

Phase 1 Erosion and Sediment Control Plan
Fill Area 3 – Site Establishment and Initial Filling

Prepared for
Gleeson Quarries Huntly Limited

Prepared By:	Southern Skies Environmental Ltd	Rev E	16 June 2022
--------------	----------------------------------	-------	--------------

Contents

1. Scope	3
2. Location and Site Description	3
3. Description of Works.....	3
3.1. General Description	3
3.2. Phase 1 Works	3
3.2.1. Deep Drainage.....	4
3.2.2. SRP	4
3.2.3. Fill Cell Establishment.....	4
3.2.4. Detention Storage and Disposal.....	4
4. Erosion and Sediment Control Specification	5
4.1. Access.....	5
4.2. Tip Head.....	5
4.3. Silt Fences.....	5
4.4. Clean Water Diversions	5
4.5. Dirty Water Diversions	5
4.6. Sediment Retention Pond	5
4.7. Tank	5
4.8. Stockpiling	5
4.9. Stabilisation	6
5. Chemical Treatment	6
6. Dust Management	6
7. As-Built Certification	6
8. Site Personnel	6
9. Monitoring and Maintenance.....	6
9.1. Monitoring Procedures.....	6
9.2. Trigger Event Monitoring	6
10. Removal of ESC Measures.....	7
11. ESCP Changes	7
Appendix A – Erosion and Sediment Control Drawings and Details.....	8
Appendix B – Chemical Treatment Management Plan.....	10

1. Scope

This Phase 1 Erosion and Sediment Control Plan (ESCP) has been prepared in general accordance with:

- *Gleeson Managed Fills Ltd, Huntly Fills 2 – 4, Erosion & Sediment Control Plan; 27 October 2019*, prepared by Erosion Management Limited (Erosion Management ESCP), as lodged with the consent application; and
- *Waikato Regional Council Technical Report No. 2009/02 Erosion and Sediment Control Guidelines for Soil Disturbing Activities, January 2009 (TR2009/02)*.

SouthernSkies Environmental Limited acknowledges the content of the Erosion Management Report prepared by Brian Handyside. This Phase 1 ESCP addresses relies on the Erosion Management document in the overall assessment of sediment related effects.

Other documents relied upon in the preparation of this ESCP are:

- *Fill Site 5 - Geotechnical Design Report, July 2021*, prepared by Gaia Engineers (Geotech Report), incorporating Appendix A Drawings.
- *Gleeson Quarries Huntly Limited – District and Regional Resource consents for new fill sites within quarry landholdings Ecological Impact Assessment*, 14 November 2019, prepared by Boffa Miskell (Ecology Report)

This ESCP describes the erosion and sediment control (ESC) methodology to be implemented during the establishment of the fill site and the formation and filling of the Initial fill cell.

2. Location and Site Description

Fill Site 3 is a broad gully being approximately 250m wide from ridge to ridge that trends in a north-westerly direction. The upper reaches of this gully are characterised by moderately steep 2.5H:1V slopes formed in weathered Waikato Coal Measures material. The gully head slopes exhibit terracettes indicative of shallow downslope soil creep movements. No signs of deeper instability either historic or recent have been observed. There are no watercourses on this site. A shallow stock pond within the centre of the site has been drained, with a rock lined channel formed eastward to the eastern gully.

The flat area of Fill Site 3 is underlain by fill placed until approximately 30 years ago, comprises predominantly overburden stripping from adjacent neighbouring coal mines that are no longer in production. Accordingly, the overburden material is mostly Waikato Coal Measures mudstone. The mudstone is broken into gravel and cobble sized particles and is variably weathered from highly to slightly weathered. The mudstone gravels are typically bound in a matrix of soil strength completely weathered Waikato Coal Measures silt. Lenses of lower strength (soft to firm) clays with variable organic content are also common throughout the observed fill. These lenses are inferred to be stripped alluvium and colluvium from pre-existing gullies.

3. Description of Works

3.1. General Description

Approximately 478,500m³ of managed fill is to be imported to the site over an area of 4.34ha. It will be placed in a series of structural bunds and non-engineered fill cells.

Prior to filling commencing, deep drainage will be installed to dewater the existing fill horizons at a rate necessary to provide for a commercially viable fill importation rate.

The site will be progressively stripped, and a clay liner and drainage blanket will be installed before fill is imported.

Clay for the liner will be excavated from the southern part of the fill site.

Runoff from the fill site will be treated via a sediment retention pond (SRP).

Once the site is established, initial filling has commenced, and discharge limits have been confirmed, the SRP will discharge to the eastern gully and watercourse. Prior to that the site will be managed in accordance with the Phase 1 works, as described below.

3.2. Phase 1 Works

Phase 1 will provide an adaptive management approach to confirming the discharge limits for the SRP. During Phase 1, the site will be set up to fully contain runoff and avoid any discharges.

Once Phase 1 is completed and the discharge limits have been confirmed, the discharge from the SRP will be diverted to a lined spillway to the eastern gully.

3.2.1. Deep Drainage

Drainage must be installed into the existing fill within the site to allow and commercially viable rate of fill placement and settlement. These drains will comprise an up to 10m deep, 1.5m wide trench with two 160mm Φ punched drainage coils, backfilled with General All Passing 65mm (GAP65) aggregate with less than 4% fines.

These drain lines will discharge via a single outlet into a manhole riser chamber with float pump and gate valve. The drained water be pumped from the chamber to a 30m³ litre tank. Water will be tested and disposed in accordance with it meeting discharge limits. This is described in the Site and Fill Management Plan (SFMP).

Silt fences will be used to treat the isolated areas of disturbance that will occur during the installation of the deep drainage.

This stage will also require backfilling of the existing surface drainage channel, using excavated fill.

3.2.2. SRP

Once the deep drainage is installed, the SRP will be constructed, and an additional 75m³ litre tank will be installed downstream. The SRP will be sized to a design maximum catchment of 5.25ha although the maximum anticipated catchment area will be 4.34ha. The SRP will correspond to a ratio of 3.63% of the actual maximum contributing catchment. The Phase 1 works catchment will be significantly less than 4.34ha.

A clean water diversion bund will be installed to minimise the catchment area of this stage of works.

Silt fences will be used to treat runoff during these works, which will also include the placement of a stockpile of material excavated during the SRP construction. Once the SRP is established, a dirty water diversion channel will be installed to carry runoff from the stockpile to the inlet of the SRP. Accordingly, the amount of runoff that is treated via the silt fences will be limited to initial stripping and small areas adjacent to the excavation.

All runoff will enter the SRP, with the tank providing backup storage. Some water may be used for dust suppression within the fill site and pasture irrigation on the adjacent Gleeson farm.

3.2.3. Fill Cell Establishment

Once the water treatment and containment system (SRP / tank) is established, dirty water diversion bunds will be installed to isolate the initial fill cell to an area of approximately 1.5ha.

The cell will be stripped of topsoil and lined with clay excavated from the southern part of the fill site. Topsoil will be used to increase the height of the diversion bunds and surplus will be stockpiled.

A clay bund will be formed at the foot of the fill cell to provide a minimum of 1500m³ of storage. A lined spillway will be formed from this storage to the dirty water flow path below, that drains to the SRP.

The area of clay excavation will be managed such that no more than approximately 0.7ha is exposed at any given time. It will be progressively stabilised.

The clay excavation face will be managed to ensure that runoff falls into the site and ultimately to the tank system.

3.2.4. Detention Storage and Disposal

The minimum combined storage that will be available on site will be:

Device	Storage (m ³)
Sediment retention pond	1575
Tank	75
Fill cell	1500
Total	3150

The 50 yr average return interval (ARI) rainfall event for the site¹ is 145mm. Based on the total contributing catchment (approximately 2.2ha²) of the working area of the site, that would equate to approximately 3190m³.

¹ HIRDS

² The maximum open area during Phase 1 of the works.

Therefore, the onsite storage will be able to contain flows close to the 50 yr event. Additional pumping down of storage during events and off-site disposal will further increase the size of event that can be managed.

As noted, until the final discharge limits are confirmed, stored runoff be removed by tanker truck and used for dust suppression on the fill site and adjacent Gleeson farm.

Once the discharge limits have been confirmed, the site water will be monitored in accordance with the SFMP and Surface Water Sampling and Analysis Plan (SAP). Compliant water will be discharged from the SRP.

4. Erosion and Sediment Control Specification

Erosion and sediment control will be installed and maintained in accordance with TR2009/02.

4.1. Access

Access will be via the existing stabilised approximately 2km route from the quarry entrance.

4.2. Tip Head

A stabilised tip head will be established at the uphill edge of the fill cell. All road going trucks accessing the site will stay on stabilised surfaces.

4.3. Silt Fences

Silt fences will be used extensively to manage runoff during the construction of the deep drainage and the SRP. The silt fence along the northern boundary will remain in place at least until the outer margins of the SRP are permanently stabilised.

4.4. Clean Water Diversions

Clean water diversion bunds will be at least 550mm in height and will be fully stabilised. Any sections greater than 2% gradient that may be prone to erosion will be further protected with rock lining. The outfalls of the clean water diversions will be rock lined to prevent erosion.

4.5. Dirty Water Diversions

All dirty water diversion bunds will be at least 550mm in height. Any sections greater than 2% gradient that may be prone to erosion will be further protected with rock lining.

4.6. Sediment Retention Pond

The SRP will be constructed in accordance with the originally proposed design, providing a minimum storage volume of 1575m³, which is sized at a ratio of 3% of its maximum catchment of its original 5.25ha catchment. The actual maximum catchment is now proposed at 4.34ha. The maximum open area associated with Phase 1 will be 2.2ha. The SRP details are provided in **Appendix A**.

As described above, filling will be staged and the catchment of the SRP will be managed to minimise the area draining to the SRP at any given time.

The SRP will be chemical treated to enhance settlement and sediment retention. That will be undertaken in accordance with a chemical treatment management plan (CTMP) that will be submitted to Waikato Regional Council for certification prior to works commencing.

Until the final discharge limits are established, the decants of the SRP will remain raised such that the full storage up to the primary spillway is maintained at all times. The SRP will spill via the primary spillway to the tank.

The SRP will be cleaned of sediment when no more than 20% full, in accordance with TR2009/02. That material will be disposed of back into the fill site.

4.7. Tank

Until the final discharge limits are established, when necessary, the SRP will discharge to the 75m³ tank that will be relocated from the quarry site. The need for the tank will be determined on the basis of predicted rainfall and available storage within the other storage areas.

4.8. Stockpiling

Stockpiles will be located within the footprint of the SRP catchment. If a stockpile is required during the construction of the SRP, that will be treated by silt fence until such time as the SRP is established.

Stockpiles will be stabilised if they are not to be used for a continuous period of more than one month.

In addition to the progressive stabilisation noted above, stockpiles will be stabilised over winter.

4.9. Stabilisation

As described above, stripping and filling will be staged, and progressive stabilisation will be undertaken as working areas are completed to ensure that no more than approximately 1.5ha of the fill cell and 0.7ha of the clay excavation is exposed to erosion and any one time. Stabilisation will comprise temporary mulching or permanent topsoiling and seeding to establish grass.

5. Chemical Treatment

The SRP will be implemented in accordance with the CTMP that is to be certified prior to the initial fill cell being established. The chemical treatment system will be monitored and maintained in accordance with the CTMP.

6. Dust Management

The working face of the fill cell will be managed to minimise the risk of dust generation.

The site is screened from sensitive receivers by topography and trees.

Water will be used to dampen the site if dust is identified as likely to discharge beyond the site boundary.

Vehicle speeds along the access route will be limited to a maximum of 20km/hr and a water cart is available to dampen the route if required.

In the unlikely event that objectionable levels of dust do arise from the fill operation, the incident will be investigated, and the appropriate amendments made to site operations and/or management as required. The investigation will include an assessment of the reasons for the event, mitigation measures and of proposed and ongoing management initiatives to ensure the effect is avoided.

7. As-Built Certification

Prior to each stage of works commencing, as-built certification of the ESCs will be provided to the Waikato Regional Council within 5 working days of the completion of the construction of these controls. The as-built certification will confirm that the controls have been constructed in accordance with the ESCP and TR2009/02.

8. Site Personnel

Shawn Mclean (029 285 4965), the Quarry Manager, will have overall responsibility for the works on site and will oversee that day to day implementation of the ESCP to ensure the requirements of that document are met.

9. Monitoring and Maintenance

9.1. Monitoring Procedures

The site will be regularly inspected during the filling operation and until the site is fully stabilised. The aim of these inspections is to ensure that all ESC devices are installed correctly and then operate effectively throughout the duration of the works. Any potential problems will be identified immediately, and remedial works will be promptly carried out.

The inspection programme that will be implemented by the delegated Gleeson Quarries staff member will consist of:

- Weekly site walkovers to inspect and determine the effectiveness of all ESC devices installed on site;
- Pre-rain event: Prior to all forecast rainfall events, additional inspections will be made of ESC devices to ensure that they are fully functioning in preparation for the forecast event.
- Rainfall Events During rainfall events inspections will be made of ESC devices, subject to health and safety restrictions, for example inspections will not be undertaken at night.
- Post-rain event: Following all rainfall events, inspections will be made of ESC measures to ensure that all controls have performed as expected and to identify any maintenance requirements.

Any remedial works will be documented during these monitoring inspections and immediately attended to.

9.2. Trigger Event Monitoring

Additional site monitoring and reporting shall be undertaken in response to the following rainfall trigger events:

- ≥ 15 mm in one hour; or

-
- $\geq 25\text{mm}$ in 24 hours

Within 24 hours of the occurrence of a rainfall trigger event, investigation, response and reporting shall be undertaken against the following sediment retention pond performance triggers:

- pH (to demonstrate it does not fall outside the range of 5.5 to 9);
- Total suspended solids, to demonstrate it is not greater than 100 g/m^3 or the sediment retention pond/s stormwater treatment is 90% treatment efficiency;
- Turbidity

The results of the investigations and sampling shall be reported to the Waikato Regional Council within 15 working days of the corresponding rainfall trigger event, including any contingency actions undertaken in response to exceedance of a trigger value.

10. Removal of ESC Measures

The removal of any erosion and sediment control measure from any area where soil has been disturbed as a result of the exercise of this consent will only occur after consultation and written approval has been obtained from the Waikato Regional Council. In this respect, the main issues that will be considered by the Waikato Regional Council include:

- i. The quality of the soil stabilisation and/or covering vegetation;
- ii. The quality of the water discharged from the rehabilitated land; and
- iii. The quality of the receiving water

11. ESCP Changes

Any changes proposed to the ESCP will be submitted as a written request for certification by Waikato Regional Council prior to the implementation of any changes proposed.

Appendix A – Erosion and Sediment Control Drawings and Details

Sediment Retention Pond Sizing

Size criteria	Length Ratio	Side slopes	Depth from Emergency Spillway	R.L. of Pond Base
Auto	3:1	2:1	2.00	0.00

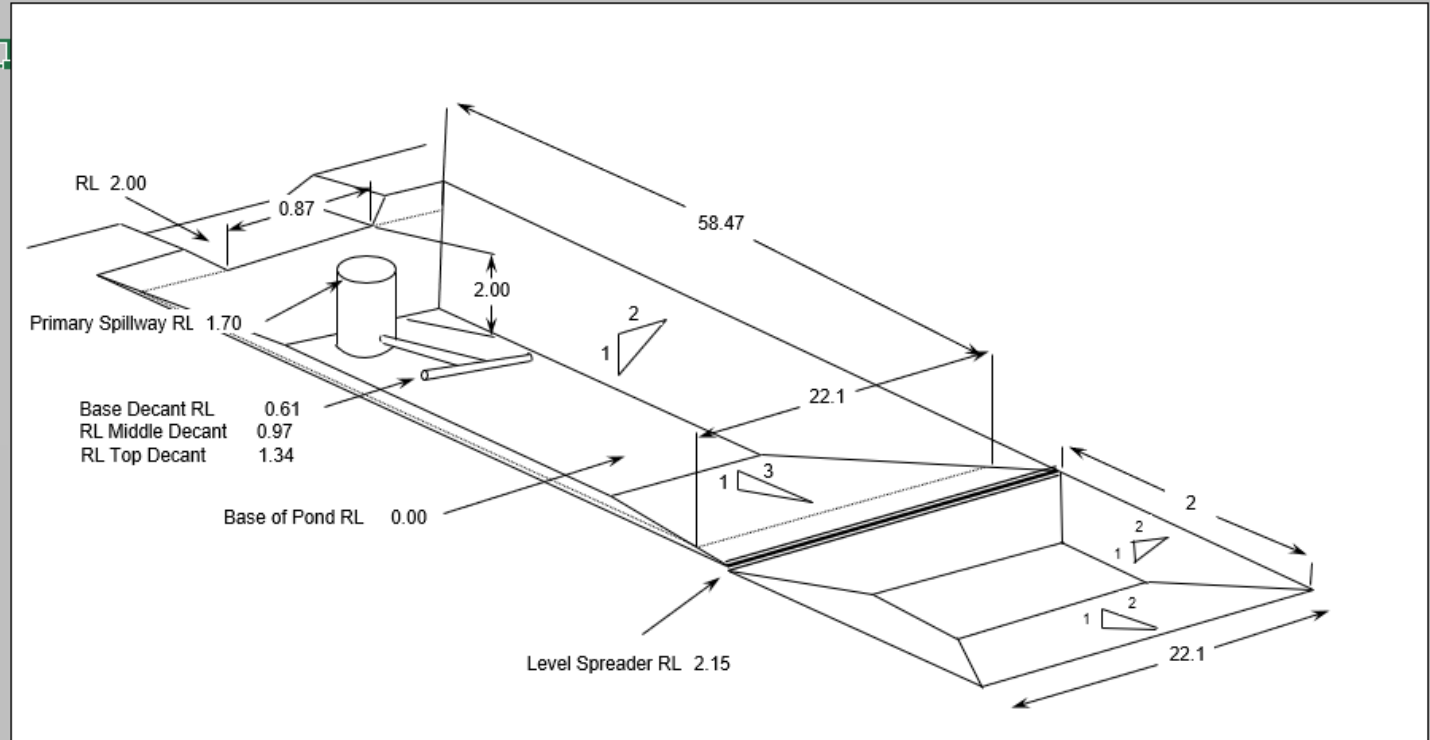
Storage Volume Criteria	3%
Contributing Catchment (ha)	5.25
Minimum Storage Volume (m3)	1575
Dead storage (m3)	472.5
Live storage (m3)	1102.5
Length at Spillway Level	58.47
Width at Spillway Level	22.17
Spillway base width (300mm deep)	0.87
Primary Spillway diameter (min)	Manhole Required
Number of decants	3
Number of holes per decant	233
Minimum outlet diameter	300mm
RL Emergency Spillway	2.00
RL Primary Spillway	1.70
RL Level Spreader (min)	2.15
RL Base Decant	0.61
RL Middle Decant	0.97
RL Top Decant	1.34
Width at Midpoint	17.57
Length at Midpoint	52.72

Forebay

Depth	1 m	min. depth
Width	22.17 m	full width of pond
Length	2 m	min. length

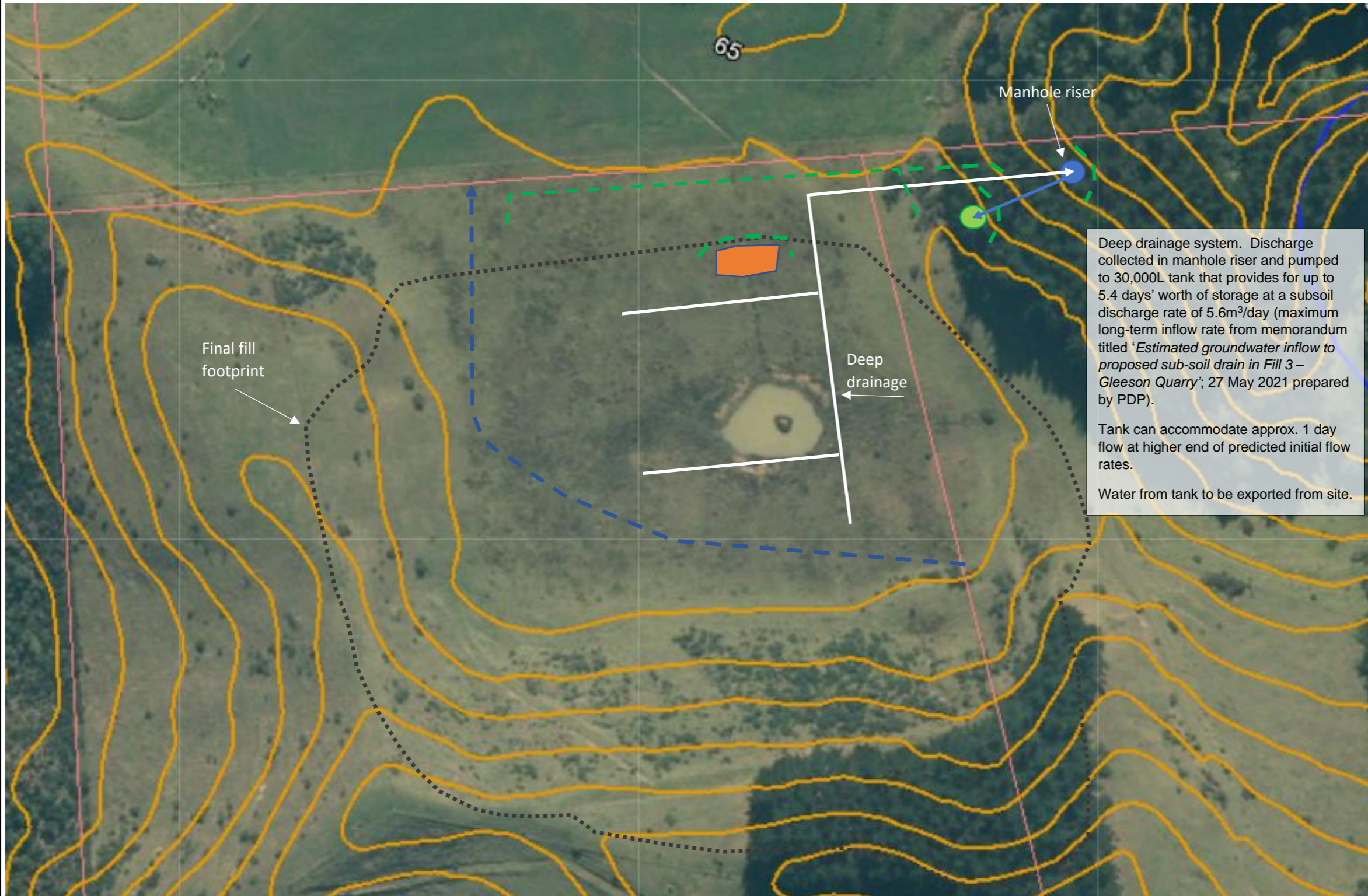
See below for GD05 cross-sections

SRP



Appendix B – Chemical Treatment Management Plan

TBC



Deep drainage system. Discharge collected in manhole riser and pumped to 30,000L tank that provides for up to 5.4 days' worth of storage at a subsoil discharge rate of 5.6m³/day (maximum long-term inflow rate from memorandum titled 'Estimated groundwater inflow to proposed sub-soil drain in Fill 3 – Gleeson Quarry'; 27 May 2021 prepared by PDP).

Tank can accommodate approx. 1 day flow at higher end of predicted initial flow rates.

Water from tank to be exported from site.

Legend	
Deep drainage	
Silt fence	
Dirty water diversion	
Clean water diversion	
Sediment retention pond	
Stockpile	
Fill area	
Floc sed / box	
Deep drainage tank	

Stage 1

Install clean water diversion upslope of deep drainage lines.

Install deep drainage. Commence at outlet end with pump chamber and at same time install tank.

Collect all drainage water from start and remove from site via tank.

Use silt fence and progressive stabilisation. Stockpile surplus trench material and treat with silt fence. Some of stockpile will be used to backfill existing open drain.

REV	DATE	REVISION DETAILS	APPROVED
A	19.07.21	Draft for review	
B	20.11.21	Draft for review	
C	06.04.22	For consent	
D	-	-	
E	16.06.22	S92 Response	



Drawn:
ZW

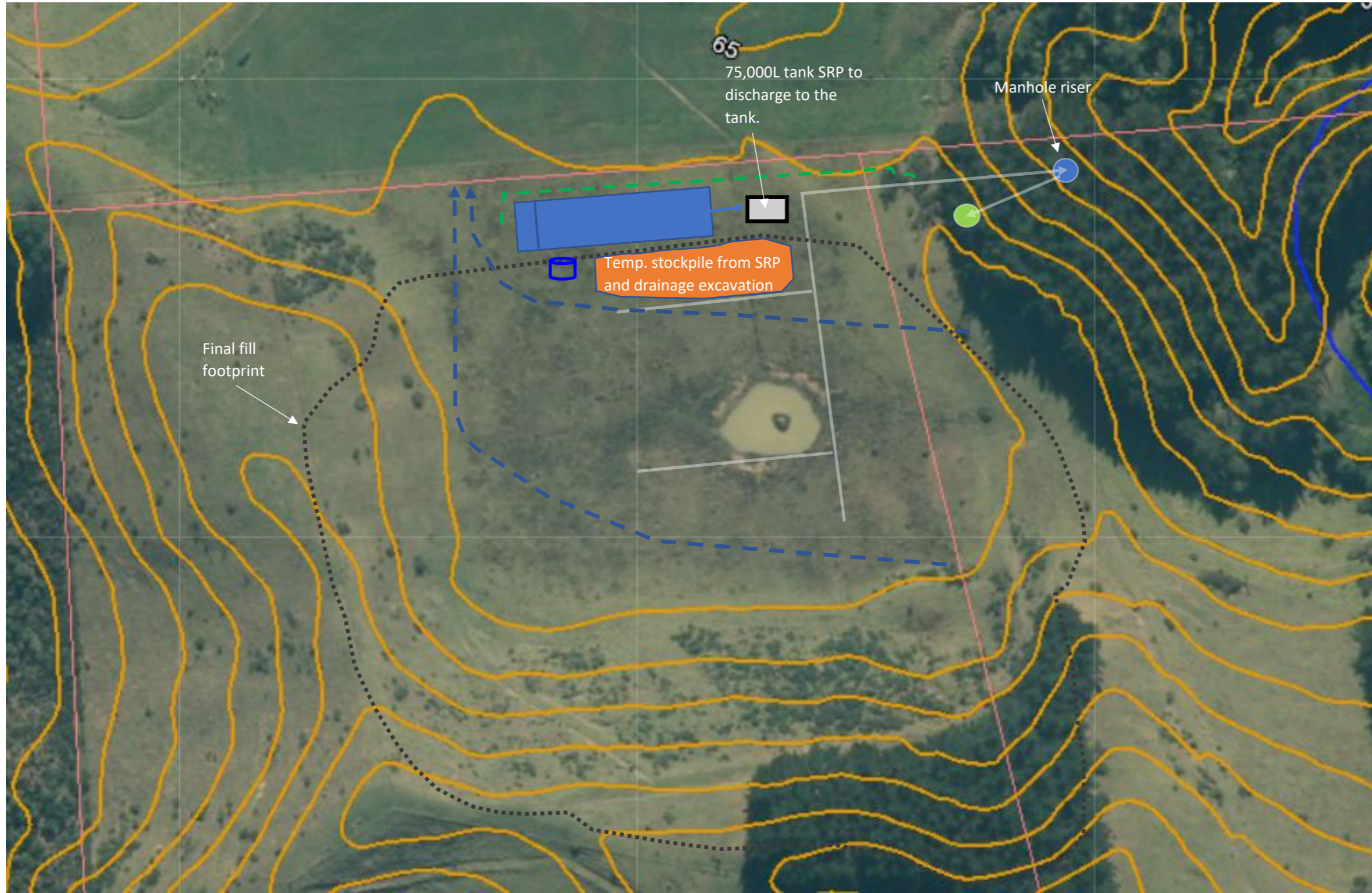
Checked:
MP

Drawing No:
ESCP-002-001

Project: **Huntly Fills**

Title: **Fill 3 – Phase 1 - ESCP**

Sheet No:
1 of 3



Legend	
Deep drainage	
Silt fence	
Dirty water diversion	
Clean water diversion	
Sediment retention pond	
Stockpile	
Fill area	
Floc shed / box	
Deep drainage tank	

Stage 2

Install clean water diversion and silt fence to isolate SRP area. Construct SRP. Install 75,000L tank that SRP will be pumped into when water exported off-site.

Backfill existing drainage channel. Stockpile surplus beside ponds. Stabilise outer banks of SRP.

SRP will be minimum 1575m³ to service in excess of the full fill area – refer to SRP design.

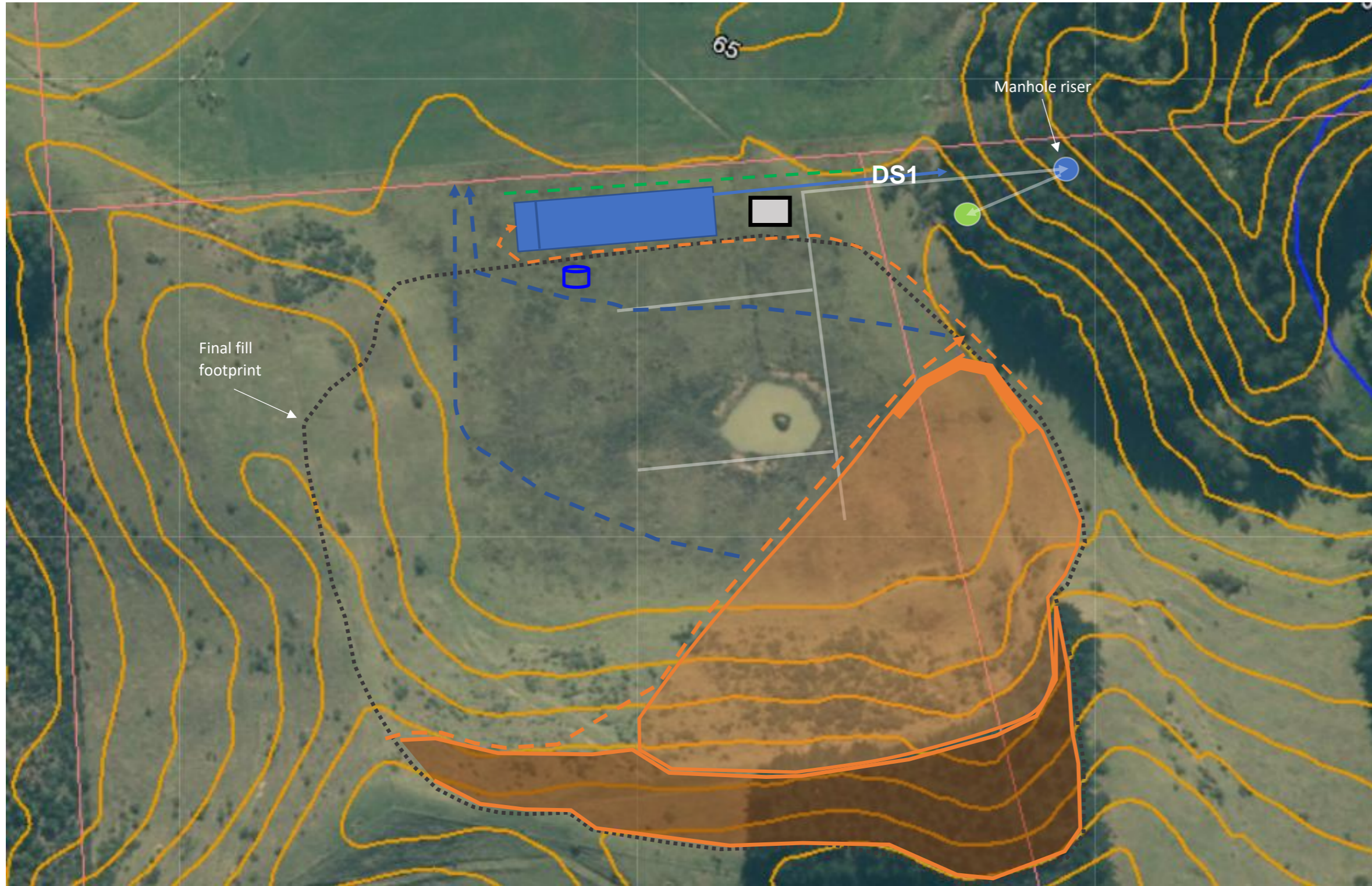
Stockpile to be relocated into fill cell once that is established.

REV	DATE	REVISION DETAILS	APPROVED
A	19.07.21	Draft for review	
B	20.11.21	Draft for review	
C	06.04.22	For consent	
D	-	-	
E	16.06.22	S92 Response	



Drawn: ZW	Checked: MP	Drawing No: ESCP-002-002
--------------	----------------	-----------------------------

Project:	Huntly Fills
Title:	Fill 3 – Phase 1 - ESCP
Sheet No:	2 of 3



Legend	
Deep drainage	
Silt fence	
Dirty water diversion	
Clean water diversion	
Sediment retention pond	
Stockpile	
Fill area	
Floc shed / box	
Deep drainage tank	

Stage 3

Install dirty water diversions to SRP.

Establish first clay lined fill cell (approx. 1.5ha) using clay cut from southern part of fill site. Form clay bund at downhill end to provide additional ponding of at least 1000m³.

Clay excavation area to be progressively opened and stabilised to minimize the exposed area to approximately 0.7ha. Manage diversion bunds to minimise catchment. Once Phase 1 fill liner is completed the full area will be stabilised.

Modify clean water diversion bund to minimise catchment area of SRP.
Relocate stockpile to fill cell.

REV	DATE	REVISION DETAILS	APPROVED
A	19.07.21	Draft for review	
B	20.11.21	Draft for review	
C	06.04.22	For consent	
D	-	-	
E	16.06.22	S92 Response	



Drawn: ZW
Checked: MP
Drawing No: ESCP-002-003

Project: Huntly Fills
Title: Fill 3 – Phase 1 - ESCP
Sheet No: 3 of 3