

**IN THE ENVIRONMENT COURT  
WELLINGTON REGISTRY**

**I TE KŌTI TAIAO O AOTEAROA  
TE WHANGANUI-A-TARA ROHE**

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**ENV-2023-WLG-000005**

<b>UNDER</b>	the Resource Management Act 1991 (the Act)
<b>IN THE MATTER</b>	the direct referral of applications for resource consents and notices of requirement under sections 87G and 198E of the Act for the Ōtaki to North of Levin Project
<b>BY</b>	<b>WAKA KOTAHI NEW ZEALAND TRANSPORT AGENCY</b>  Applicant

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**STATEMENT OF EVIDENCE OF GRAEME McINDOE ON BEHALF OF HOROWHENUA  
DISTRICT COUNCIL AND KĀPITI COAST DISTRICT COUNCIL**

**URBAN DESIGN**

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26 September 2023

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## A. INTRODUCTION

- [1] My name is Graeme McIndoe. I am an architect and urban designer. I established my specialist urban design practice in 1992 and am founding director of McIndoe Urban Ltd which was incorporated in 2012.
- [2] I prepared a report (required by section 198D of the Resource Management Act 1991 (“**RMA**”)) on the Notices of Requirement (“**NoRs**”) lodged with Horowhenua District Council and the Kāpiti Coast District Council (the “**District Councils**”) relating to the Ōtaki to North of Levin Highway Project (the “**Ō2NL Project**” or “**Project**”). My report was prepared on behalf of the District Councils and was dated 28 April 2023 (“**s198D Report**”).
- [3] In the s198D Report, I reviewed the NoRs by Waka Kotahi for the Ō2NL Project. My s198D Report focused on the urban design effects of the NORs.
- [4] I confirm I have the qualifications and experience set out at paragraphs 7 - 13 of my s198D Report. In addition, my experience of design assessment methods and tools includes:
- a) co-authorship of *Building Evaluation Techniques* (Baird, G. et al, McGraw Hill, New York 1996);
  - b) authorship and application of multiple statutory design guides;
  - c) formal assessment of multiple student design projects (including convening VUW School of Architecture’s 4<sup>th</sup> year architectural design course over the period 2000-2008); and
  - d) assessment of the design quality of various projects for consent and Environment Court evidence.
- [5] Since filing my s198D Report I have reviewed the evidence of Waka Kotahi and participated in expert conferencing on Urban Design. The output of that conferencing was a joint witness statement dated 27 July 2023 (the “**Urban Design JWS**”). I confirm the contents of the Urban Design JWS. I discuss any remaining issues and/or related conditions below.

**B. CODE OF CONDUCT**

- [6] I repeat the confirmation provided in my s198D Report that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. This evidence has been prepared in accordance with that Code. Statements expressed in this evidence are within my area of expertise.

**C. SCOPE OF EVIDENCE**

- [7] My evidence addresses the following:
- (a) The extent to which condition DTW5 and the Cultural and Environmental Design Framework (“CEDF”) address urban design, and recommendations for the design review process.
  - (b) A response to section 274 party evidence.
  - (c) Conditions addressing urban and landscape design.
  - (d) The importance of the East-West Arterial and connections at Tara-Ika.
- [8] In preparing this evidence I have reviewed the following:
- (a) The Landscape, Visual and Natural Character Technical Assessment by Gavin Lister attached as Technical Assessment D to the Assessment of Effects on the Environment for the Project.
  - (b) The s198D report prepared by Julia Williams on behalf of the District Councils and the Regional Councils in relation to landscape, natural character and visual effects.
  - (c) The statement of evidence of Gavin Lister (Landscape, Visual and Natural Character) on behalf of Waka Kotahi NZ Transport Agency dated 4 July 2023.
  - (d) The statement of evidence of Siobhan Karaitiana (witness on behalf of Muaūpoko Tribal Authority) dated 4 July 2023.

- (e) The statement of evidence of Quentin Parr (witness on behalf of Ngāti Raukawa) dated 4 July 2023.
- (f) The conditions circulated by Waka Kotahi (following mediation) on 4 September 2023 ("**Final Draft Proposed Conditions**").
- (g) The statement of evidence of Karen Prouse (s274 party) dated 12 September 2023.
- (h) The statement of evidence of Anna Carter (consultant planner for Karen and Stephen Prouse) dated 15 September 2023.
- (i) The statement of evidence of Julia Williams (witness on behalf of the District Councils and the Regional Councils in relation to landscape and visual assessment).

#### **D. OUTSTANDING ISSUES**

[9] On review of my s198D Report and the Urban Design JWS, I am of the view that the following issues remain outstanding in relation to urban design matters:

- (a) Adequacy of the CEDF in respect of urban design; and
- (b) The design review process.

[10] I also address, briefly, the importance of the East-West Arterial ("**EWA**") and connections at Tara-Ika, in support of Horowhenua District Council and Waka Kotahi's work towards finalising a commercial agreement on provision for those connections and related infrastructure and funding requirements.

[11] I address these issues in turn below.

#### **Condition DTW5 and adequacy of the CEDF in respect of urban design**

[12] Condition DTW5 addresses the CEDF and sits within the Tangata Whenua Values conditions.

[13] The urban design expert conferencing concluded that the CEDF should cover urban design, with the first comment in the Urban Design JWS stating that: *“there is an issue of ensuring suitable design quality and as the concept is developed into the outline plan:*

- *that quality is guaranteed in the conditions.<sup>1</sup>*
- *...*
- *that the principles for design review [should] include the full range of matters, including urban design, which will determine the quality of the project.”*

[14] I have added the word “should” to the third of the bullet points above as this is my recollection of the intention, and for the purpose of this evidence, aids in understanding that intention.

[15] Surety of suitable quality can only be achieved if the matters referred to in the conditions are suitably comprehensive and cover urban design. Currently they are not, and do not.

[16] The CEDF is currently a draft document and was included in the application material (being dated October 2022). Chapter 3 of that CEDF is then referenced in designation condition DTW5<sup>2</sup>. DTW5 is the key condition that addresses the detailed design of the O2NL Project – detailed design which we have not yet seen. DTW5 is also critical to ensuring that a fit-for purpose, high level of design quality is achieved.

[17] As currently proposed, condition DTW5(a) requires only that the Project be consistent with the design principles in Chapter 3 of the CEDF, Consent Version, dated October 2022. There are two core design principles (and some supporting text for those) set out in pages 52-55 of the CEDF (Consent Version). Those two core design principles are as follows:

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<sup>1</sup> Urban Design JWS Annexure A – Expert conferencing on urban design, page 1.

<sup>2</sup> Page 21 of Final Draft Proposed Conditions (Track Changes Version).

- **Tread Lightly, with the Whenua:**
  - Me tangata te whenua (treat the land as a person)
  - Kia māori te whenua (Let it be its natural self)
- Leave a positive **Enduring Legacy** for our uri (descendants, for all communities – including flora and fauna)
  - Kia māori te whakaaro (normalise māori values)
  - Me noho tangata whenua ngā mātāpono (embed the principles in all things)
  - Tū ai te tangata, Tū ai te whenua, Tū ai te Wai (elevate the status of the people, land and water)

- [18] These principles (and the content of Chapter 3) are not disputed for what is included, being cultural and environmental principles that can be expected to contribute to a high-quality outcome in those respects. The Chapter 3 principles are disputed rather for *what is not included*.
- [19] Requiring that the Project be consistent with Chapter 3 of the CEDF (Consent Version) will not ensure that there is a sound urban design outcome. There is in this chapter of the (current draft) CEDF no mention of matters relating to urban design beyond ensuring that the design “achieves a well-integrated highway, that minimises visual clutter”<sup>3</sup>. It does not contain the range of standard, expected, and important urban design principles that would ensure delivery of an outcome of the quality that has been promised in the application material. More, and greater detail, on urban design matters is therefore required to inform design development through the detailed design and outline plan of works phases.
- [20] The current absence of urban design principles and criteria can be remedied by including in condition DTW5 reference to Waka Kotahi’s ‘*Bridging the Gap*’ Urban Design Guidelines (2013) which are stated in the CEDF to have informed the design to date:

***Waka Kotahi Bridging the Gap: Waka Kotahi Urban Design Guidelines (2013)***

*“The Guidelines set out 10 over-arching urban design principles, guidance for Urban and Landscape Design Frameworks (ULDF) and Urban and Landscape Management Plans (ULMP) and on specific highway components and walking and cycling including pedestrian*

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<sup>3</sup> CEDF, page 53. Under the heading ‘Tread Lightly, with the Whenua’.

*paths, pedestrian crossings, cycle lanes and paths, pedestrian and cycle bridges, underpass design, lighting and crime prevention.”<sup>4</sup>*

- [21] The relevance of this document is further reinforced in an endnote within the CEDF:

*“A CEDF is equivalent to, and includes the requirements of, the Urban & Landscape Design Framework (ref Bridging the Gap: Waka Kotahi Urban Design Guidelines).”<sup>5</sup>*

- [22] I consider the guidance in the following sections of *Bridging the Gap* are particularly relevant to Ō2NL and need to be added into condition DTW5:

#### Part 2 – Supporting walking and cycling

- 4.5 Pedestrian paths
- 4.6 Pedestrian crossings
- 4.7 Cycle lanes and paths
- 4.8 Pedestrian and cycle bridges
- 4.9 Underpass design
- 4.10 Lighting
- 4.11 Crime prevention

#### Part 3 Highway components

- 4.12 Road bridges
- 4.13 Retaining walls
- 4.14 Earthworks
- 4.15 Noise barriers
- 4.16 Highway furniture
- 4.17 Stormwater management devices
- 4.19 Roundabouts
- 4.23 Public art

- [23] This established guidance on best practice from Waka Kotahi’s *Bridging the Gap* in relation to identified elements of the project provides a comprehensive and complete frame of reference for review of urban design matters. Furthermore, the section headings of *Bridging the Gap* are a good fit with Waka Kotahi’s proposed audit approach as the Design Audit in Chapter 4 of the CEDF is also structured by ‘element’. That is, it is based on

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<sup>4</sup> CEDF, page 16.

<sup>5</sup> CEDF, page 18.



a set of headings such as “*Bridges, Underpasses, Safety barriers, Medians*” and so on.

- [24] The current headings in the CEDF Chapter 4 Design Audit are more extensive than but similar to those in *Bridging the Gap* (and the *Landscape Guidelines* identified by Julia Williams in her statement of evidence). Therefore, it will be straightforward to apply the identified *Bridging the Gap* urban design, and also landscape content to the Ō2NL Project under the appropriate headings. I consider this type of structure is both logical and fit for purpose.
- [25] Woven through the identified sections of *Bridging the Gap* is a range of urban design considerations that are relevant to both design and auditing the elements of the Ō2NL Project. To illustrate, matters include but are not limited to:
- aesthetic coherence;
  - integration and coordination of design approach;
  - minimising visual clutter;
  - quality of experience for users, including safety and views;
  - responding to context in a sensitive and location-specific way; and
  - selection of materials and finishes for effective whole of life performance and efficient maintenance.<sup>6</sup>
- [26] To assist the Court and parties, and to illustrate the scope and robustness of the content of *Bridging the Gap*, an example of its content for road bridges is included as Attachment 1.<sup>7</sup>

### **Design review process**

- [27] The expert conferencing agreed via the Urban Design JWS “*that the CEDF and formal review process is also addressed in the conditions*”.<sup>8</sup> The

<sup>6</sup> This list is my interpretation of some of the high level principles that are woven through the *Bridging the Gap* guidelines.

<sup>7</sup> Attachment 1: *Bridging the Gap*, Section 4.12 Road Bridges (page 73) The full document is found online (<https://www.nzta.govt.nz/resources/bridging-the-gap/>).

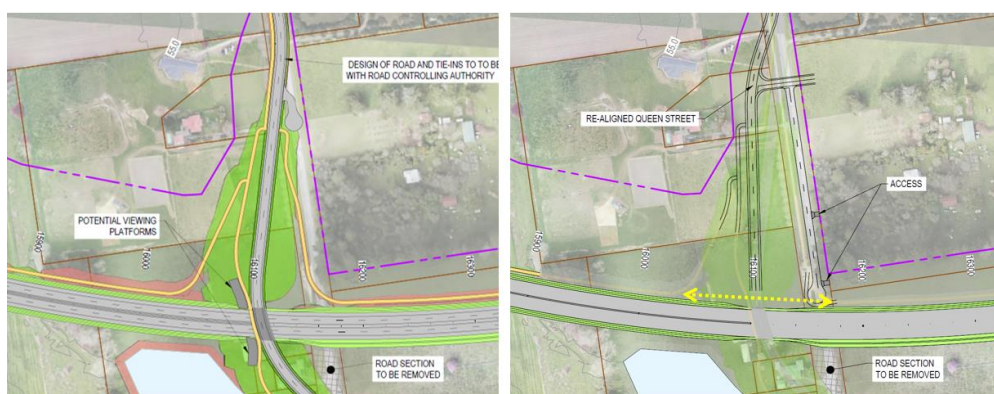
<sup>8</sup> Urban Design JWS Annexure A – Expert conferencing on urban design, page 1.

intention here was to record that the CEDF and review process needed to be addressed in the conditions.

- [28] The Chapter 3 principles supplemented with urban and landscape design content from Bridging the Gap and 'Landscape Guidelines' will not alone guarantee a successful outcome. That will be determined by the skill with which these principles and guidelines are applied, and the insight with which they are audited. In order to ensure the above matters are properly considered, it is essential that the reviewers are suitably skilled and experienced in the matters that are to be considered in design and design review auditing.
- [29] Furthermore, as a consequence of adding what is in my opinion the necessary consideration of urban and landscape design into condition DTW5, the Design Review Audit should be extended to cover this additional material.

#### E. RESPONSE TO SECTION 274 PARTY EVIDENCE

##### Shared Use Path configuration at Queen Street East



**Left:** Description of Queen Street Overbridge connection in Application set. Extract from General Arrangement Plan – Indicative Sheet 5 Drawing No. 310203848-01-100-C104 Rev. H (Dated 10.10.22)

**Right:** Description of Queen Street Overbridge and agreed general arrangement from Appendix 2 of Ms Prowse's evidence, overlaid with scenario of continuity of the cycle lane under the overbridge. The yellow dashed arrow is my overlay of a scenario for continuity of the proposed shared path under the proposed overbridge.

*Figure 1: Potential for enhancement of the Shared Use Path at Queen Street East*

- [30] At paragraph 17 of her evidence Karen Prowse notes an agreement that Waka Kotahi will provide access to the Prowse property generally in accordance with a layout shown in her Appendix 2. Figure 1 above shows the

notified layout (left) and this new proposed layout (right). The revised access arrangement to the Prouse property retains the existing cycleway and Queen Street East carriageway and appears from an urban design perspective to be, in principle, entirely appropriate.

[31] How the cycleways connect further along Queen Street East is not shown, so may not yet be finalised<sup>9</sup>. In designing the final configuration of street, intersection and path connections, I consider that the shared use path should be connected under the Queen Street East overbridge in the broad location of my yellow dashed line in Figure 1 (right). From an urban design perspective this:

- (a) would be more legible and convenient for north-south path users than an otherwise inconvenient and convoluted route;
- (b) would not in any way alter the potential for east-west connections;
- (c) would avoid the need for shared use path users travelling north-south and vice versa to cross Queen Street East; and
- (d) would also give path users travelling from the south to the east and vice versa the option of avoiding crossing any road.

#### **F. CONDITIONS ADDRESSING URBAN AND LANDSCAPE DESIGN**

[32] I have reviewed the Final Draft Proposed Conditions provided by Waka Kotahi following mediation and circulated to the parties on 4 September 2023. In my evidence, above, I have discussed the further amendments to those conditions that I consider are essential to ensure the urban and landscape design outcomes that are proposed will be implemented and will be satisfactory.

[33] I recommend the following additions and modifications to condition DTW5 CEDF as described below, including landscape design content recommended by Julia Williams (additions underlined, deletions ~~struck through~~):

DTW5 Cultural and Environmental Design Framework

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<sup>9</sup> This is also alluded to in the evidence of Anna Carter at paragraph 80-82.

- a) The Project must be consistent with the Design Principles in Chapter 3 of the *'Cultural and Environmental Design Framework'*, Consent Version, dated October 2022.
- b) While achieving the consistency with the Design Principles directed by (a) above, appropriate regard must also be given to ensuring a fit-for purpose, high level of design quality, through consistency with the following sections of:
- i. 'Bridging the Gap: Waka Kotahi Urban Design Guidelines' (NZTA, October 2013):  
Part 2 – Supporting walking and cycling
    - 4.5 Pedestrian paths
    - 4.6 Pedestrian crossings
    - 4.7 Cycle lanes and paths
    - 4.8 Pedestrian and cycle bridges
    - 4.9 Underpass design
    - 4.10 Lighting
    - 4.11 Crime prevention  
Part 3 Highway components
    - 4.12 Road bridges
    - 4.13 Retaining walls
    - 4.14 Earthworks
    - 4.15 Noise barriers
    - 4.16 Highway furniture
    - 4.17 Stormwater Management Devices
    - 4.19 Roundabouts
    - 4.23 Public art
  - ii. 'Landscape Guidelines' (NZTA, September 2014):  
Section 4 Part 3 : Landscape Treatments
    - 4.12 Topsoil
    - 4.14 Planting and Vegetation Management
    - 4.16 Further Planting Considerations
    - 4.18 Materials Source and SupplySection 4 Part 5:
    - 4.22 Defects Liability and maintenance
- c) Design Review Audits, set out in Chapter 4 of the *'Cultural Environmental Design Framework'*, to confirm that the Project is consistent with the Design Principles and with the Urban Design and Landscape Guidelines referenced in (b) above, must be undertaken:
- i. at least three (3) months prior to the outline plan being submitted to Council as set out in Condition DGA6; and
  - ii. every three (3) months until the Project is open for public use.
- d) Design Review Audits required by clause (c) may describe design elements of the Project with reference to, but not limited to, Chapter 4 of *'the Cultural and Environmental Design Framework'*, Consent Version, dated October 2022.
- e) Design Review Audits must be completed in collaboration with the Project Iwi Partners.

- f) The team undertaking a Design Review Audit must include a suitably qualified person (or persons) with formal qualifications and expertise in landscape and urban design.
- g) In addition to the requirement to include a Design Review Audit as part of the outline plan set out in Condition DGA6, the subsequent Design Review Audits required by clause (c**~~b~~**) must be provided to the District Council.

[34] Following from my recommended condition DTW5(f), for completeness and consistency I also recommend the following additional subclause be included in condition DGA9 (suitably qualified person)<sup>10</sup>:

The following documents or measures that are required to be prepared or undertaken by these conditions must be prepared or undertaken by a suitably qualified person or persons:

...

(viii) a Design Review Audit required by Condition DTW5, where the team undertaking the Design Review Audit must include a suitably qualified person (or persons) with formal qualifications and expertise in landscape and urban design.

[35] I consider these changes are necessary to ensure urban and landscape design matters are addressed in design and design review auditing, and to give surety on the robustness of the audit process and the quality of the outcome.

## **G. THE EAST-WEST ARTERIAL AND CONNECTIONS AT TARA-IKA**

[36] Tara-Ika is a zoned growth area located to the east of Levin. It has been authorised through Plan Change 4 to the Horowhenua District Plan and will provide significant new housing and urban development. The EWA is a core part of Tara-Ika, and it was agreed in the Urban Design JWS to be “*essential to Tara-Ika because it is the spine of the structure plan*” and “*provides critical cross-corridor connectivity to the centre of Tara-Ika.*”<sup>11</sup> This and other linkages for Tara-Ika (the planned growth area to the east of Levin) can be seen in Figure 2, below.

<sup>10</sup> Page 20 of Final Draft Proposed Conditions (Track Changes Version).

<sup>11</sup> Page 1 of Annexure A to the Joint Statement of Urban Design Experts 27 July 2023

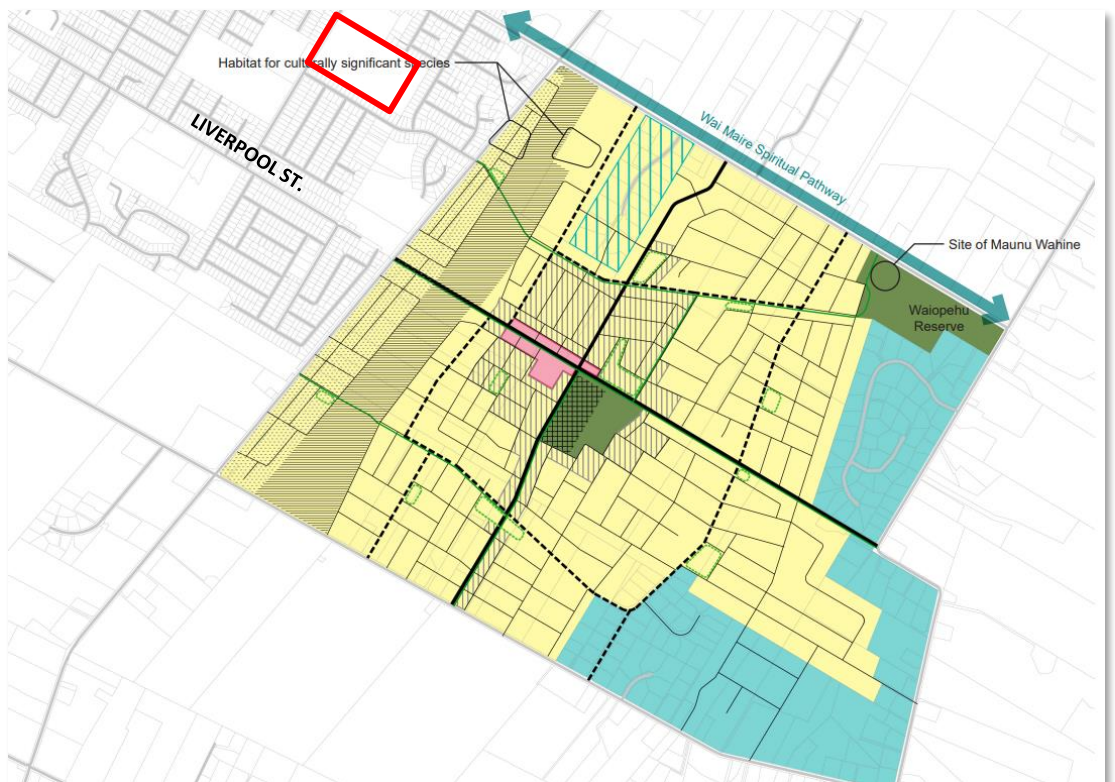


Figure 2: Tara-Ika Structure Plan Decision Version 14 June 2022.

[37] Figure 2 is the Structure Plan for Tara-Ika and shows the EWA as an arterial road connection as the bold line running east to west on the alignment of Liverpool Street and through the proposed central commercial area, shown in pink. Strategic cycleways are shown with green lines. Three of these (two being separate to the EWA) will need to cross the Ō2NL corridor, which is shown in diagonal hatching. (To orientate, I have overlaid a red rectangle which identifies Waiopehu College, and labelled Liverpool Street.)

[38] Integrating land use and infrastructure, including providing for appropriate connections, is fundamental to sound spatial planning and urban design. Furthermore, growth, infrastructure and structure planning are fundamentally future-focused. Therefore, anticipation of predicted and planned future conditions and context is essential to achieving successful outcomes. Conversely, absence of provision for an outcome which is planned to occur is inconsistent with good structure planning and design practice. The connections at Tara-Ika are not yet confirmed, however from my urban design perspective it is fundamental that, when undertaking infrastructure design, design be undertaken with reference to the existing

and planned future context and to provide necessary connections in the appropriate locations.

[39] I understand that the parties are working on the various elements that need to be addressed, such as detailed design, funding (in which respect I note with support Waka Kotahi's offer to fund the overbridge as outlined in the evidence of Lonnie Dalzell), property acquisition, relocation of services, consenting and so on, and that a commercial agreement is being progressed between Horowhenua District Council and Waka Kotahi.

[40] From my urban design perspective, the legal and planning instruments should be the means by which a sound spatial planning outcome is achieved, an outcome that contributes to a well-functioning environment for the future and in perpetuity. That includes providing for all of the connections described in, and anticipated by, the District Plan for Tara-Ika. I remain perplexed that, despite the RMA's direction that we seek sustainable management, and that we look at both present and future effects, an 'existing environment' argument could be used to suggest these considerations be ignored.

## H. CONCLUSIONS

[41] For the reasons outlined above, I consider it essential to directly cross-reference relevant sections of Waka Kotahi's *Bridging the Gap: Urban Design Guidelines* for appropriate urban design criteria, as identified in condition DTW5. I also support the reference to the '*Landscape Guidelines*', as discussed in the evidence of Julia Williams.

[42] Further, the design audit process should in my opinion be informed by professionals with appropriate expertise and experience in landscape and urban design, and this should be provided for in conditions DTW5 and DGA9.

[43] In relation to design agreements that I understand have been reached with Waka Kotahi and are recorded in the s274 evidence of Karen Prouse, I consider the proposed shared use path should be continued under the Queen Street East bridge as part of changes to access to the Prouse property, thus enhancing its legibility, convenience and connection.

- [44] The EWA and strategic cycleway overbridges are critical to the integration and function of the Tara-Ika development envisaged by the Horowhenua District Plan and should be integrated into the design and delivery of the Ō2NL project to the maximum extent possible. I support the parties working together on a commercial agreement to that end.

**Graeme McIndoe**

**26 September 2023**



## Attachment 1:

Bridging the Gap, Section 4.12 Road Bridges (page 73)

The document may be downloaded here:

<https://www.nzta.govt.nz/resources/bridging-the-gap/>

### Urban design guidance

The following guidance should guide the design of road bridges:

**Location:** Bridge design starts with its location. Bridges that span waterways can dramatically change the landscape and bridges within or next to residential areas can appear out of scale and out of character. The role of the bridge in the overall project must be established from the early stages of route selection as it can influence the alignment.

**Context:** Bridges should complement their context. This means considering the topography, the rural or urban setting, any existing structures, visibility of the bridge and the distance and height to be spanned. Where a series of bridges will be seen in succession by road users, they should be consistent in form and recognizable as a 'family' of structures with individual variations reflecting the requirements of their specific settings. Feature bridges are suitable for special places, where they can act as landmarks.

**Views:** Bridges are both viewed objects and viewing platforms. The bridge can frame a new and unexpected vista contributing to appreciation of the surrounding landscape. Optimising views to, through and from the bridge will also help with orientation on the journey. This can be achieved by making the bridge design as slender and open as possible, and minimising the height of solid barriers by using a top metal rail. Bridges that are highly visible from roads and public spaces should be designed for these views.

**Underbridge experience:** Where pedestrians and cyclists are likely to travel under a bridge, the treatment of the soffit, piers and abutments should provide a safe, convenient and attractive environment. In urban areas with high levels of foot traffic, the underbridge experience will be particularly important and justify architectural treatments and feature lighting.

**Overbridge experience:** Where a bridge provides an elevated viewpoint from which the wider landscape can be appreciated or crosses an important landscape feature (river, gully, etc.), the overbridge experience should be carefully considered. This may involve using a metal top rail to minimise the height of solid bridge barriers and maximize the view from the bridge for motorists. If pedestrians and cyclists are likely to travel over the bridge, it may be desirable to provide space where they can safely stop and enjoy the view.

**Form and proportion:** The height of the bridge, number of supports, distribution of spans and size of the various components should be carefully considered to create a simple, elegant whole and to minimise the bridge profile. Structural integrity, where the forces at play in the bridge are clearly reflected in its design, generally results in pleasing composition.

**Light and shadow:** A play of light and shadow on a bridge can reduce the apparent mass and bulk of the structure and balance its vertical and horizontal proportions. Sloping all or part of the outer face of the parapet outwards to catch the sunlight, and recessing beams to create a shadow line, will reinforce the horizontal lines in the bridge. Surface texture on barriers and retaining walls will create a finer level of detail.

**Texture:** Barriers should have minimum embellishments, with any surface patterns reinforcing the clean lines of the bridge. Any textures on retaining walls and barriers should relate to the speed of travel. Abstract, repetitive patterns are suitable to add interest, while not distracting driver. Where abutments will be visible by slow moving traffic, textures can be used on retaining walls to provide a finer level of detail and can reference the area's cultural or historical significance.

**Colour:** Colour offers opportunities to provide consistency to a family of bridges and to reinforce the landmark quality of a standalone structure. When used to highlight particular elements it should form part of a coherent, ordered composition. Colour must be used carefully as it draws the eye, especially in a rural setting.

**Lighting and drainage:** These bridge components must be considered early and integrated in the design of the structure. The external surface of the bridge should be free of drainage pipes or services. Lighting at night, like colour during the day, can be used to highlight all or parts of a feature bridge. Lighting design and selection should incorporate protection against vandalism.

**Maintenance:** It is important to select durable materials and finishes that do not significantly degrade in appearance over time. Where required, anti graffiti coating should be applied as part of the bridge construction phase to the full extent of piers and barriers to prevent patchy application and appearance at later stages.

**Barriers:** Barriers must be designed to respond to the bridge setting and to achieve a smooth transition between the structure and its approach. Barriers should have continuous lines that are not obscured or interrupted by non-structural elements. Their depth must be carefully proportioned in relation to the deck and superstructure. Barriers should be extended past the abutments to anchor the bridge in the landscape. Sloping the top of the barrier inwards towards the deck will minimise water staining on the outer face of the barrier.

**Abutments:** Open abutments should generally be used in rural areas to optimise views of the landscape. Landscaped sloped abutments are less likely to attract graffiti than retaining walls. In urban settings or when the corridor width is constrained, near vertical or vertical retaining walls are the most practical abutment options. The design of these retaining walls must present a high quality appearance if visible to approaching traffic, pedestrians and cyclists.

**Headstock:** These substructure elements should not be designed in isolation. Their design is integral to the overall form of the bridge. Structural systems that eliminate the need for headstock can lead to simpler, more elegant solutions.

**This guidance should be read in parallel with the NZTA Bridge Manual**