

20 September 2013

Julie McKee
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Dear Julie

**Central Interceptor Main Project Works
Response to Section 41C RMA Direction**

The Chairperson of the Independent Hearing Panel, Mr David Hill, has invited Watercare to provide further information in relation to two of the proposed Central Interceptor construction sites – Lyon Avenue and Keith Hay Park. The further information requested is set out in the document titled “S41C RMA Direction – Auckland Council Hearings Panel” dated 23 August 2013.

On 4 September 2013 Watercare confirmed that it would provide the further information requested by the Chairperson, and that it agreed to an extension to 24 September 2013 for the Panel to formally close the hearing.

Given the potential extent of work and significant cost to respond to the request in full, the timeframe, and the desire to conclude the hearing no later than 24 September 2013, our response is largely based on existing available information. In particular:

- In response to Item 4(a)(i), we have not carried out additional geotechnical investigations; and
- In response to Item 4(a)(v), we have undertaken a qualitative risk assessment based on inference from existing analysis and available information including Auckland Council's property files for the St Lukes Gardens Apartments.

We believe that this approach provides sufficient information to respond to the Commissioners' request, while not raising any new issues that need to be responded to by any submitter. The attached information has been prepared in direct response to the Chairperson's request and, to the extent possible, draws on existing information included in documents submitted with the Notices of Requirement and resource consent applications, and information presented at the hearing.

With regard to the Lyon Avenue site, a number of alternatives have previously been considered in this vicinity, and the latest alternative suggested by St Lukes Gardens Apartments is simply a further variation of alternative sites previously considered in Mount Albert Grammar School. In our view, there should be no opportunity given for further submissions from any other parties as a result of the Chairperson's request. As a result, the hearing can now be closed. Given the imminent notification of the Unitary Plan, if at all possible, it would be Watercare's strong preference for the decisions to be released before 30 September 2013.

Our response to the Chairperson's request is set out in the following attachments:

- 1 Response to further information requested in relation to the Lyon Avenue site, with the following supporting information:
 - a) Drawings of proposed Lyon Avenue site and Mount Albert Grammar School Alternatives
 - b) Memorandum from AECOM New Zealand Limited titled "CI – S41C Response – Technical Considerations Lyon Ave MAGS Alternative", 20 September 2013
 - c) Memorandum from Arborlab Consultancy Services Limited titled "Arboricultural Memorandum – St Lukes", 19 September 2013
 - d) Letter from Traffic Design Group Limited titled "Central Interceptor Project – Lyon Avenue Site (AS2): Access Options", 19 September 2013
 - e) Correspondence from Ministry of Education
 - f) Memorandum from Marshall Day Acoustics Limited titled "Lyon Ave site options assessment", 18 September 2013
 - g) Memorandum from Tonkin and Taylor Limited titled "Central Interceptor Project – Technical report on settlement for site AS2 – S41C RMA Direction", 20 September 2013
 - h) "Central Interceptor Main Project Works – Comparative assessment of proposed Lyon Avenue site and MAGS Alternative sites"
- 2 Response to further information requested in relation to the Keith Hay Park site, with the following supporting information:
 - i) Amended drawing of proposed Keith Hay Park site – construction works plan (Drawing Number AEE-MAIN-7.2 Issue D)

As summarised in Attachment 1, the proposed Lyon Avenue site as set out in the August 2012 Notice of Requirement remains Watercare's preferred option for the Central Interceptor works at this location.

This letter and its attachments will shortly be available on Watercare's website, along with all of the evidence and legal submissions presented on behalf of Watercare at the hearing which are already on the website.

As the information requested by the Chairperson has now been provided, Watercare requests that the hearing is now formally concluded and that, if possible, a decision is released prior to 30 September 2013.

Yours sincerely



Belinda Petersen
Resource Consents Manager
Watercare Services Limited

ATTACHMENT 1

Response to further information requested in relation to Lyon Avenue site

Our response to the Chairperson's request for further information on the Lyon Avenue site is set out below, with reference to supporting information prepared by Watercare's technical advisors.

Each of the specific matters requested by the Chairperson is quoted in full (text in italics), followed by our response to each of those matters.

In respect of the matter of the two alternatives for the proposed Lyon Avenue (AS2) site - being the preferred site on the Roy Clements Treeway (RCT) and the Mt Albert Grammar School (MAGs) option proposed by Mr G. Maddren in evidence presented on behalf of St Lukes Garden Apartments Body Corporate (SLGA) – we have insufficient comparative information on which to review the adequacy of the preference. To that end we invite the applicant / requiring authority to consider providing the following [...]

Watercare's proposed works at the Lyon Avenue site are shown on Drawing Numbers AEE-MAIN-3.1 and 3.2 Issue D, attached.

An alternative site in the Mount Albert Grammar School (MAGS) was suggested by Mr G Maddren on behalf of the St Lukes Gardens Apartments (SLGA) at the hearing on 5 August 2013. We refer to this alternative as the "MAGS Alternative". There are a number of variations that could be developed for the MAGS Alternative, in particular, the connection between the existing infrastructure at the SLGA site and the new Central Interceptor tunnel could be pipe jacked or trenched. Different construction and permanent access arrangements could also be developed.

We have summarised the previous assessment of the proposed Lyon Avenue site in this response. We have also assessed two variations of the MAGS Alternative as these variations are considered more feasible than other possible combinations of site location and construction access options. Therefore, the three options assessed in this response to the Commissioners are:

- Watercare's proposed Lyon Avenue site
- MAGS Alternative 1 – pipe jacked option with construction access via SLGA and MAGS; and
- MAGS Alternative 2 – trenched option with construction access via MAGS only.

Drawings showing these options are attached. The new drawings showing construction layouts and tunnel alignment for the MAGS Alternatives are:

- LYON-SK1001 Issue C – Central Interceptor General – Mt Albert Grammar School Alternative 1 – Lyon Avenue (AS2) – Separate Construction Access (Pipe Jacked Option)
- LYON SK1101 Issue C – Central Interceptor General – Mt Albert Grammar School Alternative 2 – Lyon Avenue (AS2) – Construction Access From MAGS (Trenched Option)
- LYON-SK401_OA Issue B – Central Interceptor General – Mt Albert Grammar School – Lyon Avenue (AS2) – Tunnel Displacement

In the development of these construction layouts, we have aimed to reflect as far as possible the layout suggested by Mr Maddren. This includes developing a layout which avoids direct physical impact on the existing cricket nets. However we note that in doing so, the site is constrained, and if it were to be developed further, the footprint may need to be extended to create a more efficient construction site layout.

New drawings of permanent works layouts for the MAGS Alternatives have not been prepared, but the effects of the permanent works, including permanent access options, are included in the comparative assessments that have been undertaken.

Our Principal Engineering Advisor, AECOM, has prepared a technical memorandum commenting on the design, construction and operational issues associated with the MAGS Alternatives. This is attached.

(i) Sufficient geotechnical information to determine a practical location for and depth of a connecting pipe for a Mt Albert Grammar School ("MAGS") option.

A geological long section has been developed for the MAGS Alternatives. This is shown on the attached Drawings LYON-SK1001 and LYON-SK1101. The long section is based on existing information derived from boreholes undertaken by Tonkin and Taylor for other clients; publicly available borehole records sourced by Tonkin and Taylor; a borehole drilled at SLGA in 2009 as part of the Central Interceptor concept design; and the geological model developed for the Central Interceptor project. This level of geotechnical information is considered sufficient to determine a practical location and depth for a connecting pipe for the MAGS Alternatives.

(ii) An assessment of any required vegetation removal (including trees) for both options (including a description and number of mature trees requiring removal).

An assessment of the potential effects on trees arising from construction works at the proposed Lyon Avenue site was included in the Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012. The Arboricultural Assessment Report was included as Technical Report B of Part D of the AEE.

Arborlab has now also undertaken an assessment of the potential vegetation effects of the MAGS Alternatives, as requested by the Commissioners. Their memorandum is attached.

The table in Section 8.1 of their memorandum summarises the potential vegetation effects of the three options as follows:

	Lyon Ave site*	MAGS alternative 1 – Pipe jack	MAGS alternative 2 – Open trench
Number of trees removed	107	46 + 240m ²	54 + 240m ²
Number of trees WWRZ¹	None identified	19	17
Number of trees retained**	None identified	47	39

* Refers to June 2012 Arborlab inventory

**Total number of retained trees includes all trees with WWRZ

¹ Works within the root zone

(iii) An assessment of the following, including realistic mitigation measures:

(a) the effect on the SLGA residents of all construction trucks passing through the SLGA internal private road;

(b) the option of providing construction-phase access through MAGs and operational-phase access through SLGA. For the MAGs phase this should include an assessment of the potential for disruptions to school functioning (e.g. for the existing driveway entrance on Alberton Avenue, and for sports activities); and

(c) the potential for disruptions to school functioning under the MAGS option both during construction and long term (e.g. for the existing driveway entrance on Alberton Avenue, and for sports activities). Mitigation measures in terms of location, access road surfacing, and shaft access lids (including surface treatment of the lids) should be considered.

Construction traffic effects in SLGA and MAGS

An assessment of the potential traffic effects of the proposed Lyon Avenue site was included in the Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012. The Traffic Impact Assessment was included as Technical Report E of Part D of the AEE. Further information was also provided in the Central Interceptor Main Project Works Section 92 Response Report to Auckland Council, December 2012, and in evidence presented at the hearing.

Alternative construction access options have also previously been considered, including construction access via Alberton Avenue and MAGS. The construction access options considered were summarised in a memorandum from AECOM dated 14 June 2013 and a letter from Traffic Design Group (TDG) dated 11 June 2013, both included in Attachment I of Belinda Petersen's primary statement of evidence at the hearing.

Based on the above information, TDG has prepared a more specific response to the Commissioners questions (iii) (a) and (b) above. Their response is attached. In summary, TDG has concluded that the proposed Lyon Avenue site and the MAGS Alternatives are all viable, but that access via Morning Star Place is the best access option from an overall traffic engineering perspective.

Potential disruptions to school functioning

General

The Crown owns most of the land required for the proposed Lyon Avenue site as well as the MAGS Alternatives. The land owned by the Crown is also designated for school purposes. A property access agreement and Requiring Authority approval from Ministry of Education (MoE) on behalf of the Crown would be required for any Central Interceptor works within the Crown land.

Neither MoE nor MAGS are a submitter in the current Resource Management Act proceedings. However, without their agreement, Watercare could not proceed with the proposed Lyon Avenue site, nor either of the MAGS Alternatives.

To assist with our response to the Commissioners question (iii) (c) above, we have sought further information from MoE and MAGS and have undertaken further site visits.

Both MoE and MAGS are opposed to a surface construction site in the MAGS playing fields and construction access via MAGS, but support in principle the proposed Lyon Avenue site as this is within an area of Crown land which is not used for school purposes.

The following recent correspondence from MoE is attached:

- Letter from MoE to Watercare dated 16 July 2013 – prepared in response to our earlier assessment of construction site and access options in MAGS; and
- E-mail from MoE to Watercare dated 3 September 2013 – prepared in response to information provided to MoE by Watercare in relation to the Commissioners Section 41C direction.

In summary, MoE is opposed to the construction works and access in MAGS for the following reasons:

- The works area required for an alternative site in MAGS is larger than the area of land required for the proposed Lyon Avenue site;
- MoE is considering future growth options for the school – the construction works would impact on consideration of options for this;
- The construction works may impact on MAGS own future building projects;
- Mitigation works can be implemented to address temporary adverse effects on the Roy Clements Treeway.

MOE also recently advised that MAGS will be building around 20 new classrooms on the site over the next three years in two or three different locations on the school site.

Construction access

The MAGS Property Manager has confirmed that the existing school access from Alberton Avenue via “Gate 1” is used for the following purposes:

- Maintenance access to the lower sports fields and cricket nets;
- Maintenance access to the School House boarding hostel (“School House”);
- Access for maintenance and deliveries to the rear of the new sports pavilion; and
- Access to student parking areas at School House.

The response from TDG, attached, sets out possible mitigation measures that could be implemented to mitigate potential adverse effects on these activities if the MAGS access road was to be used for construction access.

Marshall Day has advised that a two metre high acoustic barrier would be required to achieve acceptable noise levels at School House.

We have assumed however that any construction access to the Central Interceptor surface construction site via MAGS could not be entirely fenced off from the school as access must be maintained for all of the activities noted above, as well as for emergency vehicles.

If the MAGS Alternatives were to be pursued, further detailed development and consultation with the school would be necessary in order to establish the required extent of physical works, fencing and other management measures to minimise potential disruptions to school functioning during construction.

Permanent works

For the MAGS Alternatives, the permanent features that would remain on the site are the access lids to the drop shaft and access shaft, and a permanent all-weather access road for future servicing and maintenance activities. As the area is known to flood, the shaft lids would need to be raised to an appropriate elevation and / or made watertight. Should the lids be raised, the surrounding land area could also be raised to tie in with the lid levels and prevent ponding of water at that location. Consideration would need to be given to prevent diversion of water exacerbating flooding in other areas of the playing fields.

The site area for the MAGS Alternatives is at the edge of the existing playing fields and immediately adjacent to the cricket nets. This construction site area would have less impact on recreational activities than other options in the MAGS playing fields previously assessed by Watercare. If the MAGS Alternatives were to be progressed, the levels of the shaft lids and surrounding ground would need to be assessed in more detail to ensure that potential effects on recreational activities were minimised.

A key consideration for any future school development is that no buildings could be constructed on the land above the access shafts as this area must be available in the long term for access, inspection and maintenance activities.

(iv) The noise effect on SLGA residents (and its duration) associated with the removal of basalt, taking into account the ability to use explosives and the geotechnical conditions for the shafts and connecting tunnel for both alternatives.

An assessment of the potential noise effects of the proposed Lyon Avenue site was included in the Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012. The Noise Impact Assessment was included as Technical Report F of Part D of the AEE. Further information was also provided in the Central Interceptor Main Project Works Section 92 Response Report to Auckland Council, December 2012, and in evidence presented at the hearing.

Marshall Day has now also undertaken an assessment of the potential noise effects of the MAGS Alternatives, as requested by the Commissioners. Their memorandum is attached.

In summary, their conclusion is that in terms of noise impact, the MAGS Alternative – pipe jacked option is preferable to a trenched option. Marshall Day has also concluded that the proposed Lyon Avenue site is preferred over the MAGS Alternatives as the predicted construction noise levels overall are lower for the SLGA apartments and playing fields, and the proposed site avoids the need for construction access adjacent to the dormitories at School House.

(v) A quantified risk assessment of the potential for ground settlement adversely affecting the SLGA buildings during construction of the tunnel and shafts for both alternatives.

Given the potential extent of work and timeframe required to undertake a quantitative risk assessment, a qualitative risk assessment has been undertaken. The assessment is based on inference from existing analysis and available information including Auckland Council's property files for the St Lukes Gardens Apartments.

The attached letter report from Tonkin and Taylor provides estimates of potential settlement that might arise as a result of construction activities for the proposed Lyon Avenue site and the MAGS Alternatives. Based on these estimates, AECOM has separately prepared an assessment of the potential for the settlement to adversely affect the SGLA buildings.

In summary, the work undertaken by Tonkin and Taylor and AECOM concludes that:

For the proposed Lyon Avenue site:

- The differential movements between building pads of SLGA are estimated to be less than 5mm, equivalent to a distortion of less than 1:3000; well below the commonly applied limit of 1:2000 and highly unlikely to be noticeable or cause anything other than minor cosmetic effects, even at the more sensitive parts of the building.

- The estimated settlement levels would be within the limits of the proposed consent conditions, but would trigger other requirements of the consent conditions relating to building condition surveys, analysis, monitoring, implementation of trigger levels and contingency planning.

For the MAGS Alternative sites:

- The main drop shaft and access shaft on the MAGS playing fields are far enough away from the SLGA buildings so as to cause no settlement risk to SLGA buildings. Similarly construction of the diversion chamber and trenching between the diversion chamber and intermediate drop shaft (for the pipe jacked option) or connection chamber (for the trenched option) are relatively shallow and will have no significant impacts on the deeper groundwater or cause settlement to the SLGA buildings.
- Because the intermediate drop shaft associated with the pipe jacked option will need to extend below the basalt it will draw down groundwater in the Puketoka Formation. The potential settlement effects of constructing an intermediate drop shaft near the existing Lyon Avenue overflow for the pipe jacked option will be similar to the effects of shaft construction for the proposed Lyon Avenue site. The effects of this drop structure on the Block B and Block C areas will be similar to the proposed Lyon Avenue site; i.e. negligible.

(vi) A Multi Criteria Analysis (“MCA”) of the two alternatives, incorporating the above matters, any other matters considered relevant, and including estimated costs (capital and O&M) for shafts, connecting pipe and diversion chamber.

The multi-criteria analysis of the three options is presented in the attached table titled “Central Interceptor Main Project Works – Comparative assessment of proposed Lyon Avenue site and MAGS Alternative sites”. The table summarises relevant information set out in documents submitted with the Notices of Requirement and resource consent applications, and information presented at the hearing, in this letter and in the technical attachments. The format of the table is similar to the format we have used for previous assessments at this site and other sites, but has been modified slightly and expanded to ensure that all matters raised by the Commissioners are addressed.

Having regard to the information presented in the comparative assessment table, the proposed Lyon Avenue site as set out in the August 2012 Notice of Requirement remains as Watercare’s preferred option for the Central Interceptor works at this location. Key considerations are as follows:

- All three options are technically feasible and are of a similar order of cost.
- The proposed Lyon Avenue site is in the optimal location for connection to the Lyon Avenue overflow.
- The MAGS Alternatives require additional structures (intermediate drop shaft and connection chamber), with additional design complexities and maintenance requirements.
- The MAGS Alternatives would still require considerable construction activity, and associated potential effects, in the vicinity of SLGA, but would extend these effects to also impact on MAGS activities, students and residents of School House.
- The MAGS Alternative 1 – pipe jacked option, would reduce potential construction traffic volumes on Morning Star Place. Construction access would still be required via this road unless access is provided solely via Alberton Avenue, MAGS Gate 1 and a vehicle bridge across Meola Creek.
- Access via Alberton Avenue and MAGS Gate 1 would avoid or reduce potential traffic effects through the SLGA residential area, but would instead impact on the residents of School House and on access for other school activities.

- The MAGS Alternatives would have less overall impact on the vegetation in the Roy Clements Treeway compared to the proposed Lyon Avenue site, but would still require large areas of vegetation removal, particularly for the MAGS Alternative 2 – trenched option.
- The cost differential in favour of the MAGS Alternative 2 – trenched option with construction access via Alberton Avenue and MAGS Gate 1, is not sufficient to outweigh the potentially increased land requirements, construction complexities and environmental effects associated with this option, particularly the increased effects on Meola Creek.
- The potential settlement risks at the SLGA apartments are similar for the proposed Lyon Avenue site and the MAGS Alternative 1 – pipe jacked option.
- Permanent works associated with the proposed Lyon Avenue site would not impact on future development options for MAGS. The site can be reinstated to integrate with the Roy Clements Treeway, with potentially enhanced pedestrian access and safety compared to existing.

ATTACHMENT 2

Response to further information requested in relation to Keith Hay Park site

Our response to the Chairperson's request for further information on the Keith Hay Park site is set out below. The specific matters requested by the Chairperson are quoted in full (text in italics), followed by our response.

In the matter of the Keith Hay Park (AS5) site on Gregory Place:

- (i) *Confirmation of the mitigation measure(s) that are to be adopted with respect to:*
- (a) *Mr and Mrs Whitehead at 18 Gregory Place, and*
 - (b) *Mr and Mrs Puertollano at 47A Arundel Street.*

The potential noise mitigation measures to be implemented on the project are outlined in documents submitted in support of the Notices of Requirement and consent applications. The sections relevant to the noise mitigation measures at the Keith Hay Park site are:

Document title	Relevant section
Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012, Part A	Section 12.8 on page 121
Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012, Part B	Section 7.5.8.2 on page 109
Central Interceptor Main Project Works Assessment of Effects on the Environment (AEE) report, August 2012, Part D	Technical Report F – Noise Impact Assessment <ul style="list-style-type: none">- Section 4.5.7 on pages 47 – 49- Appendix 5 Draft Construction Noise Management Plan
Central Interceptor Main Project Works Section 92 Response Report to Auckland Council, December 2012	Attachment 7, letter from Marshall Day Acoustics Limited, response to Question (4) on page 3 and Table 1 on page 7
Primary statement of evidence of Mathew Cottle, Marshall Day Acoustics, 12 July 2013	Paragraphs 6.8 – 6.11, 6.47 – 6.49, 8.43 – 8.50

The layout of the proposed construction site incorporates a 3 metre high noise fence around the site boundary. The dwellings at 18 Gregory Place and 47A Arundel Street are two storied, so the fence alone is not sufficient for noise mitigation and other measures will need to be adopted to ensure noise levels are reasonable. The potential mitigation measures that have been identified in the above documents are:

- a) Communications and consultation with residents in advance of, during and after the works
- b) Contractor to maintain tight construction timeframes and keep construction to a minimum
- c) Contractor to use construction methods and equipment which results in lowest practicable noise levels, including regular maintenance of construction equipment
- d) Contractor to manage day to day construction practices to avoid unnecessary noise nuisance (e.g. use of horns, air brake release noise, reversing alarms)
- e) Temporary noise barriers around specific items of equipment such as the piling rig if practicable
- f) Arrange a suitable time with residents to carry out short term noise intensive works when dwellings are unoccupied

- g) Activities not complying with the Construction Noise Standard be restricted to Monday to Friday and do not occur on Saturdays
- h) Consideration of other measures requested by affected residents when they can be reasonably met.

The specific mitigation measures to be adopted at the site will be reviewed and confirmed once the detailed design is complete and a contractor appointed, and in consultation with adjacent property owners. The detailed design or construction method finally confirmed may result in effects which are different (hopefully less) than those assessed to date, therefore it is sensible to retain flexibility to adopt mitigation measures which properly reflect the final details of the proposed work.

Watercare's aim is to implement construction methods, programming and physical noise mitigation measures within each site to achieve compliance with the NZS6803:1999 Construction Noise Standards. If full compliance is not possible, we would then look at other mitigation options as identified in the documents referred to earlier. In a worst case situation, this could include acoustic treatment of adjacent dwellings (for example if significant exceedance of the Construction Noise Standards are predicted for extended durations). Marshall Day has advised that this could include retrofitting laminated glazing and insulation of external walls facing the construction site. As this type of measure would involve intrusive works, any acoustic treatment at individual dwellings would need to be agreed by both parties.

In relation point (h) above, Watercare has been consulting with Mr and Mrs Whitehead and with Mr Puertollano in relation to the proposed works. In response to a specific request from Mr Whitehead, a minor change has been made to the location of the proposed noise fence in the north eastern corner of the site. The noise fence had been shown as following the designation boundary in this area, but has now been amended so that it is a minimum of 5 metres from the property boundary and closer to the main construction site area. The amended Drawing Number AEE-MAIN-7.2 Issue D is attached.

Watercare has also been discussing other potential noise mitigation measures with Mr and Mrs Whitehead and with Mr Puertollano. The intent of the current discussions is to establish an agreed process for confirming the need for acoustic treatment at the dwellings and, if so, the process to implement that. This process will include notifying the property owners six months prior to commencement of work, and then reviewing at that time the need and options for acoustic treatment based on the confirmed construction method.

SUPPORTING INFORMATION