



Report Number: A4307 - F1

**Resource Management Act 1991, Section 42A Report**

## **Noise issues associated with the Central Plains Water Enhancement Scheme**

**As described in:**

**Notice of Requirement  
Submitted to the Selwyn District Council  
by Central Plains Water Limited**

**Applications for Resource Consent  
Submitted to the Selwyn District Council  
by the Central Plains Water Trust**

**Applications for Resource Consent  
Submitted to Environment Canterbury  
by the Central Plains Water Trust**

6 December 2007

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## Table of Contents

<b>1.0 PREAMBLE</b>	<b>2</b>
<b>2.0 THE APPLICATION AND PROPOSAL</b>	<b>2</b>
<b>3.0 SITE AND LOCALITY</b>	<b>4</b>
<b>4.0 SUBMISSIONS ON NOISE</b>	<b>5</b>
<b>5.0 PERMITTED BASELINE</b>	<b>5</b>
<b>6.0 ASSESSMENT OF NOISE EFFECTS</b>	<b>6</b>
<b>7.0 CONCLUSIONS AND PROPOSED CONDITIONS</b>	<b>11</b>

## Document control

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## **1.0 PREAMBLE**

- 1.1 The Selwyn District Council (SDC) has commissioned this report in accordance with Section 42A of the Resource Management Act 1991 (RMA) to consider the environmental noise effects, content of submissions relating to noise, and statutory requirements of the RMA relating to noise for the construction and operation of a water irrigation scheme between the Rakaia and Waimakariri Rivers, known as the Central Plains Water Enhancement Scheme (CPWES).
- 1.2 This report has been prepared by Jeremy Trevathan. I am an Acoustic Engineer and Director of Acoustic Engineering Services Limited, an acoustic engineering consultancy based in Christchurch. I hold the degrees of Bachelor of Engineering with Honours and Doctor of Philosophy in Mechanical Engineering (Acoustics) from the University of Canterbury. I am an Associate of the New Zealand Planning Institute. I have five years experience in the field of acoustic engineering consultancy and have been involved with a number of environmental noise assessment projects throughout New Zealand.

## **2.0 THE APPLICATION AND PROPOSAL**

- 2.1 URS New Zealand Ltd on behalf of the Central Plains Water Trust (CPWT) have submitted Resource Consent Applications to Environmental Canterbury in June 2006 relating to water usage for the CPWES. Urbis Traffic Planning and Development Ltd have submitted a Notice of Requirement and applied to the Selwyn District Council for Resource Consents relating to land usage for the CPWES on behalf of Central Plains Water Limited and the CPWT ("the applicant") in June 2006. In August 2006 the Selwyn District Council requested further information on several matters, including noise. In October 2006 URS New Zealand Limited and Urbis Traffic Planning and Development Ltd acting on behalf of the applicant responded to the request for further information relating to noise. In November 2006 Anthony Harper acting on behalf of the Selwyn District Council wrote to the applicant describing, among other things, the inadequacy of the information relating to noise provided to date. However, I understand no further information relating to noise has been supplied by the applicant. In March 2007 there was a part withdrawal and a new '10 km tunnel' Notice of Requirement (replacing the previous headrace and 3 km tunnel) and additional Consent application relating to two by-washes omitted in the original applications.
- 2.2 During the preparation of this report, I have had multiple communications with senior acoustic engineer Dr Stephen Chiles of URS New Zealand Ltd. Dr Chiles was however not involved with the preparation of the application or provision of the extra information relating to noise outlined above. I understand that Dr Chiles will prepare and present

evidence on behalf of the applicant at the hearing. However, I understand that the content of our discussions and any additional matters discussed does not form part of the application which this report assesses.

- 2.3 Accordingly, it is my understanding that the following constitutes the entirety of the pertinent information relating to noise supplied by the applicant to date:

Resource Consent application to Environment Canterbury

- Central Plains Water Enhancement Scheme: Assessment of Environmental Effects for Resource Consent Application to the Canterbury Regional Council: Section 7.3. Noise

Notice of Requirement to Selwyn District Council

Annexure A: Assessment of Effects on the Environment

- Section 4.7.10 Hours of operation
- Section 5.2.2 Noise Effects. *Amended by the addition of further information supplied October 2006.*
- Section 8.1.7 Noise Management Plan. *Amended by the addition of further information supplied October 2006.*

Annexure H: Proposed Conditions

- Section 1.3 Hours of Work
- Section 6 Noise and Vibration

Resource Consent applications to Selwyn District Council

(Nominally identical with regard to information relating to noise)

Annexure A: Assessment of Effects on the Environment

- Section 3.4.2 Hours of Operation
- Section 5.1 Proposed Selwyn District Plan. *Amended by the addition of further information supplied October 2006.*
- Section 6.1.2 Noise Effects. Replaced by the addition of further information supplied October 2006.
- Section 7.1.6 Noise Management Plan. *Amended by the addition of further information supplied October 2006.*

Annexure G: Proposed Conditions

- Section 1.2 Hours of Work
- Section 6 Noise and Vibration

- 2.4 Details of the CPWES proposal can be found in the Resource Consent Applications and Notice of Requirement (“the application”), and are not reproduced here. I understand aspects of the application other than noise will be addressed in reports prepared by

planning and other experts which, when viewed in conjunction with this report, will complete the section 42A report relating to the application.

- 2.5 In terms of noise effects, it is most logical to consider the application in its entirety, as the distinction between individual Resource Consent applications and Notices is not significant.

### 3.0 SITE AND LOCALITY

- 3.1 The application contains no description of the existing acoustic environment in the general locations covered by the proposal, neither in an objective (in terms of measured ambient and background noise levels) or subjective (description of the various types of noises observed) manner. Such information would often be included with an assessment of environmental noise effects, especially where expected noise levels may exceed District Plan noise limits. Information relating to the existing noise environment would typically be presented to provide an insight into the level of acoustic amenity currently experienced by residents, and to provide context to considerations of any intruding noise.
- 3.2 The application quotes the Proposed Selwyn District Plan (“the District Plan”) noise limits, but contains no discussion of what these limits imply about the general noise environment in the District anticipated by these rules, or the protection afforded to those in the District. For example, of note relating to the noise standards set out in Rule IX 1.13 of the Rural Volume of the District Plan is that noise limits in rural areas are applied not only at the notional boundary of any *dwelling*, but also at any rest home, hospital or classroom.
- 3.3 It is my opinion that to provide context to the assessment of environmental noise effects and proposed noise limits, information should be provided by the applicant relating to the existing noise environment in the CPWES area. I understand that, with regard to construction noise, typically it is not the general loss of amenity due to the noise which is of primary concern but more specifically the propensity of the noise to disrupt sleep. However, due to the long period of construction proposed in this case I feel that some consideration of the associated loss of amenity during both day and night time is relevant not only to allow an assessment of the expected effects on neighbouring residences to be undertaken, but also to allow an assessment of the expected effects on other noise sensitive receivers such as those identified in Rule IX 1.13 of the Rural Volume of the District Plan. I note that such an approach is consistent with section C7.1.1 of NZS6803:1999 which states: *“The acceptability of construction noise in any*

*community is likely to depend on the potential for interfering with activities, the expected duration of the noise and the existing background sound level at the places affected.”*

#### **4.0 SUBMISSIONS ON NOISE**

- 4.1 I have had the opportunity to view the submissions made on the Notice of Requirement and Resource Consent Applications to the Selwyn District Council identified as pertaining in part to noise.
- 4.2 The majority of submitters concerns relate to construction noise, with many being concerned in particular about noise effects on the Coalgate Township during the lengthy and intensive dam construction period. While most submitters are primarily worried about the effects of this construction noise on residential activities, a number also identified other noise sensitive activities which may be adversely affected (schools, lambing / calving). Construction noise concerns are related in particular to the absolute levels of noise which may be generated, the times at which the noise may occur and the lengthy construction period.
- 4.3 A number of submitters also refer to the existing noise environment in the area, which is typically described as “quiet and peaceful”, especially during the night time. Submitters note the considerable amenity value of this existing acoustic environment. One submitter observed that there was no indication given in the application of how the suggested construction noise limits compare with existing noise levels, making it difficult to judge if noise at these levels would represent a loss of amenity or not.
- 4.4 A group of submitters also raised concerns about the ongoing, operational noise associated with the scheme including:
- Noise from pumps
  - Noise from weirs, spillways and siphons
  - Noise from ongoing maintenance

#### **5.0 PERMITTED BASELINE**

- 5.1 Section 104(2) of the Act provides that a consent authority may disregard an adverse effect of an activity on the environment if the Plan permits an activity with that effect. Case law has established that the permitted baseline test relates to the effects of non-fanciful, hypothetical activities which could be carried out as of right under the Plan, as well as any existing lawfully established activity on the site.

5.2 With regard to noise in rural areas of the District, noise from primary production activities is excluded from noise controls. The District Plan contains some detail outlining the definition of a *limited duration* activity, which clearly precludes noise sources which would be continuous over a 24 hour period for a number of consecutive days or weeks.

## 6.0 ASSESSMENT OF NOISE EFFECTS

### 6.1 CONSTRUCTION NOISE

#### 6.1.1 Acoustical criteria

6.1 Despite various other discussions in the application documents, the application ultimately concludes via the *proposed conditions* that compliance with the *recommended upper limits for long-term construction noise received at occupied dwellings* as outlined in table 2 of NZS 6803: 1999 *Acoustics – Construction Noise* will prevent construction noise exceeding a reasonable level, and having a more than minor adverse effect, throughout the construction stage of the project (Although it is suggested in one document that less stringent limits should apply for construction of the distribution network. However, this suggestion is not carried through into the *proposed conditions*).

6.2 A limitation in operating hours within a given distance of residences is also proposed as an additional method of noise control. I would suggest such a condition is confusing and redundant, as compliance with appropriate construction noise limits should prevent unreasonable noise exposure, and ultimately dictate when and where operations can take place.

6.3 The application repeatedly quotes section 16 of the RMA, purporting that this is an additional reassurance to residents (that it is the duty of all persons generating noise to avoid, remedy or mitigate unreasonable noise). However, in reality such general statements will be of little assurance to residents as there is a dependence on the definition of an *unreasonable noise*.

6.4 I note that there is considerable precedent for using the construction noise limits proposed by the applicant to control construction noise emissions in New Zealand.

6.5 In general during the construction period, these limits would see the permissible noise exposure for dwellings within a Living Zone of a Township increase from 55 dBA  $L_{10}$  to 70 dBA  $L_{eq}$  during daytime, and from 40 dBA  $L_{10}$  to 45 dBA  $L_{eq}$  during night time. For

dwellings in the Rural Zone, these limits would see the permissible noise exposure increase from 60 dBA  $L_{10}$  to 70 dBA  $L_{eq}$  during daytime, and from 45 dBA  $L_{10}$  to 45 dBA  $L_{eq}$  during night time. Other points of note relating to the proposed limits are as follows:

- The proposed construction noise limits move the assessment position for dwellings in rural areas from the notional boundary as specified in the District Plan (20 metres from the building façade) to the façade of the building itself. This is because the proposed construction noise limits seek primarily to prevent sleep disturbance, rather than maintain existing levels of amenity.
- Unlike the District Plan noise limits, the proposed construction noise limits do not provide protection for noise-sensitive activities other than residential activities, in areas outside a Living Zone. Of perhaps the most relevance in this case is the fact that the District Plan noise limits provide protection for schools (for example, Windwhistle Primary School) while the proposed construction noise limits do not. Adaptation of the proposed construction noise limits to also protect other noise-sensitive activities may not be a simple matter of adding such activities into the description of protected activities. Alternate noise-sensitive activities may require a different type or level of protection than that provided by rules focused on preventing sleep disturbance during night time.

6.6 The application introduces a process which may be used to determine if the proposed construction noise limits are appropriate. It is stated that factors of importance include:

- Comparison with the existing ambient noise in the area in terms of level, nature and duration.
- Analysis of how the noise is expected to affect residents in terms of restriction or interference with daytime activities and sleep disturbance.

The applicant should advise whether they still agree that these factors are important, and if so, should present this analysis.

6.7 The application also describes why people normally tolerate higher noise levels for construction activities, than would otherwise be found to be acceptable. Below I have summarised these factors as stated in the application, along with a response to each, based on the typical sentiment expressed in the submissions:

- Most construction is temporary with a fairly well defined duration. *Response based on submissions:* Submitters feel that construction is long-term and duration is not well defined.
- The nature of construction noise is similar to traffic noise, which is common in most urban environments. *Response based on submissions:* Submitters feel that the proposal affects small townships and rural areas, where existing traffic noise levels are not high, especially during the night time.

- People accommodate extra noise for the perceived benefits of the construction.  
*Response based on submissions:* Submitters feel that they do not stand to gain from the scheme.

The applicant should advise whether they still agree that these factors are important, and if so, should describe how they have reached the conclusion that the proposed construction noise limits are appropriate.

- 6.8 While I do not necessarily believe that the proposed construction noise limits are inappropriate, I do believe that the applicant has a duty to more fully explore the reasons why this may be so in order to demonstrate that effects on the environment will be no more than minor. This information will also benefit other interested parties.
- 6.9 If the proposal proceeds and the construction noise limits outlined in Table 2 of NZS 6803:1999 *Acoustics – Construction Noise* adopted, the limits should be amended to include provision for adequate protection of Windwhistle Primary School.

#### 6.1.2 Compliance with proposed construction noise limits

- 6.10 At this stage of the application process, it is good practice to illustrate in general terms that any proposed construction noise standards can realistically be complied with. This is an exercise which should also be interest to the applicant, as the results may determine when (and if) construction can be undertaken on certain elements of the project. If, for example, it is found that no practicable noise mitigation measures are able to produce expected compliance with the construction noise limit for noise from the majority of the dam site received in the Coalgate Living Zone during night time, I assume this would have serious implications with regard to the construction program of the project.
- 6.11 The application states that general construction (not including pile driving and blasting) will produce a noise level 89 dBA  $L_{eq}$  at a distance of 15 metres. Generic distance / level information is given based on this.
- 6.12 Plans supplied with the application indicate that the requested designation will run along one side of Homebush Road, with a Living Zone and several houses within the Rural Zone on the other. The edge of the dam structure itself is located approximately 200 metres from the boundary of the Living Zone, and the centre of the dam structure is located approximately 400 metres from the boundary of the Living Zone. Based on the data supplied in the application, the following approximate noise levels would be expected at the Living Zone boundary due to general construction activities on the dam site:

- Construction at the centre of the dam structure – 60 dBA  $L_{eq}$
- Construction at the near edge of the dam structure – 67 dBA  $L_{eq}$
- Construction at the edge of the designated area – 93 dBA  $L_{eq}$

6.13 In general, physical mitigation measures such as noise barriers do not provide a noise reduction of more than 15 dB. It is also noted that the use and effectiveness of such noise barriers may be limited by the size and relative elevation of the construction site. These results therefore suggest that to comply with the proposed construction noise standard the hours of work on the majority of the dam structure will be limited to daytime. In addition, there may be some areas of the dam site where it is simply impossible for equipment to operate without exceeding the proposed construction noise standard at any time.

6.14 The “special construction activities” identified in the application (pile driving and blasting) should not be exempt from the proposed construction noise limits. Again site-specific calculations should be undertaken to illustrate that the noise from such activities can realistically comply with the proposed construction noise limits, and that the imposition of the proposed rules will not make the project unbuildable.

6.15 I acknowledge that the calculations above, and the additional calculations requested in paragraph 6.10, are by necessity generic and approximate in nature. However, I believe that this data should be presented at this stage of the project to illustrate that compliance with the proposed rules is possible. I agree that the applicant should then be given the opportunity to formulate the exact mitigation measures and methodologies required when the project is further advanced and likely construction machinery and techniques are better known. I would expect this analysis to be presented in the Construction Noise and Vibration Management Plan.

6.16 I would support a requirement for the installation of a permanent noise monitoring station at the edge of the Coalgate township, and see the major contribution of such a device to be the provision of all affected parties with some assurance that the procedures outlined in the Construction Noise and Vibration Management Plan are adequate in practice to achieve compliance.

### *6.1.3 Construction Noise and Vibration Management Plan*

6.17 I understand that the applicant proposes to submit a Construction Noise and Vibration Management Plan which details the methodologies required to ensure compliance with the proposed construction noise limits. It is important for this plan to be easily interpreted and prescriptive as it is unrealistic to expect contactors on site to determine

through the application of detailed tables or calculations what items of equipment may be operated in which areas, at what times of day, with what combination of mitigation in place, to remain in compliance with the construction noise limits. Alternatively, an appropriately qualified Acoustic Engineer may have to be retained by the applicant to provide such analysis and advice on site.

6.18 The Construction Noise and Vibration Management Plan should make it clear that it is not acceptable to simply employ the best practicable option (managerial and physical mitigation measures) to “minimise” adverse environmental effects. Such mitigation measures must be used to eliminate unreasonable noise.

6.19 The Construction Noise and Vibration Management Plan should give clear direction in all likely complaints scenarios. In particular, the situation where complaints are received whilst noise levels are shown by noise monitoring to remain in compliance with the construction noise limits should be anticipated, and an appropriate response outlined in the Construction Noise and Vibration Management Plan.

## **6.2 OPERATIONAL NOISE**

### *6.2.1 Acoustical criteria*

6.20 The application implies that the noise from the operation of the scheme will be designed to comply with the District Plan noise rules. It would be advisable for this to be stated more explicitly.

6.21 I consider it likely that compliance with the District Plan noise rules will ensure that any adverse effects due to operational noise from the scheme will be no more than minor.

### *6.2.2 Compliance with proposed acoustical criteria*

6.22 The application contains no general quantitative noise information relating to the following noise sources, which may be capable of exceeding the District Plan noise limits:

- Noise from pumps
- Noise from weirs, spillways and siphons
- Noise from ongoing maintenance of the scheme

This data should not be difficult to source, and will allow the applicant to demonstrate that the noise due to the operation of the scheme can realistically comply with the District Plan noise limits.

- 6.23 Regarding pumps, the application simply states that these will be designed to meet the District Plan noise requirements. As with construction noise, it would be good practice for the applicant to provide some general data which illustrates that this can realistically be achieved using known enclosure construction and ventilation techniques, thereby allowing the Commissioners to make an informed decision on these matters.
- 6.24 Regarding noise from weirs, spillways and siphons. The application proposes a minimum separation between these structures and noise sensitive receptors. The basis for this separation should be provided to illustrate that this separation will be adequate to ensure compliance with the District Plan, or to ensure on behalf of the applicant that it is not unduly restrictive. However, I would not expect such a separation to form part of any conditions for the activity, with a simple requirement that the activities comply with the District Plan noise limits being adequate to avoid any significant adverse effects. As was the case with construction noise, the applicant is then afforded some flexibility with regard to how this may be achieved in each particular instance (physical separation, noise barriers etc).
- 6.25 Regarding noise from the ongoing maintenance of the scheme. This is not addressed in the application. Typical processes and noise levels involved should be outlined, again to illustrate that these processes can comply with the District Plan noise limits.

## **7.0 CONCLUSIONS AND PROPOSED CONDITIONS**

- 7.1 Based on the analysis presented above, it is concluded that the following additional information would assist the Commissioners in considering the acoustic aspects of the application:
- Information relating to the existing noise environment in the area.
  - An explanation of why the proposed Construction Noise Limits are considered appropriate.
  - An illustration in general terms that the proposed Construction Noise Limits can realistically be complied with.
  - An illustration in general terms that operational noise from the proposal can realistically comply with the District Plan noise standards.
- 7.2 In the absence of the above information, I am unable to make a determination as to the likely extent of adverse environmental noise effects associated with the application.
- 7.3 I understand that the applicant may put forward a set of revised conditions relating to noise at the hearing. Based on the analysis presented in this report, and provided the

matters raised in 7.1 above are addressed to the Commissioners satisfaction, I suggest the revised conditions should address the following:

- Proposed construction noise standards, including provision for protection of noise-sensitive activities other than residential.
- A requirement for the preparation, submission and Council approval of a Construction Noise and Vibration Management Plan before work starts on site. This condition should contain wording to ensure it is clear that the Construction Noise and Vibration Management Plan is to outline the proper and detailed acoustic analysis which has been undertaken such that when work commences on site noise levels are expected to comply with the construction noise standards.
- A requirement for the installation of a noise monitoring station between the dam site and Coalgate Township including a description of noise parameters to be recorded and frequency of reporting to the Council.
- Explicit statement of the noise rules which will apply to operational noise emissions associated with the scheme.



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6 December 2007