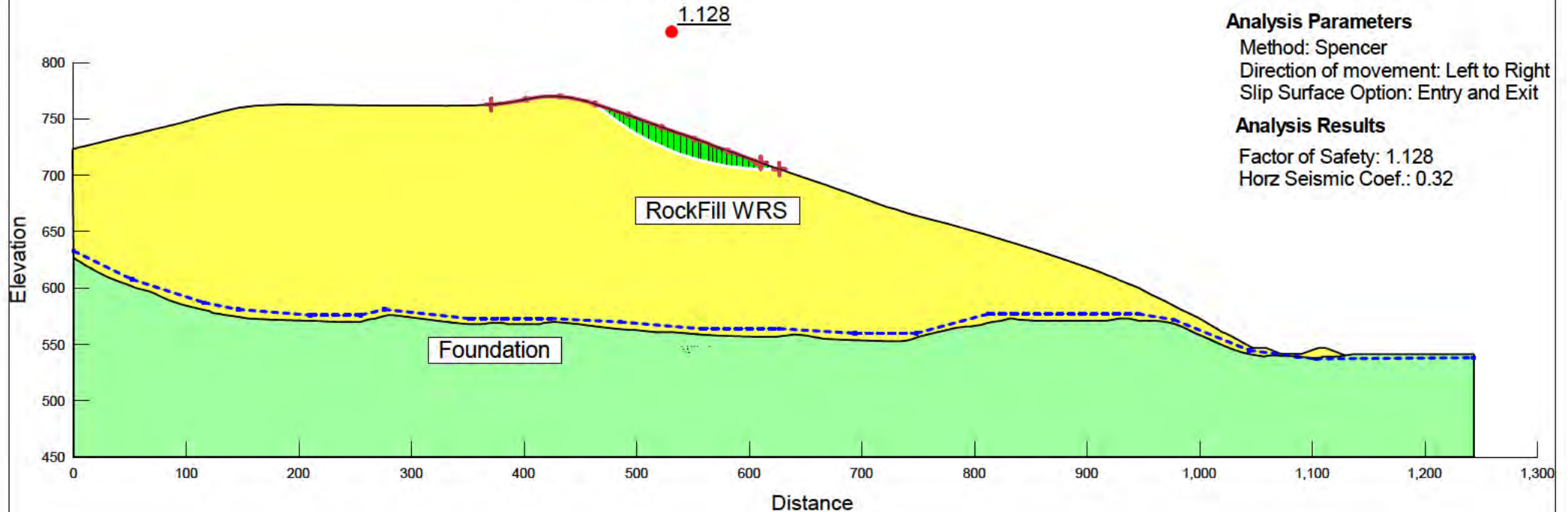
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Stability Analysis

Date: 16/04/2025
Ref: 9702
Drawn: RW

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^{0.91}$				

Horz Seismic Coef.: 0.32

1.128



OBE - Failure 1/3H below Crest

Figure A.5



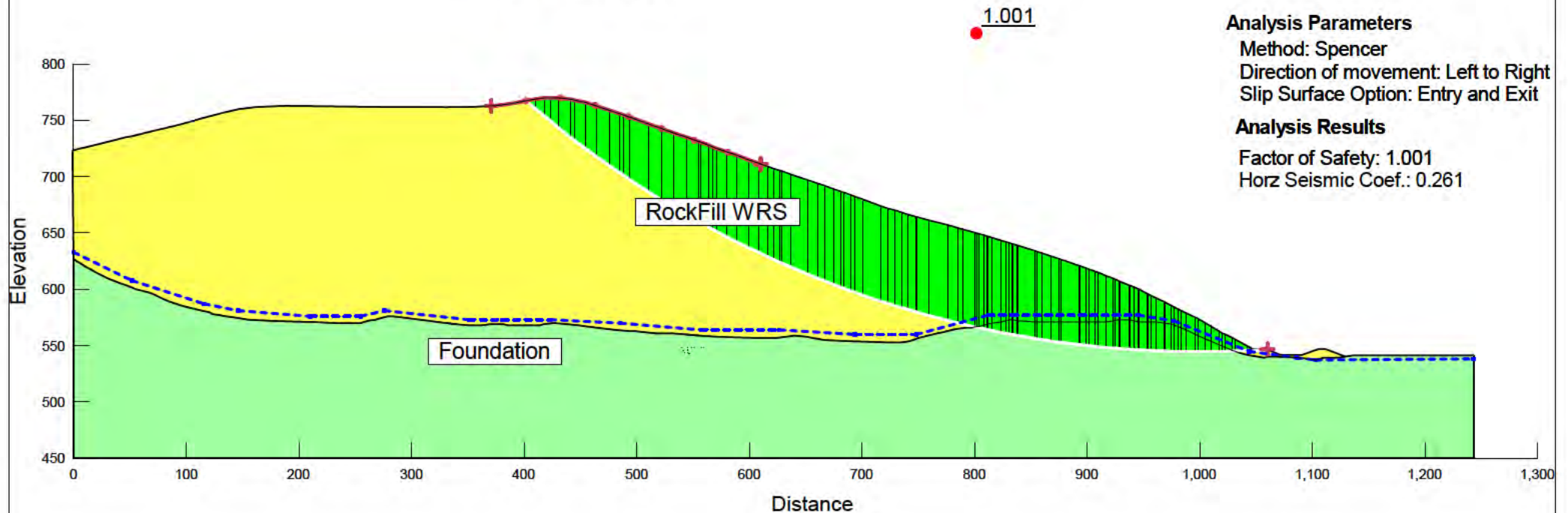
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Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				

Horz Seismic Coef.: 0.261



Yield Acceleration - Full Depth Failure

Figure A.6



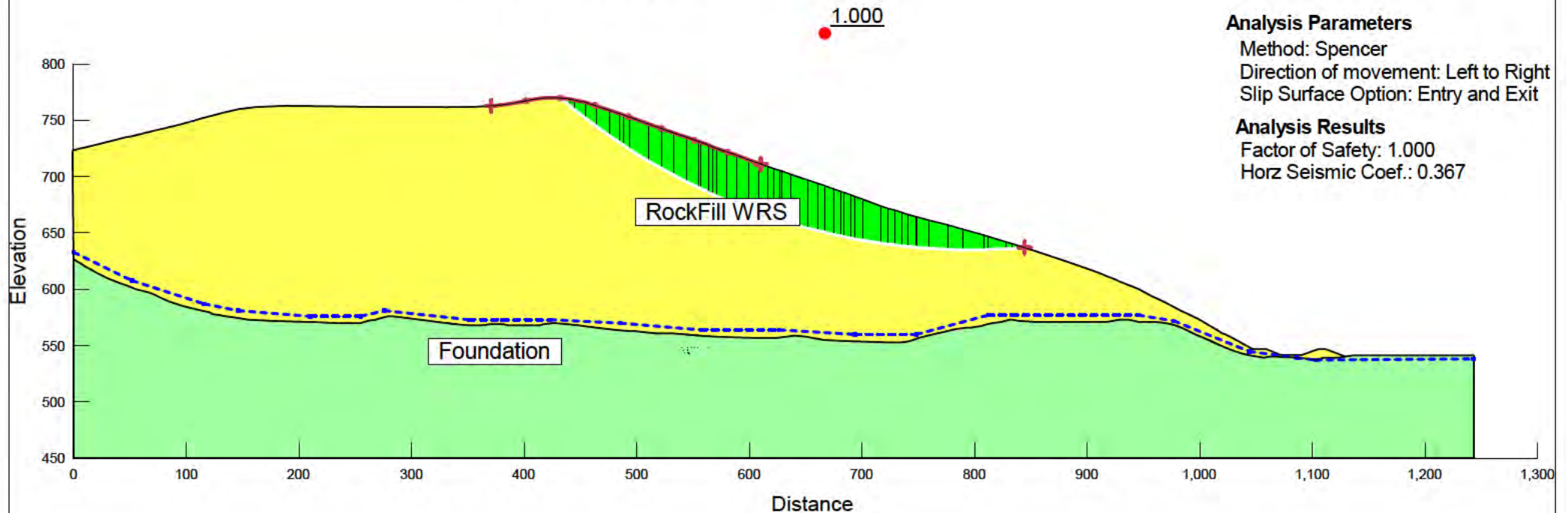
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Date: 16/04/2025
Ref: 9702
Drawn: RW

Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				

Horz Seismic Coef.: 0.367



Yield Acceleration - Failure 2/3H from Crest

Figure A.7



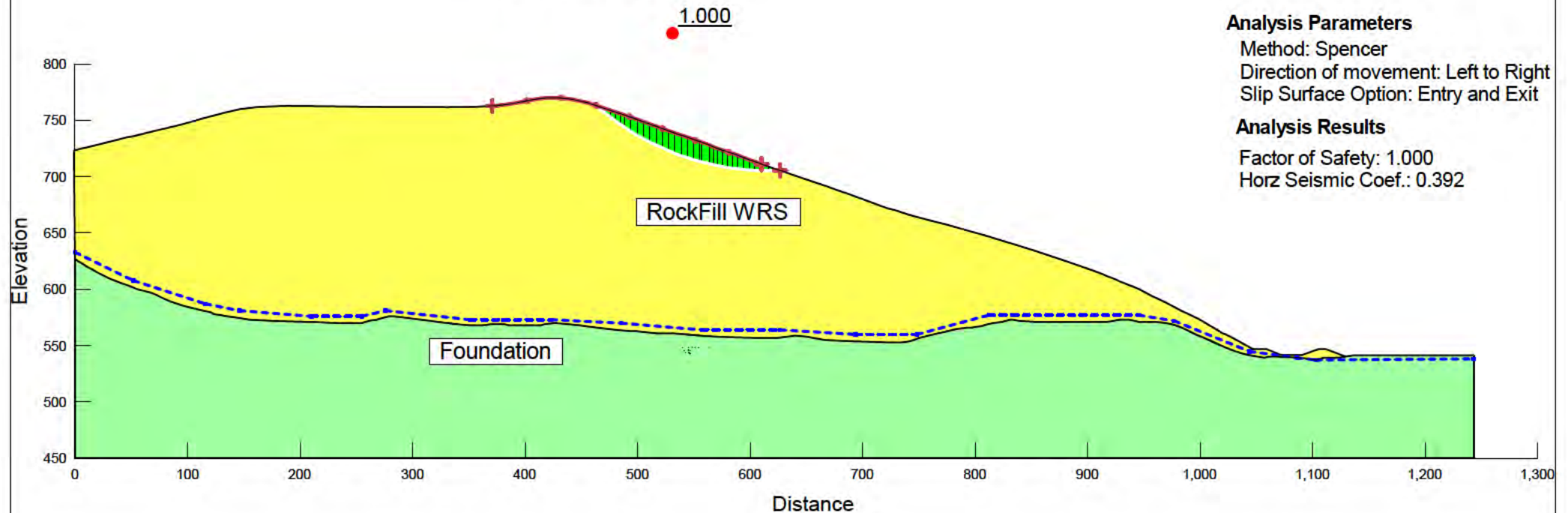
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Color	Name	Slope Stability Material Model	Unit Weight (kN/m³)	Strength Function	Effective Cohesion (kPa)	Effective Friction Angle (°)	Phi-Anisotropic Strength Fn.	C-Anisotropic Strength Fn.
Green	Foundation	Anisotropic Fn.	26		50	40	Anisotropic Phi 0.575	Anisotropic C 0.94
Yellow	Rockfill	Shear/Normal Fn.	21.5	ShearNormalWRS - $1.29 \times \sigma^0.91$				

Horz Seismic Coef.: 0.392



Yield Acceleration - Failure 1/3H from Crest

Figure A.8



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