

STOCKTON PLATEAU HYDRO SCHEME - S92 REQUEST FOR ADDITIONAL INFORMATION

West Coast Regional Council Information Request

Section A - General Information

1. WCRC Request:

The proposal includes comment that HDL are applying for a land swap with DoC. The land proposed for the land swap appears to offset the terrestrial ecology effects of the proposal. One of the major effects of the proposal is the effect to the loss of heritage values. Has similar offset been considered in terms of a land swap (see also heritage information request as overlap)

Provide an update on land swap with Doc or concession.

1.1 HDL Response

The Westport area office have completed their report assessing the values of the land to be exchanged, with this assessment encompassing historic values. The area office report is currently being assessed by DoC technical staff in Hokitika. Once finalised, assessment of the land exchange proposal will continue, with DoC advising that the final decision can be expected by June (Ian Gilbertson. pers.comm).

The project's effects on the formation of the electric loco are the only effects which can be described as loss of heritage value. The project will affect 3% of historical waypoints noted on the site, will destroy 3% of the formation of the electric loco line and will inundate 10% of the formation. The effects are minor, not major as stated. The application provides offset of the minor effects by improvements in adjoining sections of the formation not affected by the project.

2. WCRC Request:

Some mitigation such as relocating Charming Creek walkway have not been mentioned in the application or AEE yet are in the supporting technical documents (Appendix J).

Is the applicant proposing that the mitigation included in the technical reports be included in the application? Provide clarification about what mitigation is proposed. This may be best provided by way of draft conditions which the councils can consider.

2.1 HDL Response:

The application and AEE defines the mitigation that is proposed. Suggested mitigation measures in the technical supporting documents have been considered by HDL and adopted where appropriate. In the first instance, HDL has re-designed the hydro scheme to mitigate effects on users of the Charming creek walkway and residents at Hector/Ngakawau townships. Potential adverse effects have been avoided by the selection of rolled compacted concrete (non erodible) dam construction materials.

HDL anticipates that consent conditions will require the dam structures to be designed, constructed and maintained in accordance with NASOLD Dam Safety Guidelines for high potential impact dams.

3. WCRC Request

Granity Water Supply - Granity has no formal community water supply scheme with most allotments connecting into private water supplies from creeks coming of the escarpment. The BDC is uncertain as to which properties are associated with the scheme that may be affected by the proposal. The AEE states that an alternative water supply would be supplied.

Confirmation of the properties that would be affected if an alternative water supply would be required. What are the options for alternative sources given the AEE states that there would be no interruption of supply for parties concerned?

3.1 HDL Response

Approximately 20 properties are served by the water supply that feeds into the header tank on the Millerton track, commencing with S Chorley's property (94 Torea St) down to the Granity Fire station on both sides of Torea Street.

The water supply is fed by one of the numerous springs that arise from the slope debris along the escarpment behind Granity. These springs have been tapped into by Granity residents for domestic water supplies for as long as the settlement has been established. Intakes are located in response to changes in flow and are the subject of dispute within the community.

HDL will capture a spring in a similar manner and will establish a storage tank to supply water for tunneling purposes.

There are no construction works to be undertaken in the immediate vicinity of the water supply header tank on the Millerton Track or any other intake. The construction activity referred to in the AEE that may impact on the Millerton Track supply is construction of the Granity Tunnel. There is a possibility that construction of the portal may alter spring flows in the immediate vicinity of the portal. In this event any affected supply will be connected to HDL's water supply until such time as an alternative intake is established. There will be no disruption of water supplies.

The following condition of consent is proposed:

In the event that existing water supply intakes are disrupted by the proposed construction activities at Granity the Consent Holder will provide alternative water intakes of equivalent quality and flow rate.

4. WCRC Request

Disposal of silt from the silt traps at the reservoirs is likely to be to SENZ's waste dump sites. Sediment removal from the collector tunnels is to be disposed of initially in the SENZ area and it is suggested that when they have closed down there will be little sediment deposited. While that may be the case it is not certain and it would be prudent to have designated disposal sites and consents to place sediment and debris from tunnel traps in them.

Confirm whether agreement from SENZ has been obtained to use their waste dump sites.

4.1 HDL Response

The source of sediment is from mining activities or from land disturbances caused by natural events. Undisturbed land and rehabilitated mining areas do not produce significant quantities of suspended sediment in other than extreme events.

Silt traps at the schemes diversions will collect sediment that has bypassed the sediment controls established to control the effects of mining, which are subject to performance based conditions of consent. SENZ has indicated that it will accept this material back into the active overburden dumps after drying at the silt storage sites specified in the application. The volumes are insignificant compared to total material dumped during active mining operations.

Mine closure is conditional on mine rehabilitation achieving acceptable water quality, including total suspended sediments. The sediment storage areas included in the application are expected to provide sufficient volume to store sediment captured in the traps post mine closure (c 2030). Additional consents will be sought for additional dump areas if volumes of sediment movement are greater than expected post closure, due to unforeseen events such as a natural disaster or failure of a rehabilitated surface.

5. WCRC Request

The AEE states that any temporary stormwater control measures will be designed for a 2 year event however, it is not clear how stormwater from permanent access roads will be managed.

Confirm how stormwater from access roads will be managed. What is the rationale for designing stormwater control measures to cope with a 2 year event only?

5.1 HDL Response

Stormwater control from all construction activity will be managed in accordance with Auckland Regional Council's TP 90 "Erosion & Sediment Control Guidelines". The 2 year design criteria is appropriate for temporary diversion drains within a construction site where the effects of overtopping are contained within the site.

Post construction, stormwater from the project's permanent roads will be directed into water tables and into the project's sediment traps and reservoirs with no effect on waterways. Stormwater from DoC or SENZ roads used by the project will be directed to the existing stormwater controls already established for this purpose.

6. WCRC Request

Level of assessment undertaken on the impacts of putting emergency discharge into Granity Creek if the ocean outfall cannot be used. The AEE states that an emergency discharge would be up to $9\text{m}^3/\text{s}$, smaller than freshes that pass down the creek. Is there any potential effects of scouring of riverbanks and bridge supports. It is noted that the northern end of Granity beach erodes along the river mouth in certain wave patterns and that erosion protection was required.

What information is there to prove the discharge would be smaller than a fresh? What measures does HDL propose to ensure that the discharge does not cause scour or erosion in the creek? What would be the effects of an emergency discharge if Granity Creek was already in high flow during high tide?

6.1 HDL Response

The following table (KML 2006) details the flood hydrology of the Granity Stream tributaries, Upper Miller Stream and Upper Granity Stream. The peak flow from the emergency outfall is less than the annual flood of either tributary and as stated in the AEE will be similar to the small freshes which occur each year.

Flood flows which exceed the annual flood determine stream bed armouring, geomorphology and bank and pier scour. The peak flow from an emergency spill will not disturb the natural armouring

of Granity stream channel and will be contained within the stream bed.

The probability of emergency discharge at the same time as the passage of the flood peak is extremely low and is considered insignificant, adding around 10% to the flow volume over a short duration. Tidal effects do not extend above high water during flood flows.

The processes of scour at the stream mouth are determined by flood flows and wave action and will not be affected by an emergency discharge.

		Upper Mine Creek	Mine Creek @ Ngakawau	Upper Miller Stream	Upper Granity Stream
		MI-F4	MC1	MI-F2	MI-F1
Factor	m ³ /s/km ²	12.2	10.5	10.5	10.5
Catchment area	km ²	1.609	6.665	1.37	2.928
Annual flood	m ³ /s	19.6	69.9	14.3	30.7
1:5 AEP flood	m ³ /s	23.7	84.7	17.4	37.2
1:10 AEP flood	m ³ /s	26.8	95.7	19.6	42.0
1:20 AEP flood	m ³ /s	28.9	103.1	21.1	45.3
1:50 AEP flood	m ³ /s	33.0	117.8	24.2	51.7
1:100 AEP flood	m ³ /s	36.1	128.9	26.4	56.6

HDL does not believe any mitigation is required for an emergency discharge and proposes the following condition of consent.

The consent holder shall be responsible for the structural integrity and maintenance of all works associated with the exercise of the consents and for any erosion control and energy dissipation works which become necessary as a consequence of these consents.

7. WCRC Request

A number of temporary and permanent structures and diversions are required to enable construction of the project, for example: temporary diversions in Darcy Stream, Mangatini Stream and Mine Creek and temporary culverts in Weka and St Patrick Streams; and permanent culverts in Sandy Creek. No design criteria (eg. culvert sized for 1 in 10 year event) have been provided to demonstrate that they will be of sufficient capacity.

Confirm design parameters of the structures and diversions.

7.1 HDL Response

The AEE states that the culverts under the dams required for temporary diversion of the Weka and St Patrick Streams during dam construction will have a capacity for a 10 year flood event (see Section 8.9.1 of AEE)

The temporary diversions associated with the installation of the intake structures within Darcy Stream will be required for no more than the few days required to install precast intakes onto the raise bored intake tunnels (drilled from inside the tunnel). The installations will take place during dry conditions when stream flows are low and there is a clear weather forecast. The temporary diversion will be formed from sandbags that will divert low flows to one side of the stream channel.

The weirs within Mangatini Stream and Mine Creek incorporate a sluice culvert which will pass 5

cumecs. This flow is exceeded less than 10% of the time in Mangatini Stream and less than 5% of the time in Mine Creek. The weirs will be built during the Stockton dry season (Feb/March). The installations will take place during dry conditions when stream flows are low and there is a clear weather forecast. Stream flows will be temporarily diverted around the sluice using sandbags that will divert low flows to one side of the stream channel.

The culvert that passes Sandy Creek beneath the realigned haul road will be designed to pass 30 cumecs, which is the maximum flow expected to be diverted through Mine Creek diversion, (approximately 20 year flood in Upper Mine Creek and exceeding the 100 year flood in Sandy Creek).

8. WCRC Request

Ocean Outfall - The AEE notes that the probability and extent of the plume cannot be predicted by the model and that field trials would be required to determine if a plume would be visible from Granity. Section 107(1)(c) means that the council cannot grant a discharge permit that after reasonable mixing will give rise to certain effects. The extent of the plume needs to be determined to enable the effects on the receiving environment to be assessed.

Comment on how, in the absence of modelling information, a reasonable mixing zone can be determined?

8.1 HDL Response

Some general discussion on mixing zones may help answer this query. Below is a modified excerpt from the NZ Wastewater monitoring guidelines (Barter & Forrest 2002) which deals with mixing zones in general, followed by some specific comments on the HDL outfall.

Some general discussion on mixing zones may help answer this. Below is a modified excerpt from the NZ Wastewater monitoring guidelines (Barter & Forrest 2002) which deals with mixing zones in general, followed by some specific comments on the HDL outfall, prepared by Cawthron.

Mixing Zones

The RMA requires that any standards imposed through classification or section 107 is met after “reasonable mixing”. Zones of reasonable mixing are areas of transition within which classifications do not apply. They are effectively zones of non-compliance. From a practical viewpoint standards can only apply after reasonable mixing of any contaminant or water with the receiving water, disregarding the effect of any natural perturbation. The area within which this mixing occurs is called a “zone of reasonable mixing” or “zone of initial dilution (ZID)”. This “zone of reasonable mixing” provides for the mixing of discharges with receiving waters. Some further mixing could still occur outside of the zone as long as the effects in section 107(1) of the Resource Management Act 1991 do not occur and the relevant water quality classification standards are met.

In general, it is not intended that the size of a zone of reasonable mixing be tailored to the volume and nature of a discharge, but rather that the volume and nature of a discharge fit the standards and criteria in accordance with regulatory framework (e.g. Regional Council’s Coastal Plan). The zone of reasonable mixing depends on:

- the rate of discharge and concentrations;
- the physical configuration of the outfall or structure from which the discharge is emitted;
- the depth, current velocity and direction, and the rate of turbulent mixing of the receiving water;
- and

- Ambient concentrations in the receiving water.

The general requirements for the zone of reasonable mixing are outlined in “Resource Management Ideas No 10 – A discussion on reasonable mixing in water quality management.” (Rutherford, et al 1994) as follows:

- the size of the zone of reasonable mixing should be minimised;
- any adverse effects should be confined to within the zone of reasonable mixing; and
- any adverse effects within the zone of reasonable mixing should be no more than minor

It is anticipated that a discharger, altering the extent to which contaminants or water are discharged into the receiving environment, can control the size of the zone of reasonable mixing. For example, lowering the volume or improving the level of treatment or mixing characteristics, even by a small degree, can produce marked changes in mixing zone specification.

HDL mixing zone

HDL Mixing Zone

In the case of the HDL mixing zone, several factors have yet to be determined (e.g. final effluent pH) which would allow a quantitative assessment of the mixing zone size. Nevertheless, there are a number of ambient environmental factors which, by their nature, constrain the maximum size of a mixing zone in this area. For example, a fundamental aspect of setting mixing zones for coastal environments is that the mixing zone itself should not contact the shoreline. This is usually used in conjunction with a safety factor of some kind (e.g. 2:1) which helps reduce effects from the surf zone among other things.

In the case of the proposed HDL discharge, the diffuser is situated 600m from shore, which would, incorporating the 2:1 factor, equate to a maximum 300m radius mixing zone. This 300m size is commensurate with the volume of the discharge and is similar to other recently consented coastal discharges. For example, in 2005 the Fonterra Clandeboye coastal outfall was granted a 300m mixing zone for an open coastal discharge. In our experience, most of the recently consented coastal outfalls have had mixing zones from 100m to 300m radius and we see this outfall as being no different.

Therefore; the maximum mixing zone size we envisage is 300m from the point of diffusion, but this could be minimized when more detailed effluent quality/quantity information and final diffuser design details becomes available. This is in keeping with the general guidelines (Rutherford et al. 1994) outlined above. Similarly, if it transpires that relevant water quality guidelines cannot be met within this distance, then additional treatment or an alternative diffuser design would be required to ensure that standards can be met.

Section B - Hydrology Information

Context to HDL Response to Hydrology Information Sought

Stockton Plateau is one of the most intensely monitored catchments in New Zealand. Monitoring has been focused on the environmental effects of mining which are now well understood. HDL has had full access to all hydrological records and analysis and SENZ staff have reviewed the hydrology, scheme modelling and water quality reports to ensure consistency with current work undertaken for SENZ. The hydrology that supports this application has supported previous consent applications by SENZ for diversion and hydraulic structures on the same tributaries and has been

found appropriate for the purpose.

HDL proposes to capture all flows at the points of diversion. Assessment of the hydrology of the catchments downstream of the diversions require subjective predictions of the catchment's responses to rainfall. Assessment of residual flows cannot be determined with a high degree of certainty from analysis of just the hydrometric data. The hydrometric data is one input which informs the subjective assessments.

The hydrological methods applied by HDL are the same as applied by SENZ, which are subject to peer review under conditions of consent held by SENZ.

The additional hydrological information sought is not considered material to the application or to the assessment of environmental effects. Much of the information sought relates to the assessment of the hydro generation potential of the project, and indirectly to future project revenue. While of interest, HDL is not proposing a quantum of generation in mitigation of environmental effects.

Information sought on the assessment of peak flows are not relevant to the application. The design criteria for the dams, tunnels and diversions and the assessments of effects of these structures are not dependent on the certainty of the assessment of flood hydrology. In all cases spillway design is not physically constrained and is proposed to pass the maximum likely flood flows, including assessments of uncertainty.

1. WCRC Request

When discussing the effect of the proposed scheme on the tributary and main channel flows it is important that its effect over the entire flow regime is considered; not just its effect on average flow conditions. It is likely that the mean is in effect representative of very little in terms of the actual flow regime. The median flow would have been a better measure – at least from the hydrological perspective. For the statistical summary and analysis to be placed in context it is critical that a full analysis of the flow records and consequently the flow regimes is presented.

Given the nature of the flow regime in the affected catchments, with short high intensity events interspaced by periods of low flow, how appropriate/relevant is the use of mean conditions?

What is the nature and variability of the flow regime? What other measures (e.g. medians) might have been more appropriate from an environmental perspective?

1.1 HDL Response

The mean is considered an appropriate measure for the feasibility design of the project. The water courses are all in bedrock. The ecology of the streams is dominated by water quality not variable flow regimes. The ecological changes that will occur downstream of the diversions are expected to be positive in response to changes in water quality and the reduction in sediment laden flood flows as reported in Appendix D.

2. WCRC Request

The short 4-year periods of hydrometric record from the project area needs to be placed in the wider temporal context. While the application makes no claims that 2006 was average, or even what conditions it represented, this is actually critical when assessing the potential impact of the scheme. Given the strong focus, and more in-depth analysis, of the hydrometric data from 2006 it is critical that this year is placed in context. It would also allow the significance and relevance of 2006 to be highlighted; and therefore whether this was a typical year.

Provide a detailed analysis of the long term flow record for the Ngakawau catchment.

What conditions does 2006 represent?

- How did the rainfall during 2006 compare to other years?
- How typical was 2006?
- Was it distinctive in any way?
- How might this distinctiveness affect the results and conclusions reached?

Compare both the rainfall and flow records from 2006 (perhaps using the Ngakawau records) with the long term temporal record. This would allow more confidence to be placed in the conclusions derived from the analysis of this particular year.

2.1 HDL Response

The 2006 record was selected for hydro generation modeling purposes because it was the most complete, highest quality annual record. 2006 is a comparatively wet year as discussed in Appendix I. This has been taken into account in the scheme economic analysis. All available hydrological data has been considered in determining the hydrological effects of the proposed diversions.

3. WCRC Request

The comparison of synthetic and actual flow data, even using daily average data, shows that the relationship is not good. It is essential, given the extensive use and potential significance of the synthetic flow records that the potential impacts of this rather poor relationship is explored. While it is likely that little can be done to avoid the 'error', it must be recognised; as must its potential effect on the results and conclusions.

Provide comment on the potential effect on the results and conclusions on having used synthetic data.

3.1 HDL Response

Use of synthetic data is required to model hydro potential and the uncertainty has been taken into account in the design of the scheme. Use of synthetic data has no material effect on the conclusions with respect to residual flows and environmental effects.

4. WCRC Request

In the Water Quality and Hydrologic Modelling report when discussing hydrological verification it is stated that the difference is 50%. In fact, the difference is 100% with the modelled data being twice the measured data. This is a significant difference. Its effect on the results and conclusions must be addressed.

Discuss the effect on the results and conclusions due to the difference in the measured and modelled data.

4.1 HDL Response

The design of the project has been based on risk based scenario analysis. Uncertainty in the modeling is recognized and has been taken into account in the design of the project, which has been designed to ensure compliance with ANZECC water quality guidelines at the ocean outfall under a range of likely scenarios. The application further provides for the final design of the outfall to be based on field trials and improved accordingly.

5. WCRC Request

The hydrometric data record is not considered of high quality. Of the three sites discussed missing data account for 14%, 13% and 24% of the record. Of critical importance is 'which part of the record is actually missing'? It is likely that the missing record biases the data by disproportionately missing either the high flows (most likely) or low flows.

What is the effect of these missing data on the statistics derived?

How does it affect the means derived from the analysis?

What are the potential effects of this on the conclusions?

5.1 HDL Response

The hydrometric data record has focused on addressing water quality issues and is less complete and less accurate for higher flows. The effect will be to predict less volume of water available for hydro-generation and to suppress the assessment of base load. Both effects are conservative and have been taken into account in the design of the project.

6. WCRC Request

After providing some discussion of the rainfall and flow variability across the project site it is then argued that gaps in the rainfall record can be filled by substitution. No justification is provided for this approach.

Provide justification for filling gaps in the rainfall record by substitution.

6.1 HDL Response

Substitution of data does not effect the assessment of environmental effects of the proposed diversions. The data will not be used to determine final hydro operating regimes or the specification of hydraulic components of the scheme.

7. WCRC Request

Given the uncertainty of the hydrometric data sets, it is essential that the application (or an Appendix) provides a detailed analysis and quantification of the errors inherent in the analysis. This must then extend to an attempt to quantify the potential effect of these errors on the results and the conclusions. There is considerably more uncertainty regarding the hydrologic impacts of this proposal than suggested in the application. This uncertainty must be quantified if at all possible. At the least it must be recognised and acknowledged.

Provide a detailed analysis and quantification of the errors inherent in the analysis.

7.1 HDL Response

The hydrometric data sets have been exhaustively analysed by SENZ hydrological consultants over many years. HDL has benefited from this work. While the data sets are far from complete they provide an excellent resource to inform the design of the project as regards assessment of environmental effects.

The hydrological impacts of this proposal are clearly stated. The project will capture up to 100% of all runoff from the catchments affected by the diversions. Residual flows will derive from the unaffected catchments downstream of the diversions.

Uncertainty in the prediction of the residual flows and associated environmental effects is

dominated by rainfall distribution and catchment response and will not be resolved by further analysis of the data sets that are available.

HDL believes that the results presented in the supporting documents provide for a conservative assessment of hydro potential and environmental effects.

8. WCRC Request

While considerable emphasis is given to the available flow records no discussion is provided of the accuracy and reliability of the data.

How accurate are the hydrometric data?

Consider:

- how accurate are the rating curves?
- how stable are the curves?
- how do the distribution of gaugings from which the rating curves were derived relate to the flow regime? That is, what were the highest and lowest gauged flows? How do these compare to the highest and lowest flows on record?

8.1 HDL Response

Rating curves are poorly verified at high flows with the result that the stated hydro potential is conservative.

9. WCRC Request

While areal scaling has been used to derive flows for un-gauged catchments it would appear that a straight proportioning approach has been taken. It has been shown, and extensively documented in New Zealand, that areal scaling should involve $A^{0.8}$ rather than area alone. If no justification is provided to the contrary, then a similar approach should have been adopted in the current study.

Provide any justification or use areal scaling that involves $A^{0.8}$ rather than area alone.

9.1 HDL Response

Area alone was considered appropriate given the effects of rainfall distribution.

10. WCRC Request

The application contains very little on the effect of the proposed scheme on the high flow events. It is the extreme events or occurrences, rather than the normal or average conditions that have a critical effect on the stability of the system, potential stress, or the potential for change.

How will the scheme impact on the frequency of flooding and the magnitude of floods? What is the likely effect of this with increasing distance downstream? Will this have a significant affect on the environmental processes downstream?

What is the nature of the flood regime of the various tributaries? How will the scheme impact on these regimes?

10.1 HDL Response

The stream channels downstream of the diversions are all gorges in bedrock descending to the Ngakawau river gorge. The effect of reducing flood flows downstream of the diversions will be similar to the natural effects of rockfalls on streams throughout the West Coast lowland forests. The

vegetation adjacent to the active channel will dominate as forest trash is retained and as acid water affected ecology recovers.

Flood regimes will reduce but not necessarily in proportion to an areal factor. Flood flows from the Stockton Plateau are dominated by areal variations and extent of rainfall.

11. WCRC Request

While some weight is given to the flood mitigating effect of the proposed reservoirs, this effect will reduce over successive floods; unless the storage capacity of the dam is restored between events. While there will be some attenuation of flood events caused by the reservoir, this may be offset by the reduced travel time of any flood wave. This does not appear to have been considered. The potential effect of the reservoirs could be better reviewed by considering the frequency and occurrence of storm events, and how this pattern of storm activity will interact with the operating regime for the reservoirs and power schemes.

How will the pattern of storm activity interact with the operating regime for the reservoirs and power schemes?

11.1 HDL Response

The scheme operating regime will be managed to spill the least volume to maximise power generation but also to minimise AMD reporting to the Ngakawau River. The scheme will be operated by predictive modeling which will include rainfall, reservoir stage, sump capacity and market inputs.

12. WCRC Request

There is no discussion provided as to the effect of the proposal on the low flows of the tributaries, and in particular the effect of flow retention within the reservoirs on the periods and duration of low flows. While short periods of low flow may not be critical to environmental processes, extended periods of low flow can certainly have a significant effect. Of particular importance is the significance and impact of the scheme on the duration and magnitude of periods of low flow. The use of, and focus on, mean flows tends to downplay the potential significance of the scheme on low flow conditions.

Provide comment on the effect of flow retention within the reservoirs on the periods and duration of low flows.

12.1 HDL Response

There is no provision to release reservoir storage to augment low flows. There is very little freshwater ecology in the streams affected by the project. The ecology that recovers as a result of the diversions will be adapted to the low flow regimes resulting from the diversions.

13. WCRC Request

There is very limited analysis of the potential impact of the scheme on channel morphology. No attempt appears to have been made to link changes in morphology to changes in the flow regime of the various streams.

What are the potential effects of the scheme on channel morphology?

13.1 HDL Response

None, refer to Response 10.1 above. The streams flow through bedrock.

14. WCRC Request

While the potential impacts of the proposal will be less with increasing distance downstream, this has not been quantified. It is important that the full potential impact of the proposal is assessed. This includes the dissipation of effects with increasing distance from the site.

What are the effects of the increased flood flows in the Mangatini Stream?

How might these increased flows affect the morphology of the channel? How might this affect downstream users?

14.1 HDL Response

The project does not increase flows in the Mangatini Stream.

15. WCRC Request

The application makes the conclusion that one effect of the scheme may be that the 1:50-year event could become the 1:100-year event. This claim appears to be unsubstantiated. It is, however, highly likely that low flow events will become much more common, and their duration will also increase as a result of the diversion of flow into the scheme.

Provide comment on why the 1:50-year event could become the 1:100-year event.

Note: if it is demonstrated that the scheme would appropriately ameliorate flood flows, it is likely that responses to the above questions would reflect this.

15.1 HDL Response

The effect is that the project will not increase flood risk. The possible reduction in frequency is based on a simplistic analysis and would be storm specific, for the reasons discussed in Section 8.8.3 of the AEE.

The nature of the Ngakawau catchment and distribution of forest to the north and barren coal measures to the south suggests that the effects of the scheme on Ngakawau River low flows will not be as great as proposed in the application. During periods of drought all streams flowing from the Stockton Plateau dry up for extended periods. This is an issue for hydro generation which has led to conservative assessment of base generation.

16. WCRC Request

Given the life expectancy of the scheme, the potential effect of any climate change needs to be considered. The AEE states that more extreme patterns of rainfall will need to be managed and that this will be done by providing storage and increasing power production. However it is not clear whether the reservoir area proposed has accounted for this.

Confirm how potential storage requirements due to climate change have been accounted for within the reservoir areas.

16.1 HDL Response

The application is for the maximum storage that can be practically built at the given locations and incorporates tunnels that have hydraulic capacity far greater than the planned installed generation. This increases cost significantly and would be suboptimal under adverse climate change scenarios.

17. WCRC Request

In terms of sediment control, both during construction and during tunneling, there is no discussion

on the nature of the sediment load, its character, size, and volume. Likewise, there is no discussion as to how this differs from the natural load in the rivers and streams.

Given the limited hydrometric data available, how will the sediment control structures be designed, and what are the contingencies should failure occur?

What would be the potential impact of this material if it was to become ‘uncontrolled’?

17.1 HDL Response

Appendix I of the application covers a brief discussion on sedimentation issues. There is a great deal of knowledge on the characteristics of sediment movement resulting from mining activities, overburden dumps, rehabilitated land and undisturbed land. SENZ is required under conditions of consent to retain the sediment within the coal mining licence area. HDL has included silt traps at all reservoir inputs as a contingency against failure of SENZ’s controls. It is not feasible for coarse sediment to reach the tunnel intake towers.

The sources of sediment are almost exclusively sandstone (exception in upper St Pats) which exhibits very high settling rates.

18. WCRC Request

The sources of sediment within the project area are not discussed in either the application, or any of the appendices. If the sources, volume and character of the sediment changes as a result of the scheme this could impact on channel stability and morphology.

What are the sources of sediment within the project area?

How will the proposal impact on these sediment sources?

Will the proposal create new sources? How will these be managed?

What is the reliability of these management strategies?

18.1 HDL Response

Refer to Response 17.1 above.

19. WCRC Request

Given that most of the sediment moving downstream will be intercepted by the reservoirs this impact on sediment sources and transport processes downstream needs to be considered.

How will this impact on sediment sources and transport processes downstream?

Is the trapping of sediment likely to increase bank erosion downstream?

Does this have any potential to affect the integrity of the dam via head-wards migration?

19.1 HDL Response

Refer to previous responses regarding sources and morphology. Streams of the Stockton Plateau are incised in bedrock. Natural sediment loads are low.

20. WCRC Request

Considerable discussion is provided on turbidity values, and therefore the derived suspended solid

concentrations. However, no data are provided as to the reliability of the conversion from turbidity to suspended sediment; and the potential effects of any error in the calibration on the conclusions reached. Given the likely high concentrations of coal within the flow, this may have a significant effect, and a distinctive effect, which does not appear to have been considered.

With regard to the sediment analysis it would appear that only suspended load is considered.

What is the reliability of the suspended load data – especially given the comment regarding the high percentage of coal; and the reliability of any turbidity to suspended sediment calibration?

How does suspended load relate to total load?

What is the nature and significance of any bedload?

How will the scheme impact on bedload movement?

20.1 HDL Response

The streams are steep mountain streams in bedrock.

The diversions are designed to transport bedload originating upstream of the diversions to the silt traps where it will be recovered. As a result bedload in the streams downstream of the diversions will be interrupted. This will be offset by bedload movement downstream of the diversions as peak flows are reduced.

Section C - Engineering Information

1. WCRC Request

The dam breach assessments have been prepared as a preliminary assessment and are based on dam levels that are lower than those given in later documents (Weka as RL 390 compared to RL 382-384 used and for Mt William RL 575 compared to RL 565-570). The dam breach studies have also been carried out assuming that earth dams will be built where as now it is proposed to use RCC dams. The derived classifications for the earth dam structures is that they are in the high potential impact category and this is not likely to change in any new analysis using the higher lake levels and RCC dam break mechanisms. The dam breach report does not identify the level of effects from the proposed dam heights.

Confirm that, given the differences between the assessment and what is proposed, whether the effects (eg. on the area flooded) would be different from that supplied in the application.

1.1 HDL Response

The dam break study was commissioned at the commencement of the reservoir selection process to determine the potential effects of the release of volumes of water from the Weka and Mt William reservoir sites and to determine the NZSOLD impact category that should apply to dam design.

The study reports the predicted flood effects in the lower Ngakawau River and estuary resulting from sudden removal of a dam. For the purposes of the analysis the sudden removal of the dam has been modeled as rapid erosion of an earth embankment. HDL has concluded that such an event would place users of the Charming Creek walkway at unacceptable risk and would lead to property damage within Hector settlement, similar to that caused by high natural flood flows. As a result, HDL directed that the design and specification of the dams should be based on roller compacted

concrete (RCC) which are most resistant to catastrophic collapse.

2. WCRC Request

The extent of the construction areas (ie footprint) is not clear from the concept drawings. The scale of disturbance beyond the structures (eg. Dam, reservoir, tunnel portal) footprint is necessary to understand the effects of the activities. For example, at the Granity portal the footprint is necessary to determine the potential for instability.

Provide plans showing the extent of disturbance beyond the dam, reservoir and portal structures. Provide a schematic plan that shows the major hydraulic controls of the proposal showing such things as inlets, tunnels, intake tower controls, dewatering sluices, spillways, power stations and sea outfall.

2.2 HDL Response

The majority of disturbance is focused within the upper level of inundation of Weka and Mt William reservoirs. As described in the AEE, additional aggregate will be sourced from excavations within the reservoir footprint, the silt traps will be contained within the reservoirs at the point of entry of waterways and the diversion tunnel portal excavations will be contained within the inundation area. The silt storage areas are immediately adjacent to the reservoirs, as detailed in Plans C-002 and C-004, with run-off to drain into the respective reservoirs. The new roading proposed is approximately 2150m and will be in the order of 6m wide including water tables. The approximately 800m section of the haul road will be built to the same standard as the current haul road. The extent of works at Granity is detailed on Plan C-006 and described in sections 5.9 and 5.10 of the consent application.

There will be some minor disturbance along the outside edge of the embankments required to contain both Weka and Mt William reservoirs and the access roads and silt trap footprints. It is anticipated that the extent of the disturbance will be no more than 2-3 metres beyond the immediate footprint of these structures. The disturbed margins will be rehabilitated by means of direct vegetative transfer, whereby stripped vegetation from within each of the reservoirs will be utilised.

As discussed in the AEE, development of comprehensive engineering designs at the outset of a project is not feasible where the project is one of considerable scale and complexity. In these circumstances it is accepted practice to develop the project to the stage where the effects on the environment can be fully described and assessed, this has been done for the present proposal. The major hydraulic control components of the scheme are all contained within the footprints described in the AEE and are not relevant to the assessment of environmental effects.

3. WCRC Request

No mention is made of the likely operating regime of the new reservoirs, the water level range and the likely annual movement. This will have some impact on shoreline erosion from wave action which should be assessed. This information will also be required for landscape assessment and ecological assessment.

Provide comment on (i) the likely operating regime the water level range and the likely annual movement and (ii) the potential for erosion as a consequence.

3.1 HDL Response

The URS Scheme Modelling Report includes graphs showing modeled variation in water levels in Weka and Mt William reservoirs as applied to the 2002- 2005 and 2007 data for different scheme scenarios. Scenario 13 is most representative of the application.

The perimeters of both reservoirs will be exposed sandstone or granite generally at slope of 10:1 or less, other than a section of the eastern perimeter of Mt William which is formed of sandstone slope debris. This section will be lined with granite or sandstone riprap excavated from within the Mt William reservoir. There is no risk of wavelap erosion or instability caused by varying water levels.

4. WCRC Request

Excavation of Granite within the inundation area is a practical thing to do. However, there is no indication of how much material is going to be required and if the potential resource can supply the required volumes. Typically one would prove a source with at least 1.5 to 2 times the volume required.

Demonstrate that the potential resource can supply the required volumes.

4.1 HDL Response

The URS Concept Design Assessment (Appendix B) states the volume of material required for the project dams and embankments. Figure 5.7 displays an embankment volume curve for Mt William Dam, with a dam level of RL 575 requiring approximately 250,000m³ of material. Figure 5.3 displays an embankment volume curve for Weka Dam, with a dam level just below RL 390 requiring approximately 100,000m³ of material. On this basis approximately 350,000m³ of material will be required to construct all the scheme dams and embankments.

The tunnels will provide approximately 100,000m³ of granite aggregate. Excavation of granite in the bed of the reservoirs to ensure all water drains to the intake towers will provide the remaining aggregate, these borrow areas are shown on the project plans. The borrow areas depicted cover over 235,000m² and have the potential to supply far more granite than is required for the project, in excess of the proposed multiplier of 2.

5. WCRC Request

The hydraulic structures are all in the preliminary design stage and may change as the final design is worked through. The concepts for the Mt William and Weka dams are satisfactory showing a low level sluice for emergency dewatering and possible use as a diversion structure during construction. For these structures given the nature of the acidic water impounded it is prudent to allow for the reservoirs to be drained should some defect show up sometime in the future requiring the water level to be lowered below the hydro outlet level. This is a fundamental dam safety issue. Designing such facilities that will have a long life in that environment will be a challenge.

Confirm if dewatering of the reservoirs, either in an emergency or for maintenance or repairs, is included in the consents being sought for discharge of tailwater.

5.1 HDL Response

The construction sluices on the dams will be permanently sealed at completion of dam construction. The intake towers will be the lowest point within the reservoirs and will be used to drain the reservoirs when required. The scheme can be configured by operation of intake valves, sluice valves at tunnel bulkheads, diversion weir gates, and spillways to drain the reservoirs to the base of dam foundations and to drain the tunnels for inspection and maintenance at any time.

6. WCRC Request

Construction of the dams using RCC is a good choice for this high rainfall site as they are less affected by rainfall and can be overtopped without dire consequences. They will however need to show that the dams can safely contain the acid water over the life of the dam (100yrs) without any

significant reduction in stability. Leakage through dam joints in this situation has far greater consequences than for a RCC dam retaining normal water. The building consent will need to address these issues and require an adequate monitoring programme to monitor these aspects.

Show that the dams can safely contain the acid water over the life of the dam (100yrs) without any significant reduction in stability.

6.1 HDL Response

Specification of acid resistant materials will be included in the building consent application. Suitable products can be sourced locally from Holcim in Westport.

The underground concrete dams built throughout Millerton Mine over the period of 1910 – 1930s show no sign of chemical erosion with average pH levels of 3. Similarly, the historic St Patrick dam built in the 1950s displays no evidence of significant chemical erosion of the dam structure.

7. WCRC Request

There is a coal seam near the true right abutment of the Weka reservoir.

Provide comment on the potential for and effects of leakage through coal measures/workings. If there is a leakage potential, what procedures would be put in place to manage this? What confidence does HDL have that there are no other coal measures in both reservoir footprints?

7.1 HDL Response

The entire project footprint has been extensively mined over the last 100 years and in more recent times extensively drilled by SENZ. At the outset of the project HDL formed an information sharing relationship with SENZ and had access to all exploration drill information. Hence HDL is confident of the accuracy of the statement in the AEE “...that the project will not constrain future mining operations within SENZ coal mining licence nor will it isolate any coal reserves”.

There are no coal outcrops in Weka reservoir. Coal outcrops in Mt William reservoir above the maximum levels of inundation. There is no possibility of leakage through coal seams or workings.

The interface between granite foundations and Brunner Coal Measures (BCM) occurs less than 10m below maximum levels of inundation in the shoulder dams of both Weka and Mt William dam. This interface is well logged and contains clays. At this stage of design HDL has allowed to extend cutoff excavations for the shoulder dams into granite below the BCM interface. This will also preclude leakage through bedding layers within the BCM.

8. WCRC Request

All sediment traps – Confirm whether the sediment traps shown on the plans and discussed in the AEE (eg. pg 39 Darcy Diversion) are the ones to be used during construction or if other temporary ones are proposed?

8.1 HDL Response

As depicted in the project plans and discussed in the AEE permanent silt traps are to be constructed within the reservoirs at the point of entry of waterways feeding into the reservoirs. These are to contain sediment and to ensure abrasive material does not enter the generation system.

Temporary sediment traps will also be utilised where required to control stormwater run-off from roads and any other construction activities near waterways. These areas will be managed in accordance with Auckland Regional Councils TP 90 guidelines.

De-watering of groundwater seepage during tunnel construction will also be directed into temporary sediment traps/settling ponds to ensure minimal impacts on receiving waters.

9. WCRC Request

During micro tunneling extensive dewatering is required and with the potential for poor ground conditions there is a real risk of effects on adjacent properties and infrastructure. There is a need to ensure long term stability of the tunnel and not just during monitoring. The pipe size will be slightly smaller than the tunnel, allowing some possible displacement.

What measures will be implemented to minimise the potential for settlement on building and utilities (e.g. road, rail)?

What monitoring during excavation is proposed? What criteria are proposed for acceptable levels of settlement?

What contingency measures would be implemented if settlement levels are exceeded?

How long will monitoring occur for and what mitigation is proposed long term should subsidence become an issue?

9.1 HDL Response

The detailed geotech investigations required to confirm the feasibility of micro tunneling will also establish the potential for settlement that could arise through the micro tunneling process, and tunnel levels and positions that will minimise the effects. Appropriate limits of settlement can then be established to suit these conditions. Ground level monitoring along the tunnel alignment will be carried out until the work is complete.

Dewatering is generally only required around the access shaft to ensure dry access inside the tunnel. Away from the shaft, the tunnel can advance irrespective of water levels, and indeed beneath the seabed.

The mismatch of tunnel and liner pipes is overcome by the pressure injection of drilling mud into the small annulus outside the concrete liner. This has the dual purpose of preventing settlement by filling the space, and providing lubrication for the forward movement of the tunnel segments through the ground.

10. WCRC Request

During construction of the outfall vibration monitors should be set up to actually monitor the effects as well as an initial ground survey so that any ground settlement can be identified.

Confirm what monitoring is proposed.

10.1 HDL Response

Tunneling vibrations are considered very unlikely to affect the stability or structural integrity of timber structures. Cosmetic damage (eg cracking of plaster and masonry) is the first indicator of vibration damage. This can be difficult to identify or attribute to any particular occurrence as such minor cracking is often present due to other causes.

Refer to Response 6.1 of Section D of BDC material. Detailed building surveys will be carried out to identify before and after differences and HDL will undertake monitoring of initial micro-

tunneling activity to ensure the set limits for vibration (as specified in Australian Standard 2187.2-2006 for sensitive sites) are not exceeded.

As regards ground settlement, a survey will establish a network of bench marks and control marks around the perimeter of the construction site on stable ground beyond the micro tunnel alignment. Survey instruments (GPS, Total Stations and Precise Level) will be used to monitor survey pins above the micro tunnel to monitor movement both vertically, rotationally and x and y co-ordinates.

Section D – Ecological Information

1. WCRC Request

Appendix D - *Allisoniella scottii* is a liverwort with a threat classification of Nationally Critical, and *Blindia lewinskyae* is a moss that is range restricted (based on limited data). At the site visit *Blindia* was observed in Weka Creek.

What is the distribution of these bryophytes within the footprint of the proposal?

Will the *Hennediella sp* population be affected by the proposal?

1.1 HDL Response

Two reports by NIWA (Suren & McKerchar, 2001 and Suren & Glenny 2002) that refer to bryophytes, have been undertaken for the Stockton Plateau streams and Upper Waimangaroa Valley respectively. The Cypress Mine Resource Consent application and associated AEE (Solid Energy, December 2003) also summarises these studies.

The NIWA (2001) study included several sites on Mine Creek, one site on the Mangatini River and several sites on the Ngakawau River itself, two of these sites (Mine Creek Middle and Mangatini) were within the project footprint. Mine Creek Middle is located at E2416938, N5950584 and Mangatini at E2417833, N5949755. *Blindia lewinskyae* was found in the Mine Creek Mid site inside the proposed development area. *B. lewinskyae* has been found in Weka Creek (NIWA, 2001) however this was a *pers obs* siting and GHD have been unable to confirm whether the site was within the proposed development footprint.

NIWA (2001) survey observed no aquatic bryophytes within Mangatini Creek or the Ngakawau River.

The only recording of *Hennediella sp* to date has been during the NIWA 2001 survey and this was at Mine Creek West, which is outside the proposal footprint area. Therefore it is not considered that this population will be affected by the proposal.

The NIWA (2002) study surveyed 14 streams in the upper Waimangaroa and St Patricks Stream, all of which were outside the footprint of the proposed development area. Results of this study indicated that the waterways supported a rich diversity of bryophytes. *B. lewinskyae* was common throughout the area and found in 7 sites, 4 of which are affected by acid-mine drainage and not subject to the affects of the proposed scheme.

This study also observed the rare liverwort, *Allisoniella scottii*, in the mid and upper St Patrick Stream site (above the dam). This species is known only from streams flowing from the Tin Range on Stewart Island, and from Mt Euclid in the Paparoa Range. This observed population is outside the proposed development footprint. No records of this species have been recorded within the

proposed development footprint. This moss has also been recorded in the L75 Stream, also outside the proposed development footprint.

Therefore in conclusion, *B. lewinskyae*, and to a lesser extent, *A. scottii* are relatively common within the Plateau streams outside of the proposed development footprint area. They are currently present in streams that are mine-impacted and appear to be tolerant of acidic conditions, and able to deal with the often large, frequent floods that characterise the Plateau streams. *A. scottii* has not been recorded within the proposed development footprint and *B. lewinskyae* has only been recorded at one site (Mine Creek Mid). To date, *Henediella sp* has not been recorded from within the proposal footprint. Therefore it is not considered that this population will be affected by the proposed development.

2. WCRC Request

NIWA reports have noted both species in the general area, but their investigations have not specifically defined the range of these bryophytes within the footprint of the proposal. NIWA also reported a possible new species of *Henediella* in the west branch of Mine Creek.

The applicant proposes to undertake a pre-construction baseline study, and if necessary offset any habitat losses by protecting other habitat for these taxa or by relocating plants to areas outside the footprint of the proposal.

Provide information on the proposed method of relocating these plants; including how the success of the relocation will be monitored and contingency plans if relocation is unsuccessful.

Identify areas outside the footprint of the proposal that could be protected as an offset for habitat loss, and describe the mechanism and details of how this will be achieved, for example land-ownership, covenant proposals etc.

2.1 HDL Response

Section 2.3 of the AEE details that the Ngakawau Ecological Area boundary was amended to accommodate future hydro development. This was done on the basis that the area has negligible ecological value and/or values that were already well represented and under protection. This supports the view that the ecological values, including aquatic bryophytes within the proposal footprint are not significant and are represented or protected elsewhere. Habitat loss is unlikely to be significant and no habitat offset is proposed.

More detailed analysis of the available literature has confirmed that *Henediella sp.* has only been found in the West Branch of Mine Creek (sample site located south of Stockton Road), outside of the proposal footprint (NIWA, 2001). *B. lewinskyae* and *A. scottii* are known to occur in streams draining the Stockton Plateau area, in the Waimangaroa River and its tributaries. However within the proposal footprint *B. lewinskyae* has only been recorded at Mine Creek Mid and *A. scottii* has not been recorded at all.

Prior to site works commencing at Weka and Mt William reservoirs, surveys of aquatic bryophytes will be carried out within the reservoir footprint areas. Bryophyte % cover will be estimated at 3 transects placed randomly across sections of each stream. Any aquatic bryophytes found will be identified on site where possible, photos taken and if required a sample collected and frozen pending identification to species (where possible) using standard keys, in the laboratory. If the rare species, *Henediella sp.*, *B. lewinskyae* or *A. scottii* are recorded within the footprint area relocation will be considered. There are limited means of relocating aquatic fauna and translocation trials are one possible means. However, little work has been carried out on aquatic bryophytes in

NZ or around the world in this regard and as such the likely success of such trials is unknown. Such work if required would need to be carried out with extensive consultation with an expert in this field.

3. WCRC Request

Appendix D – Page 8-10: Combining of Mangatini, Weka and Sandy Creek for the purposes of assessment. The NIWA reports do not investigate these streams. Sandy and Weka Creek may not be AMD impacted and may provide an important source of colonists to other streams.

The Mangatini Stream arises in a different part of the plateau than these streams so assessing them as a single site provides insufficient resolution. Weka Creek and Sandy Creek have considerably different in-stream morphology to Mangatini Stream and should have been assessed separately.

Provide an assessment of the potential environmental effects on Sandy Creek and Weka Creek, given their potential importance as representative remnants unaffected by AMD.

3.1 HDL Response

Sandy and Weka Creeks are not un-affected catchments. Both watercourses receive run-off from the haul road and have done so since Stockton mine opened. Run-off containing high silt loads and oil/fuel contaminants from the many vehicles that utilise the haul road drain into both Weka and Sandy Creek. In addition, the haul road is constructed from sandstone which gives rise to AMD contaminated run-off.

Further, section 3.2.3 of the GHD report notes that invertebrate communities in both Weka and Sandy Creeks are dominated by chironomids, oligochaetes and ceretopogonid midges, reflective of the relatively poor water quality, low pH, sedimentation and variable flow in these waterways, features common to mine-affected waterways. From the existing available literature and surveys conducted at these sites no macro invertebrates, fish or aquatic fauna species of significant value have been found within these waterways.

4. WCRC Request

It is likely that the changes in the flow regime will lead to an increased growth of algae under the imposed low flow regime. Such an effect has been observed in other ‘managed’ river systems in New Zealand. While it is recognised that the period between freshes is seldom going to be really long enough to accumulate a high biomass of material it is not clear whether this has been considered.

Confirm what consideration has been given to the effects of increased growth of algae under the imposed low flow regime.

4.1 HDL Response

Consideration has been given to the effects of increased algae growth under the imposed low flow regime. It has been determined that given the environmental conditions present on the Plateau (high rainfall events and freshes) and stream characteristics (reasonably steep catchments with flowing water), the period between freshes and the period and extent of areas displaying slow water flows (enough for substantial algal growths to accumulate) is seldom going to be long enough to accumulate high algal biomass.

It is expected that at times there may be an increase in algae growth given the significant reduction

in flows immediately downstream of the reservoirs. However, as discussed in the AEE it is expected that removal of sediment laden water and AMD contaminated flows from the affected catchments will give rise to improvement in water quality and hence recovery of aquatic habitats adopted to the new flow regime. It is expected that an ecosystem will evolve that meets the new hydrology dominated by natural water quality conditions.

5. WCRC Request

In a number of areas baseline surveys are proposed. It is not clear what is proposed and what the management response to the surveys would be.

Describe what baseline surveys are proposed and what the management response to them would be. Alternatively indicate whether it is proposed to draft consent conditions prior to the s42a report being prepared so that it can be considered at that time.

5.1 HDL Response

Baseline surveys to determine how the ecology of each of the affected sub-catchments recovers following the construction of the project and removal of high AMD and sediment loads will be useful for developers of similar schemes on the West Coast and will be supported by HDL if researchers express interest in undertaking this work. The GHD report discusses a number of baseline surveys that may fall into this category. No management response to the outcome of such surveys is proposed as part of this application.

Section E - Geochemistry Information Request

1. WCRC Request

Appendix K – Page ES2: Statement in the Executive Summary needs clarification. It is noted that “Water quality in Mt William reservoir quality will improve ... due to increasing dominance of Mangatini waters...”

Please clarify whether or not Mangatini Stream will contribute to Mt William Reservoir (cf. for example, Table 5-1).

1.1 HDL Response

The sentence should refer to Weka Reservoir.

2. WCRC Request

Appendix K – Pages 5-1 to 5-3: The limitations of the input data for modelling are acknowledged. However, insufficient information is provided to determine just how representative the data being used is likely to be. Therefore it is not possible to judge the reliability of the modelling.

For each of the sites in Table 5-1, please specify the number of data points (“n”) used in the derivation of the mean value shown, the range of data (min-max), and the year represented by the data (i.e., 2007/08, or previous).

2.1 HDL Response

This information is provided in the following tables (inputs_ Summarised_ mins max.xls)

Table 1. Water quality inputs for scheme and non-scheme geochemical modelling **MAX VALUES**

Catchment Name	Main data points	pH	EC	SO4	Na	K	Ca	Mg	Al	Fe	Mn	Cu	Zn	As	Ni	Cl	n	Year			
<i>Mt. Williams Reservoir</i>																					
Upper St Pats	S16	4.6	48	121					13.00	1.07							300	07-08			
Darcy Headwaters	Darcy2 / Darcy3	3.7	43	129	2.4	0.70	1.22	0.70	4.79	2.89	0.034	0.0050	0.078	0.001	0.021			9	02-08		
T31 Stream	S3	5.7	12															14	07-08		
<i>Weka Reservoir</i>																					
T35 Streams	S3	5.7	12															14	07-08		
Mine Creek Upper	UM1	6.0	58															59	07-08		
Weka Catchment	S1	4.8	11															14	07-08		
Upper Mangatini - Untreated	S14 C	2.9	970	575	3.7	3.77	40.90	13.60	58.00	36.40	0.000	0.0050	1.570	0.016	0.327	3.8		4	08		
Upper Mangatini - Treated	S14 B	7.8	100	379	3.8	3.16	154.00	10.70	30.00	2.95		0.027	1.1200	0.005	0.244	3.6	113*	08	*n=2 for cations/anions except Al		
<i>Ngakawau River</i>																					
Erin Stream	Erin	6.5	35	2	3.2	0.41	3.03	0.35	0.12	0.08	0.004	0.0005		0.001	0.001	4.7		4	02-03		
Lower St. Pats	NR6	7.1	5	5															9	02	
Mid St. Pats	NR6	7.1	5	5																9	02
Ngakawau River @ NR6	NR6	7.1	5	5																9	02
St. Davids Catchment	NR6	7.1	5	5																9	02
Ngakawau Gorge	NR6	7.1	5	5																9	02
Charming Creek	CC1																				
Mangatini Lower	8W	7.7	73	2	2.6	0.60	0.62	0.32	0.19	0.20	0.005	0.0005	0.001	0.001	0.001	4.2		12	98-08		
Rome Creek	8W	7.7	73	2	2.6	0.60	0.62	0.32	0.19	0.20	0.005	0.0005	0.001	0.001	0.001	4.2		12	98-08		
Mine Creek Lower	8W	7.7	73	2	2.6	0.60	0.62	0.32	0.19	0.20	0.005	0.0005	0.001	0.001	0.001	4.2		12	98-08		

NOTES
 * Missing values have been derived from various summary reports and other catchments on table. Reports used include for data include:
 * Missing values have been derived from various summary reports including:
 Stockton Coal Mine Hydro-Geochemical Investigations Acid Rock drainage: Draft, Golders July 2002
 Table 3.2 Water Management Strategy overview for stockton site , October 2005, 16 April 2005- 24 June 2005
 Table 2.13 4 West Hydrology - September 2006
 KML Cypress Open Pit Water Geochemistry Report 03

Table 1. Water quality inputs for scheme and non-scheme geochemical modelling **MIN VALUES**

Catchment Name	Main data points	pH	EC	SO4	Na	K	Ca	Mg	Al	Fe	Mn	Cu	Zn	As	Ni	Cl	n	Year		
<i>Mt. Williams Reservoir</i>																				
Upper St Pats	S16	3.2	3	9					0.28	0.03								300	07-08	
Darcy Headwaters	Darcy2 / Darcy3	2.6	30	75	2.1	0.43	0.37	0.33	1.34	1.15	0.011	0.0016	0.056	0.001	0.008			9	02-08	
T31 Stream	S3	3.9	2															14	07-08	
<i>Weka Reservoir</i>																				
T35 Streams	S3	3.9	2															14	07-08	
Mine Creek Upper	UM1	2.6	43															59	07-08	
Weka Catchment	S1	3.9	4															14	07-08	
Upper Mangatini - Untreated	S14 C	2.8	946	464	3.3	3.06	31.20	10.40	45.00	32.00	0.000	0.0010	1.210	0.014	0.261	3.2		4	08	
Upper Mangatini - Treated	S14 B	3.3	18	312	3.4	2.65	127.00	8.30	0.05	2.01		0.0020	0.623	0.005	0.183	3.5		113	08	*n=2 for cations/anions except Al
<i>Ngakawau River</i>																				
Erin Stream	Erin	5.1	23	1	2.7	0.28	0.55	0.26	0.07	0.04	0.001	0.0005		0.001	0.001	4.0		4	02-03	
Lower St. Pats	NR6	4.2	3	1															9	02
Mid St. Pats	NR6	4.2	3	1																02
Ngakawau River @ NR6	NR6	4.2	3	1																02
St. Davids Catchment	NR6	4.2	3	1																02
Ngakawau Gorge	NR6	4.2	3	1																02
Charming Creek	CC1																			
Mangatini Lower	8W	3.6	1	1	1.6	0.10	0.20	0.19	0.07	0.00	0.002	0.0002	0.001	0.001	0.001	2.9		12	98-08	
Rome Creek	8W	3.6	1	1	1.6	0.10	0.20	0.19	0.07	0.00	0.002	0.0002	0.001	0.001	0.001	2.9		12	98-08	
Mine Creek Lower	8W	3.6	1	1	1.6	0.10	0.20	0.19	0.07	0.00	0.002	0.0002	0.001	0.001	0.001	2.9		12	98-08	

NOTES
 * Missing values have been derived from various summary reports and other catchments on table. Reports used include for data include:
 Stockton Coal Mine Hydro-Geochemical Investigations Acid Rock drainage: Draft, Golders July 2002
 Table 3.2 Water Management Strategy overview for stockton site , October 2005, 16 April 2005- 24 June 2005
 Table 2.13 4 West Hydrology - September 2006
 Cypress Open Pit Water Geochemistry Report 03

3. WCRC Request

Appendix K – Page 5-1: Two major assumptions made for modelling; that TSS are not re-suspended, and secondary mineral precipitates are not re-dissolved, are effects that are likely to be very detrimental to water quality. It is usual to model worst case scenarios.

A brief sensitivity analysis of the likely effects of TSS re-suspension and precipitate re-dissolution on modelled water quality would be useful.

3.1 HDL Response

The modelling indicated very little potential for conditions that would result in precipitation of metals within the scheme and a sensitivity analysis is thus not warranted. TSS re-suspension is unlikely in such large reservoirs.

4. WCRC Request

Appendix K – Page 5-2: There is no information on whether or not the reservoirs are expected to develop vertical stratification. This would affect downstream water quality.

Please include a statement as to whether the possibility of stratification has been considered. If so, can this effect be included in the modelling?

4.1 HDL Response

Stratification has not been considered and would be beyond the faculty of the current modelling. Intake towers will draw from the full water column.

5. WCRC Request

Appendix K - For the input data, cation or anion concentrations have been adjusted to ensure an ion balance. Changing the concentrations of some constituents could affect WQ predictions.

Please indicate which cations or anions were used to create an ion balance.

5.1 HDL Response

Cation/anion balance used the following: Ca, Mg, Na, K, Cl, SO₄, Fe, Mn, Al, Cu, Zn

6. WCRC Request

Appendix K - Waterways that are noted to contribute to the reservoirs elsewhere in the AEE documents are not listed in the input data in Table 5-1. For example: Plover, Fly, Sandy and AJ Streams.

Please clarify that the input of these waters has been included in the flow/chemistry of the streams that are listed in Table 5-1 or 5-2 (and which streams).

6.1 HDL Response

Plover and Fly Streams are included in analysis and were represented by S16 water quality data since they are located upstream of this monitoring station. AJ and Sandy Streams are located upstream of the S14a monitoring point and therefore they have also been accounted for.

7. WCRC Request

Appendix K – Page 5-3: Given the potential for Cd to bioaccumulate in benthic marine life, any information on likely Cd concentrations in the outfall would be useful.

If any data is available for Cd in the modelling input waters this should be included in the modelling process (e.g., Appendix C of this URS report shows Cd concentration significantly raised in ARD samples from Mangatini Creek (S14)).

7.1 HDL Response

Modelled Cd data is as follows (mg/l):

- Current Mt Williams-0.00014
- Closure Weka/Outfall Mt Williams- 0.00041/0.00014
- Weka Outfall-0.00047

These results mirror those of Table 5-3 of the report.

They were not reported initially as the Cd data is very limited and modelled concentrations will reflect this lack of data. In many cases distinct inputs are based on a single sample. In some cases 'donor' data has been used where no specific Cd data was known to exist.

8. WCRC Request

Appendix K – Page 5-4: Model validation against WQ monitoring for Ngakawau River is mentioned, but no results are shown.

Please include the data referred to at the end of Section 5.1.3.

8.1 HDL Response

Modelled results for location NR with no scheme in place were:

pH	4.549
Al	0.698782
Fe	0.25329

No calibration of other parameters could be undertaken due to lack of detailed data.

9. WCRC Request

Appendix K – Pages 5-4 to 5-8: There are major discrepancies between comments in the text, and the data presented in Tables 5-3 and 5-4. Some of these comments are reproduced in the main AEE document (p100).

Please clarify so that text and tabulated data are consistent.

For example, WQ in Weka Reservoir doesn't improve under high flow conditions (consider trace metal concentrations).

9.1 HDL Response

There are improvements in pH, Fe and Al levels. There are some increases between the two cases of trace metals.

10. WCRC Request

Appendix K – Pages 5-6 to 5-7: In Table 5.4, the modelled data for low, median and high flow scenarios are identical for the Mt William Reservoir. This table is reproduced in the AEE document (p100) also.

Please confirm that this is correct and, if so, include an explanation of why this occurs.

10.1 HDL Response

There is no change in the water quality for the range of flow events because the available data sets do not support a relationship between chemistry and flow – refer section 5.2.2. Determination of this relationship will be the focus of ongoing water quality monitoring. The assumption of no change in water quality with flow results in conservatively adverse predictions of water quality in Weka reservoir.

11. WCRC Request

Appendix K – Pages 5-8 and Figure 5-1: The discussion of Ngakawau River water quality is limited to pH, Al and Fe. It is unclear why modelled data for other trace metals is not discussed.

Please clarify why this data is so limited.

11.1 HDL Response

No calibration of other parameters could be undertaken due to lack of detailed data.

12. WCRC Request

Appendix C - Figure 1 does not include Fe, the precipitation of which is critical in this exercise.

Please add Fe data to Figure 1 of this appended report.

12.1 HDL Response

Appendix C is an SENZ report appended for reference at SENZs request following SENZ's review of the draft water quality report.

13. WCRC Request

Appendix K – Page 5-14: It is unclear how NTU or TSS units have been converted to units of clarity. Figure 5-5 is very difficult to interpret (e.g., what is the y axis on this figure?).

Please clarify.

13.1 HDL Response

Relationship developed within *KML (2005). Optical Water Quality Monitoring and Modelling at Stockton Site*. This report develops a relationship between turbidity and clarity as follows:

For measurements below 10NTU:

$$\text{Clarity} = (0.0105e^{(0.09961T)})^{-1}$$

For measurements above 10NTU:

$$\text{Clarity} = (0.0199e^{(0.0372T)})^{-1}$$

Regarding Figure 5-5 The y-axis is Clarity in cm. It shows the threshold of Good and Fair clarity as defined by NIWA. This is compared to the pre and post scheme clarity at station NR on the Ngakawau River. The graph shows a significant improvement in clarity post-scheme.

14. WCRC Request

Appendix L – Page 3: Worst case scenario effluent is noted to be 9m³/sec (2 x modelled median flow).

Please include an indication of how dilution modelling results will be influenced by the higher flow conditions.

14.1 HDL Response

The worst case scenario effluent flow is 9 m³/s (twice the modelled median flow). This regime will effectively double the flow conditions, and will therefore result in a halving of the dilution. It is noted, however, that the worst case scenario of effluent flow does not necessarily coincide with a worst case effluent quality. Poor effluent quality is expected to be associated with extended periods of drought. Higher flows will be directly correlated to full or rapidly filling reservoirs during higher rainfall events. Until both further benchtop studies and baseline field work improves our understanding of the water quality /dilution and dispersion relationships it is difficult to predict the events that represent an overall worst case scenario and the predicted change in dilution requirements in these circumstances. Conditions of consent will specify management actions that are to be taken when the dilution provided by the outfall is not adequate for the water quality recorded in Weka reservoir.

15. WCRC Request

Appendix L – Page 5: The summary bullet points appear somewhat contradictory. This is possibly because two different URS reports (2007 and 2008) are being referred to.

Please clarify, identifying the most recent, confirmed results of these previous studies.

15.1 HDL Response

The most recent URS water quality report (see Appendix K) refers to the assessment by Holman (2007) for the assessment of water chemistry parameters.

Revised summary points:

- Undiluted ARD is acidic (pH as low as 3), and remains so until a 1000-fold dilution with seawater has been achieved (URS 2008).
- The two major precipitates associated with the mixing of ARD into seawater are iron and aluminium.
- Dilution values reported for the precipitation of iron and aluminium are expected to be variable, fully mixed turbidity will depend on the acidity of the effluent.
- Iron will begin to precipitate with only a 10% seawater mix (URS 2008)
- Holman (2007) reported dissolved iron was fully precipitated at a dilution ratio of ~1:1 (seawater:ARD, pH approximately 4.4).
- Dissolved aluminium was fully precipitated at a dilution ratio of ~3.5:1 (seawater: AMD~pH 5.0) (Holman 2007).
- Other dissolved ions including zinc, nickel and cadmium require more alkaline conditions than iron and aluminium to facilitate precipitation.

16. WCRC Request

Appendix L – Page 20: It is unclear whether the effects of the difference in density between the outfall effluent and seawater have been taken into account, when dilution is being modelled. It does appear that this may be why so little further dilution occurs after the initial mixing of the plume into seawater.

Please confirm that CORMIX does model the movement of the outfall effluent within the seawater column in response to density differences.

16.1 HDL Response

CORMIX modelling includes the density parameters of both the effluent and seawater. The parameters included in the modelling are listed in Table 5, pg 20, where the density of the effluent is 1000 kg/m³ and the density of receiving water is 1025 kg/m³.

17. WCRC Request

Appendix L – Page 21: If modelled Cd data can be made available (see comments above re: Appendix K), then potential bioaccumulation in marine organisms could be assessed (also on p31, where food guidelines are considered).

Please add commentary on the potential for Cd bioaccumulation in benthic marine life ... if Cd concentrations in the outfall can be predicted.

17.1 HDL Response

Response prepared by Cawthron as follows:

Holman (2007) reported total levels of Cd in Mangatini Creek ARD (undiluted) at 0.0036 g/m³, which were reduced to 0.0005 g/m³ following a 10 fold dilution, then further below <0.0002 g/m³ in dilutions above 50 fold. The ANZECC (2000) trigger level for Cd in marine waters at the 99% level of protection is 0.0007 g/m³, and 0.0055 g/m³ at the 95% level of protection. Even

under low dilution scenarios it is apparent that for the 2007 study Cd was reduced to levels below the 99% trigger level.

A brief letter report (G. Miles, March 2007) outlined the results of trace metal analysis in one composited sample of mussels sampled off the Granity coastline (supplied by Joseph Hughes, SENZ). Levels of Cd in shellfish tissues were reported as 0.13 mg/kg, below the 2.0 mg/kg prescribed for human health consumption (FSANZ 2005). There is, however, a paucity of information on the accumulation of heavy metals resident biota in the Granity region. In comparison to levels of Cd previously reported around New Zealand (Nielsen & Nathan 1975), the level of 0.13 mg/kg was well within the range reported for both Green-lipped and blue mussels (range 0.1-1.6 mg/kg). Whether the levels of Cd (and other analytes) are elevated in marine biota as a result of AMD discharge via the Ngakawau River or Granity Stream is unknown. Given the ability of Cd to accumulate in organisms, exposure of sessile invertebrates or other mobile species that may feed on them may increase the potential for Cd to accumulate.

It is recommended to at least conduct background studies of levels of target contaminants of concern in resident biota to establish whether offshore discharge of AMD would have any impact on accumulation of Cd or other contaminants.

18. WCRC Request

Appendix L – Page 28: Precipitation of Fe and Al oxides (giving rise to changes in the clarity being measured) may take time.

Please specify the time allowed for reaction to occur during mixing experiments.

18.1 HDL Response

Precipitation mixing experiment for aluminium and iron precipitates conducted by Holman (20007) does not specify a time allowed for mixing.

The change in clarity /pH study by Cawthron (reported on p 28-29 of Cawthron Report No. 1537) was conducted over approximately 1 hour, whereby each reading was taken every 3-5 minutes between mixing.

19. WCRC Request

Appendix L – Page 29: Figure 5 is difficult to interpret. A clarity change can be due to a number of different processes. Was any colour change observed as clarity decreased?

Please clarify whether the vertical axis is % change in clarity, or % transmittance (as stated on p 28). Also clarify in discussion below this figure.

Note any colour changes observed.

19.1 HDL Response

A clarity change can be due to a number of different processes. No change in colour (*i.e.* from oxide precipitates) was observed as clarity decreased.

Under the heading ‘Dilution series’ on pg 28 it states:

Clarity was measured as a percent transmittance using a 25 cm path length Chelsea transmissometers (for pH 4.5 AMD as shown on Figure 5). It may therefore be appropriate to change the axis title to “Change in Clarity (as % change in Transmittance)”.

Buller District Council Information Request

Section A – General Information

1. BDC Request

Need to consider the visual effects at Granity construction site.

Will there be a permanent fence retained around the site once operational? If so will it be the existing security fence or a new fence around a smaller area?

1.1 HDL Response

There will be no permanent fence retained at Granity. The proposed construction yard fence will be removed on completion of construction of the Granity power station and ocean outfall structures. However, a permanent locked gate will be installed across the Granity tunnel portal outlet for security reasons. As discussed in the AEE, due to the construction methods at the Granity portal, whereby existing vegetation will be retained as much as possible and replanting will be undertaken around disturbed sites, it is expected that the portal outlet and the gate across the entrance will largely be screened from view.

2. BDC Request

Need to consider public accessibility to Millerton Incline track and whether a secured operational area will prevent public access to the track.

Show in relation to the perimeter fence(s) how access will be provided to the Millerton Incline, both during construction and operation.

2.1 HDL Response

Access to the beginning of the Millerton Incline track is to the immediate north of the Granity Museum and outside the security fenced area. Access to the track will not be restricted.

The track will be crossed by the access ramp up to the Granity Portal. A pedestrian crossing will be provided across the access road with appropriate hazard signs erected.

Excavations for the outfall pipeline and surge chamber will disrupt use of the track for several months. A safe pedestrian access will be provided through the site during this operation on the line of the existing track.

HDL envisages that a Construction Management Plan and Scheme Design Plans will be a condition of consent and these plans will specify all temporary and permanent walking track access within the project footprint.

3. BDC Request

The application states that the Charming Creek experience will be improved. To some who walk the walkway, the experience is the Mangatini waterfall. Reducing water volume over the falls to 40% will therefore reduce the experience.

The proposed mitigation to relocate the track to avoid flood down the river in case of dam breach, as defined in App J. This will alter the experience as the track will no longer be on the old rail line and will remove the walkway from its context.

How will the Charming Creek experience be improved?

Is the improvement proposed to be one off or on-going mitigation?

Is it a plausible action to de-scale the rocks in the Ngakawau River given that Charming Creek will still be discharging AMD waters?

3.1 HDL Response

There is no intention to reroute the Charming Creek walkway, Refer to Response 1.1 of Section C.

The improvements to visitor experience along the Charming Creek walkway referred to in the AEE relate to the visual and natural character aspects. Operation of the hydro scheme will divert the headwaters of the Mangatini Stream and capture the contaminated flows in Weka storage reservoir. There will no longer be the disparity in water colour at the point of entry into the Ngakawau River and the Mangatini stream and the Ngakawau River will revert to a natural state.

Post scheme, the flows over the Mangatini falls will be sourced from a catchment that is unaffected by mining and is largely forested. The appearance of the falls will revert to pre-mining conditions, albeit at lower flow. The mean flow will be reduced by approximately 60%, however the falls will exhibit the full range of flows previously witnessed, from drought to spectacular flood flows.

HDL proposes undertaking consultation with Ngakawau River Watch and DoC to establish areas where physical improvements to the walking track can be undertaken. Suggestions to date include the addition of a picnic table at the Mangatini Falls viewing area and rehabilitation around the margins of the falls. De-scaling of the rocks referred to in the AEE was in relation to the margins of the Mangatini falls not the Ngakawau River. This is practical, as is re-vegetating the margins of the falls that have been affected by AMD.

4. BDC Request

Will workers for the HDL construction and operation project be locally sourced? Need to consider social effects regarding accommodation, demand on services such as medical and education.

The application states 50 people and 2 shifts per day. Given days off that would be 4 shifts of 10-12 people plus management.

How many people will be employed by HDL during construction and operation?

Is this a correct interpretation of the information? If not please specify the likely spread of workers.

4.1 HDL Response

It is envisaged that workers will be mainly sourced from Westport. Specialist companies exist in Westport with the skills and manning to do all the ground engaging. Geotech Limited, a Westport based company alone employs thirty people of which half have a strong underground/ tunnel background.

Tunnel shifts would employ generally 6 people per face. 2 to 4 faces will be worked at one time, two shifts per day. The tunnels are small (3.5 metres wide or less) but are long (c 10,000m in total). Construction of the dams and ancillary works will run in parallel employing approximately 10 staff. 5 – 10 staff will be employed in the project engineering and management team. A stable workforce of around 50 staff will be employed for at least 3 years.

In the current economic climate HDL believe this project will be hugely beneficial to the local social and economic fabric.

5. BDC Request

The BDP requires bulk of buildings to be considered. The information contained in the application only states the area of the reservoir.

What is the footprint area of the dams/shoulders?

5.1 HDL Response

The footprint of Mt William dam, saddle dams, intake tower and permanent silt traps is approximately 72,000m².

The footprint of Weka dam, saddle dams, intake tower and permanent silt traps is approximately 40,000m².

6. BDC Request

Again, need to consider the footprint and height of the intake structures.

From discussions at the site visit, the intake structure will have holes around the intake at various levels. It was uncertain whether it would be capped. Weka Dam will have access around it to Repo Basin, so public could access the reservoir. There is also a need to consider a cap for preventing wildlife entering the system.

What size (height/footprint) will the intake structure be?

Will the intake structures have covers to prevent access by people and wildlife?

6.1 HDL Response

The intake towers will be approximately 3m in diameter and will rise above the dam crest by approximately 3m. The top section will contain controls for the main intake valve and will be fitted with a secure access platform door and roof. The intake will be screened to prevent ingress of debris, animal or curious visitors.

7. BDC Request

No details have been provided about the internal layout of the power stations. It is assumed that only one turbine will be required at each power station.

Provide a schematic diagram of the internal operating of the bulk head, machine hall for the proposed power stations

It would be beneficial to have a cross section of the scheme, showing the reservoirs, intakes, dams, tunnels, bulk heads, machine halls, transformers, etc to view flow of water through the scheme.

7.1 HDL Response

The power stations will be located in an underground chamber up to 150m from the tunnel portal. The internal layout of the power stations have no bearing on the assessment of environmental effects. Power station fitout will be a matter for final design and will be dictated by final decisions on installed capacity, among other things.

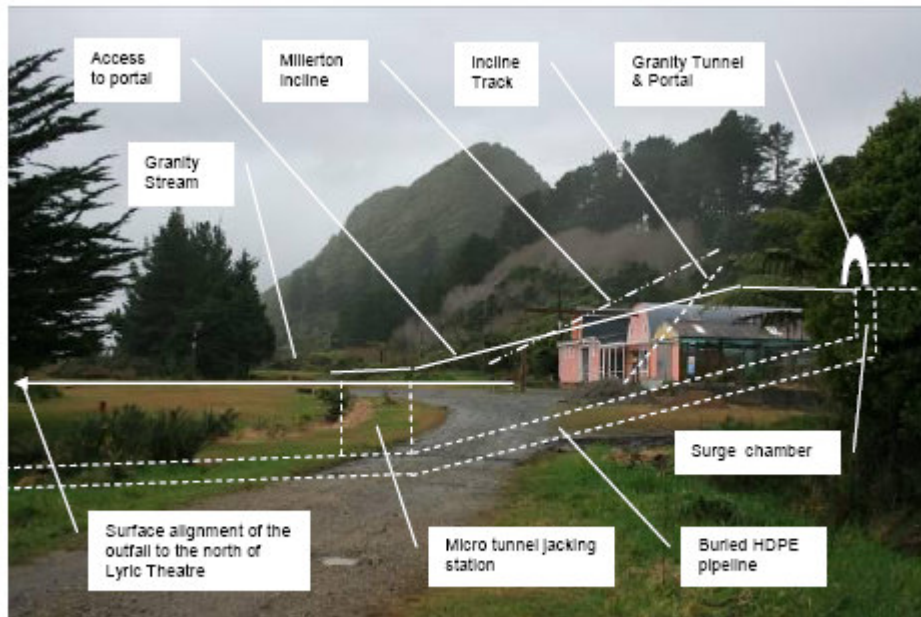
8. BDC Request

Need to assess whether there are any visual effects at Granity and whether there are any effects from noise or spray drift and from potential contamination of water supplies.

Will the surge chamber at Granity be located within the tunnel? Provide a schematic diagram.

8.1 HDL Response

The surge chamber will comprise a vertical concrete chamber that is connected to the micro tunnel using buried HDPE pipe. The surge chamber will be contained within the portal apron and will be underground. There will be no visible component to the structure and it is expected that noise will only be discernible if standing in the immediate vicinity of the portal apron. Spray and all flows will be contained within the chamber. There is no possible means of water supply contamination.



Schematic layout of the Outfall: SENZ land to the right of the road, Crown land (railway) in the centre and left of the photo



Position of portal: View back to the portal from the beach. Lyric theatre to the left. Museum to the right against the bush.

The access ramp and portal apron will be constructed as far as possible behind the existing dense vegetation at the base of scree slope. Vegetation that is removed on the line of the outfall will be replanted. Replantings are expected to fully screen the portal from view within 10 years. Similar examples are the Millerton incline and Stockton incline portal which is completely screened.

9. BDC Request

The application states that the base load will be 25MW subject to configuration and possible 3rd power station.

It is not clear whether the 25MW includes the 3rd power station. If it does, then what is the output of the two power stations?

9.1 HDL Response

A 3rd power station at Mt William is a possible future extension of the scheme but is not included in the current application and is not required to achieve a base load of 25MW. Base load is not determined by the number of power stations or installed capacity, which is likely to be in the order of 40MW for the two power stations that are covered by the application. Output from the scheme will vary on a daily basis determined by storage in the reservoirs, prevailing rainfall conditions and operating regimes of the reservoirs. It will also be determined by demand, market conditions and supply contracts. Feasibility studies indicate that a base load of 25MW should be achievable after scheme optimisation in final design.

10. BDC Request

The application states that a licence to occupy will be required for temporary occupation of On Track land. Does this mean that access to the site once the scheme is operational is to be from Back Road and the museum?

Will this affect the access ramp/overflow which appears to be located partially on rail land?

10.1 HDL Response

Once the scheme is operational access to the Granity power station will be via Back Road and past the Granity Museum.

It is expected that the access ramp and emergency outfall pipeline will be located on SENZ land, however, permanent occupation of railway land will be sought if required.

11. BDC Request

The reservoirs and feeding rivers contain mining relics such as timbers, which may become buoyant. There is the potential that this material may be forced over the spillway in times of flood.

What will the finish of the dam structures be? Is overtopped by timbers etc likely to affect the integrity of the structures / will the structure be compromised by such overtopping?

What impact will this have on the roading on Mt William Dam?

Will there be any issue regarding the integrity of the intake towers?

11.1 HDL Response

Flood debris will accumulate in the debris traps. Removal of flood debris will be a maintenance requirement as for all reservoirs in New Zealand. Small flood debris that pass over the debris traps and spillways will do so without effect.

12. BDC Request

The BDP requires consideration of bulk and height of all buildings. Although only temporary, some of the buildings will be in place for over 3 years. In Granity, consideration is required in relation to the visual impact of the bulk of buildings etc as the site is adjacent to the township. It is also possible that some of the activities, such as batching plants and silos will exceed height requirements.

Provide details on the types of proposed construction buildings both on the plateau and at Granity?

In terms of the buildings at Granity, are any of these proposed to be permanent? Will there be a control room/office block at Granity similar to that proposed at Weka power station?

12.1 HDL Response

During construction of the hydro scheme there will be 3 operational work areas, situated at Granity, Mt William dam and Weka dam. Each operational area will have a collection of temporary buildings comprising 4 portacombs (with dimensions of 10m x 3.1m) to be used as an ablution block, staff room and offices and a number of containers to be used for storing equipment. Along with the heavy machinery that will be present within each operational area, there will be a variety of smaller plant including compressors and building equipment. For the Granity operational area all the aforementioned portable buildings will be located within the fenced construction yard.

Concrete batching plants and silos will be situated at both Mt William and Weka Dam operational areas. Isolated parts of the batching plants and silos may be as high as 8m. A crushing plant will also be required on the Plateau to produce aggregate. The one plant will be relocated between the two sites. Plant required for the micro tunnel site will be as for the Christchurch site illustrated in the AEE. Equipment for batching shotcrete for use in tunnel linings will be located within or close to the tunnel portals.

On completion of construction of the scheme all plant and equipment will be removed from the operational areas. The only permanent building that may be constructed as part of the project will be the Weka power station which will include a control room and office block. This will only be required if geotechnical investigations show that it cannot be located within the tunnel portal.

13. BDC Request

Granity does not have a public water supply or sewer reticulation. The Plateau also has no services and difficult conditions for disposal of effluent.

How will potable water be provided and effluent disposed of?

How are the temporary construction buildings and the permanent office block to be serviced in terms of ablutions?

14.1 HDL Response

Potable water supply will be by means of rainwater collection into a storage tank. Sewage and greywater will be into holding tanks for collection and disposal at an approved site, or to septic tanks and ground disposal system, in accordance with permitted activity rule 6 of the Regional Plan for Discharges to Land. All sewage systems will be designed in accordance with BDC building consent requirements.

15. BDC Request

There seems to be an under estimation of the amount of material to be extracted from the tunnels, and ventilation shafts. Example: Gravity tunnel, estimated extraction of 40,000m³ (pg 50). However at 4900m long x 10.5m² diameter, the minimum amount that would be extracted would be 51,450m³ and that excludes any material from the ventilation shafts. This will affect traffic generation and also potential storage capacity of the reservoirs.

Provide an assessment as to the amount of material to be extracted from the tunnel operations. Will the storage of this material affect the generation capacity of the scheme, the amount of storage capacity and flow regime of the project?

15.1 HDL Response

The solid volume of Gravity tunnel excavations will be in the order of 40 - 60,000m³, subject to the final position of the power station chamber and other aspects of tunnel design. This material will be processed for dam aggregate and will not affect dam storage potential. The number of vehicle movement required to cart this material to Weka reservoir will be insignificant (up to 10 per day) compared to current traffic movements for Stockton mining operations.

16. BDC Request

The plans show an inundation behind the Mangatini diversion should the weir be closed, however this information has not been provided for the Mine Creek diversion. This also needs to be considered in relation to landscape and ecological effects.

How much land will be inundated if the Mine Creek weir was closed?

How long/regularly would the weirs be expected to be closed?

16.1 HDL Response

The diversions weirs on Mine and Mangatini Creeks include gates that can be closed to prevent flows entering the Weka reservoir. This is necessary to allow maintenance and to prevent ingress of any highly contaminated stream flows.

The Mine Creek diversion weir will be approximately 3m high and will operate as a small detention dam. In normal flow conditions there will be no ponding behind the weir. However, during high flood flows when spillage occurs a backwater will extend upstream of the weir. This will be minimal as there is a steep gradient into a gorge immediately upstream of the weir. No land is inundated as flows will remain within the confines of the stream bed within the gorge. The gate will be closed infrequently for short periods for maintenance or during sediment laden flood flows. There will be no landscape or ecological effects.

17. BDC Request

Due to the use of RCC, a batching plant will be required close to the dam sites. Therefore will there be two of everything? Will need to consider social, traffic effects and the number of staff required.

Will the construction of Weka and Mt William Dams occur concurrently?

Will that require two separate operating areas?

17.1 HDL Response

Construction of the Mt William and Weka dams may or may not occur concurrently depending on the funding of the project. As such there will be operational areas situated in the vicinity of Weka

dam and Mt William dam, as described in Response 12.1 above. A third operational area will be located at Gravity. The calculations as to jobs created and traffic effects contained in the AEE are based on the 3 operational areas with construction activities proceeding concurrently.

18. BDC Request

Are temporary lines proposed or is a generator to be used during the construction of the dam and tunnel? In terms of the Gravity tunnel, it is noted that the ventilation shafts will be used for power. Will this have visual and ecological effects? Also need to consider effect on snails. Any new lines would be through MAPPS? Would need to check the MAPPS restrictions.

How is electricity to be supplied to the dam sites and in the tunnels through the project construction?

Where is the power from the ventilations shafts to come from? Are new powerlines required?

What visual and ecological effects will this have?

18.1 HDL Response

Gravity tunnel will have an underground supply from the main power grid at Gravity.

Mt William dam and reservoir currently has an 11kv line running through the reservoir footprint. This line was used to feed Mt William mine. The line will be re-energised for the project and can feed the Mt William tunnel and the tunnel back to Weka reservoir plus run the batching plant for Mt William dam.

Power for activities in the Weka reservoir will be feed from the new line starting at the Weka power station and joining the existing Stockton line. A temporary spur line, within the reservoir footprint will be required. This line would be approximately one kilometre long and run down from the powerhouse to near Weka dam. The line would be “in reservoir” and will not be visible from Millerton.

Gravity tunnel ventilation shafts, if required would be pilot drilled from the surface using portable equipment but driven up from the tunnel below. A surface footprint of approximately 50m² would be required. A fan evassee some 5m high and 3m round would be required. Fan power would be provided from Gravity. The ventilation shafts would not be installed if ultimately they were not going to be used as water intakes.

For drawing water a self cleaning, stainless steel wedge wire intake screen would be required. This screen would have an area of approximately 18m² and a foot print of 30m². This structure would be in the stream bed. However, the current resource consent applications do not include consents to take and/or divert either Gravity or Miller Streams. At some stage in the future if this was deemed desirable additional resource consents would be required but they do not form part of the current proposal.

No new permanent lines will be built through the MAPPS area. There will be no visual or ecological effects.

19. BDC Request

If the MAPPS prevents mining, does it prevent tunneling? New roads are proposed to the vents. Are new roads permitted within the MAPPS area? Would power lines be permitted within MAPPS?

Provide a copy of the MAPPS agreement.

19.1 HDL Response

BDC is a signatory to the MAPPS agreement and is familiar with the terms of the agreement and holds a copy.

However, the following is a brief background on the agreement.

The Millerton Heritage and Ecological Park was officially opened to the public in August 2005. This was the culmination of several years consultation with the Millerton community to create a “buffer zone” between the township of Millerton and Stockton Opencast Mine. In 2003 SENZ and the Millerton and Plateau Protection Society (MAPPS) signed an agreement in designating 300 hectares between the township and the mine as a reserve. The aim of the agreement to preserve the ecological and heritage aspects of the reserve and to make it available to local residents and visitors. Subsequently DoC agreed to add a further 200 hectares of land to the reserve and BDC joined SENZ and MAPPS as signatories to the agreement.

A committee comprising representatives of the four groups are developing and managing the park. Plans include walking tracks, the restoration and conservation of historic sites in the area and the implementation of a predator control programme.

The MAPPS agreement is a memorandum of understanding between the 4 parties to prevent mining but nothing in the agreement precludes tunneling beneath the MAPPS area. As indicated in the above responses HDL does not intend to construct new access roads within the MAPPS area nor is there any intention to build overhead power lines.

20. BDC Request

Granity - Have very little detail about what is occurring within the construction area. Need to consider noise from stockpiling and visual effects of stockpile.

The application states that should rock be required by the community for coastal protection it would be stored somewhere. Where would this material be stored?

Is the area identified for construction large enough to include such a stockpile?

20.1 HDL Response

HDL has not proposed stockpiling rock at Granity. The AEE states that if any community group or individual has obtained the necessary consents for a particular river or coastal protection works then HDL would be willingly to cart rock to the site. This would be undertaken progressively as rock became available, either during portal construction or Granity tunnel construction. Note, rock from the different construction sources would differ in size and hence suitability for protection structures.

21. BDC Request

Granity - Confusion about whether the proposal is a 24hr operation or not. The application states 2x10hr shifts and 24hr tunnel operation at Granity.

Need to confirm hours of operation.

21.1 HDL Response

The hours of operation at Granity for underground activities (being construction of the Granity tunnel and the ocean outfall) were described in the AEE as 24 hour operations. Strictly speaking,

they will comprise 2 x 10 hour shifts 7 days per week, with the hours between shifts to allow for shift change-over and maintenance.

22. BDC Request

What is proposed if SENZ will not take sediment from the dam sites?

How large a sediment stockpile would be required if SENZ didn't take sediment? Would the footprint area need to be expanded?

What height are the stockpiles expected to be?

At what point would the stockpiles be contoured and rehabilitated?

22.1 HDL Response

Sediment extracted from the silt traps is valuable rehabilitation material of which Stockton mine is always in short supply. HDL is not anticipating that SENZ will decline to accept the material. In the event that it does, there are many locations on DoC land adjoining the Mt William access road affected by historical mining that require restoration. An agreement with DoC will be reached for restoration and consents will be sought, if required.

23. BDC Request

All other diversion structures have access roads or footpaths shown on the maps. It is assumed that a short length of track will be formed.

How is access proposed to maintain the diversion of Mine Creek?

23.1 HDL Response

Access to the Mine creek weir will be via the Mine Creek tunnel.

24. BDC Request

At the site visit, it was said that the pipe connecting the surge chamber to the jacking station would be dug in. This pipe is to be at least 7m below ground at the jacking station.

Digging may affect any archaeological remains.

Due to depth of excavation is digging or drilling more appropriate?

24.1 HDL Response

Geotechnical investigations will determine the most appropriate construction technique. Any archaeological artefacts discovered during earthworks for the ocean outfall pipeline will be dealt with in accordance with the "Accidental Discovery Protocol" discussed in Response 5.1 of Section D below.

25. BDC Request

Granity - Need to consider setback from public access/residences/rail line.

Are explosives to be stored on site? If so, where are they to be stored?

25.1 HDL Response

Initially explosives will not be stored on site. Tunnel driving will involve small blasts of below 60kg and this will be bought in as required. Once well established underground a small approved

magazine will be established that will hold up to 1 tonne of high explosives, these magazines are special steel containers constructed to specific standards. As the project develops it is probable emulsion explosives will be used. Emulsions are not explosive until loaded into the blast hole. Trucks used for dispensing emulsion pass through Granity most days servicing Stockton Mine.

26. BDC Request

The Ngakawau River is a grade 3 flood-run river. There is little known about the usage of the river. The applicant should have made an attempt to identify the level of use on the river to determine the effects of fewer but larger flood events would have on the use of the river.

What are the effects on the users of the Ngakawau River?

26.1 HDL Response

As discussed in the AEE, the project will not increase flood flows in the Ngakawau River but is likely to reduce flood peaks from storms that are located over the projects catchment area. There will be no effect on flood flows originating from storms over other areas. Reductions in the frequency of floods flows of interest to kayakers will be minor.

At the HDL Open Day, held during the submission phase, a number of local kayakers discussed the proposal with the HDL team. Subsequently submissions were lodged in support of the project by both Jo Parson (local kayaker) and the NZ Recreational Canoeing Association.

According to the NZ Recreational Canoeing submission, the Ngakawau River is a class IV -V whitewater run. Kayakers carry their boats from the Charming Creek Walkway car park to the confluence at Mangatini Falls and then kayak down the gorge. Generally the river is kayaked during high flows. Both submissions referred to the potential reduction in kayakable days being offset by the improvements in the amenity when it is kayakable due to the improved water quality.

Jo Parsons submission noted that “...*This scheme will have a positive impact on any kayaking activity on the Ngakawau – water no longer polluted by mine runoff will be much more pleasant to have up your nose, and as the Ngakawau is a 'rain run' (only paddled in flood), the reduction in catchment inflow will simply change the 'window of runability' for kayakers.*”

27. BDC Request

Need to consider the footprint required, the landscape effects and possible ecological effects if additional clearance required.

The AEE says no public access to the reservoirs. What happens when the SENZ is no longer operating on the site? Will there be a need for public restrictions/security fences to prevent access to the dams, the intakes etc?

27.1 HDL Response

There is currently public access to the Weka reservoir site via the Repo Basin walking track and this will be maintained. The public will only be excluded from working areas of the site as required by Health and Safety legislation.

HDL does not control access to the Plateau and will not restrict access to the reservoirs. Public access is currently controlled by SENZ and control will thereafter revert to DoC. On completion of mining activity on the Stockton Plateau it is expected that there will be unrestricted public access. The reservoirs will not be fenced as the intention is that these areas merge into the surrounding landscape and take the appearance of natural lakes as much as possible. However, the acidic nature

of the reservoir water is such that use for any recreational purposes would not be desirable and public notices will be erected at each of the reservoirs advising people of such.

Once the scheme is operational the only areas where public restrictions will be necessary is the Gravity power station and the Weka control room/office building. As described in Response 1.1 above, the Gravity portal outlet will have a locked gate across the entrance, while the Weka control room/office building will be enclosed with a security fence. The project tunnel portals and intake towers will be the only restricted areas post construction.

28. BDC Request

Need to consider whether hazardous material, how it is transported to the site and stored, and volume.

What will the additive be for the RCC dam to strengthen/quicken the cement?

28.1 HDL Response

Cement resistance can be enhanced by modern additives such as microsilica and metakaolin. Microsilica is a finely ground natural amorphous silica. Metakaolin is a natural kaolin heated to approximately 7500C at which stage it becomes reactive with cement. Both products form addition short range high strength calcium - aluminium silicate bonds that enhance strength and greatly reduce permeability.

As discussed in the AEE, all hazardous substances will be transported, used and stored in accordance with the relevant legislative requirements.

29. BDC Request

Some of these options include effects on recreational aspects, and landscape effects such as flood protection works for the villages of Ngakawau and Hector, and raising the level of Charming Creek walkway.

Is the applicant considering implementing any of the mitigation options proposed by URS in the dam breach report?

29.1 HDL Response

HDL has no intention of implementing any of the mitigation options proposed by URS in the Dam Breach report, for the reasons outlined in Response 2.1 of Section A WCRC material.

30. BDC Request

It is noted that Meridian Energy Ltd's application includes powerlines over the plateau which appear to run through the proposed Weka dam.

Has any consultation been undertaken in relation to the placement of the MEL poles and the HDL dam?

Would there be any conflict between powerlines if MEL's line crossed HDL's line where it ran from the Weka power station to join up with SENZ line at Station #4?

30.1 HDL Response

The current intention is to embed the project within the local network. This will be reviewed if the construction of MEL's project offers more favourable alternatives. There is no potential conflict with construction of the two transmission lines as currently proposed.

Meridian's line is a 110kV line requiring relatively high poles, ranging in height from 14 – 20m (refer to Meridian resource consent application). HDL's proposed spur line connection into SENZ's 33kV line only requires installation of single span wooden poles approximately 9m in height, being the same size and spacing as the current SENZ power line.

31. BDC Request

The construction report appears to be missing reference to noise and traffic management plans.

These will need to be included in the matters to be included in the construction report.

31.1 HDL Response

Conditions of consent will include a Noise and Vibration Management Plan to address noise management for the entire project, not just Granity as indicated in the AEE.

Rights to occupy the railway level crossing, SENZ and railway land at Granity, and SENZ's CML will determine traffic management requirements. These will be incorporated into the construction management plan which will cover all traffic management effects.

Section B - Terrestrial Ecology Information

1. BDC Request

Appendix H - Greater certainty is required regarding the conclusions that impacts on the local fernbird population will be small.

Further information to support the claim that there are likely to be several thousand fernbirds on the Stockton Plateau and analysis to place likely project losses into context. Map showing the extent of the Stockton Plateau and approximate estimate of the extent of suitable habitat for fernbird would be helpful here.

1.1 HDL Response

The Ngakawau Ecological District comprises some 16,000 ha with about a third of this habitat suitable for fernbirds. The proportion of their habitat affected by the proposed scheme is minimal. Appendix G records that numerous fauna studies have established that fernbirds are found throughout coal measure shrubland, semi open pakihi, swampy areas and forest margins on the Stockton Plateau and more widely in similar habitat throughout the Ngakawau Ecological Area. Particularly high densities of fernbirds have been noted in Blackburn pakihi, parts of the Denniston Plateau, and the Rome Ridge area between the Mine haul road and the Ngakawau Gorge.

It is considered that the effects on fernbirds are less than minor, as fernbirds can quickly re-colonise rehabilitated areas unlike most other threatened species. (Note, for that reason, among others, they have a relatively low threat ranking).

2. BDC Request

Appendix H - Greater clarity required concerning the risks to *Powelliphanta* snails, particularly *P. lignaria* "Millertoni".

Further analysis of the reasons why *Powelliphanta* snails are likely to be absent.

2.1 HDL Response

A total of 88 hours was dedicated to searching for snails around the proposed reservoir sites. The survey was undertaken by a team of experienced *Powelliphanta* searchers before arriving at the conclusion that *Powelliphanta* snails are likely to be absent from within the Project footprint.

Other surveys carried out on behalf of SENZ and L & M Coal Ltd (M. Hamilton pers. comm) have also searched areas within the HDL scheme footprint such as near Millerton, Weka Creek and the proposed Mangatini Stream diversion area without finding snails. There can be a high degree of confidence that the project will have no effect on *Powelliphanta* populations, or at the very least “core” (stronghold) populations in their range.

3. BDC Request

Greater clarity regarding the effects of access roads on flora and fauna.

Description of the vegetation habitats and associated fauna likely to be affected by permanent or temporary access roads and what will be the nature and significance of effects? What rehabilitation is proposed for the temporary access roads?

3.1 HDL Response

The following roads will be constructed as part of the Project development:

- Approximately 800m of new permanent dual carriage haul road which will replace approx 1500m of existing haul road. The existing road will form the bed of Weka reservoir or rehabilitated landform. The new road will be transferred to SENZ ownership and will be maintained by SENZ to the standard required for the operation of Stockton Mine (as at present). At closure of the mine the haul road is expected to be retained in some form to provide public access to DoC land, and will continue to service HDL's facilities. HDL will take over maintenance at mine closure by agreement with DoC.
- Approximately 2150m of new permanent access roads, 6m wide including water tables of crowned metal pavement comprising:
 - (i) 350m at Granity for site access and access ramp to portal
 - (ii) 1000m in the vicinity of Stockton portal and Mangatini diversion and silt trap;
 - (iii) 500m in the vicinity of Mine Creek diversion and silt trap;
 - (iv) 300m approaches to Mt William Dam crest.
- Approximately 4000m of minor upgrade of DoC's existing access roads to Mt William, crowned 6m wide metal pavement plus water tables. HDL will take over maintenance by agreement with DoC.
- Approximately 320m upgrade of Back Road (the existing track to Granity Museum on railway and SENZ land) to crowned 6m wide metal pavement including water tables. HDL will take over maintenance by agreement with SENZ and KiwiRail.
- Minor upgrading as required for 4WD access to approximately 3000m of existing drillers tracks which will be used to provide infrequent access to tunnel vents. These tracks are on SENZ land within Stockton Mine and will be used and maintained by Stockton Mine until closure in approximately 20 years.

Over 95% of the roading required for the project will follow well established roads and driller's tracks. Very little new disturbance of vegetation will occur. The vegetation and associated fauna is

described in the supporting technical documents. All temporary roads are within the reservoir footprints and will not require rehabilitation. The project will produce a surplus of rehabilitation materials which will be used to rehabilitate existing road corridors as appropriate and agreed with DoC.

4. BDC

Greater clarity required regarding the risks of open channels on fauna.

Further details of the locations and extent of open channels/vents and analysis of the associated risks.

4.1 HDL Response

The project plans depict ventilation shafts on Granity and Miller Streams, however, ventilation shafts will only be economic if AMD is to be collected via intake shafts. Forced ventilation from the Granity tunnel portal will replace shafts if AMD is not to be collected. The position of shafts shown in the plans is indicative and will be determined in final design.

The surface disturbance of the shafts will be approximately 1m diameter. Shafts will be bored from within the tunnels following an exploration bore hole approximately 100mm in diameter. The exploration hole will be drilled from the surface using a drill rig flown into the sites by helicopter. The rig will disturb an area of no greater than 50m². It is anticipated that drilling of the initial bore shaft will take 3 -5 days following which the drill rig would be flown out and any disturbed ground re-instated.

As stated in the AEE, HDL intends using the existing roading network on the Plateau to access the ventilation shafts. Where existing access roads are not available to specific ventilation sites, drillers will walk in from the nearest road head.

5. BDC Request

Further rationale required concerning the necessity and effectiveness of the proposed pest and predator control on access roads.

Substantial access to the project area already exists and therefore presumably opportunities for mammals to move easily through the area. In this context therefore, how great an additional risk does the project pose and how effective is pest and predator control likely to be on the new access roads.

5.1 HDL Response

The terrestrial fauna survey (Appendix H) notes there may be a possible increase in numbers of rodents or mustelids caused by improved access, changes in habitat (regenerating road margins that may favour mice) and human activity (e.g. human scent or food scraps). Proposed permanent roading for the project is some 2150 km, in the context of the extensive roading on the Stockton Plateau this comprises a minor addition with proposed roading generally in the vicinity of other existing roads or access tracks. In this environment the risk of introducing additional predators into the area is expected to be minor.

Given the large areas of open space within the Stockton Plateau, roading is unlikely to greatly assist access of predators, if at all. In fact roads can benefit biodiversity by providing favoured habitat to birds (e.g. Fernbirds and weka) and other fauna (e.g. invertebrates) along edges, and assist predator control operations.

As to introducing weed pests, the AEE has stated that all machinery will be cleaned prior to being transported up to the Plateau to minimise the spread of weeds into the adjoining Ngakawau Ecological District.

Weeds and pests will be controlled within the immediate vicinity of the Project facilities including along project roads. As mentioned in the AEE, weed and pest management strategies will be outlined within the Landscape and Rehabilitation Management Plan. The management plan will address such matters as the types of pest to be targeted, duration, location and frequency of control measures. Draft conditions will be submitted to the Consent Authorities detailing the content of this Management Plan.

6. BDC request

Further information required concerning the wetland area near the junction of Fly Creek and St Patrick Stream.

Description of the vegetation and assessment of significance. Assessment of the nature and significance of any impacts on this vegetation.

6.1 HDL response

A number of wetland areas exist throughout the footprint area, many of which appear to have been formed as a result of past mining excavations and dam formation. The St Patricks/Fly Creek wetland area was not noted as having any particularly unique botanical values. Wetland areas throughout the footprint are typically dominated by a variety of rush species including *Baumea teretifolia* (which elsewhere in the Ngakawau Ecological District is often fire-induced), as well as *Empodisma minus* (wire rush), while temporal ponds often harbor *Lepidosperma australe*. Umbrella fern (*Gleichenia dicarpa*) and red tussock often feature within wetland areas also. High species diversity was not a notable feature of the wetland areas observed nor were threatened species or species at distributional limits noted within these areas.

7. BDC Request

Clarification required concerning the merits of capture and relocation of lizards and snails.

What are the prospects of finding suitable habitats for relocation of lizards and snails where there will not competition from existing populations.

7.1 HDL Response

Translocation of fauna is practical but unlikely to be warranted.

8. BDC Request

The value of the monitoring to assess unforeseen effects on threatened birds is unclear. It is likely to be very difficult to measure and isolate unforeseen effects of this development from natural trends, particularly in populations that may already be in decline.

Further rationale required to clarify the benefits of monitoring to assess unforeseen effects on threatened bird populations.

8.1 HDL Response

The application does not propose monitoring of threatened species.

The Terrestrial Fauna report recommended monitoring for several years after the completion of development of the hydro scheme. HDL would support research of this nature if the scope provided

insight into the effects of hydro development, however for the reasons discussed in the question this is unlikely to be of benefit.

9. BDC Request

Clarification needed as to whether an entomologist has been engaged to review the macro-invertebrate life in the area.

Results of the entomological review, if one has been undertaken. Rationale for not undertaking the review if it has not occurred.

9.1 HDL Response

A macro-invertebrate survey has not been undertaken as there is no evidence of any invertebrate species being confined solely within the project footprint. Such a survey was not deemed necessary given that much of the proposed development is in areas that have already been modified by industry and settlement.

10. BDC Request

Appendix F - Further clarity regarding the significance of the *Carpha alpina* gravelfields required.

Further comment on how unusual this community is and also the significance of its loss if it is going to be affected.

10.1 HDL Response

Carpha alpina gravelfield was not identified as an association in 4.1 of Appendix F but was referred to in the discussion in 5.1. This was a mistake and should have read *Chionocloa australis* (carpet grass) gravelfield. This association occurs along the northern boundary of the footprint area. It seems likely that dam construction will affect some portion of this association and though this community does occur at least some distance beyond the likely area of submergence, care will be taken to prevent unnecessary disturbance to this association.

11. BDC Request

Appendix F- The assessment of representativeness appears to contradict the statement regarding the uniqueness of the *Carpha alpina* gravelfields referred to on page 17.

Clarification regarding the apparent contradiction.

11.1 HDL Response

As noted above, all references to *Carpha alpina* gravelfield should have read *Chionocloa australis* gravelfield. This community is represented outside of the proposed footprint area and it appears to be better represented outside of the area proposed for development than within it.

With respect to distinctiveness, it is again noted that no species within this association is threatened or at its distributional limit and that the association is low in species diversity. It is, as much as anything, the substrate on which this community occurs that imparts an element of distinctiveness to this association though its composition is similar to the more widespread *Chionocloa australis* rockland community.

12.1 BDC Request

Appendix F – The assessment of distinctiveness does not include comment on the uniqueness of the *Carpha alpina* gravelfields referred to on page 17.

Clarification required concerning the distinctiveness of the *Carpha alpina* gravelfields.

12.1 HDL Response

Refer to Response 11.1 above.

13. BDC Request

Appendix F – The assessment of “size” against the criteria on page 17 does not appear to reflect the intent and purpose of the criteria.

Analysis of the significance of the size of habitats impacted against the criteria.

13.1 HDL Response

The difficulty of determining exact habitat distribution limits by mapping is noted within Appendix F. However, for the purposes of clarification, the following quantifies the size of the various habitats within the footprint area against the criteria:

Indigenous communities:

i) Mountain beech-yellow silver-pink pine forest:	>5ha area, approx 20-25ha
ii) manuka shrubland	>5ha, approx. 15-20ha
iii) manuka- <i>Epacris pauciflora</i> shrubland	approx. 5ha
iv) mountain flax- <i>Dracophyllum spp</i> /wire rush flaxland	<5ha
v) [<i>Baumea teretifolia</i>] wire rush rushland	<5ha
vi) red tussock grassland	<5ha
vii) manuka- <i>Chionocloa juncea</i> /wire rush rushland	>5ha, approx 5-10ha
viii) <i>Chionocloa australis</i> gravelfield	<5ha
ix) <i>Chionocloa australis</i> rockland	>5ha, up to 10ha

Adventive communities:

x) Gorse shrubland	<5ha
xi) <i>Juncus squarrosus</i> gravelfield	<5ha

The size of the communities represented within the Mt William footprint are relatively small and are all better represented in the adjoining Ngakawau Ecological area. In addition, HDL is currently in the process of securing a tract of indigenous lowland vegetation for the purposes of off-site mitigation against the loss of habitat in addition to other on-site mitigation measures as outlined in the AEE.

14.1 HDL Response

The following additional comments were provided by Richard Nichol:

Effects on Representativeness Values: An estimate of the coverage of the various associations is made above. It is noted in the report that none of the communities is found solely within the footprint area and all are better represented outside of the area proposed for development. It should be noted that all the associations of greater than 5ha in area are well represented elsewhere on the Stockton Plateau and the effects on representativeness in general are not considered to be significant.

Effects on Distinctive Features: It is noted within the report that some features are distinctive and measures are included within the recommendations to mitigate for their loss as well as off-site mitigation in the form of land acquisition.

Effects on Intactness: The proposal will affect a variety of habitats of largely indigenous nature and result in the loss of vegetative cover and create ecological edge effects on the adjoining vegetation. However, the larger area proposed to be disturbed has been subject to some degree of past mining activity and the intactness of the area has already been compromised through tracking, roading and mining itself. This historical activity has facilitated the incursion of a number of weed species including some particularly invasive ones i.e gorse and *Juncus squarrosus* which has compromised the intactness of the area further. The report recommendations include weed control to mitigate the colonisation of disturbed ground by weed species.

Effects on Connectivity: The footprint area is set amongst a larger area of similar nature and the loss of approximately 50 ha footprint area is not expected to have a significant effect on the overall ecological functioning of the surrounding habitat. Connectivity within adjacent habitat of a similar state of naturalness will be maintained. As noted above, edge effects can be expected along the footprint boundary but mitigation measures such as direct transfer of vegetation to all disturbed areas will ensure the natural recovery of the margins of the dams and reservoir.

Effects on Surrounding Ecological Landscape: It will be important to prevent or control the establishment and spread of weeds both during dam construction and the post-construction rehabilitation process, including preventing the introduction of new species with machinery, spoil etc. HDL intends implementing weed control and cleaning machinery prior to transport to the project work sites therefore effects on the surrounding ecology are anticipated to be minor.

15. BDC Request

No terrestrial assessments have been provided for the proposed Granity Tunnel route. All assessments have been undertaken for Millerton Road. While it may be possible to presume similar habitats, the application area has little human interference and so may have a different distribution of species. The area also includes the *P. lignaria Millertoni*, and no information has been provided on the effects the proposal will have on them. It is not certain where the drill holes and ventilation shafts will be in relation to the snail population. Nor whether the proposed access roads will impact on the snail population.

Provide an assessment on the terrestrial ecology of the new Granity tunnel route and in particular the effects of the surface disturbance from drilling, vents, access tracks and power lines may have on the ecology, in particularly *P. lignaria Millertoni*.

Provide a map showing the proposed Granity Tunnel route and associated activity in relation to the known location of the *P. lignaria Millertoni*.

15.1 HDL Response

As regards the effects of the Granity tunnel beneath the Millerton Reserve it will be deeply buried at depths from 20m at the intake within Weka reservoir to over 300m below the surface near the Granity outlet. The depth of the tunnel is such that it will not be affected by any of the historic mine workings in the area and with the exception of exploratory drill holes and the ventilation shafts there will be no disturbance within the MAPPs area.

Exploration drilling will be confined to the general alignment of Granity tunnel and is expected to involve no more than 2-3 drill holes to confirm ground conditions along the alignment. Exploration drilling will involve minimal disturbance to vegetation with the drill rig flown to the respective drill

locations and with drill rig disturbance no greater area than 50m². Drill sites will have vegetation stripped, stockpiled and reinstated once the drilling rig has been removed from the site. Access for drillers will be by means of existing 4wd tracks or by walking.

There will be no effects on the snail population of *P. lignaria Millertoni*, which is located some 700m from the nearest Gravity tunnel ventilation shaft.

16. BDC Request

To consider the reasons behind the ecological area. From the maps, it appears that part of the dam structures at Weka creek and some flooding may occur within the Ngakawau Ecological Area.

Provide a copy of the Ngakawau Ecological Area gazettal.

16.1 HDL Response

HDL's intention is that the project structures are located outside the Ngakawau Ecological Area. This will be confirmed by ground survey in final design. Any apparent depiction to the contrary on the project plans is related to plan accuracy and should be ignored.

There may be some minor flooding across the Ngakawau Ecological Area when the reservoir is full. This will be clarified in final design.

17. BDC Request

Is it proposed that all timbers be removed or flood the larger vegetation which may result in timbers being exposed at the surface? Also some confusion about whether the timbers will be used for restoration or utilised as proposed in Appendix F.

How much large vegetation within the reservoir will be removed, and how much will be drowned?

17.1 HDL Response

Timber which could block intakes will be stripped from within the inundation area and used for rehabilitation purposes within the Project footprint, or made available for rehabilitation within Stockton Mine or the adjoining DoC estate.

18. BDC Request

Need to consider location and area of disturbance outside the reservoir and sediment site areas

Where will the sites be located for the overburden and strippings?

18.1 HDL Response

Overburden and stripping will be placed in depressions within the reservoir footprint.
Insert my response

19. BDC Request

Appendix E – Appear to be missing the last sentence in the 1st paragraph on page 20.

19.1 HDL Response

There is no missing section to this Appendix.

20. BDC Request

Appendix E – One benefit identified in the Norton Roper-Lindsay report was that a lake would

prevent public access to Repo Basin and avoid trail bikes from accessing the area. This proposal retains an access, a matter raised in submission.

Have Norton Roper-Lindsay considered the proposed access intended to be retained to Repo Basin? How much additional disturbance is required to re-route the Repo Basin walking track?

20.1 HDL Response

The Norton Roper-Lindsay report was prepared prior to installation of the Stockton Mine gate which now effectively prevents any form of vehicle access onto the Plateau. Prior to installation of the mine gate trial bikes commonly accessed the Stockton Plateau and as noted in the Norton Roper-Lindsay report, had a significant impact on the vegetation within the Weka reservoir area. This is no longer an issue and the only means for the public to access the Plateau, other than through Outwest Tours, is via walking and using such tracks as the Repo Basin walking track.

A small section of the walking track that commences at Millerton and extends through to the Repo Basin will be inundated by the Weka reservoir. Within the AEE it was stated that this section of the track would be closed for public safety reasons until construction of the Weka embankments and dam was completed and the track could be realigned along the top of the embankments/dam. Subsequently, a considerable number of submissions raised the fact that maintaining un-interrupted public access was an important consideration and HDL now intend maintaining the Repo Basin walking track throughout the entirety of project construction.

During construction a safe walking route will be established across the Weka construction area linking in with the existing track. On completion of construction activity the section of walking track flooded by Weka reservoir will be replaced with a walking track that follows the northern perimeter of the reservoir. The track will pass across or beneath the realigned haul road, up to the crest of the western saddle dam, along the reservoir margins, the main Weka dam and along the eastern saddle dam to rejoin the existing walking track.

The disturbance required to re-route the walking track will be minimal, given the vast majority of the realigned section of the track will be along the top of the embankments and dam structures.

21. BDC Request

Uncertainty as to the effect that the varying reservoir levels will have on the ecology of the area and what mitigation is proposed.

Provide an assessment of the effects of the changes to the operating level of the reservoir and mitigation proposed.

21.1 HDL Response

A natural ecology will develop appropriate to the acidity and inundation regime.

Section C – Landscape Information

1. BDC Request

Paragraph 1.5 Transmission, refers to the proposed transmission infrastructure. The application includes consents to build spur lines in order to connect to existing SENZ transmission lines. The application proposes to connect Weka Power station to SENZ's 33kV line that serves Stockton Mine. This assumes that SENZ want this connection. Is there a contingency plan if SENZ are not interested in being connected to these lines?

Knowing Meridian's plans for the Mokihinui Hydro Proposal and its proximity to HDL's project, it would be prudent to relate the routes of both project's transmission lines.

Provide alternatives for transmission line connection assuming SENZ don't need/want power resulting from proposed transmission lines connecting with their existing structures?

Or

Provide evidence of SENZ's interest in the proposal to connect to their existing transmission lines.

Provide a plan showing proposed transmission lines for Meridian's Mokihinui project. Plot both Meridian and HDL's transmission line route on plan C-000 and comment on the cumulative effects.

1.1 HDL Response

While the line to Stockton Mine is owned by SENZ, the design, construction, maintenance and operation of the line is undertaken by BEL. The line is effectively part of local network. The spur lines at Weka and Granity have been based on advice received from BEL. SENZ refusing connection is not a realistic scenario.

Cumulative effects of a transmission line that has not been consented are not relevant to this application.

2. BDC Request

Paragraph 2 of Section 3.1 - Location of Proposal notes that "No aspect of the proposal is visible from the [Millerton] township, which is physically separated from the Project by Mine Creek gully." It is difficult to assess the visibility of the proposal from Millerton township as no details are provided as to the physical height of the dam structure or transmission lines.

A cut in the road for mine traffic is visible from Millerton township. What parts of the dam may be visible through this cut from Millerton township?

Provide a landscape assessment of the visual and landscape impacts of the dam structure may be/may not be visible from Millerton township.

Will the transmission line where it connects with Station #4 be visible from Millerton township?

2.1 HDL Response

From various vantage points in Millerton approximately 30m section of the western Weka saddle dam will be visible through the haul road cutting, as a distant feature. However, the saddle dam will be largely hidden by the haul road climbing up past the dam face. The outlook will be very much the same as the current outlook where the cutting is not a feature in the expansive landscape of mountains and sea views. The proposed new power line will not be noticeable from Millerton.

3. BDC Request

The proposal mentions drilling to provide air vents and electrical supply during tunneling. Will this require the installation of additional power lines? The maps also show maintenance roads being formed.

Provide information for and locate on plans any additional transmission lines required to provide electrical power supply during tunneling

Also provide assessment as to whether the new access roads and transmission lines to the Granity tunnel vents through the MAPPS site may also be visible from the township.

3.1 HDL Response

See Response 18.1 of Section A.

Granity tunnel will have a power supply connection from the existing transmission line that passes directly in front of the tunnel portal.

The existing 11kV line to Mt William Mine will be re-commissioned to provide electricity to the Mt William construction site.

The new spur line connection from the existing Stockton 33kV line to Weka power station will provide power for Stockton tunnel construction and Weka reservoir construction.

Access to the ventilation/intake shafts would be via existing and historic tracks within Millerton pit and the MAPPS area or where tracks are not available by walking. The tracks are already part of the landscape and are barely visible from Millerton.

4. BDC Request

11.2 - Landscaping and Rehabilitation Management Plan, states that the applicant will submit a plan detailing the intended rehabilitation and landscaping of all disturbed areas on completion of construction activities. The information detailed in Section 11.2 is considered insufficient in regards to a framework for the intended contents. Therefore it is considered appropriate to provide a more detailed framework to be included in the plan.

The proposal shows rehabilitation outside of the dam footprint. If the geo-tech drilling proves that the proposal is not feasible, there is a requirement for all disturbed areas to be rehabilitated.

Provide a framework (e.g. table of contents) for the proposed Landscape Management Plans which detail expected outputs, timeframes (including review) relative to the application site. This framework will highlight specific areas requiring rehabilitation including areas around the dams and power station.

Rehabilitation Management Plans should include provision for rehabilitating the sites affected by the drilling programme should the project not go further. This including drill sites, stockpiles and access roads.

4.1 HDL Response

No modifications to the existing landscape are intended outside the immediate footprint of the dams and new access tracks. Any disturbance to the landform outside this footprint will be reinstated to as near to the original landform as possible before being rehabilitated with the original cover using vegetative direct transfer (VDT) techniques.

The Landscape and Rehabilitation Management Plan required by conditions of consent will provide details on the sequence of construction activities, the timetable for rehabilitation activities and the anticipated rehabilitation strategies. HDL also intends this plan to address disturbance resulting from exploration drilling activities.

5. BDC Request

Section 8.2.3 Granity Flora Effects, describes excavations for an access ramp and small section of access roading to a settling pond and outfall diffuser within Granity Creek. This is an area which is visible to the public.

It will be difficult for most people to visualise what the proposal would look like on completion. Consequently, it will be difficult for people to assess the visual impacts of the scheme and whether or not they will be potentially affected by the visual impacts. Although the application states that the anticipated effects will be minor, visual simulations in this instance would be a valuable tool for assisting people to properly understand what the built scheme would actually look like.

Provide visual simulations, where possible superimposed over photographs, of the proposed scheme in locations and from public vantage points on map C-006. Show view of portal, portal apron, ramp and settling pond using visual simulations. Including any landscaping between the site and the State highway.

5.1 HDL Response

The access ramp will be similar to the many inclined driveways along this section of the escarpment and, like these, will be barely visible as it will be screened with native vegetation.

The settling pond and diffuser will be built into the existing ground, as such will not protrude above ground level and will not be visible from any distance.

HDL have not received any expressions of concern regarding visualisation of any aspects of the project throughout the lengthy consultation that was undertaken, or thereafter.

6. BDC Request

With reference to information in 8.4 Landscape/Visual/Natural Character, it is not possible to make any assessment of the impacts of the nature and scale of the internal transmission infrastructure without a landscape assessment (see above regarding information required, page 18). For example, what heights will the new transmission lines be and what type of structures are proposed?

Provide details of the height of the proposed lines and the materials used for construction of the transmission line structures.

6.1 HDL Response

The appearance of the new proposed spur line connection from Weka power station to SENZ's transmission line will be identical to the existing line it connects to. It will comprise wooden poles with a single span approximately 9m high.

The Mt William operational area will be served by re-commissioning the existing line that currently runs adjacent to Fly Creek access road to Mt William. Re-commissioning will require replacement of the existing line with new lines of the same type and size and replacement of some poles that are in a deteriorated state with identical poles. No new structures are proposed.

Connection of the Granity portal to the existing transmission line will be via a single span. A temporary transformer may be required on the existing pole. No new structure is required.

7. BDC Request

Uncertainty about above ground effects. The Maps indicate that a 100m² building is proposed.

Confirm that a control room/offices/ablutions and parking will be located aboveground at Weka power station. Also indicate how large an area of disturbance is required?

7.1 HDL Response

The feasibility of locating the Weka power station within the Stockton tunnel will be confirmed in final design, following detailed survey and geotechnical investigations. Current investigations indicate that the geology of the area is such that the Weka power station can be constructed within the Stockton tunnel. Note, the control room/staff facilities building will also be incorporated within the tunnel structure. The only external aspects will be the access road off the mine haul road and carparking, with these areas to be appropriately landscaped.

However, there is a chance that complexities associated with the Millerton fault may require the power house to be located outside the portal in the area indicated on Plan C-004. In this case a building consent will be required for a power house of approximately 200m². This will incorporate the generators, control room, maintenance depot and staff facilities. Access to the building will be from the Stockton Mine haul road with parking and landscaping around the immediate surrounds of the building involving disturbance of an area no greater than 500m². The building will be a single storey built in durable products with a colour scheme that blends with the surrounding natural environment.

8. BDC Request

To be able to consider the landscape/visual effects of the option, including the visual effects of a substation/transformer

Provide a concept plan for an above ground power station at Weka Creek.

8.1 HDL Response

No concept design has been prepared for an above ground power house as it is unlikely to be required. Refer to Response 7.1 above.

9. BDC Request

What is meant by planting mature trees along the road frontage of the construction yard at Granity? The application site has no road frontage, so where is the planting proposed? Any planting to be undertaken in such a manner so as to not affect the railway line.

Provide a diagram to show where planting is proposed at Granity.

9.1 HDL Response

The term frontage is used to describe the aspect facing Granity village.

During the construction period a security fence will be erected around the construction site as shown on the plans. As this fence will be in place for around 3 years, HDL will plant trees and shrubs to reduce the visual impact of the fence.

HDL expects to obtain an easement over the land to provide ongoing access to the Granity tunnel portal. Otherwise the land will remain in SENZ and Crown ownership. These organisations will determine the future use of the land and the condition that they require it be left in on completion of construction. At the very least this will be a tidy grassed area. If the owners agree that the area is to be made available as a community area, HDL will landscape the area as agreed with the owners and the Granity community.

Rehabilitation of the Granity construction area will be addressed in the Landscape and Rehabilitation Management Plan.

10. BDC Request

The application is unclear about what landscaping is proposed around the dam sites. Need to consider visually what is to occur at the dams which will have varying levels. According to the application Weka dam will fluctuate so that it only floods the loco line 50% of the time. Therefore what will the lake edge look like? In particular there is little information provided as to what mitigation would be provided should Weka power station be above ground.

Provide an assessment of the effects of the changes to the operating level of the reservoir and mitigation proposed.

Is any mitigation proposed regarding the potential above ground location of the power station at Weka dam?

10.1 HDL Response

Any landforms disturbed during construction will be reinstated as original landform and revegetated using direct vegetative transfer techniques.

The landform around any external powerhouse would be shaped to minimise the presence of the powerhouse and landscaped to achieve integration into the surrounding environment, as will the Weka power station access road and carpark area.

All existing vegetation will be retained along the margins of the reservoirs, except where embankment/dam structures are required to retain the storage volumes and where access roads are constructed to the silt traps within the reservoirs. Any disturbed margins will be rehabilitated by means of direct vegetative transfer. Likewise, any slope stabilisation works around the base of Mt William will also be rehabilitated by direct vegetation transfer.

The low dams and reservoirs are expected to blend into the surrounding natural landscape and take the appearance of natural lakes. There are many reservoirs on the West Coast that prove this expectation.

Section D – Archeology and Heritage

1. BDC Request

Reference is made to Solid Energy's CIA for Cypress mine.

Provide a copy of SENZ's CIA for Cypress mine.

1.1 HDL Response

Mr Rick Barber forwarded a copy of the Cultural Impact Assessment prepared for the Cypress Mine as being proximate and relevant to the current proposal, a copy is attached.

2. BDC Request

The AEE refers to a cultural effects assessment Appendix M. This does not appear to be attached. Does this refer to Mr Barber's letter which is contained in Appendix N?

Confirm whether the cultural assessment is the letter in Appendix N.

2.1 HDL Response

Mr Rick Barber's letter is what is referred to in the AEE.

3. BDC Request

The Archeology Report recommends that the section of loco line at Tintown corner should not be disturbed in anyway whereas the AEE has not accepted this recommendation. Drying and wetting of sites has a more destructive effect that permanently inundating a site. Has HDL considered the types of mitigation available and come up with a preference.

What mitigation is proposed to protect the loco where it is being covered 50% of time by water?

What protection is proposed for the balance of the loco line?

3.1 HDL Response

Options to build a dam to avoid relocation of the Stockton Mine haul road and flooding of the eclectic loco formation were investigated but were found to be limited to around 1.5 million cubic metres storage. This would result in increased spill to the Ngakawau River, reduction in the base generation by around 40% and reduction in annual power generation by around 30%, (refer to the URS Scheme Modelling Report for model results for a wide range of options). There are no viable options for a storage dam at the Weka site without relocating the haul road and affecting the 460m section of the loco formation.

Reference to Project plan C-007 shows that the archaeologist identified 86 way points (points of historical interest) over the remaining above-surface formation length of the loco formation being approximately 4kms. (Note, there are also extensive sections of formation underground that are not included in this survey). Construction of Weka reservoir western saddle dam southern abutment will destroy approximately 3 way points (3%). The haul road realignment has been selected to avoid destruction of way points. Realignment of the haul road and construction of the dam abutment will cross and destroy approximately 120m of formation (3%). Flooding of Weka reservoir will intermittently inundate a further 400m of formation (10%), which will not be physically disturbed by construction works but will be affected by infrequent inundation (being within the upper operating water levels of the reservoir). It is relevant that the sections of the loco formation that will not be affected by the project are currently in far better condition than the sections that will be affected.

It is acknowledged that periodic inundation of any artefacts along the approximately 400m length of formation within the Weka reservoir footprint will, over time, accelerate decay and that these would need to be recovered. Inundation will not damage the formation which is cut in basement rock. However, during a recent site visit with Historic Places Trust there was general agreement that decay of most of the timber structures associated with the loco formation is already well advanced and most are unlikely to be salvageable.

HDL has proposed in the AEE that mitigation should focus on ensuring that the remaining intact sections of the loco formation are preserved and public access to such areas is improved. HDL will work with the land owner and occupier (DoC and SENZ) to achieve the following mitigation measures:

1. HDL's archaeologist will investigate all sites to be disturbed by the project in detail immediately prior to construction, including the section of the loco formation to be inundated by Weka reservoir. Any structures and artefacts that are salvageable will be

recovered. The project archaeologist will fully document and record any recovered items and will advise on the form and methods of preservation and display, including whether items are offered for display at the Granity museum or at displays to be created on site. The location of the site displays will be agreed with DoC and SENZ.

2. The displays will include interpretive panels detailing the history of the loco line and recovered features/structures that are deemed suitable for incorporation by the HDL's archaeologist. The archaeologist will advise on the methods, content and forms of display.
3. With the co-operation of DoC and SENZ, HDL will create a walking track linking Weka reservoir to Mt William reservoir. HDL anticipates that this would include the section of the loco formation that follows Mine Creek for approximately 700m, terminating in a tunnel portal and from there would link to the other remaining sections of the tramway that can be safely traversed. The Mine Creek and tunnel portal area is a particularly interesting section of the loco formation cut into basement rock. Currently vegetation along most of the loco formation is very dense as to be nearly impenetrable and there is no protection or preservation of remaining artifacts currently taking place. HDL's intention is to form a historic walkway. Weeds will be controlled, native vegetation restored and interpretive panels erected. This will be according to best practice followed for historic walkways in New Zealand. HDL's archaeologist would advise on the design and formation of the track and interpretive information.

HDL is confident that DoC and SENZ will be willing partners in the formation of such a walking track. While mining operations continue, public safety issues will determine the staging of public access to the historic loco formation. It may not be practical to extend public access beyond the Weka reservoir until mining operations cease. Once mining ceases at Stockton Mine and public safety is not an issue, HDL is confident that DoC and SENZ will endorse public access through to Mt William reservoir.

4. BDC Request

The Archeology Report notes that not all sites have been surveyed. Pre 1900 sites are covered by the Historic Places Act and therefore any disturbance carries the requirement to obtain an archaeological authority. Sites that are post 1900 still need to be considered given the requirements of the District Plan. It is not clear what is proposed in terms of sites that have not been assessed, such as the old manager's residence adjacent to the Millerton Incline SO2517.

What processes/mitigation measures are proposed for other areas that have not been surveyed regarding potential features and artefacts?

4.1 HDL Response

Within the AEE it was stated that an Accidental Discovery Protocol (ADP) would be established that would cover earthworks in the area of the Granity bins. However, as noted above it is equally applicable to other areas of the project. On this basis HDL will apply the ADP to the entire project to ensure that any historic artefacts that are uncovered in the process of construction can be salvaged. Any such recovered items will be fully documented and recorded.

5. BDC Request

The application identifies that an Accidental Discovery Protocol (ADP) will be in place and the contractors working on-site will be trained. However these processes appear to only be proposed for the Granity Bins and there are other areas within the proposed scheme area where the same measures would be expected.

Comment on why the ADP and training is only proposed for the Granity Bins area and not to the whole project area.

5.1 HDL Response

See Response 4.1 above.

6. BDC Request

There are a number of buildings at Granity that have heritage value. There is an absence of information to demonstrate that the existing built heritage will not be affected by construction activities, including tunneling, blasting, earthworks.

The following are identified as Category II buildings in NZHPT's register:

The Granity Library – effected by micro-tunnel

The War Memorial – effected by access road

The State Mine Store (Museum) – works within proximity, access

It is also noted that there are kilns behind the museum which are of historic significance. While not directly affected by the proposal, i.e. they are outside of the site, they may be potentially be affected by vibrations from blasting of the portal.

Outline the measures/procedures proposed to ensure the heritage buildings at Granity are not adversely affected from construction activities. And if they are affected, what mitigation is proposed.

What mitigation is proposed to ensure that the kilns are not affected by blasting?

6.1 HDL Response

Coal trains passing immediately by these building on a long-term daily basis and heavy vehicle using the state highway create more vibration than is possible from any construction activity proposed by HDL.

Tunneling vibrations are considered very unlikely to affect the stability or structural integrity of these structures. Cosmetic damage (eg cracking of plaster) is the first level of vibration damage. This can be difficult to identify or attribute to any particular occurrence, as such minor cracking is often present due to other causes. It is common to carry out detailed surveys to identify before and after differences. Recent micro tunneling for Christchurch City outfall passed along a street alignment for 3 blocks with no cosmetic damage to dwellings (they were inspected in detail before and afterwards) and barely perceptible centreline street settlement.

As regards to blasting, this will be for the purpose of splitting large rock blocks for construction of the Granity portal. Small blasts of this type are not expected to create vibrations that could adversely affect the structural stability of buildings.

However, as outlined in the AEE, HDL will undertake monitoring of representative blasts and tunneling activity to ensure the set limits for vibration (as specified in Australian Standard 2187.2-2006 for sensitive sites) are not exceeded.

As a further precaution, prior to any blasting or micro-tunneling activities occurring pre-condition surveys will be undertaken on the historic buildings/structures being the Granity Library, Granity Museum, War memorial and the kilns. On completion of the micro-tunnel and establishment of the

Granity portal, a post construction structural check will then be undertaken on these buildings to assess any changes in structural integrity. Any detectable structural damage that can be related to HDL's activities will be repaired at HDL's expense.

7. BDC Request

It is noted that there is a proposed land swap for the loss of Crown land to offset against the values that are being lost. However the 'compensation' appears to only take into account the loss of natural values as opposed to heritage values. It is uncertain whether HDL will achieve the land swap proposed. Any mitigation then will be located on either HDL land or DoC land.

What type of protection would be proposed for the loco line?

What consideration has been given to linking HDL's mitigation with that on SENZ land to ensure a consistent approach across the various land ownerships?

7.1 HDL Response

The assessment being undertaken by DoC in terms of land values for the proposed land exchange includes assessing the heritage values, in particular the values of the loco line. HDL are confident that the land exchange will proceed, see Response 1.1 of Section A WCRC material.

HDL has proposed that mitigation should focus on ensuring that the remaining intact sections of the loco formation are preserved and public access to such areas is improved. HDL will work with the land owner and occupier (DoC and SENZ) to achieve protection of the loco formation beyond the HDL development footprint. Refer to Response 3.1 above.

8. BDC Request

The Granity Library is a Category II heritage building. The tunnel is proposed to be under this building. Will micro tunneling vibration affect the integrity of library?

Provide an assessment by an heritage architect on the effects of the micro tunneling on the library.

8.1 HDL Response

Refer to Response 6.1 above.

Section E – Noise and Vibration Information

1. BDC Request

What height is security fence/bunding proposed to be around the construction site/jointing station. Will it be acoustically designed?

1.1 HDL Response

The fence enclosing the Granity construction yard and the earth bund around the Jacking Station will both be in the order of 3m high and designed by an acoustic engineer. Detailed design and location of both structures will be provided in the proposed Noise and Vibration Management Plan.

2. BDC Request

An acoustic report does not form part of the application. It is considered that an assessment should be prepared for the works up at Weka Creek re crushing and explosives, dam building near Millerton and the work at Granity. The applicant states they will comply with the District Plan requirements. Compliance with the Plan is important for the Granity site as it is close to residences,

public places and commercial activities.

How will compliance be achieved?

What mitigation would be put in place?

What happens if the requirements are not met?

Would operations cease until compliance was achieved?

Will any of the activities proposed have a repetitive noise that would attract a 5dBA penalty.

2.1 HDL Response

Scheme Operation

The Buller District Plan specifies noise standards relevant to noise levels from operation of the proposed hydro scheme as follows:

Rule 7.8.1 The following maximum noise levels measured at the stated times at the boundary of any land used for a residential activity shall not be exceeded:

7.8.1.1	Monday to Friday – 8.00am to 11.00pm	55dBA L10
	Saturday – 8.00am to 6.00pm	55dBA L10
	At all other times including any public holiday	45dBA L10 Lmax 75dBA

As the scheme is intended to operate on a 24/7 basis the night-time and Sunday criterion of 45dBA L₁₀ applies. Operational noise is expected to be generally constant with little fluctuation in noise levels therefore the Lmax criterion is not considered relevant.

The power station will be contained within a concrete housing and located some 50m within Granity tunnel therefore noise from generation is not expected to be audible beyond the portal entrance. Compliance with the District Plan noise for operation of the hydro scheme is anticipated to be readily achieved.

The District Plan specifies that noise within the Industrial, Port and Cement zones should be assessed in accordance with NZS 6802:1991, which requires a 5 dBA penalty be applied for tonal noise. If this standard is also applied to the current proposal it is anticipated that the only applicable noise source will be the transformer required to enable connection into the power network during construction. This will be less of a noise nuisance than existing transformers in Granity being of the latest technology.

Scheme Construction

Within the Buller District Plan there are no specific construction noise standards specified in the Plan. Rule 7.8.3.4 refers to construction noise as it relates to the Industrial, Port or Cement Zones and not the rural/residential zones that is the applicable zoning for the present proposal. However, it is common practice to require construction noise to comply with the most recent New Zealand Standard, being NZS 6803:1999 “Acoustics – Construction Noise”.

NZS 6803:1999 allows for noticeably higher noise levels than the District Plan rules for permitted noise activities, on the basis that effects are of a limited duration. There is a degree of acceptance that construction noise is of a temporary nature. NZS 6803:1999 includes a table of recommended

noise limits in relation to the anticipated duration of construction noise. Given construction of the hydro scheme is expected to take at least 3 years the “long term” duration noise is regarded as the applicable standard. As stated in the Section 8.5.4 of the AEE, HDL intends complying with the specified noise limits in NZS 6803:1999, as detailed in the following table:

Table 2 – Recommended upper limits for construction noise received in residential zones and dwellings in rural areas

Time of week	Time period	Duration of work					
		Typical duration (dBA)		Short-term duration (dBA)		Long-term duration (dBA)	
		L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and public holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

Note:

- Short term duration means construction work at any location for up to 14 calendar days
- Typical duration means construction at any one location for more than 14 days but less than 20 weeks
- Long term duration means construction at any one location with a duration exceeding 20 weeks.

NZS 6803:1999 is not intended to apply to blasting and for blasting noise the standard refers to Australian Standard 2187-2: 2006 “Explosives – Storage and Use” as defining the applicable standards. The main acoustic issues associated with blasting is groundborne vibration and airblast overpressure. For each of these issues AS 2187-2 provides a description of appropriate measurement procedures and guideline criteria. For the current proposal the appropriate guideline for airblast overpressure is 120 dBL and is the standard which will be adhered to for blasting operations.

Stockton Plateau

A range of noise controls can be adopted to mitigate noise effects including:

- Noise barriers and screening.
- Silencers and attenuators fitted to exhausts and engines.
- Selection of quiet equipment.
- Audible reversing alarms disabled at night.
- Blast design considerations.

However, given the distance to the nearest residential houses, over 2km from the Weka operational

area, HDL anticipates that compliance with NZS 6803:1999 is readily achievable.

As mentioned in the AEE, noise management strategies will be outlined within the Noise and Vibration Management Plan to address noise sources and control measures at Weka. This plan was initially proposed to cover the Granity site only but will be extended to cover noise management for the entire project.

Granity

Section 8.5.4 of the AEE detailed the various noise emissions that can be expected at Granity. HDL will comply with the construction noise standards specified in NZS 6803:1999. The mitigation measures intended to be adopted to ensure the applicable standards are achieved include the following measures:

- Erection of a sound insulated construction fence around the construction yard perimeter to ensure noise from within the yard is contained as much as practicable.
- Construction of a earth bund around the Jacking Station to again contain noise during both establishment and operation.
- Connection into the existing electricity network will ensure generators are not required at the Granity site.
- All surface construction activities including establishment of the Jacking Station, outlet portal, portal apron, construction yard, access roading and heavy vehicle movements will be restricted to the hours of 7.30am to 6pm Monday to Sunday. (Note, this contrasts with the hours that were specified in the AEE but are stipulated to coincide with NZS 6803:1999 and the higher construction noise limits specified for this period).
- Equipment and machinery will be fitted with silencers/attenuators where appropriate.
- Audible reversing alarms will be disable and alternative safe working practices implemented.
- Site access will be sealed in accordance with NZTA requirements and will assist with minimising noise from trucks as they enter/exit the site.
- The anticipated 10 trucks per day required to remove material excavated from Granity tunnel will be via trucks only (not a truck and trailer unit which has the potential to generate increased noise levels).
- Trucks entering/exiting the site will be required to not exceed a speed limit of 20km/h to minimise noise. Site access will be maintained in good order to ensure pot-holes or any other irregularities are repaired and do not generate additional noise. Note, to a large extent speed will be dictated by the relatively confined nature of both the site access and access ramp, which will require trucks to travel slowly throughout the site.
- Light vehicles entering via Back Road will be required to not exceed a speed limit of 30km/h to minimise noise for people residing along this street. The road will maintained in good order to ensure pot-hoes and any other irregularities are repaired and do not generated additional noise.
- Liaison with immediate neighbors to the site including Granity Museum, Torea Galley and Drifters Cafe. Development of a blasting programme in consultation with these parties to ensure that blasting occurs at set intervals during the day that minimises effects on people at these properties.
- All surface blasting activity shall be restricted to between the hours of 9am to 5pm Monday to Sunday, with a public notice erected at the site entrance detailing the blasting programme.

As detailed in the AEE, HDL will undertake noise monitoring (by a suitably qualified and experienced acoustic engineer) to ensure that noise emissions meets NZS 6803:1999 and AS 2187-2: 2006. Monitoring at two representative buildings will be carried out on a least two separate

occasions annually. In the event of non-compliance with NZS 6803 and/or AS 2187-2: 2006, HDL will cease the offending activity until such time that suitable mitigation measures are implemented. This could include any of the following measures or combination thereof:

- Local screening/enclosure around an offending noise source. For example, screens/bunding could be erected around the portal apron area to minimise noise emissions from construction activity emanating from this area. Likewise, HDL have undertaken to construct an earth bund around the jacking station on the western perimeter. This could be extended to enclose the whole jacking station or increased in height.
- Adjusting blast design, including direction of initiation and adjusting the maximum instantaneous charge.
- Using smaller machinery.
- Adjusting hours of operation for surface activities.

As mentioned in the AEE, noise management strategies will be outlined within the Noise and Vibration Management Plan, including measures to be undertaken in the event that non-compliance with noise limits occurs. Draft conditions will be submitted to the Consent Authorities detailing the content of this Management Plan.

Noteworthy, is that none of the immediate neighbours to the Granity construction site (Granity Museum, Torea Galley or Drifters Cafe) have raised concerns with noise or for that matter submitted on any aspect of the project. HDL intends consulting with the immediate neighbours and any concerned residents on a regular basis to ensure that the effects of activities (particularly dust and noise) at the Granity site are minimised and will endeavor to address any issues residents may have.

3. BDC Request

Noise will vary greatly depending on the location of the surge chamber, its closeness to the portal or whether it is outside of the tunnel.

Need to have details of the location and design of the surge chamber to consider? What noise emissions might be expected?

3.1 HDL Response

As described in Section 5.9 of the AEE, the surge chamber will comprise a tower extending some 18m vertically down to the level of the ocean outfall pipeline. It will be a concrete structure contained within the portal apron, located as shown on Plan C-006. The surge chamber will be vented within the portal apron with the vent covered by a steel grate for safety reasons. Noise will be audible from the surge vent comprising muffled surging water flows. It is anticipated noise will only be audible if standing within the immediate vicinity of the portal apron. The Granity Museum is over 80m from the proposed portal apron/surge chamber structure and it is not anticipated that any noise will be audible at this location.

4. BDC Request

Construction Noise - Granity

It is uncertain as to vibration and noise and the impact on users/residents. Consideration should be given to working under the library when it is closed and the Lyric Theatre when not in use.

Where the micro tunneling is under or close to buildings, when will drilling occur?

Will it affect night time ambiance for residents?

4.1 HDL Response

Micro tunneling for the ocean outfall will be undertaken on a near continuous basis. Based on typical tunneling rates of 4-5m per shift, tunneling should be beyond the residential area within 15 days and the entire tunnel completed within 100 days. There are precedents for this type of construction activity in very close proximity to residents that have been undertaken with no noise or vibration effects evident above ground once the tunneling head has moved past the jacking station. There will be no affect on the night time ambiance for residents.

Establishment of the micro tunnel Jacking Station requires sheet piling to create the pit and this has the potential to cause noise and minor vibration disturbances while the piles are being driven. Establishment of the Jacking Station is expected to be completed within 1 week, with the AEE having allowing for a conservative 2 week timeframe. Noise measurements of sheet piling undertaken for Christchurch residents at a distance of 10m generated a noise level of around 82 dBA. (Refer to 2005 joint decision on Christchurch Wastewater Treatment Plant Consent Application). This level is significantly higher than the long term construction noise standard specified in NZS 6803 of 70dBA but only marginally above (2dBA) the limits which the standard proposes for “short duration” work of 14 days or less.

HDL intends establishing the jacking pit as far back towards the hillslope as possible and hence providing a reasonable buffer from residents. However, worse case scenario will still have the position of the jacking Station greater than the 10m referred to above from any adjoining property and HDL intend utilising the quietest available techniques and liaison with adjoining property owners to ensure noise levels are within acceptable limits.

In addition, HDL will only undertake sheet piling for creation of the jacking pit during the hours of 7.30 to 6pm Monday to Sunday so that night time nuisance is avoided.

5. BDC Request

Operational Noise - Granity

The application states that there will be no industrial noise from the operation of generating equipment that would be discernible to residents of Granity.

If noise is measured from the tunnel, what mitigation measures are available?

5.1 HDL Response

The relevance of this question is unclear. The District Plan noise standards stipulate noise measurements “... *at the boundary of any land used for a residential activity...*” However, HDL is confident that operational noise beyond the immediate vicinity of Granity portal apron is unlikely to exceed the plan limits, given the power house will be a concrete structure set well back from the portal entrance and the surge chamber is a buried concrete structure. If noise emissions were an issue (Note, HDL does not consider this to be a realistic concern) acoustic shielding could be established at the tunnel portal entrance or around the portal apron/surge chamber area.

6. BDC Request

It is noted that BDC has received complaints about vibrations from Terrace Mine at Reefton, so is not considered suitable to say that Terrace Mine provides an example tunneling and blasting within residential areas that has no effect. The table J4.5(A) appears to be misleading, as the standard also identifies sensitive areas as being theatres, schools etc occupied by people.

This would include the museum, library and Lyric Theatre.

How will the applicant comply with vibration standards for blasting?

Would ongoing operations result in vibrations? In particular would the surge chamber result in vibrations? And if so, to what magnitude?

6.1 HDL Response

HDL intends complying with AS2187.2 for ground vibration for sensitive sites. The number of historic buildings surrounding the Granity operational area dictate the lower threshold limit as specified in AS2187.2 is applicable. The guideline limit is that peak particle velocity shall not exceed 10mm/s. (Note, this is deemed the applicable standard given operations for both the micro tunnel and Granity portal establishment will be completed within a 12 month timeframe).

As detailed in the AEE, HDL will undertake monitoring of representative blasts and tunneling activity to establish typical levels of vibration and compliance with AS2187.2. In the event that any results are within 20% of the vibration limit, measurements will continue to be undertaken until such time as the blasting levels are reduced.

As regards vibration from operation of the surge chamber, this is expected to be negligible. Vibration from operation of the surge chamber would only result if the structure was poorly designed and inefficient water flows occurred. The surge chamber will be designed to achieve a smooth laminar flow as opposed to turbulent flow that could result in vibration.

7. BDC Request

Heavy trucks can cause troublesome vibrations for building occupants from perspectives of annoyance and building damage. The normal working hours suggested in the application differ to the noise limits being proposed to be complied with.

Normal working hours are suggested to be 7am-7pm weekdays and 8am-6pm other days. Daytime noise standards however begin at 8am.

What standards will be complied with concerning vibrations caused by heavy commercial vehicle operations during the construction phase?

How does the applicant plan to meet the reduced standards outside of normal operational hours outlined in the District Plan?

7.1 HDL Response

Rule 7.8.2 of the Buller District Plan specifically excludes road traffic noise from the general noise limits specified in the plan, with this being common practice in most district plans. As such, truck movements along the State Highway and Millerton road are excluded from consideration. However, vehicles movements entering and exiting the Granity construction site and within the Granity operational area have been considered and mitigation proposed to minimise noise and vibration from such sources. Refer to Response 2.1 above.

Measures such as utilising trucks rather than truck and trailer units to cart excavations up to the Plateau, speed restrictions and maintaining access roading in a good condition will ensure both noise and vibration effects are minimised.

All surface construction activities including truck movements will be restricted to between the

hours of 7.30am to 6pm. Note, this contrasts with the hours that were specified in the AEE but are stipulated to accord with NZS 6803:1999 and the higher construction noise limits specified for this period.

Vibrations that occur on a regular basis from the passing of heavy coal trains will far exceed any vibrations from both heavy vehicle movements or for that matter any construction activity at the Granity site.

8. BDC Request

Vibration monitoring is specified for blasting and tunneling, with potential for additional monitoring in some circumstances.

How will the monitoring be used to moderate the blasting or tunneling vibrations, or otherwise satisfy potential concerns of residents?

8.1 HDL Response

Refer to Response 2.1 and 6.1 above. As outlined above HDL intends undertaking monitoring of representative blasts and initial micro tunneling activity to ensure the limits for vibration (as specified in Australian Standard 2187.2-2006 for sensitive sites) are not exceeded.

The extent of vibration from blasting can be controlled through blast design, particularly the maximum instantaneous charge and can be adjusted to ensure vibrations are minimised and the specified Australian Standards limits meet.

With respect to micro tunneling, as mentioned previously vibrations are considered very unlikely to affect the stability or structural integrity of any buildings. Recent micro tunneling for Christchurch City outfall passed along a street alignment for 3 blocks with no cosmetic damage to dwellings (they were inspected in detail before and afterwards) and barely perceptible centreline street settlement.

As indicated in the AEE, vibration measurements will be undertaken at the request of any property owner who is concerned by vibrations caused to their building due to blasting or tunneling activities.

9. BDC Request

Micro tunneling is to take place in close proximity to the historic Granity Library and historic war memorial. Vibrations are always produced during ground modification or excavation.

How will the tunneling vibrations affect the stability/structural integrity of heritage sites and what mitigation measures are proposed?

What standards will be complied with concerning vibrations caused by micro tunneling and associated construction machinery?

Is trial micro tunneling proposed to give an idea of likely vibration levels?

9.1 HDL Response

Refer to Response 2.1 and 8.1 above and 6.1 of Section D.

It is not considered practical to trial the micro tunneling process given the setup and access pit requirements, and the need for a dedicated machine matched to appropriate tunnel diameter and

ground conditions.

10. BDC Request

The Granity Noise and Vibration Management Plan should identify that action will be taken in the event that noise or vibration are excessive.

More information is required on what this Management Plan will achieve. Specify that additional mitigation measures that may be utilised for both noise and vibration.

10.1 HDL Response

It is intended to submit draft conditions that will detail the content of the Noise and Vibration Management Plan. As mentioned in response 2.1 above, it is intended that the plan will cover the entire project.

11. BDC Request

There are a number references to brief disturbance but only in a qualitative way. Overall the scheme construction should have to comply with specific noise limits determined with reference to NZS 6803:1999. The assessment says construction will comply with this standard, but this statement is too liberal. NZS 6803:1999 does not have set limits but instead gives guidelines on how to prepare a table of construction noise limits. The noise assessment refers to some blasting work on Sunday. It is questioned whether this activity would comply with a table of construction noise limits made according to the guidelines of NZS 6803:1999. 24 hour per day, 7 day per week operations are usually very difficult to conduct without causing nuisance and exceeding noise standards.

Provide a table of construction noise limits in accordance with NZS 6803:1999.

11.1 HDL Response

See Response 2.1 above.

Section F – Transport Information

1. BDC Request

Access to the site to be confirmed. At the site visit, it was said access via the Museum access road is temporary, however application comments state that access via the monument will only be temporary.

Confirm how access to the Granity site is to be provided, both temporary and long term.
Is there a need to consider upgrades?

What type of traffic will use the various access points? What are the likely noise/effect on neighbours and users?

What access will be used once the proposal is operational?

1.1 HDL Response

Access for HCV (Heavy Commercial Vehicles) will be via an existing access route off State Highway 67 (immediately south of the war memorial) and across the railway line via a temporary level crossing. This will minimise traffic effects on Granity residents by avoiding some 20 residents to the south of the site. HDL will require approval from NZTA to construct site access off the State Highway. The access will need to be upgraded to a heavy duty vehicle crossing of at least

6m in accordance with NZTA specifications.

It is intended that light vehicles transporting the workforce will utilise the existing Back Road accessway. On commissioning of the scheme it is proposed to use Back Road as the permanent accessway. Over both the construction phase and operation of the scheme, HDL will maintain Back Road as a metal surface to a standard suitable for regular use by HDL and visitors to the Museum.

With respect to traffic volumes and potential noise effects refer to response 3.1 below.

2. BDC Request

At the site visit, we were advised that HDL will comply with SENZ traffic management plan. Need to consider this and ascertain whether this only relates to within SENZ land or whether it includes public roads plan.

A copy of SENZ's traffic management plan.

2.1 HDL Response

HDL does not have access to SENZ's traffic management plan.

Stockton mine currently employs over 700 people with most working two shifts over a 24 hour period, 4 on and 4 off. 250 people drive on and off site twice daily. In addition, all haul road surfacing is carted onto site, coal is carted off site to Holcim, fuel, explosives and numerous equipment and rehabilitation materials (lime, NSD, straw etc) are transported through Granity, along Millerton Road up to Stockton Mine. BDC has access to the transport reports prepared for the Millerton Road upgrade which also should have detailed the use of the Millerton road for large volumes of Stockton Mine traffic. In this context, HDL consider the traffic effects of the project to be minor and to not require a specific traffic management plan

3. BDC Request

To consider the two access points and the generation of traffic over the life span of the project.

Provide a traffic management plan for the Granity site.

3.1 HDL Response

The following is a breakdown of the anticipated traffic that will be generated as part of project construction:

Operational Establishment

This will involve deliveries of temporary site buildings, construction equipment and heavy machinery generally by means of HCV. These vehicle movements will typically be one off deliveries of the above items to the 3 operational areas.

For Granity – this will require delivery of portacoms, construction equipment and machinery to the Granity operational area. Initial site establishment will also require approximately 50 trucks transporting aggregate for roading and construction yard formation, this is expected to be sourced from Weka. Site establishment at Granity is expected to be completed within 2 weeks.

Daily Workforce Movements

There will be traffic associated with the arrival and departure at each operational site of construction workforce for each shift change. Typically this will occur in the morning and evening with workers traveling in LVs (light vehicle). This will be a short duration activity that is likely to

co-incide with Stockton Mine shift change-over times.

Tunnel shifts are expected to comprise 6 people per shift and the two operational sites at Weka and Mt William dam are expected to involve a workforce of up to 10 respectively. Therefore at anyone time there will be a workforce on the Plateau of up to 16 people and like the Stockton workforce workers will be collected in vans for transport to the respective operational areas.

For Granity tunnel construction, shifts are expected to comprise 6 people per shift. Workers are expected to come from Westport or immediate surrounds, with workers to be collected by one van for each shift change and accessing the site via Back Road. The AEE stated that approximately 8 light vehicles at the start and end of each day were envisaged. However, given the workforce is expected to travel together, even working in consultants and project management visits to the site this is likely to be an over estimate for LV movements.

Bulk Materials Delivery

The bulk of the aggregate and material required for construction of the respective dams/embankments is expected to be sourced from excavations within the Weka and Mt William reservoir and the proposed tunnels. However, additional products will need to be delivered to the operational areas such as bulk cement, cement additives, explosives, transmission infrastructure, power house equipment and fuel. This will generally be delivered in heavy commercial vehicles (HCVs) which are already a common occurrence through Granity, along Millerton road to Stockton Mine. The above deliveries of materials will be spread over the construction phase of 3-5 years and it is not anticipated that there will be any particularly intensive period of site deliveries.

As regards Granity, this will comprise the occasional concrete truck supplying shotcrete for tunnel lining over the 4 year tunnel construction phase. On completion of Granity tunnel construction approximately 40 concrete trucks will be required for construction of portal and power station structures, likely to be sourced from the concrete batching plant located at Weka. Establishment of the jacking station and associated equipment will require further vehicle movements and pipes for the ocean outfall.

Granity Tunnel Excavations

Approximately 10 trucks (no trailers) carting approximately 10 tonne of material per truck will transport excavations from the Granity tunnel to the Weka reservoir on a daily basis. This will continue for a period of up to 4 years, being the expected time frame to complete construction of the Granity tunnel. (Note, the AEE gives varying completion time frames ranging from 3 to 5 years, the 3 years relates to the minimum time frame for tunnel construction alone, while the 5 year time frame also incorporated site establishment and is the expected maximum period required for all construction activity at Granity).

The proposed route for these trucks will be via site access adjacent to the war memorial, to avoid passing some 20 residents if the existing Back road access route was used.

Vehicle movements to and from the Granity construction site are expected to have a greater impact than the Stockton Plateau traffic given the proximity of residents and businesses to this operational area. The following is a breakdown of the proposed traffic movements at Granity and the anticipated duration and sequence of events:

Activity and Duration	Daily Vehicle Movements	Site Access and route
Operational establishment	Up to 6 HCVs per day entering	All HCV entering/exiting via the

Activity and Duration	Daily Vehicle Movements	Site Access and route
(2 weeks)	and exiting the site carting construction aggregate for roading and construction yard formation and transporting temporary site buildings, equipment and machinery to the site.	level crossing adjacent to the Granity war memorial. Approximately 5 trucks per day traveling from Weka carting aggregate and 1 truck per day transporting equipment/machinery – most likely route being from Westport.
Granity Tunnel excavations (4 years)	Up to 10 HCVs per day entering and exiting the site carting Granity tunnel excavations.	All HCV entering/exiting via the level crossing adjacent to the Granity war memorial traveling to Weka.
Bulk Materials Delivery (4 years)	1 HCV per day entering and exiting the site delivering fuel, explosives or equipment to the construction yard.	All HCV entering/exiting via the level crossing adjacent to the Granity war memorial and generally traveling from Westport.
Granity power station and associated structures including surge chamber and portal apron (6 months)	2 HCV per week entering and exiting the site delivering equipment associated with construction of the power station and associated infrastructure. Within this 6 month construction period an intensive period of some 2 weeks were there will be up to 4 HCV per day entering and exiting site carting concrete for power station, surge chamber and portal apron construction.	All HCV entering/exiting via the level crossing and generally coming from Westport. During the 2 weeks of carting concrete HCVs will travel from Weka.
Ocean Outfall (6 months)	2 HCV per week entering and exiting the site initially delivering the jacking station equipment and thereafter transporting the outfall pipe work.	All HCV entering/exiting via the level crossing and generally coming from Westport.
Daily Workforce (5 years)	Up to 8 LVs per day entering and exiting the site transporting workforce, project management and consultants involved with the project.	All entering/exiting via Back Road, approximately 50% workforce and 50% consultants and/or technical service agents etc. With the majority expected to come from Westport.