

Tasman District Council  
Private Bag 4  
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Attention: David Stephenson - Utilities Assets Engineer

Dear David

### **Non-Financial Elements Review of the Joint Venture Strategy**

Nelson City Council (NCC) & Tasman District Council (TDC), aim to reach agreement on a joint landfill strategy between the York Valley Landfill and Eves Valley Landfill. A financial review has been conducted by MWH to evaluate a number of joint landfill management scenarios. The financial review concluded that a joint single landfill option provides the most economic solution for solid waste management across the two councils. However, prior to a final decision being made, the Councils have requested a review is undertaken of the non-financial aspects of such a strategy. In a letter from the TDC Chief Executive to the NCC Chief executive dated 10 July 2013 the non-financial aspects to be considered is thought to include:

- accounting for carbon
- neighbourhood and reverse sensitivity issues
- traffic flows
- externalities
- Iwi
- resilience and redundancy
- natural disasters
- management, executive and political relationships
- alternative use of savings
- operational maintenance and governance issues
- consenting risks

In addition to these aspects we consider that environmental risk factors associated with ongoing landfill development should also be considered.

A number of these factors are subjective in nature and are therefore difficult to assess in a quantitative fashion. Some however, such as the cost of carbon and environmental risk factors, can be assessed as part of a financial assessment (ie the costs associated with mitigating the risk of an environmental impact or cost associated with clean up after an incident has occurred). It is noted



that associated with these aspects that can be assessed financially there is also a subjective, reputational / public perception aspect.

Tonkin & Taylor (T&T) has been engaged by TDC, on behalf of TDC & NCC, to conduct the review of the non-financial aspects. This letter outlines the findings of this review and is intended to provide background information for a discussion with the Councils and T&T on 24 September 2013.

## 1 Approach

In order to provide a framework for assessing the non-financial aspects we have undertaken a qualitative risk assessment of the two facilities and the likely changes to these risks associated with a joint single operation at either facility. To facilitate this approach, a list of questions was posed to the Councils for each of the landfills. Responses were then reviewed and potential risk elements were further assessed to determine if those matters could be mitigated based on the existing landfill management practices, or if further management would be required. These risk elements were then ranked with regard to risk to assist in identifying which site had more issues to overcome in order to continue operations with the least added effort.

## 2 Findings

A summary of characteristics for each of the sites based on information provided by the Councils is detailed in **Table 1-1**.

### 2.1 Site similarities

There are a number of similarities between the sites as follows:

- Both sites currently accept similar volumes of waste. Therefore, should waste be transported to a single landfill the void space consumption would effectively be doubled. This is expected to occur initially, however as waste minimisation efforts take effect it is anticipated that the tonnage will decrease with time.
- Both sites commenced operations around similar periods.
- Both sites have no public access.
- Both sites accept similar waste types including domestic, commercial and some hazardous waste.
- Both sites are built in valleys and at similar proximity to sensitive receptors. However there are a greater number of existing neighbours at York Valley.
- Both sites currently use cover material won on site, however there is likely to be a shortfall at both sites in the future.
- Both sites have similar geological challenges with York Valley in close proximity to faults at the head and toe of the landfill.
- Both sites have leachate and stormwater challenges, particularly during high rainfall events.
- Both sites have similar rainfall, generate similar volumes of leachate and, at times, struggle with leachate management.
- Both Councils contract out operations of the landfill.
- Both sites have received a small number of complaints.
- Both sites have similar number of environmental monitoring points.
- There are no particular difficulties in regard to landfill design for the sites.
- Both sites are designated.

- Both sites have good relationships with Iwi and the wider community.

## 2.2 Advantages and disadvantages

Based on a review of available information, the following advantages and disadvantages of each site have been identified:

**Table 2-1: Advantages and disadvantages of each site**

Eves Valley Landfill	York Valley Landfill
<b>Advantages</b>	
<ul style="list-style-type: none"> <li>• Site holds less consents, 3nr (compared to 7 for York Valley) thereby potentially simplifying consent compliance.</li> <li>• There are no fault lines in close proximity to the site.</li> <li>• Although additional traffic flow associated with a single facility would have a more significant relative increase than York Valley the infrastructure is specifically designed for heavy vehicles and therefore likely to be able to cope with the increase</li> </ul>	<ul style="list-style-type: none"> <li>• Site is 1.5 times larger than the Eves Valley Landfill and therefore has potential additional capacity.</li> <li>• Currently consented for 35 year through to 31 December 2034</li> <li>• The site has only received one complaint in relation to odour in 2000.</li> <li>• Additional traffic flow associated with a single facility is relatively minor in comparison with surrounding traffic flows.</li> <li>• A landfill gas management system is operating at the site and the collected landfill gas is used to fuel boilers at the Nelson Hospital. Therefore, likely to pay fewer levies on carbon emissions.</li> </ul>
<b>Disadvantages</b>	
<ul style="list-style-type: none"> <li>• The site has to commence consent renewal process soon to allow operations to continue once current consent expires 1 October 2015.</li> <li>• Access is restricted during high rainfall events and in the past has prevented access to landfill for refuse disposal.</li> <li>• Leachate is discharged to stormwater ponds during extreme events. Leachate odour at downstream discharge point.</li> <li>• LFG passively vented to atmosphere.</li> </ul>	<ul style="list-style-type: none"> <li>• Landfill is unlined and has the potential for leachate contamination of the surrounding area at some point in the future. Although it is noted that the landfill was consented in this way it is likely as a result of tougher requirements that future consents will require a liner.</li> <li>• Geology mainly comprises Port Hills Gravels and there are number of fault lines in close proximity to the head and toe of the landfill.</li> </ul>

## 3 Risk assessment

An assessment of the risks identified for each of the disadvantages associated with the landfills has been undertaken based on AS/NZS ISO 31000:2009 Risk Management – Principals and Guidelines.

### 3.1 Risk characterisation

The level of risk associated with any given event at the site is assessed by considering:

- The likelihood of a particular event occurring; and
- The severity of the particular event’s impact, should it occur.

To assess the likelihood of an event occurring and the resultant risk associated with an impact, the following assessment criteria has been adapted from a typical risk assessment matrix.

The probability of the risk being realised is based on its likely or expected occurrence. Five levels have been chosen to describe the probability of the risk occurring and are detailed in **Table 3-1** below.

**Table 3-1: Likelihood descriptors**

Level	Indicator	Frequency (It is noted that this includes near misses as well as actual events)
A	Almost Certain	The unwanted event has occurred frequently in the order of 1 or more times per year and is likely to reoccur within 1 year.
B	Likely	The unwanted event has occurred infrequently; occurs in order of less than once per year and is likely to reoccur within 5 years.
C	Possible	The unwanted event has happened at the facility at some time, or could happen within 10 years.
D	Unlikely	The unwanted event has happened in the facility at some time, or could happen within 20 years.
E	Rare	The unwanted event has never been known to occur in the facility, or it is highly unlikely that it will occur within 20 years.

The consequences and impacts of each risk is an event where to occur, are detailed in **Table 3-2** below.

**Table 3-2: Hazard effect descriptors (severity)**

Level	Description	Hazard Effect (Potential Impact)
1	Severe	Death, substantial offsite impacts to broader environment, long-term environmental damage, extensive clean up required, complete failure of environmental protection controls.
2	Significant	Hospitalisation required, offsite impacts to a segment of the environment, medium-term environmental damage, offsite clean up required, breach of environmental legislation.
3	Moderate	Medical attention required, some offsite, temporary impacts, moderate onsite impacts.
4	Minor	First aid required, minimal onsite impacts immediately contained, no discernible offsite impacts, no external complaints received.
5	Negligible	No health impacts, negligible offsite impacts, no offsite impacts.

The level of risk is a combination of the likelihood of a risk occurring and the consequence of it occurring. The risk ratings adopted for the risk assessment are detailed in **Table 3-3** below.

**Table 3-3: Risk Ratings and broad action approach required for each rating indicator**

		Consequence				
		5 Negligible	4 Minor	3 Moderate	2 Significant	1 Severe
Likelihood	Almost Certain (A)	H	H	V	V	V
	Likely (B)	M	M	H	H	V
	Probable (C)	L	M	M	H	V
	Unlikely (D)	L	M	M	H	H
	Rare (E)	L	L	M	M	H
Risk Level		Guidelines for Risk Matrix				
V		Very high risk, immediate action required				
H		High Risk, management required from senior CRJV staff; check monthly				
M		Moderate Risk, specify required management, check every three months				
L		Low Risk, manage with standard operating procedure; check annually				

### 3.2 Risks identified

Risks (disadvantages) associated with the landfills have been identified, and where possible, mitigation measures as described in the Landfill Management Plan or informed by the Councils have been applied. The mitigations measures include actions that are not currently being taken but could be to reduce the risk. The risk ratings have then be revised based on the mitigation measures, where possible. In addition, the risks associated with operating a single joint venture landfill have been identified.

**Table 3-4: Risks identified for Eves Valley Landfill**

Risk Element	Likelihood	Severity	Risk rating without mitigation	Current and future mitigation measures	Revised risk rating following mitigation/ Comments
a The site has to commence consent renewal process soon to allow operations to continue once current consent expires 1 October 2015.	A – almost certain to occur should landfill continue operating	2 – Not renewing consents will result in a breach of consent	<b>Very High</b>	Consents have been obtained in the past with few submitters. Relationships with iwi and wider community are well maintained. Although likely to go through a hearing, the consent is likely to be approved.	<b>Low</b> Cost implications of consenting process to be considered.
b Access is restricted during high rainfall events and in the past has prevented access to landfill for refuse disposal.	A – likely to occur annually during high rainfall events	2 – site cannot operate, waste needs to be redirected	<b>Very High</b>	Current practice is to wait for rain to ease. However a bridge or culvert could be constructed to provide continuous access.	<b>Low</b> Subject to construction of bridge or culvert. Cost implications.
c Poor leachate and stormwater control particularly during high rainfall events. Leachate is discharged to stormwater ponds during extreme events.	A – likely to occur annually during high rainfall events	2 – offsite discharge is in breach of consent	<b>Very High</b>	Additional storage and/or reduced generation required to better manage leachate. Works being planned and expected to be completed in 18 months.	<b>Low</b> Subject to construction of additional measures. Cost implications
d LFG passively vented to atmosphere without treatment increasing carbon liability.	A – likely to occur	4 – no discernible offsite impacts, however increases ETS obligations	<b>High</b>	LFG extraction required once Stage 3 commences filling. Potential for gas to be supplied to the Eves Valley Sawmill to fire wood kilns.	<b>Moderate</b> NES does not require controls, at this stage, however there are likely to be cost implications with ETS.

**Table 3-5: Risks identified for York Valley Landfill**

Risk Element	Likelihood	Severity	Risk rating without mitigation	Current and future mitigation measures	Revised risk rating following mitigation/ Comments
<p>e Landfill is unlined creating potential for leachate to impact on groundwater.</p>	<p>B – Likely over the life of the landfill</p>	<p>2 – offsite impacts and breach of consent</p>	<p><b>High</b></p>	<p>Sub soil is considered transitional rock and as such provides low permeability to ground water sources. While York Valley is located in an area with low sensitivity to leachate contamination the landfill management plan was developed based on a precautionary approach by limiting the disposal of liquid and hazardous waste. Continue regular monitoring of downstream groundwater to check for contamination. Additional measures could be undertaken including construction of a piggy back liner, cut off or extraction if contamination proved to be a problem.</p>	<p><b>Moderate</b></p> <p>Subject to ongoing monitoring and installation of additional measures if contamination detected.</p>

Risk Element	Likelihood	Severity	Risk rating without mitigation	Current and future mitigation measures	Revised risk rating following mitigation/ Comments
f There are number of fault lines in close proximity to the head and toe of the landfill which puts the landfill at risk of impacts from earthquakes.	E – highly unlikely to occur within 20 years	3-4 – Minor to moderate severity Fault at toe of landfill is not active, but fault at head of landfill is active (Bishopdale Fault). Based on small size of fault, unlikely to cause a significant rupture and expect minor ground shaking.	<b>Low - Moderate</b>	Inspections following an earthquake are described in the Landfill Management Plan.  Develop additional contingency measures if required.	<b>Low</b>  Further design measures and contingency planning may be required.

**Table 3-6: Risks identified for single Joint Strategy Landfill**

Risk Element	Likelihood	Severity	Risk rating without mitigation	Mitigation recommended	Revised risk rating following mitigation/ Comments
a Changes to operation with increased filling rate, and potential follow on effects with management of increased leachate.	A – almost certain to occur	2 – poor management would lead to offsite impacts and breach of consent	<b>Very High</b>	Develop whole of life plan for the landfill including design and operational changes that would need to be implemented and training of staff to cope with management of a larger site.	<b>Low</b> Subject to development of a landfill management plan.
b Reduction in regional redundancy in disposal options (ie under current conditions waste from one can be diverted to the other in an emergency).	C – possible	3 – delayed disposal while normal operation restored	<b>Moderate</b>	Contingency planning to be included in the Landfill Management Plan	<b>Low</b> Subject to development of a landfill management plan
c Option 4 - Disposal of approximately 2,500 tpa special / hazardous waste into a single landfill increasing risks associated with managing special / hazardous waste	A – almost certain to occur	4 – offsite impact, breach of consent	<b>Very High</b>	The Landfill Management Plans for both landfills states that as a rule, no hazardous waste will be accepted at the site, but provides management strategies for management of hazardous waste. Therefore, re-consenting likely to be required and plan for increased costs associated with separately managing special / hazardous waste. In addition, hazardous waste placed on its own can potentially increase the potential for off site impacts as the other waste is not available to “absorb” the hazardous components.	<b>Moderate</b> Subject to review of waste disposal practices and potential impacts.

Risk Element	Likelihood	Severity	Risk rating without mitigation	Mitigation recommended	Revised risk rating following mitigation/ Comments
d Increase in traffic affecting local amenity and onsite operations	B – offsite and onsite impact likely to occur	4 – no discernible offsite impacts due to increase in traffic	<b>Moderate</b>	On site management of increased vehicle movements can be managed with appropriate planning. Consideration should be given to hours of operation given the proximity to resident. Offsite impacts to YVL are considered minor based on relative contribution of vehicle movement although would need to consider congestion and immediate neighbourhood. Impacts to EVL would be more discernible due to lower traffic count in the area, however there are few receptors in the area that could be affected.	<b>Low</b> Subject to management of traffic movements
e Potential for increased difficulty in consenting of, or more onerous consent conditions for, Eves Valley Landfill in the future if the facility is required.	C - possible	4 – increased cost and time to consent with possibility of more onerous compliance requirements	<b>Moderate</b>	Plan consenting process well in advance (potentially a 5 year lead time).	<b>Moderate</b>

## 4 Discussion

There are a number of similarities between the two sites, and the key advantages and disadvantages have been identified. The disadvantages have been considered potential risk matters that have been further assessed to determine if they can be mitigated to an acceptable level using current practices. Recommendations have been made where further mitigation measures are required. Consideration has also been given to how the site could handle a 2 fold increase in filling rate. A summary of the assessment for each site, and a single operation, is provided below.

### 4.1 York Valley Landfill

There are a number of advantages associated with the continued operation of the York Valley Landfill with the main points being that the site is larger, is consented for a longer term and is considered to be well managed in accordance with its consent requirements.

One key difference between the two sites is the proximity of the York Valley Landfill to both Nelson City and Richmond, the likely majority waste source. The proximity to the city and hence population can be considered an advantage or disadvantage. The disadvantage being that the landfill is closer to sensitive receptors. The site is situated in a predominately rural area with a large quarry not far from the site, which includes a cleanfill operation. This is likely to restrict the development of residential dwellings for a significant period in the future. However, records show that the facility has been operating with relatively low impacts to neighbouring receptors and only one odour complaint in 2000. The Landfill has almost no visual impact with screen planting to the front of the site and vegetated hills in the immediate surrounds.

Being closer to urban areas has the advantage of reducing transport time hence reducing the carbon footprint of the waste disposal operations. Filling the site sooner before the population expands and encroaches within the landfill buffer would serve the community better rather than returning to the site sometime in the future when reverse sensitivity effects could be more adverse and planning issues would be more difficult to mitigate.

There are high traffic movements along Market Road with 2,300 vehicle movements per day, servicing the residents in Bishopdale and the landfill. On average 50 vehicles access York Valley per day. 22 heavy vehicle movements are expected to be diverted from Eves Valley. This would result in a 1% increase in traffic movements along Market Road by the landfill. However, traffic congestion may need to be taken into account and management of traffic movement times implemented.

The identified risks of the York Valley Landfill can be mitigated by further design of the site to ensure that future cells are lined in accordance with good practice as well as assess the hydrogeology of the site to better understand the potential impacts of leachate on groundwater. The proximity to fault lines is a concern, however based on information from GNS Science, only the fault line at the head of the landfill is active. The severity of an earthquake near the landfill is expected to be minor considering the small size of the fault line. In addition, it is unknown when an earthquake is likely to occur. The presence of the Eves Valley Landfill provides some redundancy should the York Valley Landfill be decommissioned due to a severe earthquake. This benefit would be lost however if the consents for Eves Valley were not renewed. We understand that the consenting process has commenced. Consideration will need to be given to the potential for the consents to lapse should waste be diverted from Eves Valley to York Valley.

## 4.2 Eves Valley Landfill

The key advantages of the Eves Valley landfill is that the newer stage has an HDPE lined base, the groundwater table is below the base of the landfill and there are no known fault lines in the vicinity of the site therefore no additional design requirements would need to be considered.

The site resource consent is due to expire in 2015 which means that the consent renewal process needs to commence by the end of this year. The consenting process could take up to a year taking into account consultation and potentially a Council hearing.

The Eves Valley Landfill is generally well managed and complies with its consents the majority of the time. The key risks for this site are with regard to high rainfall events preventing access to the site, management of leachate and stormwater, and landfill gas collection. Based on recent rainfall events restricted site access potentially occurs at least once a year. Further design around the ford to allow access to the site during high rainfall events would be required. We understood that this is relatively straightforward and a bridge or culvert would be relatively simple to constructed.

High rainfall events have resulted in leachate discharge to stormwater ponds and offsite trucking of leachate. Additional storage and/or treatment should be considered for better onsite control. Planning for leachate management takes considerable time and would need to be implemented as soon as practicable. We understand that this process is underway.

Expansion of the landfill gas extraction system would be required including an upgrade to an active system for treatment (flaring or to fuel wood kilns). Further planning would be required to upgrade the landfill gas system sooner than expected with the increased filling rate.

## 4.3 Single landfill operation

Risks associated with operating a single joint venture landfill has been considered in **Table 3-6**. Key issues are around operational changes with regard to an increased filling rate, consenting requirements in relation to changing the site operations, management special / hazardous waste and a dedicated facility (if Option 4 selected) and impacts of traffic movements.

Overall, the risks can be managed through careful planning. Should waste be diverted to a single landfill, operations cannot remain at status quo. Consideration needs to be given to a change in operations to take into account an increase capacity including training of operators to cope with the increased load, review of leachate and landfill gas control measures, and availability of daily cover material. Contingency planning will also be required for waste management in the event that the landfill is not able to accept waste.

Option 4 considers the option of maintaining operation of Eves Valley for special / hazardous waste disposal. Disposal of special / hazardous wastes adds complication to the operations of the site and increases potential impacts to the environment when handled on its own. For the site to accept special / hazardous wastes, a new resource consent application would need to be lodged although this could be dovetailed into the current consenting process for Eves Valley.

A single landfill would result in increased traffic movements to the selected sites. This may be less of an issue for York Valley where the traffic count is relatively high as Market Road services a number of residents in Bishopdale. The relative contribution of traffic from Eves Valley is considered minor (1%). Amenity effects on the residents, noise, vibration and congestion may need to be considered further. We also note that York valley has received 50,000 tonnes per annum without any specific adverse affects being noted.

At Eves Valley, the Eves Valley Road mainly services the landfill and the Eves Valley Sawmill with high volumes of heavy vehicles along the first 1.5km. These roads are specifically designed for heavy

traffic movements so are unlikely to be a problem but congestion may need to be considered further. Traffic disturbance to this immediate area is considered minimal. However, there is potential for traffic impacts further upstream should heavy vehicles travel through Stoke and Richmond.

## 5 Applicability

This report has been prepared for the benefit of Tasman District Council with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Tonkin & Taylor Ltd

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**Table 1-1**

**Table 1-1: Summary information for the Eves Valley Landfill and York Valley Landfill**

Potential Risk Identified	Response for Eves Valley Landfill (TDC)	Response for York Valley Landfill (NCC)
<b>Operational Elements</b>		
1) Site area	42 ha	65 ha
2) Opened	1989	1987
3) What is the site designated for?	Sanitary	Sanitary
4) Licensed to accept	Household/ domestic refuse Commercial and industrial refuse excluding hazardous (depending on degree of hazard) No car bodies or whiteware	Domestic, commercial, industrial and some hazardous.
5) How long was the process of consenting? Were there any particular issues to address or overcome? Was a hearing required during the consenting process. If so, how many submissions were there and did the submitters present their case?	Consent application lodged 6 June 1997, notified August 1997, designation amendment recommended January 1998, consents granted August 1998.  Heard by Derek Shaw, Commissioner. <u>Five submissions received</u> , three relating to discharge consents. Peter Wilks, northern neighbour opposed to gas flaring due to fire risk; Tim King, southern neighbour concerned about vermin at landfill, requesting baiting or trapping; Public Health Service supported proposal, endorsed management plan requirement and asked for measurement of gas quantities. Carter Holt Harvey concerned of additional planting and additional fire risk. PF Olsen supported proposal for planting and fencing maintenance.	Consent granted for 35 Years from 25 November 1999.  Heard by commissioner. Submitters presented. <u>20+ submitters</u> supported by legal Counsel and civil engineering specialist.

Potential Risk Identified	Response for Eves Valley Landfill (TDC)	Response for York Valley Landfill (NCC)
6) What is the annual tonnage at this site and expected future tonnages?	<p>30,771 tonnes in the 2012/13 year and 29,872 tonnes in 2011/12, which consumed 29,450m<sup>3</sup> (2012/13 survey results are not yet finalised). AMP forecasts 1.05% growth p.a. (in parallel with population growth), in waste, which has largely happened although special waste and flood waste in April 2013 has increased volumes.</p> <p>Air space consumption 35,000 m<sup>3</sup> pa.</p>	<p>38,400m<sup>3</sup> airspace consumption per annum.</p>
7) Are there any reasons waste tonnages could change e.g. waste policies, other landfills, diversion, etc.	<p>Hazardous Waste likely to be in the order of 2,500 tpa with 1,600 tpa from TDC and 900 tpa from NCC should one landfill close.</p> <p>Key considerations are out-of-region waste (essentially Buller, 2000-3000 tonnes p.a., currently at NCC) and consideration of increased kerbside recycling and processing. Outcome of landfill negotiations would influence Council's minimisation approach.</p>	<p>Improved waste minimisation.</p>
8) What is the estimated life of the landfill?	<p>Stage 2 = 2018 (currently consented top level RL110, consent to lift top level currently being considered)</p> <p>Stage 3 (yet to be consented) – estimated capacity 800k to 1.6M cu.m, which would extend life to between 2034 and 2053.</p> <p>Further potential stages 4 and 5.</p>	<p>37 years at 38,400 per annum (approximately 20 years if operated as a joint single facility)</p>
9) Who are the site operators? What is the relationship with the contractors? How long do the operations contracts have to run?	<p>Council manages the site, contracts operations to Fulton Hogan through NZS3910 contract. Current contract in process of extension to 2016.</p>	<p>Nelson City Council. Contracting operations out. Monitoring contracted out to professional consultants.</p>
10) What daily cover material is used at the site, and at what cost?	<p>150mm Moutere clay excavated on site and waste sawdust as available. Cover is won from within footprint and included in Landfilling contract rates. Close to running out of easily winnable cover and likely to need further</p>	<p>150m (sawdust, cleanfill or cover material from site). Material won on site is likely to run into deficit.</p>

Potential Risk Identified	Response for Eves Valley Landfill (TDC)	Response for York Valley Landfill (NCC)
	40,000m <sup>3</sup> in next three years (assuming a closure in late 2016). This material would be won from an adjacent gully. Future stages would win material from Stage 3 or other locations on site.	
11) What are the current areas of temporary, intermediate and final capping?	Stage 1, total cover: 3.9ha Stage 2 final cover: 1.0 ha (front face) Stage 2 intermediate cover: 2.1 ha Stage 2 daily cover approx. 0.2 ha	3.5ha
12) Are there any particular difficulties with location of the site in regard to topography, hydrology, fault lines?	Three main gullies within a larger valley. There are no fault lines within 5-6km of the site. <u>Access to site restricted in very high rainfall events.</u> "Landfill stream" flows to Eves Valley Stream, which flows to O'Conner Creek. Redwoods rural water supply is taken from shallow bore adjacent to O'Conner Creek.	Nil. Dr Johnson: Port Hills gravel- transitional to a rock. Silty claybound gravel – not very permeable. Johnson raised no geological concerns. Fault at toe of landfill is not active, but fault at head of landfill is active (Bishopdale Fault). Based on small size of fault, unlikely to cause a significant rupture and expect minor ground shaking.
13) Ability to respond to emergency situations e.g. fires, natural disasters, etc	July 2012 Activity Management Plan identified this as a potential high risk issue. The Landfill Management Plan described emergency response procedures and including how to handle surface and deep fires. Included are prescriptive measures for hazardous waste spills, and contingency measures for landfill gas leachate and stormwater system failures.	The Landfill Management Plan describes emergency procedures and methods to combat fires. A number of inspections are described following an earthquake.
14) When was the landfill management plan last revised?	February 2010 by MWH	October 2011.
15) Aftercare use	Ongoing waste management or light grazing.	Open green space.

Potential Risk Identified	Response for Eves Valley Landfill (TDC)	Response for York Valley Landfill (NCC)
<b>Design Elements</b>		
16) Geology of the site including proximity to known faults and insitu permeability	<p>See Annual Report 2012, section 4.2:</p> <p>The geology in the area consists of clay-bound <u>Moutere Gravels</u>, a late Pliocene formation greater than 1,000 metres thick.</p> <p>The Moutere Gravels are characterised by numerous rounded to well-rounded rocks of greywacke sandstone, up to 0.4 metres but mostly less than 0.2 metres across, in a low permeability, brown silty-clay matrix.</p>	<p>Dr Johnson did not consider that there are issues around geology or in-situ soils that can be considered problematic. <u>For development of valley three and four he considered that there are engineering mitigation that can be affected to mitigate earthquake risk.</u> Sub soil is considered transitional rock and as such provides low permeability to ground water sources. While York valley is located in an area with low sensitivity to leachate contamination the landfill management plan was developed based on a precautionary approach by limiting the disposal of liquid and hazardous waste.</p> <p>Mr Jacobsen, Engineering specialist: There are no aquifers underneath these gullies.</p> <p>MJL: Geology around site is <u>Port Hills Gravels</u> from the Pliocene at 1 - 2 MPA. Mainly comprising soft rock bound with clay, silt and sands with lenses of silt stone.</p>
17) Depth to groundwater? What are the local uses of the groundwater?	<p>Refer section 4.2, section 7 and Table 7-1 and Figure 7-3 of 2012 Annual report. Groundwater level is below base of landfill (Fig 7 cross section). <u>Approximately 4.3 to 4.5 m deep at toe of landfill.</u></p> <p>No known local uses of groundwater within 1km. Rural water take from groundwater 9.3km downstream.</p>	<p>Groundwater levels are approx. 5-10m above base of landfill. Monitoring shows some minor impact on GW.</p> <p>Groundwater flow from south to north/NE and NW.</p> <p>There are no known local groundwater users downstream of York Valley.</p>
18) Are there any particular difficulties with design of the landfill that need to be allowed for e.g. steep walls, available space, obstructions, geology, etc.	<p>No particular difficulties. Generally cut to fill cover, with material available on-site. May need to relocate stormwater and leachate pond for Stage 3.</p>	<p>N/A. Design already implemented.</p>

Potential Risk Identified	Response for Eves Valley Landfill (TDC)	Response for York Valley Landfill (NCC)
19) Has the site been designed to manage leachate, landfill gas and surface water?	<p>Leachate and stormwater ponds provided on-site. Stormwater cut-off drain above Stage 2. Combined leachate drainage and gas venting network.</p> <p>Current stormwater and leachate ponds will need upgrading.</p> <p>On-site cover material requires floc treatment in stormwater ponds, but these do not eliminate discolouration.</p>	<p>Leachate collected at base of the valley floor into a leachate collection system and piped to the sewer system. Council maintains a secondary leachate collection as part of consent condition D (17).</p> <p>Leachate is minimised by placement of cover materials with sufficient clay content to minimise rainwater infiltration.</p>
20) What is the liner design?	<p>HDPE liner in excavated portion of base only. Gully sides unlined. Slotted PVC drain located under liner, drains to surface water.</p>	<p><u>Site is unlined.</u></p> <p>Location, design and management plan minimises risk associated with leachate. Dr Johnson: Port Hills gravel formation – silty claybound gravel with low permeability.</p>
21) How is leachate collected and disposed of? What is the current leachate generation rate?	<p>Leachate drains to pond and thus to urban wastewater network. Current estimates of leachate are approximately 20% of rainfall on total site.</p> <p><u>Leachate control and disposal is an issue particularly during high rainfall events.</u></p> <p>Leachate generation is approximately 16,220 m<sup>3</sup>/yr.</p>	<p>Leachate is collected at the base of the original valley floor into a leachate collection system and piped into sewer system. Section 2.2.3 of Management Plan.</p> <p>Leachate management and installation of extraction network is conducted in an adhoc manner only in problem areas.</p> <p>Leachate generation rate is approximately 12,600 m<sup>3</sup>/yr.</p>
22) How is landfill gas managed on the site? Is there any beneficial reuse? What is the current collection rate? (m <sup>3</sup> /hr)	<p>Gas vents to atmosphere via chimneys at 50m centres. No quantity data collected.</p> <p>Not required to collect and treat gas as total landfill capacity is &lt;1Mm<sup>3</sup>.</p> <p>Potential for gas to be supplied to the Eves Valley Sawmill to fire wood kilns.</p>	<p>Landfill gas collection system was developed in 1999 and upgraded in 2005 to allow for pumping of gas to fuel boilers at Nelson Hospital. Average 250m<sup>3</sup>/h.</p> <p>Energy for Industry manages landfill gas extraction system and pays NCC for use of LFG harvested from the landfill.</p> <p>With introduction of ETS, from 2013 this site will pay fewer levies on methane emissions.</p>

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		Organic treatment facility may impact on landfill gas generation.
23) What limitations or issues are there with regard to managing leachate and landfill gas?	In large rainfall events leachate exceeds pump and pond capacity and is tankered off site. In extreme events leachate discharges to stormwater pond. Additional storage and/or reduced generation required to better manage leachate. Some complaints in recent years regarding leachate odour at downstream discharge point.	None that NCC is aware of.
24) What is the average annual rainfall at the site?	970mm	980mm
<b>Environmental Elements</b>		
25) What consents are held at the sites?	<p>Consents for:</p> <ul style="list-style-type: none"> <li>• NN970271 Discharge into water</li> <li>• NN970272 Discharge into air</li> <li>• NN970122 Discharge onto land</li> </ul> <p>Designation in place for landfill area, amended in 1998.</p> <ul style="list-style-type: none"> <li>• Discharge to land increased from 20,000 t.p.a to 40,000 t.p.a in 2006.</li> </ul>	<p>975261 - A: Water permit - divert stormwater.</p> <p>975261 - B: Water permit – dam stormwater.</p> <p>975261 - C: Water permit – leachate and groundwater discharged to sewer.</p> <p>975261 - D: Discharge consent – municipal waste and leachate onto land.</p> <p>975261 – E: Discharge consent – discharge contaminated stormwater to York Valley.</p> <p>975261 – F: Discharge consent – discharge landfill gasses.</p> <p>975261 – G: Discharge consent – discharge contaminants in stormwater into York Valley.</p> <p>As amended: No. 015033, No. 055044, No. 05343 and 065160.</p>
26) Expiration of consents	1 October 2015 for all consents	31 December 2034
27) How stringent are the resource consents?	Site holds 3 resource consents. Does not appear onerous with standard requirements for monitoring and reporting. Consultant provides	Site holds 7 resource consents. Conditions are prescriptive and do not appear particularly onerous, although there are a number of conditions to check

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	assistance in compliance monitoring.	compliance against. As the site is located closer to the city conditions could reflect Consultant provides assistance in compliance monitoring.
28) Are there any sensitive environmental or cultural receptors that have the potential to be affected by the site (eg waterways, wetlands, wildlife habitats sensitive biota or fauna, ancestral land, historic significance)	None known. Receptors were considered during consent process. Refer to decision of consultation with iwi.	Assume any significant receptors were considered during consent process.
29) Number of monitoring points	9 LFG 7 GW 4 SW 1 Leachate	Leachate: 10 Groundwater: 8 Surface water: 2. Stormwater: 1. Landfill gas: Monitoring system consisting of three elements.
30) How has the site been complying with consent conditions? Provide a compliance register. If not, what conditions have been in breach and why.	<u>Some difficulty in complying. Key issues are high leachate flows and stormwater quality (as per 2011 and 2012 storm events accounted in the incident reports). SW pond exceeded ammonia consent limits during storm events when leachate was discharged into SW pond.</u> Other issues include technical matters (such as guideline values for groundwater contaminants). Variations to consents currently be considered, further discharge consents are being sought. Refer section 12 of 2012 Annual Report.	Complaint register: One compliant received in 2010. All compliance issues are reported annually in Annual Monitoring Report. Even though the site is unlined there is currently only some minor impact on groundwater. There is bund at toe of the landfill which possibly extends further north to the access road which contains leachate within the waste.
31) Would an increase in traffic movements affect the area? Provide current and historic traffic counts.	Effect likely to be small. Eves Valley sawmill located on same road with high volumes of heavy vehicles for first 1.5km. Last 800m of public road is alongside saw mill and limited rural dwellings (three or less). AADT weekday = 727 AADT weekend = 192	Traffic count 2007: 2,300 traffic movements per day along Market Road. On average 50 vehicles access York Valley per day. Expects 8 loads per day from TDC should Eves be closed.

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	<p>Heavy vehicles = 33%</p> <p>Traffic count after turnoff to landfill = 68 (assume weekday), therefore ADDT weekday = 659 (217 HV)</p> <p>Approximately 22 HV movements per weekday.</p>	
32) How is the relationship with community/ iwi? Has consultation been conducted before and what was the feedback? Is there a community liaison group? If so, how active is it?	<p>No liaison group. Reasonably good relationship with immediate neighbours. Normally updated with annual newsletter and additional telephone calls / visits as required. Southern neighbour Cr King who recently sold neighbouring land to Council – positive working relationship. Mr Wilkes to north generally positive manages forest on landfill land. Mr Buschl on north, sometimes difficult relationship with litter issues. Good working relationship with CHH. Consultation in person with neighbours two years ago. Generally positive. <u>Generally good working relationship with iwi</u>, meet monthly on wide-ranging issues. No specific recent issues with landfill.</p>	<p>No liaison committee. Sniff committee is managed by Environmental Inspection Services – an agency that conduct consent compliance inspections on behalf of NCC consents team.</p>
33) Has a complaints register been kept? Please provide a copy.	<p>Received small number of complaints (1-2 complaints per year) over the last 3 years with regard to litter and birds.</p>	<p>Only one complaint received regarding odours in 2000.</p>
34) Are there any amenity issues with regard to odour, dust or noise?	<p>Mainly small plastic bag litter to north following strong south-westerlies, noise issues in the past with reversing beepers on plant – since resolved.</p>	<p>Not and that we are aware off.</p>
35) What is the buffer distance to the closest resident/ sensitive receptor?	<p>750m SW, 800m NE</p> <p>New house moved to 400m from south site boundary in last 12 months.</p>	<p>356m</p>
36) What is included in the District and Regional Plan with respect to the site?	<p>Site is designated</p>	<p>Site is designated</p>