

**Before Independent Hearing Commissioners
At Lower Hutt**

Under the Resource Management Act 1991 (the Act)

In the matter of a notice of requirement for a designation by Wellington Water Limited ('WWL'), on behalf of Hutt City Council ('HCC'), in accordance with section 168A of the Act, for the construction, operation and maintenance of a water supply reservoir at Summit Road, Fairfield, Lower Hutt.

**Statement of evidence of Paul Jeffrey Carran for Wellington Water Limited
(Site Selection)**

Dated 14 November 2024



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Statement of Evidence of Paul Jeffrey Carran

1 Introduction

- 1.1 My full name is Paul Jeffrey Carran.
- 1.2 I am a Principal Water Engineer at WSP. I have been in this position since 2018. I am responsible for managing and leading large water projects such as the site selection process for the Eastern Hills Reservoir.
- 1.3 This evidence relates to a notice of requirement (**'NOR'**) for a designation issued by Hutt City Council (**'HCC'**), in accordance with section 168A of the Resource Management Act 1991 (**'RMA'**), for the construction, operation and maintenance of the proposed Eastern Hills Reservoir adjacent to the existing Naenae Reservoir at Summit Road, Fairfield, Lower Hutt (**'Project'**). In particular, my evidence relates to site selection.
- 1.4 I have been asked to provide evidence by Wellington Water Limited.
- 1.5 I have been involved with this project since the reservoir storage requirement assessment in 2021 and led the subsequent phase of work to identify a preferred site for the proposed reservoir. I was involved in the preparation of Site Selection Report (June 2022), including the multi criteria analysis of short listed sites.

2 Qualifications and experience

- 2.1 My qualifications include a Bachelor of Engineering (Civil) (Hons) from the University of Canterbury. I am a Member of Engineering New Zealand (MEngNZ).
- 2.2 I have worked as an Engineer on water infrastructure projects for 24 years in New Zealand. My experience has largely been related to water supply and stormwater management, from investigations through to construction and ongoing asset management. In particular, I have led investigations and upgrades for water supplies in Ashburton and Rangiora, and reservoirs at Rangiora, Darfield, Rolleston Prison and Oxford.

3 Code of Conduct

- 3.1 While the NOR is not before the Environment Court, I have read and am familiar with the Code of Conduct for Expert Witnesses in the current Environment Court Practice Note (2023). Accordingly, I have complied with the Code in the

preparation of this evidence and will follow it when presenting evidence at the hearing.

- 3.2 The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in my evidence to follow.
- 3.3 Unless I state otherwise, my evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

4 Scope of evidence

- 4.1 My evidence addresses the following:
- a Design parameters for site selection;
 - b Site identification and assessment;
 - c Options considered in relation to delivery, overflow and scour pipes;
 - d Planning and policy considerations;
 - e Responses to submissions;
 - f Response to Section 42A Officer's Report ('**Officer's Report**').

5 Executive Summary

- 5.1 A comprehensive site selection process was undertaken to identify a preferred site for a new 15 ML potable water reservoir in the Lower Hutt Central water supply area.
- 5.2 This initially identified 28 locations that would potentially satisfy key technical criteria, in particular matching the elevation of other reservoirs in the water supply area ('**WSA**'). Closer consideration of terrain, access, likely earthworks volumes and connecting pipe alignments reduced this to a long-list of seven sites.
- 5.3 Concept designs for each of the seven long-list sites were developed and assessed in more detail against a range of factors including earthworks (site and access road), pipeline route challenges, geotechnical resilience and risks, structural considerations, planning/consenting/legal requirements, archaeological risk, potential recreational impacts (public access/walking/cycle tracks), proximity

to potentially contaminated sites, and land ownership. A short list of three sites was determined.

- 5.4 Each of the three short-list sites were assessed on further detail with input sought from subject matter experts on ecology, landscape, heritage and culture, social impacts, noise and vibration, traffic, recreation, geotechnical engineering, and planning. This information was used to inform a multi-criteria analysis (MCA) workshop where representatives from Wellington Water and Hutt City Council, supported by subject matter experts, scored each site against agreed criteria.
- 5.5 The MCA process identified 'Naenae 2' (as it was called at that time) as the highest scoring option. This location is adjacent to the existing Naenae reservoir at the top of Summit Road. Sensitivity analysis confirmed that the MCA outcome was not sensitive to the adopted weightings.
- 5.6 Engagement with Mana Whenua (Taranaki Whānui) identified that of the three short listed options, the Naenae 2 site had the lowest risk of significant impacts on mana whenua values.
- 5.7 The initial concept for the Naenae 2 site anticipated that a new 750 mm diameter delivery main be constructed down Summit Road to connect into the distribution network. Concern regarding the practicability of this alignment and recognition that this route would exacerbate and extend potential construction impacts on the Summit Road community led to the consideration of alternatives.
- 5.8 Alternative pipe routes down the hill north of the reservoir towards Balgownie Grove were identified. Two route options with several variants were evaluated for comparison with the Summit Road route.
- 5.9 This assessment concluded that the Summit Road route was impracticable based on the identified constructability issues and risks taken in conjunction with the very high level of construction impacts (noise, vibration, traffic and access) on residents over an extended duration.
- 5.10 The preferred route down the ridge, across Waiwhetū Stream and along Balgownie Grove to Waddington Drive will have: the least complex construction; the lowest community impact; best operability and resilience; smallest environmental impact; and potential for the lowest cost.
- 5.11 One of the MCA criteria specifically considered resilience and vulnerability. This recognised that the location of the reservoir adjacent to an existing reservoir was

a drawback, but this is only one of many factors related to resilience that were considered in the analysis.

- 5.12 The requirements with regard to alternatives assessments and site selection have been satisfied by a robust site selection and assessment process including:
- a Initial identification of 28 site opportunities;
 - b Preliminary assessment of 14 sites;
 - c Long list assessment of seven sites;
 - d Short list assessment of three sites using a comprehensive multi criteria analysis (MCA) process;
 - e Review of pipeline route selection in relation to the proposed site.
- 5.13 Paragraph 176 of the Officer's Report agrees that adequate consideration has been given to alternatives and does not raise any other matters relevant to my evidence.

6 Design parameters for site selection

- 6.1 For any project, confirming the design needs before assessing site suitability is crucial because the design requirements dictate the specific conditions and features a site must have. In this case some of the key design requirements for the Project are as follows:
- a A new reservoir is required to provide fifteen megalitres (15 ML) of potable water storage within the Lower Hut Central and Taita Water Storage areas to address the current storage shortfall, ensure sufficient storage for future growth and provide a resilient supply, as set out in the evidence of **Mr Lawrence Edwards**.
 - b The new reservoir is to be integrated into the existing water supply network and operate in conjunction with other elevated storage reservoirs at Gracefield, Naenae and Taita. The top and bottom water levels of the new reservoir must match that of these existing assets in order to operate efficiently.
 - c The reservoir diameter needs to be around 55 m in order to provide the required storage volume with suitable top and bottom water levels.

- d Vehicle access is required to the site, both for construction and ongoing operation and maintenance.
 - e The reservoir will be used to store treated water from the Waterloo Water Treatment Plant. A treated water supply pipeline approximately 750 mm in diameter will be required from the treatment plant to the reservoir¹.
 - f A second pipeline is required to deliver water from the reservoir to one of the larger trunk mains in the existing potable water distribution network.
 - g A third pipeline is required to allow for the reservoir to be drained and to accommodate any overflow to a suitable receiving environment, typically via the stormwater network.
- 6.2 In summary, the reservoir project requires a hillside site at around elevation 66 m RL (Wellington Vertical Datum (WVD) 1953), where a large platform can be prepared for a 55 m diameter reservoir, with suitable vehicle access, and in reasonable proximity to the Waterloo Water Treatment Plant, distribution network trunk mains and the stormwater network.

7 Site Identification and Assessment

- 7.1 The Project team considered a range of sites for the reservoir, which are detailed in the Site Selection report.² Below I set out the site assessment steps that were undertaken and the outcome of that process.
- 7.2 An initial options identification exercise identified 28 potential sites³ based on the key technical requirements outlined in section 6.
- 7.3 This also included consideration of site geography, noting the relatively steep topography on both sides of the valley, the Wellington Fault running along the valley, the Hutt River/Te Awa Kairangi and Waiwhetū Stream, the rail corridors and State Highway 2, and the Lower Hutt Central Business District. These features are of relevance not only to the reservoir site itself but also to the pipeline routes connecting to the reservoir in terms of resilience, constructability, and disruption during construction.
- 7.4 Access constraints were another factor in the initial identification process. Permanent access is needed to the site for construction, operation and

¹ Not required for the 'Naenae 2' site as the existing treated water supply pipeline has sufficient capacity.

² AEE, Appendix M: Site Selection Report, section 3

³ AEE, Appendix M, Site Selection Report, p 21 for figure showing potential reservoir sites.

maintenance. Existing land use significantly limits the number of access points from the valley floor up to the target contour zone along the hillside.

- 7.5 Other factors such as cultural and ecological values and land ownership were not considered during this initial assessment but were introduced during subsequent stages of the assessment.
- 7.6 A number of the initial 28 sites were discounted due to steep terrain that would preclude formation of a suitable reservoir platform or access road. Others were set aside where adjacent sites (effectively substitute options) were better. Fourteen potential sites were taken forward into the next stage for further consideration.
- 7.7 For each of these 14 sites, an assessment was made of likely earthworks volumes for a reservoir platform and access road, and potential connecting pipeline routes. This provided an indication of the likely scale and impact of work required at each site. At this stage, sites were discounted on the basis of requiring significantly greater earthworks, very high earthworks cut/fill heights, long or unfeasible access roads and long pipeline routes. This produced a long-list of seven potential sites.⁴
- 7.8 Each of the seven long listed sites was assessed against a range of factors and qualitative scoring applied in order to guide the selection of several sites (the short-list) for more detailed consideration, costing and multi-criteria analysis (MCA).
- 7.9 This assessment took into account:⁵
- a Earthworks (site and access road);
 - b Pipeline route challenges;
 - c Geotechnical resilience and risks;
 - d Structural considerations;
 - e Planning/consenting/legal requirements;
 - f Archaeological risk;

⁴ AEE, Appendix M, Site Selection Report, p 24 for figure showing long-listed sites.

⁵ AEE, Appendix M, Site Selection Report, at 4.2.

- g Potential recreational impacts (public access/walking/cycle tracks);
 - h Proximity to potentially contaminated sites; and
 - i Land ownership
- 7.10 The three highest scoring (most favoured) sites from the long-list assessment were short-listed. These were⁶:
- a Naenae 2 – adjacent to the existing Naenae reservoir
 - b Cambridge Terrace – above Pick-A-Part car wrecker site
 - c Gracefield 2 – adjacent to the existing Gracefield reservoir
- 7.11 A relative cost estimate comparison was made for the seven long listed sites. The Naenae 2 cost estimate was roughly half of that of the other site options. This reflects the benefits of utilising a site with existing road access and bulk water supply (inlet) main and in close proximity to the water distribution network.
- 7.12 The assessment findings to this point were presented to Wellington Water staff and a Hutt City Council representative at a site selection workshop on 2 December 2021. The purpose of this workshop was to outline the long listing approach and to confirm three preferred sites for further development and multicriteria analysis. The workshop attendees agreed that the three most preferred sites at this stage were Cambridge Terrace, Naenae 2 and Gracefield 2.
- 7.13 The three short-listed sites were taken forward to a comprehensive Multi-Criteria Analysis (MCA) process.⁷
- 7.14 Each of the short-listed options were further developed to allow for assessment against a broad range of weighted criteria and scored in a workshop attended by representatives of Wellington Water and Hutt City Council, supported by subject matter experts from WSP.
- 7.15 Fifteen evaluation criteria were identified within the following five general groupings:
- a Environmental;

⁶ AEE, Appendix M: Site Selection Report, p52 Figure 32 shows the three short listed site locations

⁷ AEE, Appendix M: Site Selection Report, section 5

- b Social;
- c Technical;
- d Financial; and
- e Carbon.

- 7.16 Full details of the individual criteria, descriptions and weightings are provided in the Site Selection Report⁸.
- 7.17 The proposed MCA criteria included Mana Whenua Values. An adviser to Taranaki Whānui joined the MCA workshop as an observer to gain familiarity with the project. The Mana Whenua Values criterion was set aside and not scored at the workshop pending specific engagement to follow.
- 7.18 Each option was assessed against each criterion on a seven point qualitative scale⁹ from strong positive (7) through to strong negative (1).
- 7.19 The final MCA scores and ranks are summarised below. A breakdown of scores for each criteria is provided the Site Selection Report¹⁰.

Option name	MCA Score	MCA Rank
Naenae 2	4.5	1 st
Cambridge Tce	3.7	2 nd
Gracefield 2	3.0	3 rd

- 7.20 The Naenae 2 site received the highest score overall. It was also top ranked for four out of the five criteria ‘groups’ but scored lowest against the Social criteria group (noise, vibration and dust, traffic and access, recreation). Relatively poorer scoring (2.2, moderate negative)¹¹ in this group reflects the proximity of the site to existing residential property and site access being via residential streets. While not a fatal flaw, this outcome indicated that consideration would need to be given to managing construction impacts on the local community if this site were to be selected. An alternative delivery main pipe route has been adopted (refer Section 8) which will alleviate some of the adverse social impacts on the Summit Road community. Review of the MCA scoring (refer 8.8) found that this does not change the overall MCA outcome.

⁸ AEE, Appendix M: Site Selection Report, p62-65,

⁹ AEE, Appendix M: Site Selection Report, p68

¹⁰ AEE, Appendix M: Site Selection Report, p87-88

¹¹ Scored on the basis of a Summit Road pipe route prior to consideration of alternatives.

- 7.21 A range of sensitivity testing scenarios¹² were considered by adjusting criteria weightings. In all cases the relative rankings of the three site options remained unchanged, except in an extreme scenario where the Social group weighting was increased to 40% and the Financial criteria was excluded (i.e. given zero weighting). This is an unrealistic scenario and in this case the Cambridge Terrace option scored slightly higher than Naenae 2.
- 7.22 Subsequent engagement with Mana Whenua (Taranaki Whānui) identified that two of the options had potential for higher adverse effects on mana whenua values, and one site, Naenae 2, had the lowest risk of significant impacts on mana whenua values out of the three shortlisted options. This position aligns with the MCA outcome and had it been scored it would have only reinforced Naenae 2 as the highest scoring option.
- 7.23 In conclusion, the MCA process identified Naenae 2 as the highest scoring option. Sensitivity analysis confirmed that the MCA outcome was not particularly sensitive to the adopted weightings (remaining constant in all but an extreme scenario).

8 Options considered in relation to delivery, overflow and scour pipes

- 8.1 Initial project scoping and assessment (including for the purposes of site selection) had anticipated that the delivery main from the new reservoir would be routed down Summit Road. This would have subjected the Summit Road community to construction impacts from pipeline construction, in addition to those impacts from the proposed reservoir construction. These two elements of work would be undertaken sequentially, as access for reservoir construction would be precluded during construction of a new pipeline up Summit Road, thus extending the duration over which this group of residents would be affected.
- 8.2 The next phase of the Project development considered opportunities to alleviate this impact, in keeping with the MCA finding that particular consideration would need to be given to managing construction impacts on the local community as noted in paragraph 7.20.
- 8.3 A second pipeline is also required as a drain/overflow from the existing and proposed reservoirs, and for stormwater discharge from the reservoir site. This will discharge to Waiwhetū Stream. The existing drain/overflow arrangement from Naenae No 1 reservoir has caused erosion in the receiving gully north of the site and sediment discharge to Waiwhetū Stream. An alternative solution is

¹² AEE, Appendix M: Site Selection Report, p89

therefore required irrespective of whether the second reservoir is progressed. It is proposed that both pipes will be constructed along the same alignment to minimise community and environmental impacts.

- 8.4 Three options for a new delivery pipeline and parallel scour/overflow pipeline down the hillside were identified and evaluated by the WSP project team¹³. Option 1 follows Summit Road down to Waiwhetū Stream. Options 2a and 2b (ridgeline), and 3a and 3b (gully), would take different alignments down the vegetated hillside north of the reservoir to a common location at Waiwhetū Stream. Variant 'a' utilises the Balgownie Grove Road corridor to Waddington Drive. Variant 'b' follows along the true right bank of Waiwhetu Stream and crosses Waddington Road Reserve. This is reported in the Pipe Alignment Report¹⁴.
- 8.5 I support the assessment of Option 1 as being impracticable based on the identified constructability issues and risks taken in conjunction with the very high level of construction impacts (noise, vibration, traffic and access) on residents over an extended duration.
- 8.6 There is an operational need for an outlet main and overflow pipeline from the proposed reservoir. The only practicable options require the pipelines to traverse an ecological area identified in the Hutt City District Plan as Significant Natural Resource 12: Eastern Hills Bush ('**SNR12**').
- 8.7 I consider that Option 2a is better than Options 2b, 3a and 3b as is has:
- a The least complex construction;
 - b The lowest community impact;
 - c Best operability and resilience;
 - d Smallest environmental impact; and
 - e Potential for the lowest cost.
- 8.8 Review of the site selection MCA scoring confirmed that the alternative pipe alignment would have made no material difference to the site selection outcome.¹⁵ Assigning less favourable scores for ecology, landscape and regulatory framework criteria reduces the overall weighted score from 4.5 to 4.4,

¹³ AEE, Appendix P: p8 map of pipe alignment options

¹⁴ AEE, Appendix P: Pipe Alignment Report

¹⁵ AEE, Appendix P: Pipe Alignment Assessment, section 6.3 and Appendix A

still above the second ranking score of 3.7. While moving the pipe route away from Summit Road gives a net reduction in impacts on residents, a conservative approach was adopted by not revising the Social criterion scoring to account for this.

9 Planning and policy considerations

- 9.1 I understand that some of the planning or policy matters to be considered (and which **Ms Cathy Crooks** will address in her planning evidence) include whether there are practicable alternative locations for the reservoir, and whether there is a “functional or operational need” for the reservoir to be in its proposed location under the National Policy Statement on Indigenous Biodiversity (**‘NPS-IB’**)¹⁶ as the site is within SNR12, a Significant Natural Area (SNA). I also understand that the same considerations apply to the delivery and overflow/scour pipelines.
- 9.2 I comment on this matter in general terms in my evidence above, and it is also addressed in the site selection report and pipe alignment report which are Appendices M and P to the AEE.
- 9.3 In summary, I have concluded that:
- a Since the reservoir top and bottom water levels need to match those of existing reservoirs in the system, there are limited site options available. Of the 28 potential locations identified at that elevation, many were discounted due to their steep terrain that would make access and construction unfeasible, or where two sites directly adjoined each other, the least favourable site was discounted, leaving fourteen sites. A further seven sites were discounted due to earthworks volumes, very high cut/fill heights, long/unfeasible access roads, and long pipeline routes. Each of the remaining seven longlisted suitable locations had its land parcels in an SNR area¹⁷, including the reservoir site ultimately chosen.
 - b There is an operational need for an outlet main and overflow pipeline from the proposed reservoir. Each of the pipe alignment options considered required the pipeline to traverse the SNR:12 area, aside from Option 1 – going through Summit Road, which is not practicable due to constructability issues and a very high level of construction impact.
- 9.4 In addition, I understand that there needs to be consideration of the adverse effects on indigenous biodiversity from the construction of the reservoir, and

¹⁶ NPS-IB, clause 3.11(1)(c).

¹⁷ See page 104, Appendix M. The relevant SNRs are SNR:12, 53, 36 and 21.

whether these will be avoided to the extent practicable.¹⁸ As set out above at 9.3a it was not practicable to avoid a SNR area in choosing a suitable site for the reservoir. Avoidance of adverse effects within the selected site is discussed further in the evidence of **Mr Mark Hansen** at paragraphs 9.1 to 9.3.

10 Responses to submissions

10.1 I have reviewed the submissions lodged in relation to the NOR application for the Project. Where I am able to respond to the matters raised, I do this below.

Submissions from C Holt and R Parry

10.2 Mr Colin Holt is concerned about the Project in terms of safety, and potential property damage and fatalities. Specifically he states he is 'Concerned about the safety aspect of 15 million litres above our heads'. Mr Richard Parry is concerned about the resilience of water supply where the proposed new reservoir is next to the current one. He states: 'This location is fundamentally unsuitable if the aim is to create fault tolerance in the network'.

10.3 New reservoirs are designed for a 100-year working life and designed to retain water and not collapse or cause harm to people in a 1 in 2,500 year return period seismic event. Seismic hazard is discussed further in the evidence of **Mr Campbell Keepa**.

10.4 The Multi Criteria Analysis ('**MCA**') process used to identify a preferred site from the short list included Vulnerability and Resilience within the Technical criteria grouping. This was described as the "degree of vulnerability to external impacts and ability to withstand and recover from such impacts. The advantage of a separate reservoir site was identified and taken into consideration in the scoring of this criterion, along with other factors such as pipeline vulnerability and proximity to the Wellington Fault¹⁹.

10.5 The Naenae 2 site received a neutral score of 4 (out of 7) on this criterion. Option 1 (Cambridge Tce) scored a slight positive (5 out of 7) recognising the benefit of establishing a new reservoir site separated from existing reservoirs but offset by long pipelines introducing some vulnerability. Option 3 (Gracefield 2) scored a slight negative (3 out of 7) due to long pipelines with the pipe route traversing increased thickness of soft sediment.

¹⁸ NPS-IB, clause 1.6(1) Interpretation, definition of 'effects management hierarchy'.

¹⁹ AEE, Appendix M: Site Selection Report, Section 5.7.6 and Table 21

- 10.6 Geotechnical conditions and hazards were considered throughout the site identification and assessment process. This included early review of recorded landslide sites, fault proximity, liquefaction ground spreading potential, and earthquake induced slope failure hazard²⁰ when sites were initially being identified and shortlisted. A desktop geotechnical assessment was prepared for the three short-listed sites and associated pipeline routes²¹ to confirm that the sites and pipeline routes were appropriate for the proposed conceptual design. This did not identify any geotechnical issues that could not be mitigated by detailed design.
- 10.7 I agree with Mr Parry that, 'all things being equal', there would be benefits from a resilience perspective in locating a new reservoir further from an existing reservoir. This was considered as part of the MCA process. However there were a range of relevant considerations in this case, and the 'Naenae 2' site came out as the highest scoring option overall.

Submission on location from C Holt

- 10.8 Mr Holt is opposed to the location chosen for the project and the water outlet pipe being installed in Balgownie Grove. As discussed above, the pipe alignment selected is appropriate as:
- a I consider the potential alignment down Summit Road impracticable based on the identified constructability issues and risks taken in conjunction with the very high level of social and construction impacts (noise, vibration, traffic, parking and access) on residents over an extended duration.
 - b The alternative route along Waiwhetū Stream to Waddington Drive Reserve is less favourable than the Balgownie Grove route due to the constructability risks and disruption for residents caused by work along the narrow stream bank.
 - c The recommended alignment (Balgownie Grove) will have lesser environmental impact and risk, simplified construction and consenting, and have no greater community impact than any other routine in-street infrastructure works.

²⁰ AEE, Appendix M: Site Selection Report, Sections 4.1.1 and 4.2, Table 7

²¹ AEE, Appendix M: Site Selection Report, Appendix G

Submission on location from F&P Clarke

- 10.9 Mr and Mrs Clark propose routing the pipe through the reserve adjoining number 20 Waddington Drive instead of down Balgownie Grove.
- a I consider that the route through Waddington Drive Reserve (adjacent to 20 Waddington Drive) would introduce constructability risks associated with proximity to Waiwhetū Stream and generate an increased level of disruption to local residents.
 - b The proposed alternative route has been considered and a comparison of alternatives is presented in the Pipe Alignment Report²².
 - c The Waddington Drive Reserve route requires construction along a constrained corridor between private properties and the stream, with poor access. Bank stabilisation would be required, potentially requiring piling. Stream diversion by overpumping may be required for instream works. Construction access would be via Balgownie Grove. Materials and Equipment may need to be craned over private property for construction. Ongoing maintenance could require access across private property.
 - d Construction in a limited space introduces complexity and health and safety risks, and an extended construction programme. Construction adjacent to Waiwhetū Stream introduces environmental risks.
 - e Construction along the opposite (true left) bank has been considered but this would require vegetation removal and earthworks within 100 m of a natural inland wetland adjacent to the stream. A pipeline along the stream bank would be at risk of lateral spread in an earthquake and scour from the stream requiring significant work to increase resilience. Access for repair would be difficult.
 - f Taranaki Whānui has expressed a preference for “the pipeline alignment with the lowest environmental impact on Raumānuka (Eastern Hills) and the Waiwhetū Stream”.
 - g On balance, construction along Balgownie Grove will be less disruptive to residents overall, reduces construction complexity, and minimises environmental risks.

²² AEE, Appendix P: Pipe Alignment Report, Table 2

11 Response to Section 42A Officer's Report

- 11.1 I have read the Officer's Report. Paragraph 176 of that report agrees that adequate consideration has been given to alternatives, and the report does not raise any other matters relevant to my evidence.

12 Conclusions

- 12.1 The proposed reservoir site at Summit Road was determined following a thorough site selection process. Three potential sites were shortlisted for multicriteria analysis which has provided a balanced consideration of the options across against technical, social, environmental, financial and carbon criteria. These included, among others, noise, vibration and dust, traffic and access, and vulnerability and resilience. The highest scoring site option has been selected.
- 12.2 There is an operational need for an outlet main and overflow pipeline from the proposed reservoir. The initial concept identified a potential route down Summit Road which was subsequently found to be impracticable based on constructability issues and risks, in conjunction with a very high level of construction impacts. The only practicable options require the pipelines to traverse an ecological area identified in the Hutt City District Plan as SNR12. The proposed route down the ridge north of the site, across Waiwhetu Stream and along Balgownie Grove offers the least complex construction, lowest community impact, best operability and resilience and smallest environmental impact.

Paul Jeffrey Carran

14 November 2024