

# ANNEXURE 1 EXPERT ASSESSMENT SUMMARIES

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<b>Expert Report:</b>	Huntly Quarry - Fill Assessment & Design Report (June 2019)
<b>Experts/Author of Report:</b>	Terra Mining Consultants Ltd. – Graeme Fulton

**What this report is about:**

The report estimates the available rock volume in the ground and also estimates how much dirt sits on top of the rock and needs to be excavated before being able to mine the aggregate. This is called ‘overburden’. The report also investigates a selection of the prospective fill sites and identifies any potential limitations. A preliminary fill plan and design was included, identifying the fill areas and the estimated volume of material they could accommodate.

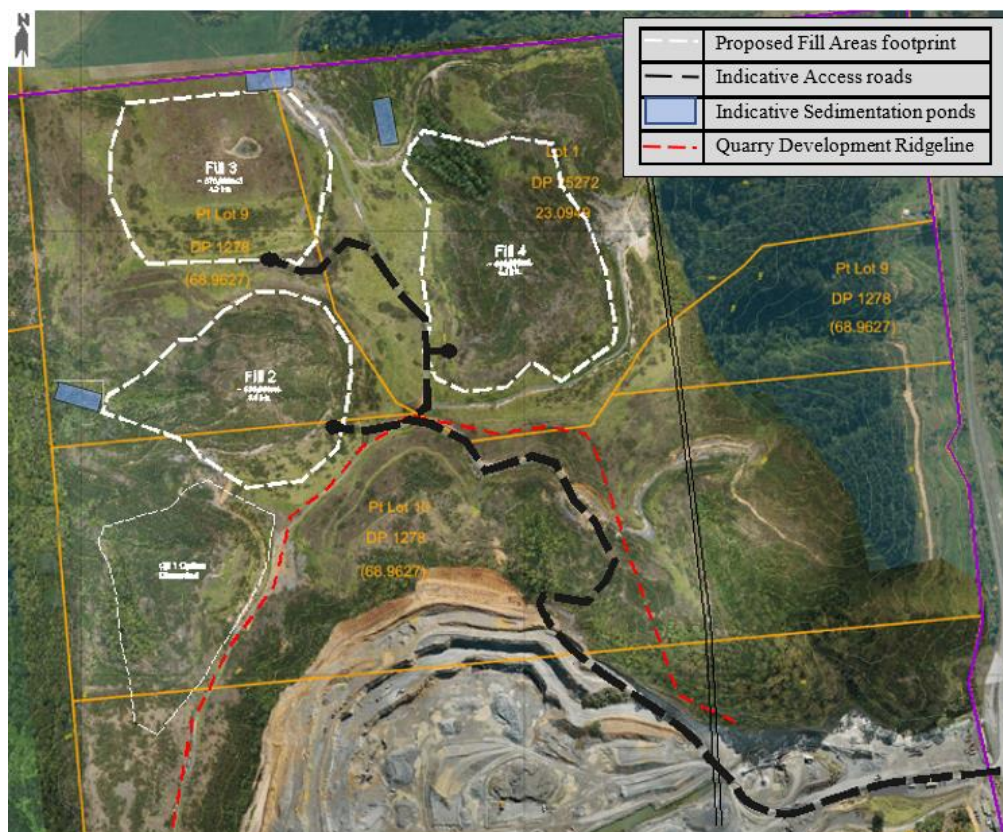
**Key Findings:**

- A total volume of **2,191,800 m<sup>3</sup>** of material can be disposed of in the identified gullies, made up of:
  - Fill 2 Area – 632,600 m<sup>3</sup>
  - Fill 3 Area – 576,600 m<sup>3</sup>
  - Fill 4 Area – 800,000 m<sup>3</sup>
- The remaining overburden volumes within the 35 Year pit design and as per the April 2019 topographic survey that need to be catered for is **674,940 m<sup>3</sup>**
- This leaves an estimate of **1,516,860 m<sup>3</sup>** capacity within Fill Areas 2-4 for clean or managed fill.
- A ponding area is shown north of Fill 4 area has been identified as stormwater detention for both Fill 3 area and Fill 4 area.
- A nominal 20m buffer zone has been applied to the northern extent of the Fill 3 area to provide separation from boundary.

**Recommendations & Further Studies (if required)**

- Note, the ponds shown on these plans are not designs are indicative only. Pond design and layouts will need to be undertaken by the respective consultant on the team.

**Maps: Fill and Design map for proposed fill areas (Terra Mining Report, June 2019)**



<b>Expert Report:</b>	Huntly Quarry Disposal Sites – Geotechnical Assessment (September 2019)
<b>Experts/Author of Report:</b>	GAIA Engineers

**What this report is about:**

This report sets out geotechnical design advice for the proposed fill sites. The purpose of their report is to provide sufficient geotechnical investigation to support the lodgement of a Resource Consent application to fill the identified gullies with overburden from the quarry and imported managed fill material. On-site investigation was undertaken by Gaia Engineers from the 17th to the 20th of June 2019. The investigation consisted of a site walkover by an engineering geologist and the logging of machine excavated test pits to a maximum depth of 6.2m.

**Key Findings:****Site Topography:**

	Site Topography
Fill Site 2	<ul style="list-style-type: none"> <li>Broad gully network</li> <li>Eastern end forms large amphitheatre with remnant central ridge running down centre (separating two smaller gullies)</li> <li>Small dam has been constructed 60m west of where the two small gullies converge</li> <li>Natural slopes 2H:1V (main); 5H:1V present downstream northern flank</li> </ul>
Fill Site 3	<ul style="list-style-type: none"> <li>Previous filling of gully to be related to a nearby historic mine overburden removal activity.</li> <li>Overburden placed has created flat area.</li> <li>Remnants of the amphitheatre shaped gully head still visible at the southern end.</li> <li>Natural slopes are approximately 2.5H:1V; average gradient of flat area is approximately 50H:1V.</li> </ul>
Fill Site 4	<ul style="list-style-type: none"> <li>Broad gully network trending south-east to north-west direction.</li> <li>Gully head forms large amphitheatre with two minor remnant ridges running down the centre, separating into three smaller gullies.</li> <li>Large farm dam of approximately 6m height present near base of the gully, smaller dam approximately 100m upstream of the larger farm dam.</li> <li>Natural slopes at the head of the gully range between 2H:1V and 3H:1V.</li> </ul>

**Geomorphology:**

The geomorphology of the site is predominantly controlled by the underlying geology.

The large amphitheatre valleys of Fill Sites 2, 3 (partially obscured by fill) and 4 are characteristic of the Waikato Coal Measures.

The parent rock weathers at a relatively quick rate, losing strength and becoming soils.

- Subject to appropriate specific design and careful construction monitoring, it is expected that the proposed project will not unsatisfactorily impact the existing area in terms of land stability, subsidence and flooding.

**Methodology:**

- The works involve stripping the gully of all vegetation and topsoil and installing a stormwater pond and associated drains to ensure all stormwater/surface water from the top of the gully down is captured and drains into the stormwater detention pond. This includes erosion and sediment control measures to protect the stream networks from siltation running into the streams.
- Some additional detailed design is required to create stable slopes for filling, and containment bunds will be created to ensure the fill is placed in a structurally sound manner.
- Drainage blankets will be used to relieve water pressure and ensure water does not build up in the gullies as the fill becomes consolidated.
- Each gully will be filled from the bottom up and built up in sub-horizontal layers.
- Monitoring of the fill placed during construction is required

**Expert Report:**

Archaeological Assessment (July 2019)

**Experts/Author of Report:**

Clough & Associates Ltd – Ellen Cameron

**What this report is about:**

An archaeological assessment was commissioned to establish whether the proposed work is likely to impact on archaeological values. This report was prepared as part of the required assessment of effects accompanying a resource consent application under the Resource Management Act 1991 (RMA) and to identify any requirements under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA). Recommendations are made in accordance with statutory requirements.

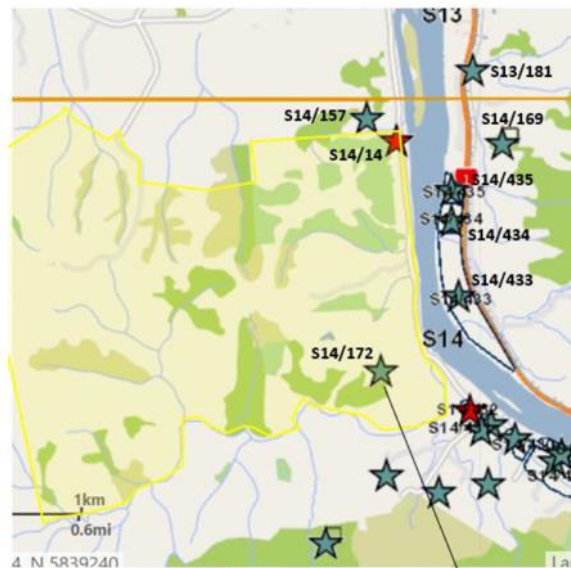
**Key Findings:**

- Archaeological sites located in close proximity of the proposed fill sites are:
  - S14/14 Pa site: located on a low spur alongside the Waikato River with pits, a defensive ditch and remnants of a shell midden.
  - S14/157 Transport/Communication: Kupa Kupa Mine incline tramway' used to convey coal from the mine to the Waikato River. Remnants may survive.
  - S14/172 Pit/Terrance: Pits and terraces on a hilltop with possible building platform.
- These archaeological sites are not located in or in proximity to the proposed fill sites and are not expected to be adversely affected by the currently proposed works.
- There are two main soil types on the overall quarry property, which in general represent imperfectly drained soils:
  - Otawhi/Pukemiro (which cover most of the property) and are moderately well drained soils; and
  - Mataikona/Otorohanga (along the riverside and in the southern part of the property).
- Both of the archaeological sites on the quarry property are situated on the latter Mataikona/Otorohanga soil.
- The proposed fill sites, areas 1, 2, 3 and 4 are situated on generally more poorly drained soils.

**Recommendations & Further Studies (if required)**

- It should be noted that archaeological sites should be avoided wherever possible.
- Any changes to the locations of the proposed fill sites are made and/or additional works areas such as access/ haul roads are added to the current layout plans, they should take into account the locations of the two recorded archaeological sites and ensure that they are avoided.
- With respect to the currently proposed works, in any area where archaeological sites have been recorded in the general vicinity it is possible that unrecorded subsurface remains may be exposed during development.
- While it is considered unlikely in this situation based on the terrain, soil types and past activities including agriculture and tree clearance, the possibility can be provided for by putting procedures in place ensuring that the Council and Heritage NZ are contacted should this occur.

**Maps: Locations of archaeological sites on and in the vicinity of the quarry property (Figure 9 & 20, Archaeological Assessment, July 2019)**



<b>Expert Report:</b>	Ecological Impact Assessment (July 2019)
<b>Experts/Author of Report:</b>	Boffa Miskell Limited
<b>What this report is about:</b>	
<p>The ecology impact assessment describes and assess the existing terrestrial and freshwater ecological values present within the areas identified as new fill areas (Fill Areas 2 – 4). The assessment discusses in detail the likely and potential effects on the ecological values for these proposed sites from the change in land-use. The report further provides recommendations for appropriate measures to avoid/minimise/remediate/ mitigate and/or compensate any adverse effects from the proposed new land-use on the ecological values present within the proposed Fill Areas 2-4.</p>	

## **Key Findings:**

- The property is located within Meremere Ecological District (ED) which encompasses a large basin surrounding the Waikato River, containing alluvial flats and a series of lakes and wetlands, notably the Whangamarino Swamp to the north.

### **Waterbodies**

- No watercourses observed across any of the surveyed sites have been identified under the Waikato Regional Council's Water Classification Maps or the Waikato District Plan.
- Similarly, none of the watercourses have been identified as significant natural area (SNA) within the Waikato District plan.
- No perennial (permanent) stream reaches were observed; however, areas featuring ephemeral and intermittent stream reaches were present. None of the ephemeral or intermittent watercourses are considered significant under the Waikato RPS Indigenous Biodiversity Criteria.
- Reaches of intermittent watercourses within the quarry boundaries were limited, with little water depth and flow. Wetland areas were observed within Fill Areas 2, 3 and 4.
- Overall, the proposed new Fill Area 2-4 (excluding Fill Area 5) will result in the loss of approximately:
- 415 m of ephemeral waterway (negligible ecological value);
- 40 m of intermittent waterway (low ecological value);
- 1,530 m<sup>2</sup> of wetland area (low ecological value but classified as significant habitat.
- Note – it is intended to re-establish these waterways once the fill operation is complete.

### **Vegetation**

- The vegetation types within Fill areas consist predominately of pasture, gorse dominated scrub with some native broadleaved scrub, wetland vegetation and broadleaf forest – the ecology report identifies all these as having low or low-negligible ecological value, other than the broadleaf forest areas, which are outside the footprint of works in the gullies, and will remain intact.

### **Herpetofauna (Lizards)**

- The level of effect for herpetofauna is likely to be **Low** based on the level of disturbance in the fill areas and the limited mobility of herpetofauna to recolonise these areas.
- The removal of vegetation without appropriate measures to minimise the potential for injury or mortality to herpetofauna could result in a Very High level of effects depending on the number and threat status of the individuals affected.

### **Avifauna (birds)**

- The vegetation types on site provide habitats of varying type and quality for common native birds as well as 'Threatened' and 'At Risk' species including New Zealand pipit, New Zealand falcon, and various wetland birds and waterfowl.
- Level of effect likely to be Low to Very Low based on the species observed on site and habitat assessments.
- Removal of the wetlands in Fill Areas 2 – 4 which are the most valuable habitats and connectivity for birds could result in Very High level of effects on Avifauna if Threatened or At-Risk species are confirmed using the habitats.
- The removal of vegetation during the nesting season could result in the injury or mortality of native birds and their eggs and fledglings. This could result in a Very High level of effect depending on the number and threat status of the birds affected.

### **Bats**

- Potential roost trees for long tailed bats (classified as Threatened – Nationally Critical) were identified in Fill Area 2 (in the old growth pines) and Fill Areas 4 in the exotic plantings and individual mature native trees in native scrub.
- Vegetation types within the site have differing value, with the secondary podocarp- broadleaf forest, exotic forest/treeland, and wetlands assessed as Very High value, while the remainder of the site has Low value for long-tailed bats.
- Level of habitat loss is regarded as Moderate – Very High depending on whether communal roost habitat is identified on site and cannot be avoided.
- The removal of occupied roosts resulting in the injury or mortality of long- tailed bats is assessed a Very High level of effect.

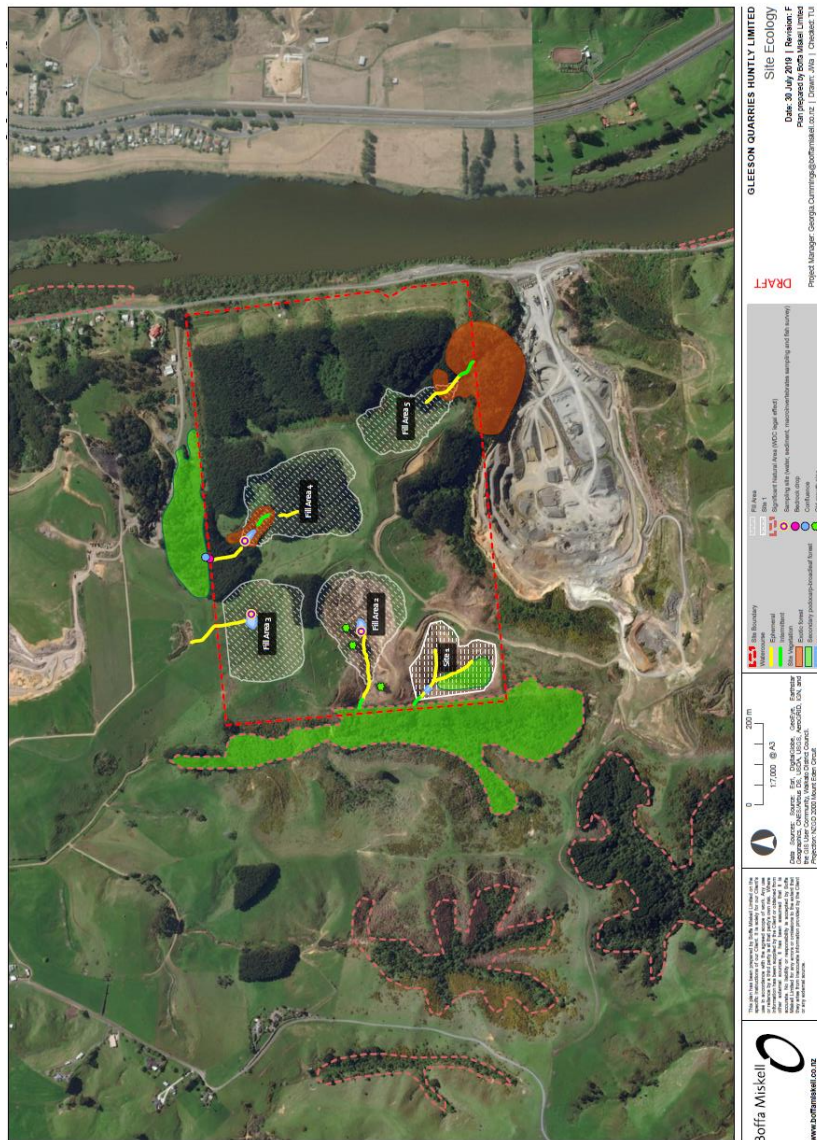
## **Recommendations & Further Studies (if required)**

- We recommend undertaking surveys for avifauna and long-tailed bats to enable completion of a comprehensive and accurate assessment of effects, and so that appropriate management methods can be more fully determined.
- Surveys for wetland birds and waterfowl should be undertaken during the breeding season (August to March inclusive) to provide an assessment of the value of the site's wetland habitats for avifauna.
- Acoustic surveys for bats should be undertaken to determine whether bats are regularly using and roosting in vegetation on the property.
- Preparation and implementation of a Fauna Management Plan (FMP).

- Creating wetland habitat at a ratio of 1:1 (wetland loss : wetland creation). This is proposed to mitigate for the loss of 1530 m<sup>2</sup> in total from fill areas 2, 3 and 4. We recommend realising all wetland mitigation in one or two areas that are not affected by the proposed change in land use or by any potential future spatial expansion of the quarry's activities.
- We recommend native fish relocation practices are implemented for the wetlands in areas 2, 3 and 4.

Note: Studies for bats are underway, and mitigation sites which include bush habitat, stream and wetland areas are being investigated to fence and protect in exchange for loss of stream/wetland/bush/ecological habitat.

**Maps: Site context and ecological features of the proposed new fill areas  
(Appendix 1, Ecological Impact Assessment, July 2019)**



<b>Expert Report:</b>	Assessment of Landscape and Visual Effects (August 2019)
<b>Experts/Author of Report:</b>	LA4 Landscape Architects
<b>What this report is about:</b>	This assessment investigates the existing character of the site and locality, identifies the key landscape features of the area, describes those elements of the proposal that will be visible from outside the site and assesses their landscape and visual effects on the locality. The key to assessing the visual and landscape effects of the proposal is first to establish the existing characteristics and values of the landscape and then to assess the effects of the proposal on them.
<b>Key Findings:</b>	
<b>Landscape</b>	

- The wider environment has been subjected to various degrees of modification and is not high in landscape character values.
- In terms of landscape effects, the proposed fill areas would permanently alter the landform of the gully areas resulting in more gentle and even slopes than currently exist.
- Following completion of the earthworks and reinstatement of the pasture, the finished landform will fit well into the surrounding landscape and improve the existing degraded amenity values of the gully areas and lower flat.
- Overall the project will have low landscape effects, particularly in relation to the rural character and quality of the site and the surrounds.

**Visual**

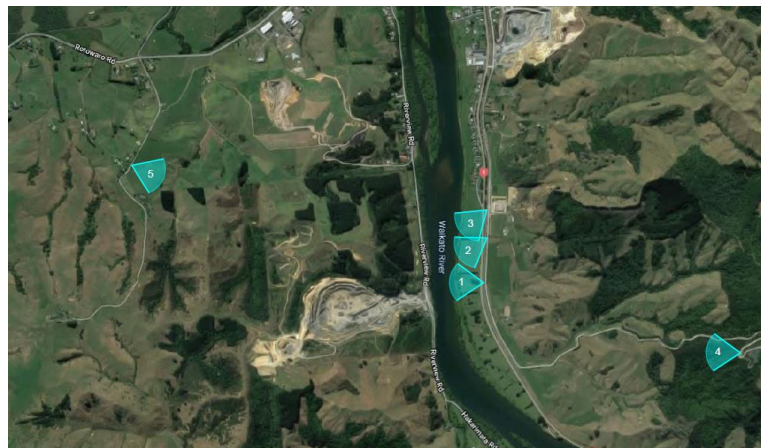
- Five viewpoints have been identified and the visual effects from each of these have been assessed.

Viewpoint	Key findings
<b>Viewpoint 1:</b> Properties on the eastern banks of the Waikato River	<ul style="list-style-type: none"> <li>• The sensitivity of the view and viewer is likely to be low.</li> <li>• The vegetation flanking the quarry entrance is to be retained and will provide ongoing screening of the fill sites.</li> </ul>
<b>Viewpoint 2:</b> State Highway 1 <b>Viewpoint 3:</b> State Highway 1 layby	<ul style="list-style-type: none"> <li>• From this viewpoint the working characteristics of the quarry are evident with the cut benches and rock faces with the haul road winding up the side of the pit.</li> <li>• Landform and vegetation largely screen views into the site.</li> <li>• The northern quarry face is not visible behind the eucalypt tree plantation.</li> </ul>
<b>Viewpoint 4:</b> Hillside Resort	<ul style="list-style-type: none"> <li>• The filling activities would not be visible from here and the visual effects would be very low, being visually contained within the gullies and screened by landform and vegetation.</li> </ul>
<b>Viewpoint 5:</b> Hillside Heights Road	<ul style="list-style-type: none"> <li>• From here parts of Fill Area 3 and 4 will be visible to varying degrees.</li> <li>• The proposal will initially have a noticeable impact on the existing rural amenity from here through the removal of the existing vegetation within the gully and infilling.</li> <li>• Once revegetated, the new landform would be assimilated within this rural landscape and result in a low effect.</li> </ul>

**Recommendations & Further Studies (if required)**

- The proposed fill activities will not be out of character with the surrounding rural environment and the potential effects from the activity on the character and amenity of the rural environment are considered to be low.
- Any adverse effects on rural character and amenity will be temporary and overall low. Long term there will be positive effects on amenity and amenity values through the improvements to the site, proposed works and reinstatement of productive pasture within the site.

**Maps: The Site and Viewpoint location Map  
(Appendix 1, Visual and Landscape assessment, August 2019)**



<b>Expert Report:</b>	Noise Assessment (September 2019)
<b>Experts/Author of Report:</b>	Hegley Acoustic Consultants
<b>What this report is about:</b>	
This report assesses the noise on a busy day from the managed fill operating at 300,000m <sup>3</sup> of fill per annum. The assessment has been undertaken with plant at the maximum height (noisiest stage of any fill activity) of each of the fill areas.	
<b>Key Findings:</b>	

- The hours of operation of the managed fill will be:
  - 5am - 8pm Monday – Friday plus 5am – 3pm on Saturday from 1 October - 30 April; and
  - 5am - 6pm Monday – Friday plus 5am - 3pm Saturday from 1 May – 30 September.
  - There is no work proposed on Sundays and public holidays.
- Existing noise environment has been measured from Tuesday 30 July – Saturday 3 August 2019 at two sites (Hillside Heights Road and the second in Riverview Road) that represent the locations where the maximum noise exposure to the proposed managed fill will occur for any residents.
- The noise from this equipment has been based on measurements undertaken of the machinery operating in the field with the measured sound power level (LWA) [*Komatsu D65 Bulldozer, 114dB; Caterpillar 20 Ton excavator, 106dB; Caterpillar 16G grader, 102dB; 10,000 litre Watercart, 102dB; Compactor, 107dB and trucks delivering the fill material, 105dB.*]
- In addition to the contouring the noise has been calculated at the notional boundary of each of the 10 identified closer dwellings (Table 1, page 15).
- Both the noise contours and spot levels at the notional boundary of the closer houses has been predicted and this shows the noise will not exceed 37dBA L<sub>10</sub> at the most exposed notional boundary on Riverview Road and 34dBA L<sub>10</sub> on Hillside Heights Road.
- This is below the existing measured background (LA95) noise environment for the proposed hours of work so there will not be any adverse noise effects for the residents around the site.
- **Traffic Noise:** As set out above, the only change to the truck numbers as a result of the proposed managed fill is an increase of 12 trucks a day. This is insignificant and will not have any noticeable effect on the traffic noise that will be experienced by residents along Riverview Road.

#### Recommendations & Further Studies (if required)

- The proposed noise levels from the fill operation will comply with Waikato District Plan Standards for noise.

<b>Expert Report:</b>	Traffic Impact Assessment (September 2019)
<b>Experts/Author of Report:</b>	Traffic Engineering & Management Ltd (TEAM)
<b>What this report is about:</b>	
<p>Team Traffic undertook a Traffic Impact Assessment (TIA) of the proposal. The TIA addresses the following matters:</p> <ul style="list-style-type: none"> <li>○ Assessment of the existing road safety, efficiency, and traffic patterns of the existing local road network.</li> <li>○ The traffic likely to be generated by the proposed development and the ability of the road network to accommodate the generated vehicle trips.</li> <li>○ The ability of the proposed development to satisfy the design standards and layout requirements of the Waikato District Plan.</li> </ul>	
<b>Key Findings:</b>	
<ul style="list-style-type: none"> <li>• Sole access to the site is provided from Riverview Road.</li> <li>• Both operations (quarry and managed fill) are proposed to have the same operating hours.</li> </ul>	
<b>Internal Haul Road:</b>	
<ul style="list-style-type: none"> <li>• An internal haul road will be constructed. The design the internal roads aims to minimise wear and tear on the trucks and other machinery.</li> <li>• It will be approximately 15 metres wide and will have a grade not exceeding 10 percent. These parameters will ensure that the trucks and plant can easily move around on the site and trucks will be able to pass each other without incident.</li> </ul>	
<b>Likely Additional Truck movements:</b>	
<ul style="list-style-type: none"> <li>• The proposed managed fill is expecting to have 60 truck and trailers or 120 trips delivering material to and from the site per day.</li> <li>• It is anticipated that 48 truck (80% of the 60 trucks required to deliver material) owned by Gleeson and Cox Ltd that were originally travelling with no payload to the quarry will now be travelling with a load of cleanfill. This number of trips although relatively small when compared with the total number of truck movements, with a fully laden truck, will contribute towards road derogation.</li> <li>• If these assumptions are correct it can be expected that a maximum of 20 percent of the fill trips will be made by other contractors and therefore up to 12 trucks a day or 24 trips per day could be made by other drivers.</li> <li>• This number of additional trips per day is likely to add in the order of two additional trips per hour onto the local road network and this is less than the hourly variations that currently occur along Riverview Road.</li> <li>• These trips are likely to be spread throughout the day and are likely to follow a similar pattern as currently operates at the quarry. The bulk of the trips will be made between 7.00am and 5.00pm.</li> </ul>	



	Left In	Left Out	Right In	Right Out
Quarry trips (466 trips)	116	116	116	116
Fill (120 trips)	6	6	6	6
Total Number	122	122	122	122

#### **Road Network:**

- From the comprehensive assessment of Riverview Road and its existing use, it is considered that the impact of the additional truck movements associated with the proposed establishment of a managed fill will be acceptable from a traffic engineering perspective, and that no operational or capacity problems will arise on the road network.

#### **Wheelwash:**

- It is expected that the single wheel wash will adequately cater for both the quarry operation and the managed fill activity.
- For these reasons it is considered that the proposed increase in production at the Gleeson and Cox managed fill in Huntly is acceptable from a traffic engineering perspective.

#### **Recommendations & Further Studies (if required)**

- The findings of the report are that the proposed activity can be established without adversely impacting on the function, capacity, or safety of the surrounding road network. Traffic effects are considered to be less than minor.
- It is expected that a second weigh bridge will be required before the activities on the site reach the consented volumes and this could be some time away. The company will monitor the situation and will install a second weigh bridge when it is deemed to be required.

<b>Expert Report:</b>	Erosion and Sediment Control (September 2019)
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<b>Experts/Author of Report:</b>	Erosion Management Ltd
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#### **What this report is about:**

This report has been prepared to address the erosion and sediment control implications and potential discharge of the earthworks associated with the proposal for a combined cleanfill and managed fill operation on three separate sites located north of the existing Gleeson Quarry.

#### **Key Findings:**

##### **Fill Areas:**

- Erosion and sediment control measures will be the first works undertaken on site.
- A sedimentation pond is proposed at the bottom of each fill area.
- Each pond will have a supplementary chemical treatment facility. This system will be installed and operational before the commencement of filling.

	Fill Area 2	Fill Area 3	Fill Area 4
Site drains to:	Freshwater stream- Watercourse 1	Freshwater stream- Watercourse 2	Freshwater stream- North to Watercourse 2
Forms part of catchment:	Part of Lake Waahi and Lake Puketirini catchments	Part of the Waikato River Catchment	
Sediment retention pond	Proposed in the bottom of the gully against the side of ecological value	Proposed in the north-eastern corner of the site with this discharging to watercourse 2 located to the east.	Proposed in the bottom of the gully below the farm dam.
Approximate catchment area	5.71 hectares	5.25 hectares	6.95 hectares
Minimum volume (m <sup>3</sup> ):	1,715	1,575	2,085

#### **Above Site runoff:**

- The runoff control measures involve the construction of runoff diversion systems (bunds and/or channels) to convey above site runoff around the site where the proposed sediment retention pond is to be constructed.
- The channel(s) will be a minimum of 0.75m high and constructed of compacted topsoil stripped from the adjacent work area and shaped and compacted to form the clean water diversion bunds.
- The proposed diversion bund/channels will have a 0.5m wide channel floor, 1v:3h side slopes, have a minimum compacted height of 0.75m and be on a minimum 2% grade (to ensure fall).

- The 1% AEP flow depth will be 0.32m and the bund will therefore have approximately 430mm freeboard for this 100 year storm event.

**On Site runoff:**

- A super silt fence will be installed at the bottom end of the work area for sediment control while the pond for the fill site is constructed.
- An on-site dirty water diversion bund will be needed (Fill 3) to control and direct site stormwater. These bunds will be a minimum of 1m compacted height; slightly higher than the clean water bunds to give some allowance for sediment deposition that could occur with low gradient channels.
- The fill surface will be worked and shaped to direct flow to specific discharge points (and which will vary as filling progresses).
- Initially runoff will be directed to the gully floor and then down to the lower sediment retention pond.
- As the fill increases in height, runoff will be directed across and down to one side where it will be directed down to the pond.
- A stabilised or erosion proof rock flume or similar will be constructed on this side of the fill at the fill/natural land interface to convey site runoff down the side of the fill to the pond. This rock flume will eventually convey runoff from the entire fill surface down to the fill pond for treatment.

**Truck Bowl wash:**

- A wash system to clean truck bowls after fill deposition is proposed.
- This will consist of a water cart with pump that the driver of each truck can operate to clean the truck bowl as required which will be directed down to the lower sediment pond for treatment.
- Asbestos material will be placed in an excavated hole, the truck bowl washed out into the same hole and the hole then filled in. This wash water will therefore be directed into the hole and not to the lower sediment pond.

**Monitoring & Maintenance:**

- All erosion and sediment control measures (channels, ponds, flumes etc.) will be inspected on a regular basis.
- Site monitoring will be undertaken before and immediately after rain as well as during heavy rainfall events.
- Any required maintenance or improvements to control measures will be undertaken.
- Sediment retention pond cleaned when 20 % full of sediment.

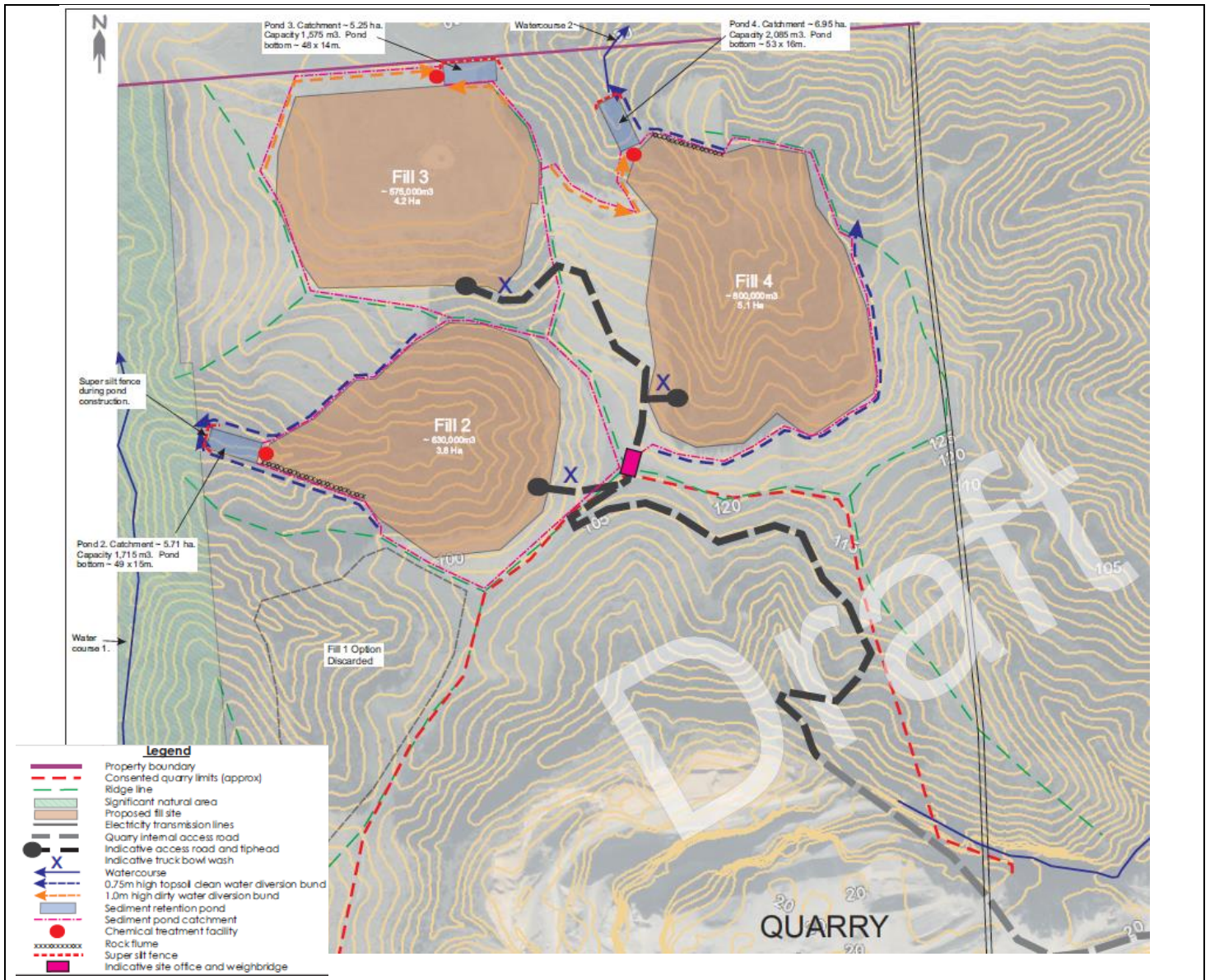
**Rehabilitation:**

- Completed fill areas will be progressively topsoiled, grassed and returned to a permanent pastoral land use. The final landform will have a cross slope across to the final overland flow path that will be constructed on one side of the fill.
- The sediment retention pond will either be filled in at the completion of filling or it will be retained and converted to a wetland in the same way as other redundant sediment ponds have been managed at the quarry.

**Recommendations & Further Studies (if required)**

- The natural annual sediment load will not increase as a result of the fill operation because the sediment yield from the fill site after treatment will be slightly less than current natural levels.
- It is concluded from this assessment that the fill activity will not have an adverse sediment related effect on the environment but instead should have a slightly positive effect.

**Maps: Proposed Fill Sites 2,3 & 4 Erosion and Sediment Control  
(Drawing HQ-19-10-1, ESCP, September 2019)**



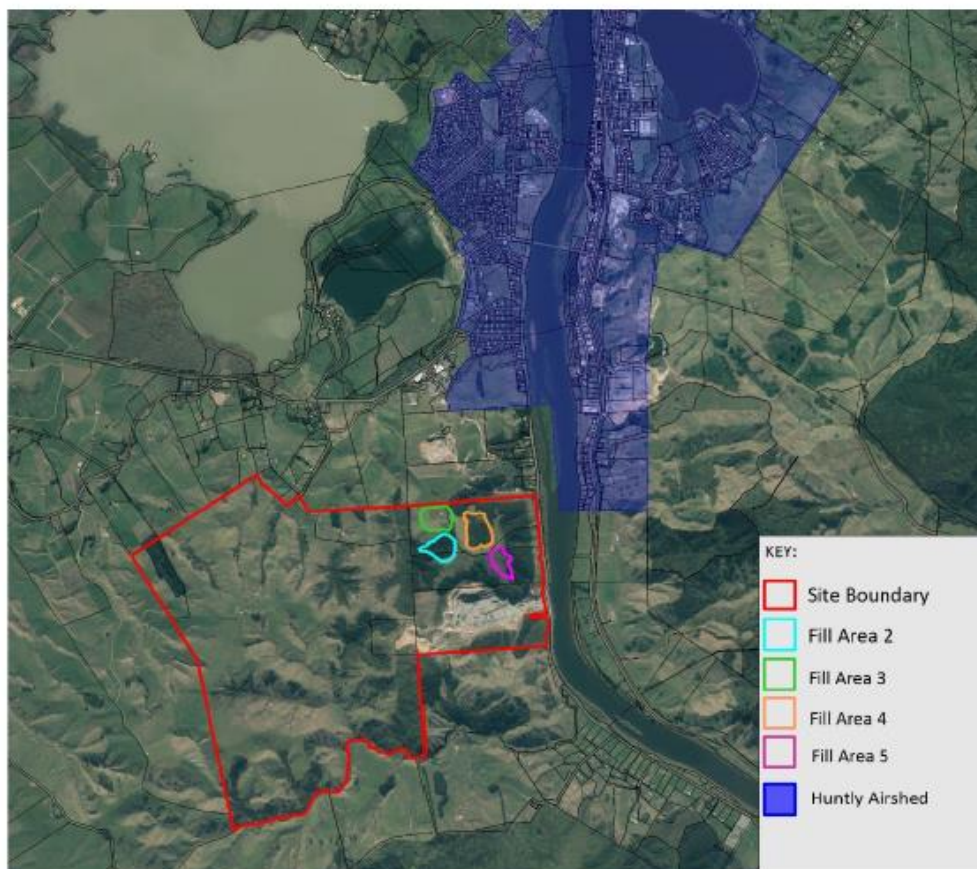
<b>Expert Report:</b>	Huntly Quarry Managed Fill - Air Quality Technical Assessment (September 2019)
<b>Experts/Author of Report:</b>	Pattle Delamore Partners Ltd
<b>What this report is about:</b>	This report provides an air quality technical assessment for the overburden, clean fill, and managed fill activity, with recommended mitigation and monitoring.
<b>Key Findings:</b>	<ul style="list-style-type: none"> <li>All Asbestos Containing Material will be wrapped with 200 <math>\mu</math> heavy gauge polyethene (asbestos bags or truck tray/skip lining), and truck/skip cover.</li> <li>Once the fill material has been deposited, the material will be compacted and stabilised using bulldozers or excavators.</li> <li>The proposed Site is outside the gazetted airshed for Huntly, although the Site boundary is approximately 200 metres to the airshed boundary at the nearest point. It is unlikely that the emissions from the Site will have a significant impact on the airshed at this distance.</li> <li>We consider the sensitivity of the receiving environment to be moderate, given the distance of the activity to sensitive receptors, and that the area is already impacted by similar activities such as quarries located to the north and to the south of the Site.</li> <li>The properties immediately to the east and northeast of the site are most at risk due to the higher frequency of strong winds occurring from the west and southwest, whereas properties in other directions from the site will be at a significantly lower risk of experiencing windblown dust.</li> </ul>

- Limited potential for off-site dust nuisance effects to occur with any significant frequency.
- The concentrations of any dust emitted from the Site activities is expected to be low, and there is limited potential for adverse effects from the Site.
- It is concluded that it is unlikely that there will be any exceedance of air quality assessment criteria at a location beyond the site boundary, or that there will be noxious, dangerous, objectionable or offensive dust to the extent that it causes an adverse effect at or beyond the boundary of the site.

**Recommendations & Further Studies (if required)**

- Real-time monitoring of wind speed and direction is recommended to assist with decision making for applying the appropriate level of controls and to assist with any dust compliant investigation.
- Potentially dusty material will be dampened with water during placement with the use of a water cart.

**Maps: Proposed Fill Sites Areas relative to Huntly airshed  
(Figure 8, Air Quality Technical Assessment, September 2019)**



**Expert Report:**

Huntly Managed Fill – Assessment of Environmental Effects and Waste Acceptance Criteria (October 2019)

**Experts/Author of Report:**

Pattle Delamore Partners Ltd

**What this report is about:**

The scope of work has included the following:

- A review of applicable human health and waste acceptance criteria for chemical contaminants and asbestos used at other managed fill facilities within the Waikato Region, the new managed fill criteria in the Technical Guidelines for Disposal to Land (WasteMINZ, updated August 2018), and relevant national and international human health guidelines commonly used in New Zealand.
- An assessment of the surface water quality risk using existing background contaminant concentrations in the Waikato River.
- The development of the soil quality criteria for the capping material for the managed fill to allow for future rural residential or agricultural land uses.

**Key Findings:**

## Proposed Waste Acceptance Criteria for the Managed Fill

**Table 5: Proposed Waste Acceptance Criteria for the Managed Fill**

Contaminant Type	Parameter <sup>1</sup>	Proposed Waste Acceptance Criteria (> 2 m)	Proposed Weighted Rolling Month Mean Concentration	Proposed SPLP Leachability Limits (mg/L) <sup>8</sup>	Maximum Truckload Fill Concentrations Shallow (<2 m) Cleanfill
Elements	Arsenic	100 <sup>2</sup>	50	-	12
	Boron	45 <sup>3,10</sup> (260) <sup>7</sup>	180	2	45
	Cadmium	7.5 <sup>4,9</sup>	5.25	-	0.65 <sup>9</sup>
	Chromium	400 <sup>4,9</sup>	280	-	55
	Copper	325 <sup>4,9</sup>	225	-	45
	Mercury	1.5	1.0	-	0.45
	Nickel	65 (320) <sup>7</sup>	225	1	35
	Lead	250 <sup>10</sup> (1,000) <sup>7</sup>	660	1	65
	Thallium	23 <sup>12</sup>	15	-	1
	Zinc	400 <sup>10</sup> (2,000) <sup>7</sup>	750	1	180
BTEX Compounds	Benzene	0.2 <sup>10</sup>	0.004	-	0.0054 <sup>9</sup>
	Toluene	1.0 <sup>9</sup>	0.5	-	1.1 <sup>9</sup>
	Ethylbenzene	1.1 <sup>9</sup>	0.6	-	1.0
	Total xylenes	0.61 <sup>9</sup>	0.4	-	0.61
Polycyclic Aromatic Hydrocarbons (PAH)	Benzo-a-pyrene (eq)	20 <sup>4</sup>	14	-	0.0054 <sup>9</sup>
	Naphthalene	7.2 <sup>5</sup>	7.2	-	0.013 <sup>11</sup>
Contaminant Type	Parameter <sup>1</sup>	Proposed Waste Acceptance Criteria (> 2 m)	Proposed Weighted Rolling Month Mean Concentration	Proposed SPLP Leachability Limits (mg/L) <sup>8</sup>	Maximum Truckload Fill Concentrations Shallow (<2 m) Cleanfill
Total Petroleum Hydrocarbons (TPH)	C <sub>7</sub> -C <sub>9</sub>	120 <sup>5</sup>	80	-	120 <sup>9</sup>
	C <sub>10</sub> -C <sub>14</sub>	300 (1,400) <sup>13</sup>	-	-	58 <sup>9</sup>
	C <sub>15</sub> -C <sub>36</sub>	20,000 <sup>13</sup>	-	-	-
Others	DDT and isomers	8.4 <sup>4,6</sup>	-	-	0.7 <sup>9</sup>
	Aldrin	0.7	-	-	-
	Dieldrin	0.7 <sup>4,6</sup>	-	-	-
	Tributyltin	6 <sup>14</sup>	-	0.3 <sup>14</sup>	-
Asbestos	Refer to Table 2 of the Huntly Quarry – Asbestos Fill Management Plan (PDP, 2019).				

### Groundwater

- The groundwater level of the main aquifer at the main quarry pit is approximately 19 m RL, and approximately 12 m RL near the Waikato River.
- Groundwater will not be intercepted by the proposed fill areas.
- Groundwater is not considered as a sensitive receptor as there are no existing groundwater extraction bores in use within the site or between the managed fill areas and the Waikato River.

### Human Health

- The proposed rolling monthly mean waste acceptance criteria are less than the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Soil Contaminant Standards (NES SCSs) for industrial outdoor workers.
- The proposed soil quality criteria for the capping material (2 m cap) the NES SCSs for rural residents.
- Therefore, the managed fill is unlikely to pose a human health risk to onsite workers and potential future rural residents and the average exposure that workers will be exposed to will be lower than guidelines levels.

### Ecological

- The results of the Risk-Based Corrective Action modelling indicate that discharge concentrations from the proposed overburden and managed fill material for all parameters in Table 6 (after reasonable mixing) are likely to be less than 0.001% of the freshwater guidelines values (ANZG, 2018).

- Therefore, with the exception of arsenic (which already exceeds water quality guidelines (ANZG, 2018)), the predicted concentrations of elements within the Waikato River are likely to be below the 95% ecosystem protection guidelines.
- Therefore, any discharge is unlikely to pose a risk to the ecological receptors in the Waikato River Environmental modelling (see Section 3.1) indicated that the Waikato River has significant dilution capability for zinc and after reasonable mixing there should be no significant change in zinc concentrations within the Waikato River.

**Recommendations & Further Studies (if required)**

- Due to the mobility of boron, lead and nickel, it is proposed that SPLP testing is required for any fill containing these elements at concentrations that exceed the proposed SPLP trigger values outlined in Table 5.

<b>Expert Report:</b>	Asbestos Fill Management Plan (September 2019)
<b>Experts/Author of Report:</b>	Pattle Delamore Partners Ltd

**What this report is about:**

The Asbestos Fill Management Plan has been prepared in support of a resource consent application to permit the construction of a Managed Fill facility at the site. It is proposed that this Managed Fill facility also accepts asbestos and Asbestos Containing Material (ACM) waste, and asbestos-in-soil, as part of its waste acceptance.

**Key Findings:**

- The AFMP includes operational processes and frameworks to maintain concentrations of asbestos fibres in air at the site boundary, or within the breathing zone of any worker not wearing Personal Protection Equipment (PPE)/ Respiratory Protective Equipment (RPE), at levels below ‘trace level’ under the Asbestos Regulations.
- The AFMP requires that some specific responsibilities are allocated and fulfilled to achieve compliance with the Asbestos Regulations. Table 1 indicates the role of the assumed individuals who are the most likely to be accountable for undertaking these responsibilities; specific regulations have been referred to where applicable.
- Asbestos/ACM waste and asbestos-in-soil waste is to only be received from pre-approved contractors.
- Prior to entering the Managed Fill each truck approved to bring ACM waste and asbestos in soil must be weighed and inspected at the weighbridge to ensure that the load is sufficiently covered, lined, and moistened; dependent of the nature and type of asbestos/ACM waste and asbestos-in-soil contained expected from the source site.
- Construct a 0.2 m of ‘cover layer’ over the top of any asbestos/ACM waste and asbestos-in-soil deposited within the tipping area; comprising of non-asbestos fill material (sourced from quarry overburden and/or non-asbestos sites).
- The types of asbestos anticipated to be disposed of at the site:

<b>Waste Material Summary</b>		
<b>Waste Type</b>	<b>Asbestos Category</b>	
<b>Asbestos and ACM waste (i.e. from removal/demolition projects)</b>		
Class A (friable asbestos) and Class B (non-friable ACM) waste	Any volume or concentration of asbestos or ACM (both licensed – i.e. Class A and B, or unlicensed)	
<b>Asbestos-in-soil (concentration)</b>		
Category <sup>1</sup>	ACM >10 mm (% w/w) <sup>2</sup>	AF/FA (% w/w)
‘Class A’: friable	NA <sup>3</sup>	>1
‘Class B’: non-friable	>1	>0.01-1
‘Asbestos Related Works’	>0.01-1	>0.001-0.01
‘Unlicensed Asbestos Works’	<0.01	<0.001

**Recommendations & Further Studies (if required)**

Ongoing management requirements relate to:

- Record keeping of type, volume and location of the ACM/asbestos-in-soil deposited within the fill areas.
- Dust suppression and daily cover (including processes for constructing and maintaining the cover layer.
- Vehicle washdown requirements
- Worker training, inductions and health monitoring, including the provision of adequate PPE supplies.
- Air monitoring and regular reporting requirements.

It is expected that WRC will require an Annual Monitoring Report (AMR) to be provided to them at a regular time each year which summarises:

- Nature of the filling activities which have occurred
- Broad categorization of the waste accepted into these areas
- Summary of air monitoring results
- Summary of information for any complaints/breaches to the AFMP and/or any incidents which occurred within the Managed Fill Facility.