

**BEFORE THE PALMERSTON NORTH CITY, MANAWATŪ DISTRICT (MDC)  
AND TARARUA DISTRICT COUNCILS**

**IN THE MATTER** of the Resource Management Act 1991 (“the Act”)

**AND**

**IN THE MATTER** NOTICES OF REQUIREMENT by NZTA under s168 of the Act for the construction, operation, maintenance and improvement of approximately 11.5km of new State Highway between Ashurst and Woodville to replace the closed section of SH3 through the Manawatū Gorge and associated works, known as the Te Ahu a Turanga, Manawatū Tararua Highway Project (“the Project”)

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**Nicholas Paul Goldwater**

**EVIDENCE ON BEHALF OF THE DIRECTOR-GENERAL OF CONSERVATION  
(Freshwater Ecology)**

Dated: 15 March 2019

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## TABLE OF CONTENTS:

Section	Heading	Page No's
1	Qualifications and Experience	1-2
2	Project Involvement	2-3
3	Purpose and Scope of Evidence	3
4	Assessment of Aquatic Ecological Values	3-5
5	Potential Ecological Effects of the Proposed Bypass	5-8
6	Options to Avoid, Mitigate, or Offset Potential Adverse Effects on Freshwater Ecology	9-11
7	Conclusion	11

### 1. QUALIFICATIONS AND EXPERIENCE

- 1.1. My full name is Nicholas Paul Goldwater.
- 1.2. I am a Principal Ecologist with Wildland Consultants Ltd (Wildlands), based in Auckland. I have been employed as a consultant ecologist with Wildland Consultants since 2008.
- 1.3. I have a Master of Science (First Class Honours) in ecology and environmental science from the University of Auckland, and have over eleven years' experience in ecological consultancy. In my role as Principal Ecologist I undertake field assessments, provide technical advice and services, and manage projects for a range of clients. I have undertaken numerous terrestrial and aquatic assessments in the Auckland, Northland, Waikato, and Wellington regions.
- 1.4. I have considerable experience with consents relating to vegetation removal and ecological restoration, including quarrying activities, subdivisions, and infrastructure projects, all involving the assessment of environmental effects under the Resource Management Act 1991 (RMA). I have assisted Auckland Council with numerous projects that include baseline biodiversity surveys, consent reviews, delineation of boundaries for Significant Ecological Areas, preparation of Ecological Management Plans, and field surveys for indigenous fish, threatened plants, birds, and reptiles.

- 1.5. I have extensive experience in wetland ecology in the Northland, Auckland and Waikato regions, and I was Principal Botanist for the Auckland Council regional wetland monitoring programme from 2012 to 2014. I have over eight years' experience in aquatic ecology, during which I have undertaken many stream surveys throughout the North Island. I am a qualified practitioner of the Stream Ecological Valuation (SEV) methodology and I have ten years' experience in sampling aquatic macroinvertebrates and freshwater fish.
- 1.6. I recently provided advice to New Plymouth District Council on the Stream Ecological Valuation (SEV) offsetting approach used in the application for a designation to construct a new state highway through indigenous forest, wetlands and watercourses at Mt Messenger.
- 1.7. I have read the Code of Conduct for Expert Witnesses 2006 and have complied with it in the preparation of this statement of evidence. Except where I state that I am relying upon the specified evidence of another person, my evidence in this statement is within my area of expertise. I have not omitted to consider any material facts known to me that might alter or detract from the opinions which I express below.
- 1.8. I am presenting evidence on behalf of the appellant, the Department of Conservation, in relation to the proposed SH3 bypass of Manawatū Gorge.

## **2. PROJECT INVOLVEMENT**

- 2.1. I undertook a walk-through survey of habitats throughout the site on 23 November 2018, accompanied by two Wildlands staff, Jacqui Wairepo, a herpetologist, and Tim Martin, a terrestrial ecologist. The focus of this assessment was the older forest remnants, wetlands and watercourses at Chainage 4000-4400 and 5500-5900, and watercourses, wetlands and shrublands at Chainage 9300-9400. We also viewed many parts of the route from vantage points to understand the broader habitats of the route as a whole, e.g. shrubland areas on the Eastern Rise.
- 2.2. In December 2018 I assisted with a review of the ecological aspects of the application, titled "High-Level Initial Guidance on Ecological Aspects of the Application to Bypass the Manawatū Gorge at SH3, between

Palmerston North and Woodville". This report reviewed the specialist ecology reports for the NOR (downloaded from the NZTA website on 9 November 2018), provided a critique of the assessment, and identified information gaps.

### **3. PURPOSE AND SCOPE OF EVIDENCE**

3.1. My evidence will address the following issues in relation to the NOR and resource consent application:

- a. Potential loss of stream length within the designation, including spoil sites.
- b. A summary assessment of the adverse effects of the Project on hydrological and aquatic ecological values.
- c. Offsetting and mitigation for stream loss.

3.2. My evidence does not include comments on the assessment of effects on natural character.

3.3. I have reviewed and provided comments on the following:

- a. Te Ahu a Turanga; Manawatu Tararua Highway Project: Freshwater - Ecological Impact Assessment ("Freshwater EIA"), prepared by Kieran Miller.
- b. The designation plan (Sheet 1-10), dated October 2018.
- c. Council Section 42A report (freshwater) prepared by Logan Brown.
- d. Statement of evidence of Kieran Miller for NZTA dated 8 March 2019.

### **4. ASSESSMENT OF AQUATIC ECOLOGICAL VALUES**

4.1. Eight freshwater locations were sampled in the Freshwater EIA, each of which is considered to be representative of watercourses within the designation. The Freshwater EIA provides sufficient descriptions of the freshwater habitats and associated values, which are supported by photographs. Table 6.C.7 in the EIA provides a useful summary of the sample stream characteristics and ecological values.

- 4.2. The Applicant carried out Stream Ecological Valuations (SEVs) at eight locations, which included sampling of fish and aquatic habitats (see Table 6.C.5 of the report). The results showed a noticeable range in SEV scores and stream condition throughout the study site, which largely correlate to the presence/absence of woody riparian vegetation and connectivity to the floodplain.
- 4.3. The Applicant undertook the stream surveys in July 2018, which is an optimal time of year for determining the true extent of permanent and intermittent reaches (i.e. wetter weather), although less so when surveying for fish. The New Zealand Freshwater Fish Sampling Protocols (Joy *et al.* 2013<sup>1</sup>) recommends that fish surveys should not place between 1 May and 30 November. The reason for this is that generally fish become less active and less susceptible to capture when temperatures are low (Joy *et al.* 2013).
- 4.4. Mr Brown makes the point that one-off sampling “*does not necessarily capture all of the ecological values at a site (which can vary depending on the season in which sampling is undertaken)*”.<sup>2</sup> I agree that the one-off sampling undertaken by the Applicant is likely to have missed seasonal variations in fish and macroinvertebrate diversity and abundance, and also any variations in macrophyte abundance. Ideally, a minimum of two sampling events is required (summer and winter) to cover seasonal variations. However, this needs to be weighed up in the context of the freshwater survey scope, which is far more high level than the terrestrial ecology report. Moreover, the Applicant acknowledges the need for further surveys to be conducted during the design phase.<sup>3</sup>
- 4.5. The Applicant has recognised the high ecological values of the streams that flow through the steep bush-clad gullies within the Manawatū Gorge Scenic Reserve. During the site visit, I had the opportunity to inspect the lower reaches of a permanent watercourse that flowed through indigenous forest on the southern side of the gorge. The stream was characterised by a series of stepped pools, flumes, small waterfalls, and boulders, and was well-shaded and buffered by the overhead canopy and bankside vegetation. In my opinion, most if not all streams within

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<sup>1</sup> Joy M., David B. and Lake M. 2013: New Zealand Freshwater Fish Sampling Protocols, Part 1 - Wadeable Rivers & Streams. Published by The Ecology Group – Institute of Natural Resources.

<sup>2</sup> Freshwater Section 42A Report at [49].

<sup>3</sup> Miller EIC at [20].

Manawatū Gorge Scenic Reserve would be in a relatively unmodified state and would have high ecological values.

- 4.6. In my opinion, the freshwater survey should have included aquatic habitats within the Manawatū Gorge Scenic Reserve, given their proximity to the designation and the fact that they comprise the downstream receiving environments for the proposed bypass. A quantification of these habitats would allow a better understanding of the potential adverse effects of the project.
- 4.7. The Applicant has characterised the human-made ponds that occur in the designation corridor and assessed them as having limited aquatic ecological value, acknowledging that they may support eels (*Anguilla* spp.) and potentially bully (*Gobiomorphis* spp.) species. While I agree that the habitat values of these ponds are low, recent fish rescue and relocation works undertaken by Wildland Consultants Ltd has demonstrated that similar-sized farm ponds can support significant numbers (>1,000) of shortfin eels<sup>4</sup>.

## 5. POTENTIAL ECOLOGICAL EFFECTS OF THE PROPOSED BYPASS

### Overview

- 5.1. In the Freshwater EIA, it is estimated that c.4,000 metres of stream loss may occur as a result of the proposed works. This amount, however, does not take into account the stream loss that would occur due to the establishment of up to nine spoil sites within the designation. On 22 February 2019 I used Google Earth to measure the stream reaches that occur within the footprint of the proposed bypass, spoil sites, and lay down area as shown on Indicative Alignment Plan (Sheets 1-10). I estimate that the total stream loss will be approximately 7,000 metres, acknowledging that a very small proportion of this would likely comprise ephemeral stream habitat.
- 5.2. I acknowledge that Applicant's Freshwater EIA is high level with respect to the potential adverse effects on freshwater ecology, and that it serves

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<sup>4</sup> In early 2018 Wildlands captured 1,215 shortfin eels from a farm pond in Hingaia, Auckland. Contract Report No. 4311, Hingaia Summary Letter dated 6 March 2018.

as a precursor to a more detailed assessment of the Project's effects on freshwater ecology.

5.3. The following potential adverse effects have been identified in the Freshwater EIA:

- Permanent stream loss;
- Potential barriers to species passage;
- Loss of habitat along the Manawatū River;
- Injury to and/or mortality of aquatic fauna;
- Erosion and sedimentation; and
- Stormwater discharge.

#### **Erosion and sedimentation**

5.4. The Applicant states in Section 4.1.3 of the Freshwater EIA that *“the magnitude of effects on aquatic ecological values from erosion and sedimentation, in our experience from other large-scale roading projects, is likely to be low against the background, even though a substantial amount of sediment may be discharged”*. I suggest that such statements should be made cautiously in the absence of detailed geotechnical reports and rainfall data. I consider sedimentation to be a key issue for this project given the high ecological values and steep topography of the receiving environments immediately downstream. Substantial amounts of sediment could drastically alter the character and condition of the steep hard-bottomed streams within Manawatū Gorge Scenic Reserve, as well as adversely affecting aquatic habitat within the Manawatū River.

5.5. I agree with Mr Brown's statement regarding the potential long-term effects of sedimentation on aquatic habitats and that such effects have not been properly addressed by the Applicant.<sup>5</sup> Mr Miller argues that any measurable adverse effects of sedimentation will be temporary in nature.<sup>6</sup> In my opinion, a key issue with sedimentation is the potential for it to adversely affect high quality downstream receiving environments within the Manawatū Gorge Scenic Reserve. Based on my observations of watercourses on the southern side of the Manawatū Gorge, the reaches that flow through the northern side are all likely to be high-

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<sup>5</sup> Freshwater Section 42A Report at [17]-[18].

<sup>6</sup> Miller EIA at [14].

energy, hard-bottomed systems. Sedimentation has the potential to substantially change the character of these streams through the filling of interstitial spaces and small pools, as well as modifying macroinvertebrate communities. Mr Brown expresses a similar concern in *that “any sediment that makes its way into this reaches downstream of the works area is likely to have a more pronounced effect compared to a stream that runs through rural land-use. These effects can therefore be long term.”*<sup>7</sup>

- 5.6. Mr Miller notes that baseline monitoring is currently being conducted within selected stream reaches across the Project corridor.<sup>8</sup> For the reasons outlined in paragraph 5.5 above, I strongly recommend that aquatic baseline monitoring is also undertaken within watercourses that flow through the Manawatū Gorge Scenic Reserve. This should include fish and macroinvertebrate communities, baseline sediment and periphyton levels, and flow rates (allowing for seasonal variations).

#### **EIANZ Guidelines**

- 5.7. The Applicant has applied the EIANZ Guidelines<sup>9</sup> to quantify the magnitude and level of effects of potential stream loss. Briefly, the magnitude of effect correlates with the proportion of linear stream length that will be lost, while the level of effect is dependent on the ecological values being affected, which is variable, together with the magnitude of the likely effects.
- 5.8. Using this approach, the Applicant recommends that mitigation is undertaken where *“the level of effects is moderate or higher”*, meaning that *“low level effects”* do not need to be mitigated. I do not agree with this approach, as it is standard practice to undertake mitigation and offsetting for all stream types, regardless of condition, using the SEV methodology. Importantly, the SEV methodology takes into account the potential values of degraded or low quality streams. At any rate, the Applicant’s approach of applying magnitude and level of effects to stream loss would need to be revisited to take into account the adverse effects of the proposed spoil sites, i.e. an additional ~3,000 metres of stream loss.

<sup>7</sup> Freshwater Section 42A Report at [63].

<sup>8</sup> Miller EIC at [21].

<sup>9</sup> Environment Institute of Australia and New Zealand 2018. Ecological Impact Assessment (EiA)-EIANZ guidelines for use in New Zealand: terrestrial and freshwater systems (2<sup>nd</sup> edition). EIANZ, Melbourne.

- 5.9. In my opinion, there is the potential to underestimate the significance of stream loss using the EIANZ guidelines. For example, under the guidelines, the level of ecological effect from installation of a 50 metre culvert may be assessed as 'Low' if the affected stream has 'Low' ecological values. However, even stream reaches assessed as having 'Low' ecological values can provide habitat for aquatic fauna, including threatened species such as longfin eel (*Anguilla dieffenbachii*). In addition, the Applicant needs to account for the cumulative effect of numerous small losses, particularly in the wider context of ongoing stream loss that is occurring throughout New Zealand. Mr Brown also expresses concern over the use of the 'magnitude of effects' approach, particularly with regards to the cumulative loss of stream length.<sup>10</sup>

#### **Proposed spoil sites**

- 5.10. The Freshwater EIA does not address the potential adverse effects of the proposed spoil sites. The construction of spoil sites will directly affect the headwaters of numerous streams within the bypass corridor. For example, almost an entire sub-catchment will be filled between Chainage 4,500 and Chainage 5,200, which has the potential to adversely affect the hydrology of downstream receiving environments, including streams, wetlands, and areas of swamp forest.

#### **Culverts**

- 5.11. Consideration also needs to be given to the operational effects of new culverts, some of which are likely to be up to 270 metres long. Even moderate velocities can act as a barrier to upstream fish migration, as well as resulting in scour and erosion in downstream receiving environments. I support Mr Brown's concerns regarding changes in flow regimes and connectivity resulting from the installation of culverts, and the potential adverse effects these changes can have on aquatic biota.<sup>11</sup> The potential operational effects of culverts are not addressed in the Freshwater EIA and the EIC of Mr Miller.

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<sup>10</sup> Freshwater section 42A Report at [54].

<sup>11</sup> Freshwater Section 42A Report at [64] - [65].

## 6. OPTIONS TO AVOID, MITIGATE, OR OFFSET POTENTIAL ADVERSE EFFECTS ON FRESHWATER ECOLOGY

- 6.1. It is possible that c.7,000 metres of stream loss may occur as a result of the proposed works, which includes the proposed spoil sites and lay down areas. While it is acknowledged that environmental offset ratios for stream loss cannot be provided until potential offset sites have been identified, the Mr Miller does not provide any guidance as to where such sites could potentially be located in the Freshwater EIA. He does, however, claim that Dr Forbes and Mr Dalzell “discuss opportunities and processes for identifying and securing land beyond the designation corridor for ecological restoration processes”<sup>12</sup> I have reviewed the evidence in chief of Dr Forbes and Mr Dalzell and I cannot find any information that specifically addresses the offsetting of stream loss outside of the designation. Appendices C and D in Dr Forbes’ EIC illustrate proposed restoration areas for terrestrial and wetland planting, but do not include potential offsite areas for stream offsetting.
- 6.2. Mr Brown correctly mentions that the Applicant has not provided a response on how the potential loss of stream habitat within the NOR designation will be avoided, remedied or mitigated, although he acknowledges that this cannot be done until a final road design and construction methodology is established.<sup>13</sup> I note that Mr Brown has not discussed whether or not there is scope for stream offsetting within the designation. This is a critical issue, given it is highly likely that the Applicant will need to do stream offsetting on properties outside of the designation. This presents considerable uncertainty given that landowners may not want to offer up their streams.
- 6.3. In general, the Freshwater EIA provides little information on measures by which to avoid, mitigate or remedy the effects of the proposed bypass, even though the scope of the report includes this bullet point on page 1:

*“provide preliminary recommendations for appropriate avoidance, remediation and/or mitigation of adverse effects from the Project on the freshwater ecological values present.”*

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<sup>12</sup> Miller EIC at [37]

<sup>13</sup> Freshwater section 42A Report at [57] – [58] of the Section 42A report, also reiterated in Miller EIC at [28].

Rather, it is stated in the Freshwater EIA that mitigation will be addressed at the resource consent stage (Section 5). Mr Brown has also commented on this in.<sup>14</sup>

- 6.4. Even a conservative offset ratio of 1:3 would require some 21,000 metres of stream length to be restored, although the Applicant should be prepared to undertake offsetting at a ratio of up to 1:5 (c.35,000 metres). There is insufficient stream length available within the NOR designation to offset all likely stream loss, hence off-site options will need to be investigated in conjunction with obtaining landowner permission. Mr Miller agrees that the quantum of mitigation required is likely to be larger than what can be undertaken within the designation.<sup>15</sup>
- 6.5. Avoidance is at the top of the mitigation hierarchy, and there are obvious opportunities to avoid adverse effects on some streams by constructing bridges rather than culverts. I acknowledge the additional costs involved, although I would have expected that alternatives to piping were identified and evaluated in the Application. The benefits of bridging in terms of minimising ecological impacts on streams have been subsequently acknowledged by Mr Miller.<sup>16</sup>
- 6.6. It is important to differentiate between offsetting and mitigation with respect to adverse effects on aquatic habitats. This is not properly addressed in the Freshwater EIA. The SEV methodology should be used to determine biodiversity offsetting ratios in order to achieve a net gain in biodiversity values. This will involve identification of streams along which to undertake restoration works such as planting, fencing, and improvement of fish passage. Options for mitigation, on the other hand, include actions such as sediment and erosion control, stormwater treatment, constructing fish-friendly culverts, and the rescue and relocation of aquatic fauna.
- 6.7. Stream restoration methodology will need to be guided by a comprehensive Ecological Management Plan once the offset streams have been confirmed. Issues such as sediment and erosion control, stormwater management, and fauna salvage will need to be addressed.

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<sup>14</sup> Freshwater section 42A Report at [48].

<sup>15</sup> Miller EIC at [37].

<sup>16</sup> Miller EIC at [13] in response to a question raised by the Hearing Panel.

### **Draft requirement conditions**

- 6.8. Mr Brown notes that the draft condition 5(e) proposes maximum lengths of stream habitat that can be piped in the QEII Trust west and QEII Trust east.<sup>17</sup> These lengths seem somewhat arbitrary, and I agree with Mr Brown that there is a lack of justification for the lengths of stream that can be impacted. I agree that it is impossible to assess the appropriateness of this condition without further information.

## **7. CONCLUSIONS**

- 7.1. With the inclusion of the proposed spoil sites and lay down area, the potential stream loss within the NOR designation will be in the order of 7,000 metres, which is about 3,000 metres more than originally identified by the Applicant (acknowledging that a very minor proportion of this stream length will comprise ephemeral reaches). It is unlikely that sufficient stream offsetting can be achieved within the designation, so off-site options will need to be pursued.
- 7.2. All stream offsetting should be guided by the Stream Ecological Valuation (SEV) methodology and should account for all permanent and intermittent stream loss, regardless of condition. The Applicant needs to demonstrate how a net positive gain in aquatic indigenous biodiversity can be achieved through mitigation and offsetting.
- 7.3. The Applicant needs to provide a thorough assessment of the potential effects on catchment hydrology within the bypass corridor and demonstrate how the proposed spoil sites and culverts will not adversely affect water levels and flow regimes of downstream receiving environments, including wetlands.
- 7.4. All other forms of mitigation will need to be addressed in detail including in separate management plans.
- 7.5. As it currently stands, the proposed bypass will have significant residual effects on watercourses within the designation, and it is likely that construction and operational activities will adversely affect high quality

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<sup>17</sup> Freshwater section 42A Report at [66] – [68].

downstream receiving environments in the Manawatū Gorge Scenic Reserve.

**Nicholas Goldwater**  
**15 March 2019**