



21 January 2016

Bay of Plenty Regional Council
c/- Harrison Grierson Consultants Ltd
PO Box 336
Whakatane 3158

Attention: Tim Fergusson/Brendon Love

Dear Sir

Re: Proposed Kopeopeo Canal Remediation – Construction Noise from Revised Remediation Method

As requested, we have carried out a noise assessment in relation to the revised method to remediate the Kopeopeo Canal in Whakatane.

The revised method is to use a cutter suction dredge which travels on a barge along the length of the canal. The cutter suction dredge sucks sediment from the canal and pumps it along a pipe to the containment sites. At the containment site, excess water is removed and pumped back to the canal. The remaining sediment is treated at the containment site.

The proposed methodology is expected to significantly reduce noise emissions, since excavation noise from excavators and trucks is virtually eliminated.

1.0 Existing Consent - Construction Noise Performance Standards

The existing Consent granted by Whakatane District Council contains conditions relating to noise. These are set out below:

- 5.1 Construction work shall be carried out in general accordance with the recommendations set out in the report prepared by Design Acoustics and dated 25 October 2012.*
- 5.2 Noise associated with construction activity shall comply with the limits recommended in, and shall be measured in accordance with, NZS6803:1999 Acoustics – Construction Noise*

5.3 Prior to the commencement of construction activities on the sites, a Construction Noise Management Plan shall be submitted to the Whakatane District Council. The Plan shall outline the range of activities, equipment, their potential noise levels and any noise mitigation/management measures that will be implemented to ensure compliance with the above conditions. The Plan shall include requirements to monitor noise emissions and include a log for registering and dealing with any complaints regarding noise. Separate Construction Noise Management Plans may be prepared for Season 1 and Season 2 works.

The existing Consent provides the 'permitted baseline' in relation to noise from the remediation works, that is, noise shall not exceed the noise limits specified in the NZ Construction Standard NZS6803:1999. These noise limits are widely adopted throughout NZ and are considered to provide a good control for construction noise. The preparation of a noise management plan is good practice to help ensure compliance with the noise limits, by adoption of the best methods to mitigate and manage noise emissions. We included a draft of a Noise Management Plan with our original noise assessment.

The earthworks and processes associated with the original proposal would have involved the use of large diesel powered vehicles such as excavators and trucks. The revised methodology will significantly reduce these kinds of activities and on this basis there is likely to be a positive benefit to neighbours. While no change to the noise limits of the original Consent is proposed, the revised methodology is expected to reduce noise emissions and therefore compliance with the noise limits will be achieved with a greater margin of safety and any noise effects for the neighbours will be reduced.

For your information, the following is provided as per our original report dated 25 October 2012. This sets out the noise limits which would apply at residential/rural dwellings and at industrial/Commercial properties.

1.1 Noise Received at Residential and Rural Dwellings

Table 1 of the Standard specifies the following noise limits in relation to noise received at dwellings within the Rural Zone. These are as follows:

Recommended Upper Limits for Construction Noise Received in Residential Zones and dwellings in Rural Areas

Time Period	Weekdays (dBA)		Saturdays (dBA)		Sundays and Public holidays (dBA)	
	Leq	Lmax	Leq	Lmax	Leq	Lmax
0630-0730	60	75	45	75	45	75
0730-1800	75	90	75	90	55	85
1800-2000	70	85	45	75	45	75
2000-0630	45	75	45	75	45	75

The above noise limits apply for 'typical' duration of construction work; this is defined as work which is carried out at any one location for more than 14 calendar days but less than 20 weeks. In our opinion, this is appropriate since work carried out at the western end of the canal, for example, would not affect dwellings at the eastern end of the canal, approximately 4 km away.

The Leq noise limit relates to 'average' noise emissions over a representative time period (usually 15 minutes to 1hour) whereas the Lmax limit places limits on 'maximum' noise levels from 'single events' such as impacts ('bangs' etc).

1.2 Noise Received at Industrial or Commercial Properties

The Construction Noise Standard also provides noise limits to control noise received at Commercial or Industrial properties. These are as follows, again for 'typical duration' of construction work:

Recommended upper limits for construction noise received in Industrial or Commercial areas for all days of the year.

Time Period	Leq (dBA)
0730-1800	75
1800-0730	80

As such, the same noise limit of 75 dBA Leq applies during the 'daytime' period between 7.30am and 6.00pm as for residential zoned properties. A higher noise limit of 80 dBA Leq applies during night time since industrial/commercial properties are not generally occupied during night time hours and sleep disturbance is not an issue.

There are no Lmax noise limits which apply at commercial or industrial properties at any time of the day.

2.0 Noise Sources and Predicted Noise Levels

The new methodology involves the use of a 'cutter suction dredge' to excavate sediment from the canal bed and pump it as a slurry (via a sealed pipeline) to the containment sites. At the containment sites the slurry is treated with a flocculent to help separate the water from the sediment, and then pumped into large geotextile tubes ("geotubes") for dewatering.

As for the original proposal, the canal would be divided into sections, using sheet piling, to create weirs in order to slow the movement of water in the canal. However, the number of sections will be significantly reduced from the original proposal, and therefore the number of sheet pile dams/duration of piling noise will be reduced. Further, the latest proposal will not require earth dams at each end of the remediation zone, and associated excavation noise.

The remediation will commence at the western end and head eastwards. Although the remediation work will be in the same general area for a few weeks and, in some cases will be near to rural dwellings, we consider that the noise limits for 'Typical duration' of construction work will apply to work in each area. That is, it is expected that work will be carried out for less than 20 weeks at any one location.

We have based our assessment on noise from our own measurements of similar kinds of plant and equipment, as well as noise data contained in the Construction Noise Standard NZS6803:1999. The predicted noise levels are our best engineering estimates since actual sound emissions from items of equipment to be used on the site are not known. This depends on the Contractor who is

selected to complete the project and their chosen machinery and construction methodology.

In general, noise sources associated with the plant/activities can be grouped broadly as follows:

- Small scale earthworks to create flat platforms for pipes/pumps and other plant, as well as access tracks for staff and maintenance vehicles.
- Sheet piling associated with construction of weirs within the canal.
- A cutter suction dredge, ideally located on a barge floating on the canal, will suck sediment from the bottom of the canal and transport it via pumps/pipes to the containment site.
- At the containment site, the sediment will be treated with flocculants to assist with dewatering the fluid – the water will be pumped back to the canal.
- The sediment will be treated at the containment site.
- The weirs will be removed once the canal has been remediated.

The area is relatively flat and the topography is unlikely to provide any significant screening of plant or equipment. However, the cutter suction plant located on the barge may be partially or wholly screened by the banks of the canal or buildings in some instances.

There will be attenuation of sound over distance to the nearest dwellings and this includes attenuation from ground cover, and absorption by air. Wind conditions during the day will affect noise levels received at dwellings however, our predictions are for 'zero-met' conditions which are under calm conditions with no positive or negative effect from wind direction.

As noted above, actual equipment to be used is not yet known, and the following are our findings are based on our best engineering estimates of the noise from the cutter suction dredge and associated plant:

- At all dwellings, noise from the operation is likely to safely comply with a 70 or 75 dBA Leq noise limit. This applies between 7.30am and 8.00pm Monday to Friday, and 7.30am to 6.00pm on Saturdays. Noise levels are predicted to be 5-10 dBA lower than originally estimated, due to the quieter remediation process.
- It is likely that at dwellings which are 150m or more from the cutter suction dredge, that compliance with the daytime and night time noise limits will be achieved, and a full 24-hour operation can be considered.
- At dwellings within 150m of the cutter suction dredge, for example dwellings at the western end (southern side of Kope Drain Road) and eastern end (along Keepa Road) it is unlikely that a full 24-hour operation can occur, since a stricter 45 dBA limit applies during the night time period. However, this will be investigated during preliminary selection/start-up of the remediation works.

- In the central area (eg. Shaw Road to Keepa Road) there are commercial and industrial zoned properties (eg Gateway Industrial Area) and a higher noise limit of 80 dBA Leq applies during night time. In this area, operation of the cutter suction dredge can be carried out during the day and night time and comply with the relevant noise limits.
- The removal of excavation and truck movements, associated with the canal excavation of the original proposal, will significantly reduce noise emissions. Our best engineering estimate is that noise levels from the proposal will typically be 5-10 dBA lower than the original consented proposal. A 5 dBA decrease is a clearly noticeable decrease and a 10 dBA decrease sounds 'half as loud'. The character of the noise is likely to be less intrusive for the neighbours in that there will be less variation in noise level (eg diesel driven trucks and excavator noise – revving, impacts, rattles etc.). By comparison, noise from the cutter suction dredge, pump/motor assemblies etc. is expected to be at a more constant/lower level without these kinds of 'intrusive' characteristics.
- Noise from any booster pumps which may be required to assist with transport of water is unlikely to be an issue with careful selection and location of pumps. As a preliminary specification, pumpsets that produce no more than 60 dBA at 7m distance should be selected to ensure compliance with the night time noise limit, assuming the pump is located at least 50m away from any dwelling.
- Other activities will still occur as per the original proposal. For example, weirs are likely to be constructed using sheet piles. However, as noted in our original report, soft ground conditions are expected and piles are unlikely to be hammer or vibratory -driven. It is expected that sheet piles can be pushed into the ground by pressure from a long-reach excavator bucket. In addition, the revised proposal uses fewer weirs than the original 'minor bunds'.
- As for the original proposal, the bioremediation of the sediment at the containment sites will not be a significant noise-producing activity. There may be some movement of sediment within the site associated with addition of lime, wood chips, bacteria and fungal spores to the sediment. There will be no changes to the location of the containment sites, however the design of the earth bunds and internal layout of the sites is likely to change slightly. This is not expected to significantly affect the overall scale or duration of the earthworks activity at each site. Noise from these activities will safely comply with the construction noise limits and unlikely to cause disturbance to rural or industrial neighbours.

3.0 Conclusions and Recommendations

We have carried out a further noise assessment in relation to the revised method to remediate the Kopeopeo Canal. We consider that noise from the equipment and activities will comply with the Construction Noise limits at the nearest rural dwellings, or commercial/industrial properties along the length of the route.

We recommend the noise consent conditions which were specified in the Consent should also apply to the revised method. This includes preparation of a construction management plan and compliance with the Construction Noise Standard.

We consider that a 24-hour operation is feasible but care would need to be taken with selection of machinery/activities. As a preliminary guide, a separation distance of approximately 150m between the dredge and the nearest dwellings is likely to be required for a full night time operation.

In conclusion, we consider that noise from the proposed Kopeopeo Canal remediation will comply with the Construction noise limits. The revised method provides significant benefits in relation to noise received at neighbouring residents and we consider that any noise effects will be less than minor.

We trust this information is satisfactory. If you have any queries or require any further information, please do not hesitate to contact us.

Yours faithfully,
Design Acoustics Ltd

A handwritten signature in black ink, appearing to read 'Tony Windner'.

Tony Windner
Director