

Before the Board of Inquiry
Waterview Connection Project

in the matter of: the Resource Management Act 1991

and

in the matter of: a Board of Inquiry appointed under s 149J of the Resource Management Act 1991 to decide notices of requirement and resource consent applications by the NZ Transport Agency for the Waterview Connection Project

Statement of evidence of Edward Sides (Freshwater Ecology) on behalf of the **NZ Transport Agency**

Dated: 9 November 2010

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INDEX

INTRODUCTION 3

SCOPE OF EVIDENCE 4

EXECUTIVE SUMMARY 5

BACKGROUND AND ROLE..... 5

SUMMARY OF ASSESSMENT OF FRESHWATER EFFECTS 6

POST-LODGE MENT EVENTS..... 13

COMMENTS ON SUBMISSIONS..... 14

PROPOSED FRESHWATER CONDITIONS..... 17

ANNEXURE A: PROPOSED FRESHWATER CONDITIONS18

STATEMENT OF EVIDENCE OF EDWARD SIDES ON BEHALF OF THE NZ TRANSPORT AGENCY

INTRODUCTION

- 1 My full name is Edward St George Sides. I am a freshwater ecologist and an Associate Principal of Boffa Miskell Limited. I have a Master of Science Degree with Honours in Environmental Science and Zoology from the University of Auckland. I am a member of the New Zealand Freshwater Sciences Society. I have been employed as a professional ecologist since 1996, and during that time have undertaken numerous assessments of freshwater habitats, particularly in the Auckland Region.
- 2 I have extensive experience in assessing the effects of highway construction on freshwater ecosystems and of monitoring the effects of these projects on the environment.
- 3 My relevant experience includes the following roading projects for which I have undertaken assessment and/or monitoring of effects on freshwater environments.
 - 3.1 SH20 Maioro Street Interchange (2009) (which related to the Stoddard Road tributary of Oakley Creek using Stream Ecological Valuation method, and evaluation of off-setting mitigation in Hendon Park);
 - 3.2 Eastern Taupo Arterial, Taupo (2009);
 - 3.3 Transmission Gully, Wellington (2008);
 - 3.4 Kennedy Bay Road Upgrade, Coromandel (2003);
 - 3.5 SH20 Mt Roskill (2002-present) (which related to Oakley Creek and its tributaries);
 - 3.6 North Shore Busway, North Shore, Auckland (2002);
 - 3.7 Northern Gateway Toll Road (2001-present);
 - 3.8 SH20-SH1 Motorway Link, Manukau, Auckland (2001);
 - 3.9 Penlink, North Shore, Auckland (2000).
- 4 In addition to roading projects, I have also advised on a number of other large infrastructure projects including several windfarms. As freshwater ecologist for these projects, I have generally undertaken field investigations and ecological assessments, and provided advice on measures to reduce impacts and gain ecological benefits (for

example, with respect to off-setting mitigation). The windfarm projects include:

- 4.1 Pouto Wind Farm, Northland (ongoing);
 - 4.2 Mill Creek Wind Farm, Wellington (2008);
 - 4.3 Waiouru Windfarm, Central North Island (2008);
 - 4.4 Taharoa Wind Farm, Waikato (2007-2009);
 - 4.5 Gumfields Wind Farm, Ahipara (2006-2009);
 - 4.6 West Wind, Wellington (2006-2008).
- 5 My evidence is given in support of notices of requirement and applications for resource consents lodged with the Environmental Protection Authority (*EPA*) by the NZ Transport Agency (*NZTA*) on 20 August 2010 in relation to the Waterview Connection Project (*Project*). The Project comprises works previously investigated and developed as two separate projects, being:
- 5.1 The State Highway 16 (*SH16*) Causeway Project; and
 - 5.2 The State Highway 20 (*SH20*) Waterview Connection Project.
- 6 I am familiar with the area that the Project covers, and the State Highway and roading network in the vicinity of the Project.
- 7 I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Consolidated Practice Note (2006), and agree to comply with it. In preparing my evidence, I have not omitted to consider material facts known to me that might alter or detract from my opinions expressed.

SCOPE OF EVIDENCE

- 8 My evidence will deal with the following:
- 8.1 Executive summary;
 - 8.2 Background and role;
 - 8.3 Summary of assessment of freshwater ecological effects;
 - 8.4 Post-lodgement events;
 - 8.5 Comments on submissions; and
 - 8.6 Proposed freshwater ecological conditions.

EXECUTIVE SUMMARY

- 9 The freshwater ecology of the Oakley Creek, Meola Creek and Pixie Streams were surveyed and described in detail in the Assessment of Freshwater Ecological Effects.¹ The potential effects of the Project on aquatic plants and animals, habitats and water quality were assessed.
- 10 As a consequence of incorporating tunnels in the Project design, physical disturbance of the Oakley Creek will largely be avoided, and sediment discharges to the stream will be relatively minor. Effects will be greatest in Alan Wood Reserve (Sector 9, surface motorway and southern tunnel portal). Stream realignments here will have locally significant effects during the construction phase of the Project, but will maintain the continuity and connectivity of the stream and will provide improved habitat values once established. Effects on the stream below New North Road will not be ecologically significant. Overall effects on both Pixie Stream and Meola Creek will not be significant.
- 11 An extensive monitoring program is proposed for freshwater environments. Mitigation for adverse effects on Oakley Creek, including ecosourced riparian planting through much of Alan Wood Reserve, has been proposed to ensure “no net loss” of stream ecological values. Stormwater treatment for both new and existing motorway surfaces will ensure that the Project will deliver an improvement in water quality. While some adverse effects are likely to occur, these will generally be short-term and temporary, and in the long term the Project will improve freshwater ecological values.

BACKGROUND AND ROLE

- 12 The NZTA retained Boffa Miskell Limited (BML) as part of a consortia team to assist with the investigation, engineering and planning of the Project. I have been involved in the Project since 2005, initially in the options assessment phase of SH20, which included assessment of potential effects of proposed route options on freshwater environments including Oakley Creek, completion of field investigations, assessment of ecological values and sensitivity, and evaluation of potential impacts of route options.
- 13 I was asked to prepare an Assessment of Freshwater Ecological Effects Report (*Report*) assessing the potential effects of the Project on freshwater ecology in the streams affected by the Project. Specifically, the Report assesses the effects of the Project on Oakley Creek (including the unnamed Stoddard Road tributary), Pixie

¹ AEE, Part G, Technical Report G.6.

Stream and Meola Creek.² The Report was reviewed by Dave Slaven (Director, BML).

- 14 My Report was lodged with the EPA in August 2010 as part of *the* overall Assessment of Environmental Effects (*AAE*) (specifically, Part G, Technical Report G.6).

SUMMARY OF ASSESSMENT OF FRESHWATER EFFECTS

- 15 In this section of my evidence I will describe the methodology and key conclusions of my Report.

Summary of Methodology

- 16 My assessment of effects consisted of three parts, namely:
- 16.1 A description of existing freshwater ecological communities and their habitats, and the evaluation of their values and sensitivity;
 - 16.2 A review of Project activities with the potential to affect freshwater environments;
 - 16.3 An assessment of effects of the Project on freshwater ecology.
- 17 The description of the existing environment involved a review of the extensive data from surveys³ undertaken for this and other projects, and of the New Zealand Freshwater Fish Database, as well as field sampling⁴ in each of Oakley Creek, Meola Stream and Pixie Creek.
- 18 Ecological surveys in Oakley Creek included sampling of macroinvertebrates (communities of small animals including insects, snails and worms that are useful indicators of ecological health) and fish (using fyke nets, bait traps and backpack electrofishing); and Stream Ecological Valuation (*SEV*) surveys.⁵
- 19 Surveys of macro-invertebrate and fish communities have also been undertaken in Pixie Stream. Surveys included the annual Freshwater Fisheries Monitoring Programme for Waitakere City Council (*WCC*) and an *SEV* survey by Bioreserches Group Limited (*BGL*) in 2009.

² See Figure 2 of Technical Report G.6, page 4.

³ Table 1 in my Report (at page 9) lists the numerous surveys undertaken in different parts of Oakley Creek. Table 2 and Table 3 (at pages 9 and 10 respectively) list the data sources for Pixie Stream and Meola Creek that were identified as a result of the literature review.

⁴ See Technical Report G.6, sections 4.2 to 4.4.

⁵ Undertaken in accordance with the ARC Technical Publication No.302, (*SEV Manual*) (ARC, 2008).

- 20 Surveys in Meola Creek included investigations of riparian and in-stream habitat, fish and macro-invertebrate communities by BGL in 1998; a verification survey to confirm that earlier data remained valid by BML in 2010 and an SEV survey below the existing SH16 culvert in 2010.
- 21 In preparing my Report, I also ensured that I was familiar with the various aspects of the Project affecting freshwater, which include sediment discharge, stream diversion, and effects on water quality. The Project has involved a series of briefings, presentations, meetings and exchange of information between relevant experts including review of the relevant technical reports.

Freshwater values within the Project Area

- 22 In section 5 of my Report I have described the existing freshwater ecological communities and their habitats in each of the 3 streams in terms of their:
- 22.1 Physical habitat;
 - 22.2 Aquatic vegetation;
 - 22.3 Aquatic invertebrates;
 - 22.4 Fish;
 - 22.5 Sediment quality; and
 - 22.6 Water quality.
- 23 Section 5 also sets out the results of SEV assessments for each of the streams, and then summarises my assessments of the existing stream environments⁶. The following analysis highlights only key findings.
- Oakley Creek**
- 24 Oakley Creek is approximately 12km in length from its headwaters near Hillsborough through to the Waitemata Harbour at Waterview. The lower sections of the stream have vegetated margins and are relatively unmodified, but riparian vegetation is sparse or absent upstream of New North Road and there are extensive sections of block-walled channel within Alan Wood Reserve (Sector 9). It is classified under the proposed Regional Plan: Air, Land and Water as a 'Highly Disturbed Urban Stream' for stream management purposes.
- 25 Oxygen weed (*Egeria densa*) forms dense growths during stable summer conditions. Other aquatic plants recorded in the stream

⁶ In section 5.8 of Technical Report G.6.

include alligator weed *Alternanthera philoxeroides*, willow weed *Polygonum* spp, *Potamogeton crispus*, *P. cheesemanii*, starwort *Callitriche* sp., and moss *Leptodicyton* sp. The Nationally Endangered moss *Fissidens berteroi* has also been recorded.

- 26 Macroinvertebrate communities are characterised by low biodiversity, with pollution-tolerant taxa such as snails, worms and midges being predominant indicating poor water quality and low ecological health.
- 27 A total of eight native fish species have been recorded in the lower stream below the waterfall (which forms a natural barrier about 900m above the Great North Road culvert). The most common were shortfin eel, longfin eel, inanga and common bully, while redfin bully, torrentfish, giant bully, common smelt and yelloweye mullet have also been recorded. Above the waterfall, however, only shortfin and longfin eels and two exotic species (goldfish and *Gambusia*) are abundant (a single individual banded kokopu has also been recorded).
- 28 Longfin eels, torrentfish, inanga, and redfin bully are classified as "At Risk, Declining" in the most recent conservation status assessment for New Zealand freshwater fish.⁷
- 29 Analysis of water quality data indicates that water quality in Oakley Creek is fair under baseflow conditions, but is often highly contaminated when it rains with concentrations of copper, lead, zinc and nickel in stream sediments sufficient to adversely affect some aquatic species, especially in the upper catchment.
- 30 Overall ecological values were assessed and summarised using the SEV methodology.⁸ The SEV scores for three representative sites in Oakley Creek were 0.39 (Stoddard Road tributary), 0.34 (Hendon Park) and 0.45 (lower Oakley Creek). This indicated low functional values in the upper creek and moderate values in the lower reaches.

Pixie Stream

- 31 Pixie Stream is a small stream that flows for approximately 320m along the northern boundary of Jack Colvin Park before discharging to the estuarine reaches of Henderson Creek. The majority of the stream has been piped, with the only stretch of open channel being confined to the reaches downstream of the existing SH16 carriageway.

⁷ (Allibone *et al*, 2010)

⁸ Under the SEV assessment, sixteen parameters representing hydrological, biochemical, habitat provision and biodiversity stream functions are used to calculate an overall stream score between 0 and 1. Sites scoring less than 0.4 are considered to have low functional values while those scoring above 0.8 have high values.

- 32 The stream is generally shallow with some deeper pool habitat present. The substrate is comprised of gravel and soft mud. Its riparian vegetation consists of plantings of manuka, flax and cabbage trees, plus exotic trees such as willows. Aquatic vegetation is relatively abundant.
- 33 The macroinvertebrate community has moderate diversity (11 taxa), dominated by *Potamopyrgus* snails (78% of the total sample). The MCI score was 76, indicative of 'poor' environmental quality.⁹
- 34 A small range of native fish species was recorded, including both shortfin and longfin eel, inanga and common bully. The Fish Index of Biotic Integrity score for this site was 40, indicative of 'good' habitat quality or connectivity for fish migrations.¹⁰
- 35 Water quality data is limited but suggests fair water quality under baseflow conditions; while water quality during and after rainfall is likely to be poor.
- 36 The SEV score for the stream was 0.67, which indicates that the tributary is of moderate ecological value but has been impacted by both catchment and instream changes.¹¹

Meola Creek

- 37 Meola Creek originates near Mount Albert and flows behind Mount Albert Grammar School, through Chamberlain Park Golf course and along Motions Road to its estuary near Meola Reef, a distance of approximately 5 km.
- 38 The riparian vegetation of Meola Creek below SH16 consists of tall shading exotic vegetation (primarily willows) with a ground cover of weed species and rank grasses. The substrate is dominated by mud, with bedrock and basalt boulders in some areas.
- 39 Meola Creek supports dense growths of the introduced macrophyte *Vallisneria gigantea*, interspersed with oxygen weed (*Egeria densa*), starwort and *Nitella hookeria*. The Nationally Endangered aquatic moss *Fissidens berteroi* is also present in Meola Creek downstream of the Project footprint.¹²
- 40 Macroinvertebrate communities in the vicinity of the SH16 were characterised by low taxonomic richness and a few pollution-

⁹ Stark and Maxted, 2007a.

¹⁰ Joy and Henderson, 2004.

¹¹ BGI, 2009.

¹² See Technical Report G.6., page 21.

sensitive taxa. Surveys downstream of SH16 have recorded seven to ten taxa, dominated by amphipods and snails.¹³

- 41 Fish recorded in Meola Creek consist of shortfin and longfin eel, and common bully, plus banded kokopu, inanga and torrentfish and two marine wanderers (yellow-eyed mullet and cockabully). As noted above, longfin eel, inanga and torrentfish are "At Risk" in terms of conservation threat.
- 42 Water quality data indicates that concentrations of common contaminants are below guideline levels for protection of aquatic life, under baseflow conditions. However, water quality during and after rainfall is likely to be poor.
- 43 An SEV assessment was also completed immediately downstream of SH16, with an overall score of 0.54 indicating moderate ecological functional values.

Assessment of Effects on the Freshwater Environments
Construction Effects

- 44 Potential effects on freshwater environments from the construction phase of the Project include sediment discharge from Sediment Retention Ponds (SRP's) and instream works; discharges of contaminants from contaminated soils or groundwater; effects of the proposed tunnel on stream base flows (as a result of groundwater drawdown); ground settlement effects on the bed of Oakley Creek (again as a result of groundwater drawdown); and effects of diverting and filling parts of Oakley Creek on aquatic communities.
- 45 The large scale of the Project means there is significant potential for sediment generation. However, land disturbing activities which might have generated sediment will be largely avoided in the tunnelled sectors.
- 46 A detailed Erosion and Sediment Control Plan (ESCP) has been prepared,¹⁴ describing how erosion will be minimised and sediment volumes reduced prior to discharge of stormwater to the receiving environments. These measures will meet or exceed ARC TP90 standards. The ESCP also describes how erosion and sediment controls will be monitored to ensure they function effectively.
- 47 Sediment generated in Sector 1 and Sector 6 will be discharged (after treatment) to Pixie Stream and Meola Creek respectively. Stormwater from the Waterview Interchange area (Sector 5) and the driven tunnel section (Sector 8) will not discharge to the freshwater environment. Discharges from Sectors 7 and 9 could

¹³ BML, 2010; BGL, 1998; Allibone et al, 2001.

¹⁴ Refer AEE, Technical Report G.22 (and evidence of Graeme Ridley).

potentially increase loads in Oakley Creek by up to 6%. However, this amount will be significantly reduced by way of progressive stabilisation. It is also notable that a substantial portion of the earthworks are related to the two tunnel portals, in Sectors 5 and 9 respectively. These are effectively holes in the ground from which discharge is fully controlled by pumping, with high levels of control including chemical treatment which will further reduce actual sediment discharge from the potential levels that have been calculated.¹⁵

- 48 Investigations of contaminated land suggest that such areas are limited in extent and can be avoided or managed to ensure no significant contamination of stream water occurs. Effects on stream flow and channel settlement will be negligible.
- 49 The stream realignments in Alan Wood Reserve are considered to be high risk areas in terms of sediment generating potential. However, a methodology for construction outside of the creek channel will minimise, as far as practicable, sediment mobilisation here. There will be a pulse of suspended sediment upon water first being diverted into the channel, and probably elevated levels for the first few rainfall events. Sediment volumes are unlikely to result in sediment deposits that cause extensive or sustained adverse ecological effects.
- 50 While temporary and localised adverse ecological effects from construction are expected in the downstream receiving environments, overall I conclude that these effects will not be significant, given the mitigation measures proposed.
- 51 The effects of the extensive diversions of the stream on the resident ecological communities will be significant. However, it is my opinion that these effects will be avoided or mitigated as far as practicable and will not reduce the wider ecological values of the Oakley Creek. Furthermore, ecological values will be restored once fish and communities become established in the realignment.
- 52 There are unlikely to be any significant ecological effects on Meola Creek, as it is a relatively large stream with a small project footprint. Pixie Stream is small and effects such as sediment deposition may be evident. These effects would be localised short-term and would not affect any significant ecological values.

Operational effects

- 53 Permanent environmental effects of this Project will include the discharge of additional stormwater to Oakley Creek, Meola Creek and Pixie Stream, and loss of stream length in Oakley Creek and Pixie Stream. However, the proposed tunnel will significantly reduce

¹⁵ Refer section 6.9 of Technical Report G.22.

potential stormwater generation as the tunnel will result in less impermeable surface area in the catchment, compared with a surface motorway.

- 54 Away from the tunnelled sectors, the increase in percentage of impermeable surface areas in each stream catchment will be small. Furthermore, all stormwater from new motorway surfaces will be treated, and some currently untreated areas will also be treated.
- 55 The biological communities resident in the receiving environments have relatively low ecological values and are characterised by species able to tolerate poor water quality conditions. The additional stormwater is unlikely to have significant adverse ecological effects.
- 56 Stream realignments within Oakley Creek will be undertaken in accordance with appropriate guidelines¹⁶ and will result in an improvement over the existing situation, by replacing the present blockwork channel walls with more natural contours and planting the resultant riparian margins. These works will result in benefits to aquatic invertebrate communities, as well as benefits in relation to flood management, and will achieve significant enhancements in relation to amenity, landscape and recreational values within the realigned sections.
- 57 Loss of stream length for Oakley Creek within Alan Wood Reserve, Hendon Park, the Goldstar Block (25 Valonia Street) and for Pixie Stream, will need to be compensated for by stream rehabilitation to ensure no net loss of ecological values. The amount of rehabilitation required has been assessed using the ARC's TP302 methodology, and rehabilitation guidelines have been prepared describing how such rehabilitation should be undertaken within Alan Wood Reserve, Hendon Park and the Goldstar Block. This will ensure that the Project is sustainable in terms of maintaining stream functional values.
- Mitigation**
- 58 Mitigation of effects on the freshwater environment includes all of the proposed measures to minimise sediments and contaminants entering the streams; minimising stream works and avoiding piping of streams where possible; designing stream realignments to improve physical habitat values; fish relocation and undertaking additional stream rehabilitation to off-set ecological effects.
- 59 The diverting and shortening of the Oakley Creek by 137m, and the extension of the SH16 culvert on Pixie Stream by 23m will result in permanent loss of stream habitat. An assessment of the loss of

¹⁶ Appendix C, Technical Report G.6 - Oakley Creek Re-alignment and Rehabilitation Guidelines. (BML, 2010b)

ecological values and amount of ecological rehabilitation necessary to off-set lost values was undertaken following the method described in TP302. This assessment calculated that a further 343m of riparian planting would be required to compensate for the effects on Oakley Creek. I recommend that these works should be undertaken in Oakley Creek, as any rehabilitation outside of the Oakley Creek would fail to address the effects of the Project on the Creek itself. Compensation for effects on Pixie Stream will also be undertaken, however the Stream has already been rehabilitated so the offset rehabilitation will need to occur elsewhere¹⁷.

POST-LODGE MENT EVENTS

- 60 Further work has been carried out, post lodgement, on the effects on aquatic communities directly affected by the stream realignments.

Technical Addendum

- 61 A Technical Addendum was lodged with the EPA in September 2010, and forms part of the AEE (specifically Part G, Technical Report G.31). Appendix 3 to that Addendum was prepared by Mr Dave Slaven of BML and myself.

- 62 The addendum includes analysis of additional macroinvertebrate, water and sediment quality data, some of which was not previously available. Specifically:

62.1 Inclusion of macroinvertebrate data from the ARC monitoring site in Oakley Creek;

62.2 Discussion of Banded Kokopu in Oakley Creek, together with a comparison of the fish communities in Oakley Creek compared to other Auckland urban streams;

62.3 Inclusion of additional sediment quality data; and

62.4 Inclusion of additional water quality data.

- 63 This information added to the completeness of my Report but did not affect its conclusion.

Relocation of Eels

- 64 The channel realignment of Oakley Creek will involve filling over 1000m of diverted stream, resulting in some mortality of invertebrates and eels. This will not have any significant effect on the species composition, biodiversity or ecological functioning of the

¹⁷ The rehabilitation site is yet to be determined but ongoing consultation to identify an appropriate stream is discussed in the post-lodgement section of my evidence.

wider Oakley Creek, but will nonetheless involve loss of ecological communities from a relatively long section of watercourse.

- 65 Part of the mitigation of adverse effects of the Project involves capture and relocation of eels from the sections of stream that will be realigned and filled, to other parts of the Creek. We anticipate that a high percentage of eels will be recovered, and that by releasing them at numerous dispersed locations along the Creek the effects on aquatic communities at the release sites will not be significant. We are currently progressing further investigations to confirm the effects of and methodology for this translocation. For assessment of the effects of the Project, however, I can confirm that the eel relocation will mitigate effects of the Project and is unlikely to have any significant effects on fish populations in receiving environments.

Pixie Stream off-set rehabilitation

- 66 Consultation with Auckland Council stakeholders is also being progressed to confirm a mitigation package to compensate for effects on Pixie Stream, including the location and details of stream enhancement. This is likely to involve riparian planting along a nearby stream at the western end of the project, such as Avondale Stream.

COMMENTS ON SUBMISSIONS

- 67 I have reviewed all submissions received by the NZTA that expressed concerns regarding potential effects of the Project on freshwater environments. There were about 40 submissions on freshwater ecology, the majority of which are concerned with ecological effects (including biodiversity) and water quality in Oakley Creek.
- 68 Effects on water quality¹⁸ are addressed in sections 6.2 and 6.6 of my Report¹⁹. This includes construction effects (primarily discharge of sediment) and operational effects (road surface contaminants). It is my assessment that effects on water quality will not result in a significant reduction in the ecological values of Oakley Creek either during or after construction.
- 69 Damage to stream ecology may result from either water pollution (addressed above) or physical disturbance. The latter will be restricted to the realignment of sections of stream in Alan Wood reserve. While there will be some loss of fish and aquatic

¹⁸ Raised by the Friends of Oakley Creek (Submitter No. 179), the North Western Community Association (Submitter No. 185) and numerous other submitters.

¹⁹ Technical Report G.6

invertebrates here, this will be minimized as far as practicable²⁰ and the realignments will provide improved habitat conditions for the future.

- 70 Biodiversity²¹ is a key ecological value and effects are assessed in Section 6 of my Report. In general, biodiversity is relatively low in Oakley Creek and the species present are environmentally tolerant.²² The Project will not result in the loss of any species from Oakley Creek.
- 71 Individual submitters²³ have identified hydrological concerns (i.e. effects of increased or decreased flows on stream life). A slight reduction in stream flow is anticipated as a result of groundwater drawdown caused by tunnel pumping during construction. This is assessed in Section 6.3 of my Report where I conclude the effects will be minor. Stream flows are variable, and the percent change caused by the Project is small (generally less than 2%) and will not have any significant effects on stream ecology. As for flooding, fish communities in Oakley Creek are adapted to frequent high flow events and the Project will not, in any event, produce any significant increase in flooding.
- 72 Ngati Whatua o Orakei²⁴ raised concerns at the loss of the opportunity to create an ecological corridor along the Oakley Creek. I note that Project works will result in the vegetated riparian corridor being extended a significant distance upstream from New North Road. This will help restore some of the natural values and character of this section of Oakley Creek.
- 73 The Auckland Regional Council²⁵ stated that the AEE assessment of effects on freshwater was comprehensive and of a high standard, and that the proposed monitoring program was appropriate. The Green Party and Friends of Oakley Creek²⁶ support the proposed realignment design. Auckland City Council supports the planned riparian revegetation.²⁷

²⁰ Further work to confirm the location of appropriate habitat in which to relocate eels from the realigned sections of Oakley Creek, (as sought by Submitter No. 156 on behalf of the Green Party), is ongoing as noted earlier in my evidence.

²¹ Which is raised as a concern in numerous submissions including Submitter Nos. 66, 159, 176, 179, 193, 214, 215, 216, 217 and 233.

²² I note this conclusion is supported by Auckland City Council (Submission No. 111 at paragraph 283).

²³ Including Submitter Nos. 26 and 179.

²⁴ Submitter No. 170.

²⁵ Submitter No. 207 (at 4.5.1).

²⁶ Submitters No. 156 and 179.

²⁷ Submitter No. 111 (at paragraph 284).

- 74 A number of submitters²⁸ requested long periods of monitoring, and I confirm that this will be provided over the duration of the Project. In particular, the Friends of Oakley Creek²⁹ have requested monitoring of threatened species including any translocated populations. The proposed freshwater conditions will deliver this (see **Annexure A**).
- 75 The Friends of Oakley Creek submission also sought:
- 75.1 Installation of a stream litter trap;
 - 75.2 A minimum planted width of 20m along Oakley Creek; and
 - 75.3 Further investigations into groundwater drawdown effects.
- 76 In response I note that:
- 76.1 While a litter trap may address aesthetic issues, it would have limited ecological benefits;
 - 76.2 Riparian planting proposed should generally achieve or exceed a 20m planted width under the proposed Guidelines;³⁰
 - 76.3 I have assessed the effects of groundwater drawdown on Oakley Creek and have not identified any significant ecological risks. In my opinion, no further investigations are required.
- 77 The Friends of Oakley Creek further requested that the cumulative ecological effects of SH20 Mt Roskill Extension, Maioro Interchange and SH20 Waterview be considered together³¹. These major infrastructure projects have largely avoided loss of habitats in the main Oakley Creek. Ecological compensation for stream loss, especially for the Stoddard Road tributary, has been incorporated into each project, and amounts to a substantial combined total. The percentage increase in impermeable surface area in this urbanised catchment is small, and adverse effects of the additional stormwater generated have been mitigated using management devices such as treatment wetlands. The combined projects will not have any significant effect on overall ecological values of the Creek, including biodiversity and conservation values. In my opinion adverse effects will be adequately mitigated, or off-set by stream rehabilitation.

²⁸ Including Submitters Nos. 89, 186, 225 and 230.

²⁹ Submitter No. 179.

³⁰ Appendix C, Technical Report G.6 - Oakley Creek Re-alignment and Rehabilitation Guidelines. (BML, 2010b).

³¹ Submitter No.179 at topic 7(c).

- 78 The Auckland Regional Council³² requested that ecological monitoring be undertaken in summer, and that Polyaromatic Hydrocarbons and Total Petroleum Hydrocarbons be addressed in the AEE and in monitoring. In response I note that monitoring will be undertaken in, but not limited to, summer, and that hydrocarbons are included in the water quality monitoring programme.
- 79 The Auckland City Council requested that rehabilitation for this Project be integrated with that for the Maioro Road project in a single open space package, which will be done. However, the Council's submission³³ also seeks that additional stream rehabilitation occur upstream of Richardson Road, and downstream of New North Road. I do not agree that this additional mitigation is necessary to mitigate the effects of the Project. Using the Auckland Regional Council TP302 (2008) SEV method,³⁴ I have calculated that the stream rehabilitation required for both projects can be contained between New North Road and Richardson Road (as depicted in Figure 10 to my Report).³⁵

PROPOSED FRESHWATER CONDITIONS

- 80 In the documentation lodged with the AEE, the NZTA included a set of Proposed Consent Conditions (see Part E, Appendix E.1). These included proposed freshwater conditions which I recommend would be appropriate to attach as conditions to the designations sought. A copy of the proposed conditions is contained in **Annexure A** to my evidence.
- 81 I consider that those conditions are still appropriate.



Eddie Sides
November 2010

³² Submitter No. 208 (at 4.7.33).

³³ Submitter No. 111, paragraphs 85, 86, 126 and 127. Submitter No. 179 (Friends of Oakley Creek) also seeks additional stream rehabilitation measures to mitigate the loss of stream habitat through realignment (see topic 7(d) of that submission).

³⁴ See Section 6.7.1.2 of Technical Report G.6.

³⁵ See Figure 11, Section 8.1 of Technical Report G.6.

ANNEXURE A: PROPOSED FRESHWATER CONDITIONS³⁶

F.1.	<p>The NZTA shall finalise, and implement through the CEMP, the Ecological Management Plan (ECOMP) submitted with this application. The ECOMP shall be updated to ensure compliance with the conditions of this consent and include changes to the details of construction processes prior to construction commencing. The ECOMP shall include, but not be limited to details of:</p> <ul style="list-style-type: none"> (a) Monitoring of the freshwater environment; (b) Trigger event criteria for undertaking additional monitoring; (c) Procedures for responding to accidental discharges of contaminants to the freshwater environment.
F.2.	<p>The NZTA shall engage a suitably qualified ecologist to undertake freshwater monitoring programme prior to, during and following construction to monitor the effect of the Project on the freshwater ecology. The freshwater monitoring shall be undertaken in Oakley Creek, Pixie Stream and Meola Creek. The freshwater monitoring programme shall be undertaken in accordance with the details set out in the ECOMP and include:</p> <ul style="list-style-type: none"> (a) Cross sectional profiles; (b) Macroinvertebrates sampling; and (c) Freshwater fish monitoring.
F.3.	<p>The freshwater monitoring programme shall, as a minimum, be undertaken in accordance with the following frequency:</p> <ul style="list-style-type: none"> (a) Prior to construction – two baseline surveys; (b) During construction – annually for fish and macroinvertebrates and three times per year for cross sectional profiles, prior to, during and at the end of the earthworks season; (c) Post construction – on an annual basis for a maximum period of three years, or less if the [Auckland Council] is satisfied that no adverse effects have occurred or are likely to occur from the Project.
F.4.	<p>The NZTA shall undertake additional freshwater monitoring in the event of a 'trigger event' for freshwater habitats. For the purposes of this consent, a 'trigger event' for freshwater habitats is defined in the ECOMP.</p>
F.5.	<p>The NZTA shall review the freshwater monitoring results, provided from Conditions F.2 to F.4, and results in monitoring detailed in earthworks Conditions E.9 and E.19. In the event that potential adverse effects are identified, the NZTA shall develop and implement appropriate contingency plans and/or remedial measures in accordance with the measures set out in the ECOMP.</p>
F.6.	<p>Freshwater monitoring reports shall be compiled from the monitoring undertaken pursuant to Conditions F.2 to F.4, and a report provided to the [Auckland Council] annually.</p>

³⁶ Contained in AEE, Appendix E.1, pages 62 - 63.