Woodstock Landfill

Updated Proposal Description
28 September 2023

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Preamble

This document provides a summary of the current status of the Application by WQL for the Woodstock Landfill project. This document has been prepared by Garry Blay and Emma Fraser on behalf of the Applicant.

This document should be read together with the following documents:

1. **Proposed Conditions of Consents dated 28 September 2023**
2. **Objectives and Contents of Landfill Management Plan dated 28 September 2023**
3. **Drawings Issue 6, September 2023.**

Updated Proposal Description

Concept Philosophy

1. The Applicant has applied for land use consents from the Waimakariri District Council to undertake earthworks (including quarrying) and to establish and operate a landfill and associated activities at 513 Trig Road near Oxford. The earthworks / quarrying will create a quarried space of approximately 9.3 ha within the area shown as the Landfill Footprint, for the landfilling operations. Other earthworks as required for on-site roading, stockpiling, a container transfer area, stormwater management and other ancillary earthworks activities, will be carried out within the Landfill Site Boundary.

2. The area of quarrying and earthworks applied for in this application will be in addition to, and concurrently with, the earthworks / quarrying approved under RC185244, which will carry on outside of the Landfill Site Boundary. Drawing B2 shows the Landfill Footprint and the Landfill Site Boundary. The Landfill Footprint includes land already open with quarry works (approximately 2.0 ha currently being worked in this area, and approximately 2.5 ha prepared for future work) as well as approximately 4.8 ha which will be new and further quarry activity.

3. The Applicant has also applied for the following consents from the Canterbury Regional Council (CRC):
   a. The use of land to excavate material and to deposit material over an aquifer
   b. Discharge contaminants, namely landfill, onto or into land
   c. Discharge drainage water and stormwater onto land and into land where it may enter surface water
   d. Dam water in sediment ponds, and take and use water from sediment ponds
   e. Discharge contaminants from an industrial and trade premises into air

4. A draft landfill operations and management plan (Landfill Management Plan (LMP) Issue 4 July 2023) covering operation and management of the landfill has been developed and is attached as Appendix 1, together with the Objectives and Contents of the LMP dated 28 September 2023, which is attached as Appendix 2. This document includes methods to ensure all aspects of the construction, operation and closure of the landfill site are carried out in accordance with best practise management techniques to ensure uncontrolled discharges of contaminants to the environment are avoided and that the landfill is managed in accordance with legislative and consenting requirements.

5. An overview of construction, operation and closure of the quarry/landfill is set out in the following sections.

Landfill area and volume

6. The total footprint of the landfill will be approximately 9.3 hectares, with an approximate total volume of 3.2 million cubic metres, including a capping layer of approximately 60,000 cubic metres. This equates to about 2.8 million tonnes of waste in the landfill, along with daily cover and intermediate capping. The overall area of the landfill is shown on Drawings B2 and B3.

Landform

7. The landfill will be developed in a manner that will:
   a. Be constructed in accordance with standards applicable to a Class 1 landfill as defined in the WasteMINZ Technical Guidelines for Disposal to Land (2022).
   b. Utilise and expand an existing excavated area (approximately 4.5ha already open or under physical quarry operations and an additional 4.8 ha to be excavated for quarry activity and landfill preparation).
   c. Provide a graded free draining landform to enable run-off of surface water to ensure surface water ponding is avoided. Surface water running off the quarry/landfill area outside the areas subject to waste deposition will be captured in a stormwater management system, treated in sediment ponds to remove silt and discharged to ground below the quarry/landfill site.
   d. Provide stable slopes.
   e. Allow for future access for maintenance, rehabilitation and/or monitoring.
   f. Provide economically viable refuse placement capacity.
   g. Provide a final landform consistent with the surrounding area and suitable for planting.

Excavation and Quarrying

8. Drawing B3 contains plans for the quarry and landfill area inside the Landfill Footprint, including an earthworks summary and cross section index that summarises the area of excavation and quarry activities, pre-landfill. Approximately 4.5 ha is already developed, having been either prepared for or quarried under separate existing consents. This application is to open a further approximately 4.8 ha of land by removing hard-rock quarry materials.

9. Excavation for associated and auxiliary works will be required inside the Landfill Site Boundary (but outside of the Landfill Footprint) as shown by the orange broken line on Drawing B6. Along with earthworks, this area will also be required for stockpiling of quarry material for use as intermediate or final capping layers. The white contour lines on Drawing B1 show the extent of the excavation required to construct the landfill. The magenta line on Drawing B2 shows the extent of the Landfill Footprint. The red shaded area on Drawing B2 shows the extent of the toe bund, and the white contour lines on this drawing show the post settlement finished contours of the landfill capping.

10. Excavation and quarry activities in the landfill area may include occasion for blasting. This is addressed in WQL's Health and Safety Management Plan (shotcreting SOP, SMP protocols), which have been developed in accordance with WorkSafe Guidelines. Blasting has been occurring within the property in association with quarrying activities for the last 8 years and due to the remote location and lack of sensitive activities in the area, there is no record of complaints. The quarry and landfill site is geologically stable and not directly impacted on by fault lines.

11. The excavation and quarry activity and landfill development will require benches of 3.5m and batters of 5m, as shown on Details E and F of Drawing C2. The benches in the weathered rock will be 5m.

12. The practicality of constructing the steep wall liner systems on relatively narrow width benches has been assessed, including reviewing options for wider benches at higher levels. The bench height is related to the use of scaffold system for construction of the liner. Given the complexity of the bench liner arrangement, limited width and potential for rock mass failures it is likely that a top down rock anchors and bolts system would be required to the form the design steep wall profile.

13. A significant proportion of the excavated material is hard rock and will be processed by the quarry operation for future sale. Non-saleable material, primarily the weathered upper zone, will be stockpiled and used for capping material over landfill cells. Stockpiled quarry material will be stored in differing locations within the landfill site boundary external area. Drawing A6 and Drawing F7 shows the land areas currently used for stockpiles, and proposed stockpile areas, respectively.

Landfill Creation

14. The landfill will occupy an area excavated by quarrying operations. Creation of the landfill will follow three key steps, being:
    a. Staging and construction
    b. Operation
    c. Closure and remediation

Staging and Construction

Staging

15. The land fill operation will occur in areas where quarrying has been completed. Completion of quarrying will result in an area below natural ground level surrounded by stable excavated faces on three sides with an approximately flat and roughly smoothed surface which will provide the base and supporting backdrop on which the landfill will be placed. The technical details of the site preparation that is required for the quarry walls, the sidewalls geometry and liner system are shown on Drawings C2 to C5, as agreed in the Joint Witness Statement Quarry Wall Stability (8 June 2023)**.**

16. As quarrying over the entire area to be used for landfill has not yet been completed, it is intended that landfilling will occur in stages as area becomes available from quarrying operations. Landfilling will begin at the eastern end and progress generally westward. The proposed staging is illustrated in Detail C of Drawing C1.

17. Cell development will generally follow the sequence below with variation as required to suit the location and stage of land fill development:
    a. Provision of temporary access for cell construction;
    b. Establishment of erosion and sediment control systems including cut-off drains and sedimentation ponds as required;
    c. Installation of liner layers as required for each cell;
    d. Connection of liner discharge systems as required;
    e. Placement and connection of leachate collection tanks;
    f. Placement of refuse;

g. Placement of gas collection system if and as required.

18. The liner will be installed at grade to ensure collection of leachate and surface water entering the cells is directed to the leachate collection system.

Containment

19. The overall design philosophy of the landfill is that any contaminated/waste materials or associated discharges will be contained within the landfill footprint. This is to be achieved by installation of a containment liner, collection and recycling or disposal off-site of leachate, separation and discharge of clean stormwater and flaring of any gas produced. The key components of containment are geological stability, landfill mass stability and a competent liner.

20. Prior to the commencement of landfill physical works, monitoring of ground and surface water will be carried out to establish water quality baselines to which ongoing water quality monitoring during operation of the quarry and landfill can be compared. Trigger levels of contaminants for water quality are contained in the proposed conditions. If monitoring indicates contaminant levels exceeding the trigger levels, responses will be required in accordance with the criteria set in proposed conditions.

21. The potential volumes of groundwater drainage have been assessed at a conservatively high leachate discharge through the liner, to enable assessment of subsequent potential effects on ground water quality, including drinking water.

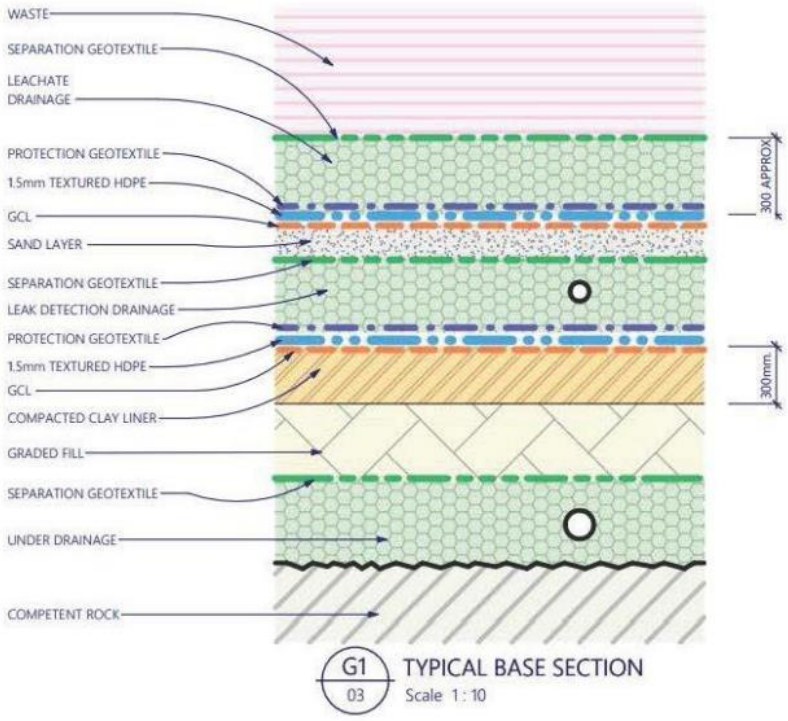
22. The landfill has been designed using multiple levels of redundancy to ensure containment and avoidance of adverse effects on groundwater, surface water and air. These are illustrated in the diagrams included in Drawings C3, C4 and C5. Defence measures include:
    a. Installation of a multi-layered containment liner between the natural bedrock and waste;
    b. Installation of cut-off drainage around uphill areas of the landfill to reduce inflow of surface water as shown on Drawing B1 and B2. These cutoff drains also ensure that overland flow from the upper slopes continues to flow into the existing waterways to the east and west of the landfill development area;
    c. Installation of a compartmentalised leachate collection system which will also collect stormwater entering the operating area or surface seepages of leachate, with discharge to collection tanks and recycling back into the landfill to assist with dust management and compaction of waste;
    d. Installation of compartmentalised sub-liner drainage layers to provide for groundwater flow underneath the liner, and to act as a 3rd level fail-safe system for leachate collection should the above double liner system be breached;
    e. Installation of a final capping layer and creation of a contoured free draining landform that will be revegetated with plants consistent with those occurring naturally in the area and which produces a stormwater quality acceptable for discharge to the surrounding area;
    f. Minimisation of the working area and using daily cover to minimise emissions of dust or odour to air;
    g. Installation of a landfill gas collection system utilising vertical piping and/or a horizontal collection system to ensure gas can be collected;
    h. Treatment of landfill gas through flaring or as otherwise necessary to manage adverse environmental effects in compliance with the NES for Air Quality.

23. The purpose of the multi-layered liner is two-fold, being firstly to prevent waste material or leachate entering the wider environment, and secondly to prevent surface or groundwater entering the landfill. The liner system will be approximately 1600mm thick and will line the base of the landfill, as illustrated in Drawings C3, C4 and C5.

24. The liner will be raised around the perimeter of each cell as illustrated on Detail L of Drawing C3 to prevent any leachate exiting the cell. Should any areas of weakness within the underlying rock be encountered these will be assessed by an appropriately qualified and experienced engineer, with remediation measures put in place as required to ensure a seal. This could include grouting or use of some other liner system suitable for the circumstance (this will be determined at the time).

25. The liner has been designed to be flexible and is of sufficient thickness to accommodate likely seismic displacements. A multi-layered base layer consisting of permeable and impermeable materials will be constructed to line the base of the landfill as shown on Detail G1 on Drawing C5.

26. A double liner system for the landfill floor will be installed. This liner system will include a sand layer between two of the geotextile materials to ensure that there is no potential weaker interface layer. The proposed double liner system for the landfill floor exceeds the liner standards for Class 1 landfills as detailed in the WasteMINZ Guideline on Disposal to Land (2022). The floor liner system, shown on Detail G1 of Drawing C5, and reproduced below, consists of:
    - Liner Protection Geotextile
    - 1.5mm High Density Polyethylene (HDPE dual textured)
    - Geosynthetic Clay Liner (GCL)
    - Sand layer (*New layer included)
    - Separation geotextile
    - Leak detection aggregate drainage layer
    - 1.5mm HDPE (dual textured)
    - GCL
    - Compacted Clay Liner (CCL)
    - Under drainage system



27. The liner system includes a free draining layer shown as the leak detection layer below the primary liner system. This leak detection layer is designed to collect and measure any leakage through the primary liner system.

28. The landfill base profile and floor liner profile will be saw toothed in an east west orientation between each landfill cell with a longitudinal fall from north to south. The proposed leachate drainage profiles will be 2% min gradient, which is the typical minimum acceptable grade for leachate drainage pipework.

29. The upper leachate collection system will collect leachate in a sump and pump it to the landfill footprint containment system, and finally out of the landfill footprint leachate containment system. The containment area is proposed to be bunded, and have a minimum capacity for 10 days storage. The leachate storage capacity will be confirmed during detail design taking into consideration estimated leachate generation volumes along with appropriate contingency.

30. Leachate recirculation is proposed, ultimately collected leachate is to be disposed of offsite. The dual composite liner system includes an aggregate leachate leak detection layer that would intercept leachate leakage from the primary liner (upper 1.5mm HDPE) and discharge it via a pumped manhole system to the leachate containment system, and recirculated or ultimately discharged off site. As this system would allow for accurate measurement of the primarily liner (upper 1.5mm HDPE) leakage this flow rate will be monitored, trigger levels set (Action Leak Rates) and the trends reviewed for monitoring liner performance. Conditions to respond to and manage exceedances will be included as part of the conditions of Amalgamated Consents CRC214073/77 and 214075.

31. The landfill liner system will have an underdrainage system to collect ground water seepage beneath the liner, including the steep wall and any potential liner leachate leakage which discharges into the perimeter storm system via a continuously monitored manhole system. The manhole will be continuously monitored (15 minute minimum intervals) for conductivity and pH, as early indicators of liner leakage. An action plan for exceedances will be prepared as part of the Groundwater Monitoring and Response Plan included in the landfill management plan.

32. Monitoring will establish the baseline water chemistry of the water that might be captured by the underdrainage system, in relation to pH and conductivity. The groundwater monitoring bores will establish the baseline chemistry of the water that may be collected in the underdrainage system. In the proposed conditions the baseline water chemistry will be established by collecting and analysing the water in the groundwater monitoring bores over a 12 month period prior to the commencement of landfill physical works.

33. More detailed monitoring of the discharges from the underdrainage system will be undertaken to provide a high level of confidence of potential contamination of the underdrainage system.

34. Because the water chemistry in the base of the landfill may be slightly different to that in the groundwater monitoring bores, the baseline chemistry will be reviewed after 2 years of landfill operation.

35. The outlets from the underdrainage system will remain open and operational during landfilling and post closure.

36. The landfill base profile and floor liner profile is shown in Drawings C1 to C5.

Sub-liner drainage

37. The assessed potential ground water discharges under the completed 9.3 ha landfill will be in the order of 1 to 4m^3 per day. A sub-liner drainage system is therefore proposed to capture and transport groundwater away from the landfill to protect the liner from uplift and prevent intrusion of ground water into the landfill. Each cell adjacent to the bed rock will have its own dedicated subliner groundwater drainage system terminating in an inspection manhole prior to linking and discharging into the common discharge network to the sedimentation ponds. The groundwater discharge system within each cell will be able to be isolated in case leachate penetrates the liner and enters the subliner drainage system. This will then allow contaminated ground water to be diverted to the leachate system and disposed of accordingly. Detection of contamination in the groundwater from each cell will be enabled by continual monitoring of discharges for changes in conductivity and pH.

38. The sub-liner drainage system arrangement, in conjunction with upward hydraulic groundwater gradients, will assist with 3rd level leachate control, should part of the liner be compromised.

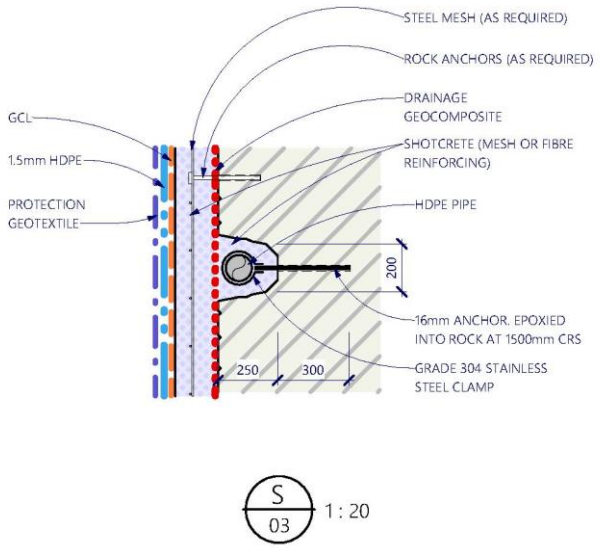
39. Any groundwater entering the area of the quarry/pit not utilised for landfill purposes will be discharged to the swale constructed around the outer edge of the lined area and from there to the stormwater system. Any rainfall landing within the area being utilised for landfill will be captured within the leachate management system. Any water captured in the stormwater

system will be conveyed to the stormwater management/sedimentation pond located to the south and downhill of the landfill site.

40. Two ponds joined by a weir, as shown on Drawing B1 and the detail on Drawing C4 will be constructed to enable settlement of any sediment, before discharge of clean water to land downhill of the ponds via an engineered energy dissipating and dispersal outflow system to avoid scouring. The direction of discharge will be to the west with water spreading out over a wide area covered in scrub and regenerating beech forest before reaching a gully which in turn leads to a stream. The stream is located approximately 400 metres from the discharge point and it is therefore unlikely that discharges from the sedimentation pond/s will directly enter any water body, with soakage to ground the most likely outcome. However, the application seeks consent for discharge of both ground and surface water to this stream to ensure these discharges are consented if they do occur.

Side wall lining, leachate filter / drainage

41. The sides of the landfill will be keyed into both weathered and competent rock, with the base liner raised at the foot of the wall to assist with sealing and transport of leachate draining down the side of the face to the leachate drainage system. The wall liner system will be a geosynthetic liner over shotcrete, as shown on Detail S of Drawing C5, repeated below.



42. Preferential drainage down the cut face will be assisted by the use of benched free draining layers as shown on Detail L of Drawing C3. This system will also allow any groundwater draining from the cut face to be captured in the leachate system. The permeability of the cut face rock will be significantly lower than that of the drainage material and therefore leachate infiltration into the side walls is not anticipated.

43. With regard to the potential for landfill gas (if it develops) to preferentially exit the landfill via the side wall drainage system, this will be prevented by sealing of the sidewall drainage layer with clay or other low permeability material at the time of cell completion. This material will be removed before placement of the next layer of side wall drainage material.

Cell drainage

44. Run-off, seepage and stormwater from active cells will be collected within the leachate system, with bunds around active cells containing stormwater and seepage. Run-off from sealed cells will be directed away from active cells, with this clean water run-off collected in the downslope swale and diverted to the sedimentation ponds prior to final discharge.

45. Leachate will be collected in perforated pipes in the upper free draining aggregate layer of the liner system and transported to a drainage system connected to storage tanks. The free draining aggregate layer will enable leachate drainage should the pipes become blocked. Flushing pipes will also be included to allow flushing of the leachate collection pipes to prevent or clear blockages. Leachate will then be returned to the landfill to assist with compaction and dust management.

46. Should the quantity of leachate exceed the capacity of the tanks, it will be transported off site and disposed of at an approved facility. Suitable facilities are available at all Council owned and operated wastewater treatment plants, several of which are available within the Waimakariri, Selwyn and Christchurch districts. In addition, there are leachate package plant treatment systems that could be installed on site to avoid transporting the leachate off site.

47. Leachate will be piped to the leachate collection system, consisting of sealed tanks contained within a bunded area, or self bunded tanks, of sufficient capacity to contain 125% of the tank volume. The tanks will be fitted with overflow prevention mechanisms. Leachate will then be pumped back onto active cells for use as a dust suppressant and compaction aid. Should the capacity of the tanks be exceeded and the overflow mechanisms be triggered, back up of leachate within the cells will be contained by bunds around the working area. Following emptying of the tanks, any leachate contained within the landfill will be able to flow through to the tanks. Stored leachate can then be removed until such time that active management within the landfill and tanks can re-occur.

Toe Bund and Waste Stability

48. The toe bund located on the southern edge of the landfill is designed to ensure containment of the waste and leachate. The design ensures that the quarry walls, waste mass and toe bund of the landfill will be stable. The location of the toe bund is shown as a red shaded area on Drawing B2. The nominal height of the toe bund is 12m and is shown on Detail M of Drawing C4.

Perimeter drainage

49. The landfill will be provided with perimeter clean water diversion to divert surface water flows away from the landfill. This will be achieved by construction of a sloped vehicle track around the entire perimeter. Surface flows will then follow natural drainage paths in a

downhill direction. The contour of the land surrounding the landfill is such that this system will largely reflect that which occurred on the site prior to quarrying.

50. Downslope of the landfill the vehicle access track will slope in towards a surface water drain to be constructed at the lower edge of the landfill toe bund, as illustrated in Detail N of Drawing C5. This surface water drain will connect to the sedimentation ponds and final discharge will be to land to the south of the landfill site.

51. This system will significantly reduce the amount of stormwater directed to the landfill stormwater management system and will remain following final capping and rehabilitation of the landfill. Run-off collected in this system will contain only sediment, with no other contaminants from the landfill area able to enter the system due to design features (toe bund, impermeable liner) preventing entry of flows from the landfill.

52. With regard to the capacity of this system, the perimeter stormwater drain will be designed to accommodate the 1% AEP storm event. The sedimentation pond will be designed to retain the flows from a 10% AEP storm event, with an overflow structure that will be able to safely pass a 1% AEP storm event. The proposed conditions of consent reflect these design requirements.

Waste characteristics and volume

Waste composition

53. Material to be deposited in the landfill will include demolition and construction waste, and potentially hazardous waste less than the specified maximum total concentrations as detailed in the WasteMINZ Technical Guidelines for Disposal to Land (2022). It will not include more than 5% putrescible waste, or any municipal solid waste. The proposed conditions of consent detail the process for the application and approval process for all waste coming to the landfill.

54. Relevant definitions from the WasteMINZ Technical Guidelines for Disposal to Land (2022) are:

> Construction and demolition (C & D) waste:
>
> *Non-household, non-putrescible construction and demolition wastes. This includes waste generated from the construction, renovation, repair and demolition of structures such as residential and commercial buildings, roads and bridges. The composition of C & D waste varies for these different activities and structures. Overall, C & D waste is composed mainly of wood products, asphalt, plasterboard and masonry. Other components often present in significant quantities include metals, plastics, earth, shingles, insulation, paper and cardboard.*
>
> Municipal Solid Waste:
>
> *Any non-hazardous, solid waste from household, commercial and/or industrial sources. It includes putrescible waste, garden waste, biosolids, and clinical and related waste sterilised to a standard acceptable to the Ministry of Health. All municipal solid waste*

should have an angle of repose of greater than five degrees (5°) and have no free liquid component.

Hazardous Waste:

Any waste that:

- *contains hazardous substances at sufficient concentrations to exceed the minimum degrees of hazard specified by Hazardous Substances (Minimum Degrees of Hazard) Regulations 2000 under the Hazardous Substances and New Organism Act 1996; or*
- *meets the definition for infectious substances included in the Land Transport Rule: Dangerous Goods 1999 and NZ Standard 5433: 1999 - Transport of Dangerous Goods on Land; or*
- *meets the definition for radioactive material included in the Radiation Protection Act 1965 and Regulations 1982.*

Only Hazardous Waste that meets the specifications in the Waste Acceptance Criteria (WAC) will be disposed of in the landfill.

Filling/Placement of Waste

55. The placement of refuse will be done in a manner that is consistent with best practise waste disposal principles and that will minimise potential adverse effects of the activity. This will include filling of the airspace in a series of cells that will enable discrete operating areas to be completed and either a containment or final cover established before moving on to the next cell in a progressive manner. The cell construction sequencing is shown on Detail C of Drawing C1.

The proposed cell design approach will allow:

- Minimisation of the extent of the working face;
- Use of daily and intermediate covers to minimise the adverse effects of waste placement, including dust and attraction of pests;
- Containment and stabilisation of intermediate areas;
- Early construction of final capping;
- Increased ability to control access.

Waste placement

56. Waste material will be unloaded at the tipping area prior to being spread across the landfill area by an excavator, and compacted using a specialist waste compactor.

Daily cover

57. At the end of each day the waste deposited during that day will be covered using suitable compacted clean waste material from quarry operations. No landfill material will be left exposed overnight, with covering at more frequent intervals as required if weather

conditions require more immediate cover. Daily cover material will be of a compacted minimum depth of 150mm to all exposed waste faces.

Intermediate cover

58. Completed cells located in areas that will have additional cells layered on top will be capped with an intermediate layer which will be contoured to ensure run-off of surface water to the collection system and stabilised using grass.

Final Capping

59. A final capping layer at least 600mm thick will be placed when cells reach the final contour level. Additional capping layers of clay and/or topsoil may be used if available or considered necessary. The capping layer will be graded to assist surface water run-off to the stormwater management system and planted in indigenous vegetation reflecting that occurring naturally within the site. Details of the potential capping system are shown on Detail H of Drawing C2.

Closure, Remediation and Aftercare

60. Following completion of deposition of waste and closure of the landfill, ongoing management will include:
    - Flaring of landfill gas as required;
    - Monitoring and maintenance of a continuous, vegetated and free draining capping layer;
    - Monitoring of stormwater discharges and water quality in Woodstock Stream;
    - Collection and disposal of leachate

61. Prior to the end of the life of the landfill a Landfill Closure Plan will be prepared to detail the activities required for closure of the landfill and during the aftercare period. In general terms, the activities required for closure and aftercare are described in the following sections.

62. The final capping system will be constructed progressively after filling in any area has been brought up to final level. This work will generally comprise:
    - Excavating soils from the soil stockpiles and placing in layers on the landfill cap in accordance with the design;
    - Placing an upper topsoil and growth layer from materials stockpiled on site;
    - Constructing surface contour drains to manage stormwater falling on the landfill cap, including connections to the perimeter drainage systems;
    - Establishing vegetation (grass/shrubs, etc.) in accordance with an established planting plan.

63. On completion, the stockpile sites will be graded to conform to the adjacent topography and re-vegetated. The sediment ponds downstream of the stockpiles will be removed on completion of the works, unless it is determined that they should be remain because of any established ecology.

64. Work will be undertaken to ensure that all remaining stormwater systems required for the long-term management of stormwater on site are in good working condition, any new works required constructed, and all stormwater infrastructure no longer required is removed. Any excess sediment will be removed from the stormwater ponds and the ponds left in a condition whereby they can operate with minimal attention.

65. All facilities not required during the landfill aftercare period will be removed. Such facilities will include:

- Bin exchange area facilities;
- Site office;
- General plant maintenance workshop;
- Removal of any leachate storage or other facilities no longer required.

66. It is proposed that all site roading remain in place unless the adopted long-term use for the site requires some alteration to the roading system.

67. Aftercare activities comprise:

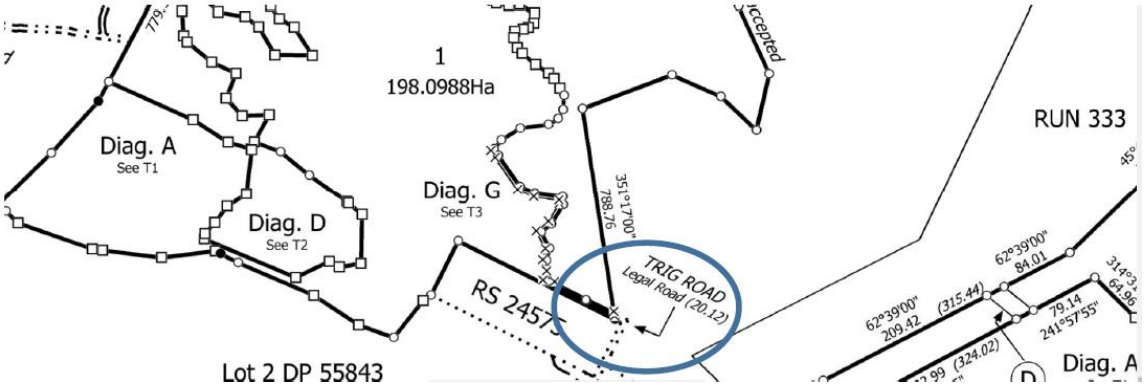
- Ongoing operation and maintenance of the LFG extraction and treatment system;
- Ongoing operation and maintenance of the leachate collection, treatment, and disposal system;
- Maintenance of the site stormwater systems;
- Maintenance of the landfill cap, including filling any areas that may have been subject to differential settlement, repair of any surface erosion and maintenance of vegetation as required;
- Maintenance of any remaining site infrastructure, including fences and the like;
- Ongoing environmental monitoring as required by consents;
- Any reporting required by consents;
- Responding to contingent events as set out in the Landfill Closure Plan.

Landfill Operations

Access and vehicle movements

68. Material will be transported to the site in trucks via existing public and internal private haul roads constructed for the quarrying operation. It is expected that an average of 100,000 tonnes of landfill material will be received per year, being split consistently throughout the year. This means that on average 400 tonnes per day, or 2000 tonnes per week will be received at the landfill. Between 15 and 20 trucks per day are expected to be required for this maximum volume of material.

69. The access road from the quarry to Trig Road is located within the legal road boundary or covered by easement. Although some cadastral information available in the public domain does not ideally show the legal road boundaries traversing all the way to the site, the title plan for the site shows the legal corridor of Trig Road as a pecked line terminating at the site boundary. This can be confirmed if required.



70. Any trucks accessing the operational face of the landfill that will then travel on public roads will travel over a wheel wash with containment trap to ensure no contaminated material leaves the land fill site. Material from the containment trap will be cleaned out as required and returned to the land fill.

71. In addition to heavy vehicle movements there will be additional light vehicle movements due to the additional staffing required to operate the landfill, and also additional contractors to service the landfill plant. Total vehicle movements per day will equate to a daily average of 48 movements directly attributed to the landfill operation activities, as per the following table.

Table of vehicle movements per day[1]				
Proposed average vehicle movements with landfill				
Generator	Volume per day		Vehicles	
	Tonnes	Loaded trucks	Heavy movements (one truck in and out = 2 movements)	Light movements (one car in and out = 2 movements)
Land fill material[2] coming into the site	444	20[3]	40	8
Total proposed vehicle movements per day				48

72. The traffic movements outlined in the Application summarise the average movements per day, but there will be occasions when traffic movements will be greater than the average. For heavy vehicle movements there could be short term increases under the following circumstances that could see peak movements increase by up to 50%, such as:

- A large demolition project with tight time constraints
- A major land remediation project

[1] Based on 45 working weeks per year x 5 days per week = 225 working days per year
[2] Allowing for 100,000t total material per year/225 working days = 444t per year
[3] 22t per load

- Response to a civil emergency

73. For light vehicle movements there could be a short term increase under the following circumstances that could see peak movements increase by up to 100%, such as:

- A major equipment breakdown requiring specialist contractors onsite
- Major construction works associated with cell development
- Events to which visitors have been invited

74. In the circumstances outlined above, it is expected that peak movements will be as summarised in the table below;

Table of peak vehicle movements per day		
Proposed peak vehicle movements with landfill		
Generator	Heavy Vehicle	Light Vehicles
Landfill material coming into site	60	16
Total proposed peak vehicle movements per day	76	

75. The existing quarrying consent RC185244 has conditions limiting the light and heavy traffic vehicle movements, and while that is a stand-alone consent the combined vehicle numbers are assessed in the table below;

Table of peak vehicle movements per day from quarry and landfill traffic		
Proposed peak vehicle movements with landfill		
Generator	Heavy Vehicle	Light Vehicles
Quarry (under existing consent RC185244)	125	6
Landfill	60	16
Total proposed peak vehicle movements per day	207	

76. The upkeep of Trig Road is maintained via a written agreement between the Applicant and Council's Roading Manager. It is proposed that the agreement remain as a living document subject to the satisfaction of the Council's Roading Manager. Any effects, including costs, of the additional traffic movements proposed on the roading network are already fully addressed by the Applicant in the road maintenance agreement between WQL and the Council's Roading Manager.

77. Further details of how effects relating to the traffic movements can be avoided are summarised as follows:

a. A Transport Management Plan (TMP) will be prepared by a suitably qualified person and submitted to WDC Manager of District Plan Implementation for approval within 12 months of the date of this consent. The TMP shall include (but not be limited to) the following measures:

i. A one-way routing plan for all trucks to and from the south (via Waimakariri Gorge Bridge) to the site to minimise conflicts (including vehicles associated with RC185244);

ii. Heavy vehicles departing from the site south, over Waimakariri Gorge Bridge, will first turn left onto Woodstock Road from Trig Road, before turning right onto Harmans Gorge Road. At the end of Harmans Gorge Road, heavy vehicles will turn right onto Depot Road.
iii. No restrictions on heavy traffic along Woodstock Road, except as required by the one-way routing plan
iv. No restrictions on light vehicle movements associated with the activity
v. A restricted heavy vehicle speed limit of 60km/h on Waimakariri Gorge Road, Harmans Gorge Road, Trig Road and Woodstock Road (between Harmans Gorge Road and Trig Road) (see condition 43 below re truck speed);
vi. Internal management protocol to manage traffic along Trig Road through the 'dip' section; and
vii. Limited hours of operation, including only trucking from: 7am to 6pm Monday to Thursday, 7am to 5pm Friday, 7am to 11am Saturday

b. The consent holder shall update the Road Maintenance Agreement, held between the Applicant and WDC, to include the following;
   i. Upkeep of Trig Road between the Site access and Woodstock Road; and
   ii. Upkeep of Woodstock Road (unsealed section from Trig Rd intersection).

c. The written agreement shall be signed and executed by both parties prior to this consent being given effect to.

d. The consent holder will record the number and type of vehicle movements to and from the site on a daily basis. This record shall be made available to the Waimakariri District Council on request.

e. The consent holder's Site Manager will be responsible for the monitoring of quarry and waste haul truck speeds through the truck's GPS systems, where fitted, on a random basis. These speed records will be retained for up to 6 months and made available to Council (upon request).

f. The consent holder will ensure that the Agreement between the Consent Holder and the owners of the quarry and waste haul trucks requires the truck owners to provide speed data of its trucks, and have appropriate disciplinary procedures in the event of repeated non-compliance of speed limits.

g. Any complaint regarding excessive speeds will be investigated by the Consent Holder and the Council will be provided with the following details within 14 days of the complaint being received by the Consent Holder:
   - The details of the complaint (including the date and time of the complaint / issue, location of excessive speed and haulage company involved).
   - The outcome of the investigation.
   - The outcome of any resulting disciplinary procedures.

h. The Consent Holder will upgrade the intersection of Woodstock Road, Trig Road and Waimakariri Gorge Road to include the following;
   - extending the culvert by 1m on the north-east corner
   - install a sight rail in accordance with WDC Engineering Code of Practice Standard Drawing 600:241 (issue B).
   - minor reshaping followed by resurfacing of the intersection with argillite, across the width of the intersection

i. The Consent Holder will upgrade Trig Road as follows;
   - widen Trig Road to 7m in width from the intersection with Woodstock Road to the site access
   - widen the first bend north of the intersection with Woodstock Road, Trig Road and Waimakariri Gorge Road
   - position a 'road narrows – both sides' sign on both sides of the dip
   - remove trees on the inside of the bend where the dip is located
   - maintain tree trimming on the inside of the bend where the dip is located for on-going visibility
   - incorporation of dust control measures as deemed necessary

j. The Consent Holder will resurface the unsealed portion of Woodstock Road east of Trig Road, with argillite.

k. The Consent Holder will upgrade the western corner of the Depot Road/Harmans Gorge Road intersection to meet WDC Engineering Code of Practice Standard Drawing 600:262A (Issue F), including localised widening.

l. The Consent Holder will upgrade the western corner of the Waimakariri Gorge Road/Harmans Gorge Road intersection to meet WDC Engineering Code of Practice Standard Drawing 600:262A (Issue F), including localised widening.

m. A 'stop' control sign on the site access to Trig Road shall be installed.

n. The vehicle crossing to the site (on the northern side of Trig Road) shall be ungraded to meet WDC Engineering Code of Practice Engineering Code of Practice Standard Drawing 600:217 (Issue D), except that only the west side requires upgrading to include a 7m radius and taper on the inside bend. The gate and boundary fence shall be relocated on both sides of the crossing.

78. There is one residential property that relies on Trig Road for access to a dwelling, numbered 402 Trig Road. The vehicle crossing to the dwelling is north (beyond) of the vehicle crossing to the WQL access. This property benefits from the upkeep and maintenance of Trig Rd by WQL. What would be a local metal road maintained to rights of way standard (to provide access to one dwelling) is capable of carrying truck and trailer units and graded more regularly than a rural metal local road would normally enjoy. The formation and maintenance of Trig Rd by WQL allows two vehicles to pass comfortably.

79. The operation of the proposed activity will not be undertaken on public holidays and shall be limited to the same hours as the existing quarry operations, being:

Transport operations

- Between the hours of 7am and 6pm Monday to Thursday
- Between the hours of 7am and 5pm Friday
- Between the hours of 7am and 11am Saturday (excluding public holidays)

Quarry and landfill operations

- Between the hours of 6am and 8pm Monday to Friday
- Between the hours of 7am and 12pm Saturday (excluding public holidays)

Landfill gas management

80. The National Environmental Standard for Air Quality requires landfill gas (LFG) to be collected and combusted to minimise its greenhouse gas effect. It is anticipated that gas production from the material to be deposited in this landfill will be minimal. However, provision has been made for inclusion of a gas collection system and this will be installed as a matter of course during landfill construction. Monitoring and testing for gas production will be done regularly. Should gas be produced it will then be flared off. A draft LFG well and reticulation layout is shown on Drawing F5.

81. Condensate from the gas collection system will be drained back to the landfill and/or trapped and treated as leachate.

Environmental management and monitoring

82. Management of adverse environmental effects during quarrying, construction and operation of the landfill will be achieved through compliance with conditions to be imposed on the consents. Proposed conditions have been prepared by the applicant for both the District and Regional applications and provide for management of the quarry and landfill activities such that potential adverse effects on the environment will be avoided, remedied or mitigated. A key component of ensuring the conditions of consent are implemented is the Landfill Management Plan.

83. Ongoing monitoring of ground and surface water quality will be done in accordance with the Landfill Management Plan. Monitoring of leachate and groundwater discharges will be required to ensure the liner is functioning as expected and leachate is not entering the subliner drainage system and subsequently the stormwater system.

84. Air quality will be maintained by implementation of methods to ensure dust creation is minimised, that no more than 5% putrescible materials are accepted, and that any gas produced is flared off.

Management of Beech Forest and Lizard Habitats

85. There are no Significant Natural Areas listed in the Operative District Plan or the Proposed District Plan over the site. The mapped SNA (Vegetation and Habitat site V159) is located to the east of the site and is identified as the Oxford Conservation Area.

86. The vegetation cover type within the WQL site has a Threatened Environment (TE) classification of 6. TE class 6 indicates >30% of this vegetation cover type is remaining and >20% is under protection. Consequently, this vegetation cover is not considered threatened.

87. Prior to the commencement of landfill physical works, an Ecological Impact Assessment (EcIA) will be completed by a suitably qualified ecologist in the areas where habitat is to be removed for landfill physical works. An Indigenous Vegetation Restoration Plan (IVRP) will also be prepared by a suitably qualified ecologist. The IVRP will focus on the re-establishment of the indigenous black beech forest type as a compensatory measure for the temporary loss of this significant ecological value.

88. The ecology assessment undertaken for the applicant indicates no lizards were found during a limited manual habitat search within the site. It also points to the quarry expansion area as being potentially suitable for lizard habitat. A pre-clearance survey will be completed prior to habitat removal in the landfill footprint to determine if there are lizard populations present, and if there are, an Indigenous Fauna Management Plan will be completed to determine action required. Any lizard preclearance survey or management plan would be carried out under a Department of Conservation Wildlife Act Authority.