

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

Rebuttal evidence of **David Slaven (Terrestrial Vegetation)** on behalf of the **NZ Transport Agency**

Dated: 2 February 2011

Hearing start date: 7 February 2011

REFERENCE: Suzanne Janissen (suzanne.janissen@chapmantripp.com)
Cameron Law (cameron.law@chapmantripp.com)

Chapman Tripp
T: +64 9 357 9000
F: +64 9 357 9099

23 Albert Street
PO Box 2206, Auckland 1140
New Zealand

www.chapmantripp.com
Auckland, Wellington,
Christchurch



INDEX

INTRODUCTION	3
PURPOSE OF EVIDENCE.....	3
ANDREA JULIAN (FOR AUCKLAND COUNCIL).....	3
DAVID HAVELL (FOR DEPARTMENT OF CONSERVATION)	14
WENDY JOHN (FOR FRIENDS OF OAKLEY CREEK)	15
SHONA MYERS (FOR LIVING COMMUNITIES (AUCKLAND) INC & FRIENDS OF OAKLEY CREEK).....	18
CONDITIONS	21
ANNEXURE A: PROPOSED VEGETATION CONDITIONS	22
ANNEXURE B: STREAMWORKS PLAN	26
ANNEXURE C: ERIC ARMISHAW PARK RESTORATION PLAN.....	27
ANNEXURE D: TRAHERNE ISLAND NATURAL HERITAGE RESTORATION PLAN	28

REBUTTAL EVIDENCE OF DAVID SLAVEN ON BEHALF OF THE NZ TRANSPORT AGENCY

INTRODUCTION

- 1 My full name is David Charles Slaven. I refer the Board of Inquiry to the statement of my qualifications and experience set out in my evidence in chief (*EIC*) (dated 11 November 2010).
- 2 I repeat the confirmation given in that statement that I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court.

PURPOSE OF EVIDENCE

- 3 The purpose of this rebuttal evidence is to respond to certain aspects of the evidence lodged by submitters. Specifically, my evidence will respond to the evidence of:
 - 3.1 Dr Andrea Julian (EPA No.111-2) for Auckland Council.
 - 3.2 Mr David Havell (32-2) for Department of Conservation.
 - 3.3 Ms Wendy John (EPA No 179-1) for Friends of Oakley Creek
 - 3.4 Ms Shona Myers (EPA No.167 and 179-2) Living Communities & Friends of Oakley Creek.
- 4 In addition, I have considered the section 42A Report prepared by Environmental Management Services (EMS) dated 7 December 2010 and the Addendum to that report, dated 20 December 2010. Neither report raises vegetation issues to address.
- 5 In many instances, in response to the concerns raised by submitters in their evidence, I have recommended amendments to the existing Vegetation Conditions as well as the inclusion of four new ones. I therefore attach as **Annexure A** to my rebuttal evidence an updated version of the Vegetation Conditions as I now recommend. These revised Vegetation Conditions also reflect all of the agreements reached over the course of caucusing with the vegetation experts acting for submitters.¹

ANDREA JULIAN (FOR AUCKLAND COUNCIL)

- 6 The evidence of Dr Julian has several points relating to vegetation, which I discuss below.

¹ Although I attended other ecological caucusing sessions, references in this statement to caucusing refer to the Vegetation experts caucusing.

**Points of Agreement or Partial Agreement
Significant Vegetation**

- 7 Dr Julian considers² that the Valued and Significant Vegetation alongside the SH16 causeway, as identified in Figure 3 of Technical Report G.17, '*Assessment of Terrestrial Vegetation Effects*' is significant under s.6(c) RMA, as well as being scheduled and mapped as significant in a number of relevant statutory planning documents.
- 8 While I concur that the vegetation is scheduled and mapped as significant in a number of relevant statutory planning documents, I do not concur that all of the Valued Vegetation so mapped is automatically significant under s.6(c) RMA. As an example, the great majority of the Valued Vegetation consists of mangroves, and in my opinion it is not a matter of national importance to protect mangroves. Indeed, the Auckland Regional Plan: Coastal provides for the removal of mangroves and mangrove seedlings (either as a permitted, controlled or discretionary activity) even within Coastal Protection Areas.

Rock Forest Concept

- 9 In Annexure C of my EIC I propose a '*Rock Forest Provisional Concept Plan*' for the northern banks of Oakley Creek, for the purposes of restoring lava flow (rock) forest here. While in agreement with this proposal, Dr Julian considers³ that it has not been integrated sufficiently into the application documentation. Shona Myers also raises this point in her evidence.⁴ I concur with Dr Julian in this regard, and recommend that Annexure C: '*Rock Forest Provisional Concept Plan*' of my EIC be included as a new Appendix H in the Project Ecological Management Plan (ECOMP), while also adding a new condition V.14 to give effect to this (as set out in paragraph 11 below).
- 10 Dr Julian also considers that the species and methods proposed in Annexure C of my EIC: '*Rock Forest Provisional Concept Plan*' are flawed, and that a '*Basalt Rock Forest Restoration Plan*' (to be approved by Auckland Council) is necessary.⁵ In my opinion, the species and methods specified in Annexure C of my EIC are entirely appropriate.
- 11 Notwithstanding this however, I recognise that Annexure C in my EIC is a '*Provisional Concept Plan*', and I concur that it is best restoration practice for subsequent detailed Planting Plans to be prepared for any restoration Concept Plan. Given this, during caucusing the parties agreed to resolve Dr Julian's concerns by

² Julian Evidence, paragraphs 4.2 to 4.5.

³ Julian Evidence, paragraph 6.2.

⁴ Myers Evidence, paragraph 5.6.

⁵ Julian Evidence, paragraph 6.2.

recommending the following amendments to Condition V.14 (as well as recognising the existence of the 'Oakley Inlet Heritage Area' plan that has some implications for this same area), as follows:

"V14. A rock forest restoration programme will be undertaken by the NZTA on the northern banks of the Oakley Creek Inlet in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix H 'Rock Forest Provisional Concept Plan'. Detailed planting plans shall be submitted to Auckland Council for approval prior to implementation of the planting, with these designs to include planting specifications and management techniques. The detailed planting plan shall be integrated with cultural heritage values including, but not limited to, those shown on the plan entitled 'Oakley Inlet Heritage Area' (Urban Design & Landscape Plans Sheet 224 – 20.1.11-3-D-L-810-224 Rev B)."

- 12 Similarly, the point raised by Dr Julian and Ms Myers as discussed above is also applicable to the proposed rock revetment planting treatments described in Annexure E: 'Conceptual Rock Revetment Planting Designs' of my EIC, which, at present, are not referenced in the proposed consent conditions. This was also discussed at caucusing, and in order to rectify this the caucusing group recommends including Annexure E of my EIC as a new Appendix I in the ECOMP, and adding a new condition V.15 as follows:

"V15. Planting along and within the rock revetment of the widened SH16 causeway will be undertaken by the NZTA at locations in general accordance with the Urban Design and Landscape Plans, as identified in those plans under the label "Rock Armour with Saltwater Revetment Planting". The planting treatments will be in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix I 'Conceptual Rock Revetment Planting Designs'."

Ecological District

- 13 Dr Julian considers that plant material to be used in the revegetation undertakings should only be sourced from the Tamaki

Ecological District, and Condition V.10 should be amended to reflect this.⁶

- 14 I agree that sourcing plants from the local ecological district is preferable. The present wording of condition V.10 simply reflects my opinion that some flexibility in eco-sourcing is both useful and appropriate, given the vagaries of construction projects as large as the Project. This matter was discussed during caucusing, and the parties agreed to recommend the following rewording of Condition V.10:

"V.10 Any planting utilising native plants shall use plants genetically sourced from the Tamaki Ecological District-where possible, or otherwise shall use plants that have been genetically sourced from within-the Auckland Ecological Region."

Mimulus Relocation

- 15 In relation to the proposed translocation of Maori musk (*Mimulus repens*), Dr Julian is concerned that, as there is no guarantee of success, Condition V.11 should be amended to require ongoing monitoring and weed management at the recipient sites.⁷
- 16 I concur with this point, and agree with the majority of the proposed rewording of Condition V.11. However, I consider that the recipient sites for the *Mimulus repens* translocations should be (as far as possible) weed-free in the first instance, and in locations where future weed invasion is unlikely. Where this cannot be achieved then weed management will be necessary. This was agreed to during caucusing (with amendments to Condition V.11 as noted below).
- 17 It was also agreed during caucusing to recommend that Condition V.11 be amended to stipulate that should all attempts at establishing new sites for this species within the Waterview Inlet fail, then NZTA should be required to determine, in consultation with DOC, an alternative appropriate form of mitigation. In my opinion, in the first instance this should be focused on *Mimulus repens* but, as circumstances might dictate, without precluding other alternative conservation-beneficial initiatives. To this end the caucusing parties recommend that Condition V.11 be reworded as follows:

"V.11 Prior to commencement of works adjacent to Traherne Island, the NZTA shall employ a suitably qualified and experienced plant translocation expert to uplift and protect all areas of *Mimulus repens* on Traherne Island that will be affected by the work. The *Mimulus repens*

⁶ Julian Evidence, paragraph 6.3. A similar point is raised in the evidence of Mr Michael Coote (EPA No.217-1) at paragraph 5f.

⁷ Julian Evidence, paragraphs 8.1-8.3.

*shall be relocated to suitable and safe habitat away from the works area, or otherwise held and protected for the duration of the works in the vicinity of their original location and be replanted back at that location (or in close proximity to it) upon completion of the works. The location of the recipient sites will be determined in consultation with DOC and in general accordance with the Traherne Island Natural Heritage Restoration Plan (2009-2014). **Trials will be undertaken to identify appropriate recipient sites, with these trial sites being monitored for a period of no less than 5 years, or until their failure. Where possible, recipient sites will be located in currently weed-free areas. Where recipient sites may potentially be affected by weeds they will be subject to an on-going weed management plan. Should translocation attempts fail at all trial sites then the NZTA, in consultation with DOC, will determine an alternative appropriate form of mitigation.***

Riparian Shading

- 18 Dr Julian suggests that Condition STW.20 be amended to require that 70% shading of streams by riparian revegetation is to be achieved at the maturity of that vegetation.⁸
- 19 I am in partial agreement with this suggested amendment. To elaborate, the planting proposed within Alan Wood Reserve and Hendon Park is predominantly a mix of overhanging sedges and ferns, together with shrubs. The sedges and ferns are at spacings of 0.5m centres while the shrubs are at spacings of 1m centres. This is consistent with best revegetation practice. In addition to these sedges, ferns and shrubs, it is intended to also include canopy trees at a rate of 1/10m² specifically for stream shading purposes (see *Western Ring Route Waterview Connection Indicative Planting Species by Ecotype – Freshwater Riparian Margins*⁹). This is consistent with the findings in published literature¹⁰ that such spacings will achieve 70% stream shading while allowing sufficient light through to maintain ground cover (eg. ferns and sedges).
- 20 This same published research also recommends that tree planting (to achieve such shading) be planted back from the stream edge – which is what is intended in Alan Wood Reserve and Hendon Park.

⁸ Julian Evidence, paragraph 9.1.

⁹ Being a schedule of F.16 Urban Design and Landscape report – 810 (page 42).

¹⁰ Rutherford et al. 1997 "Predicting the Effects of Shade on Water Temperature in Small Streams". NZ Jnl Marine & Freshwater Research Vol. 31 : 707-721.

The trees to be used will be selected (at the detailed design stage) from the coastal or basalt rock forest species lists.¹¹

- 21 Notwithstanding the above, it needs to be recognised that Oakley Creek is a significant community asset, and the community should be allowed to enjoy it in multiple ways (including visual amenity, recreational, access, etc). Not all of these are consistent with a strict planting regime designed to achieve 70% stream shading in all locations (for example CPTED safety principles may restrict planting in places). In light of this, the 1/10m² specified in the Urban Design and Landscape Plan schedule for riparian canopy trees reflects more of an overall average rather than a prescriptive standard to be applied in all areas – such an approach will allow for the planting of some denser copses of trees while also catering to other desired outcomes.
- 22 It should also be noted that the shading of streams is an ecological enhancement (stream restoration technique) that is required by the Stream Ecological Valuation ('SEV') method¹² – in the case of the Project the NZTA is only required to restore 343m of stream length. Hence the 70% shading does not need to apply to the entire length of Oakley Creek within Hendon Park and Alan Wood Reserve. The intended area where this 343m of stream restoration will be undertaken is depicted in the '*Streamworks & Flood Protection Oakley Creek Realignment Layout Plan*' (the *Streamworks Layout Plan*), a copy of which is attached as **Annexure B** to this statement.¹³ The 343m of stream restoration will be within the proposed '**Oakley Creek Rehabilitation Areas**' (coloured light green on that plan).¹⁴ In these areas 70% of stream shading will be achieved at vegetation maturity.
- 23 In addition to the above, the NZTA also intends to treat the necessary creek realignments within these two reserves using appropriate ecological restoration standards (consistent with Typology B of the Oakley Creek Realignment and Rehabilitation Guidelines).¹⁵ The areas where this would apply are the Oakley Creek Realignments A-C, the Oakley Creek Realignment under the SH20 Motorway Bridge and the Stoddard Tributary Realignment to Accommodate Railway Alignment (all coloured khaki on the

¹¹ See schedules of F.16 Urban Design and Landscape report – 810

¹² Rowe et al. (2008). Stream Ecological Valuation (SEV): a method for scoring the ecological performance of Auckland streams and for quantifying environmental compensation. 2nd edition. ARC Technical Publication No.302. 85pp.

¹³ Drawing 20.1.11-3-D-D-330-211 Rev A – found in Appendix A (page 245) of G.15 Assessment of Stormwater and Streamworks Effects..

¹⁴ This intent is captured by proposed new Streamworks Condition STW.20A discussed in more detail in the evidence of Mr Eddie Sides.:

¹⁵ Appendix C to Technical Report G.6 Assessment of Freshwater Ecological Effects.

Streamworks Plan¹⁶). Application of Typology B in these areas will also result in 70% of stream shading at vegetation maturity.

- 24 Further to the above, the NZTA intends to apply its stream restoration obligations associated with the Maioro Interchange project within the Waterview Project area, specifically within Alan Wood Reserve and Hendon Park. This restoration will be undertaken upstream and/or downstream of the Realignment and Rehabilitation Areas shown on the Streamworks Plan, and will be in general accordance with both the Oakley Creek Realignment and Rehabilitation Guidelines and the Urban Design & Landscape Plans.
- 25 This matter was discussed during caucusing, and the parties agreed to recommend the following amended Condition STW.20:

STW.20 The NZTA shall submit for review to the Auckland Council a Stream Works Environmental Management Plan (SWEMP) which shall include details of the final freshwater mitigation and environmental enhancement works associated with the Project ... shall include, but not be limited to, the following:

*(d) Riparian planting programmes, including detailed planting plans and specifications relating to species mix, location, density, size and maintenance, **to achieve an overall average of 70% shading of stream at maturity within those reaches where realignments or the SEV off-setting mitigation associated with the Project are proposed.***

Advice Note: The intent is to include the SEV off-setting mitigation associated with the Maioro Interchange Project within Hendon Park and Alan Wood Reserve, and to the same shading standard as specified in Condition STW.20(d).

Points of Disagreement

Eco-tone Mitigation

- 26 Dr Julian considers¹⁷ that the proposal to mitigate the loss of the eco-tone sequences at Traherne Island via replacement eco-tone sequences adjacent to Eric Armishaw Park at the eastern end of the SH16 causeway (the "Recipient Site") will not replace "like with like", as she considers that conditions at the Recipient Site will not be sufficiently salty and exposed to develop and sustain the sort of vegetation that would be lost.

¹⁶ Refer Annexure B.

¹⁷ Julian Evidence, paragraph 6.1.

27 In relation to this concern, I note that the majority of the eco-tones affected by the Project at Traherne Island are already well represented in the general area of the Recipient Site. Hence, rather than a strict "like for like" replacement the emphasis at the Recipient Site will instead have 4 main focal points, as described next and as mapped in **Annexure C** (*'Eric Armishaw Park Restoration Plan'*) to my rebuttal evidence:¹⁸

27.1 Creation of new flax-cabbage tree wetlands and enhancement of the existing stand already present at the Recipient Site. Flax-cabbage tree wetlands are the least common of the vegetation types present within the Waterview Inlet, and the extent of these created and maintained at the Recipient Site will be greater than that lost at Traherne Island (i.e. at least 0.41ha¹⁹ vs 0.3ha respectively).

27.2 Creation of an area of *Olearia*-dominated salt scrub – this is one of only two vegetation types affected at Traherne Island that is not already represented in the area adjacent to the Recipient Site (the other type being flaxland with emergent wattle).

27.3 The Recipient Site offers an excellent opportunity to expand upon the range of eco-tones present at this locality, being the creation of an area of rock forest of at least 0.2ha. This would be in keeping with the volcanic rock nature of part of the Recipient Site.

27.4 The Recipient Site also offers an additional opportunity to add at least 0.9ha of coastal forest to the eco-tone sequences at this locality, in the more dry and non-rock parts of the site.

28 I am confident that all four of these vegetation types will thrive at the Recipient Site and, in my opinion, the result of this will be an improved situation in relation to the overall extent and composition of the eco-tone sequences that will be present within both the Recipient Site and the wider Waterview Inlet. The Eric Armishaw Park Restoration Plan was discussed at caucusing, where it was agreed by the vegetation experts that should the Board of Inquiry consider it appropriate to undertake the proposed revegetation in the vicinity of Eric Armishaw Park (either for eco-tone replacement or other mitigation purposes), then the parties recommend that **Annexure C** to my rebuttal evidence be included in the Project

¹⁸ I note that Annexure C represents a progression in the concept design from Annexure D in my EIC, with the earlier EIC design identifying the boundaries and existing vegetation of the site while the plan attached to this statement of rebuttal evidence illustrates the proposed new eco-tone concept, together with its site context.

¹⁹ This relates to the land within the existing NZTA designation in this area, and excludes the possible additional 0.041ha that could also be created within the adjacent Council owned road reserve to the west.

ECOMP as Appendix J: '*Eric Armishaw Park Restoration Plan*', and that a new condition V.16 be added, as follows:

"V16. A restoration programme will be undertaken by the NZTA within the designation adjacent to Eric Armishaw Park, in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix J: '*Eric Armishaw Park Restoration Plan*'.

Advice Note: In addition to the lands within the designation at this location the NZTA shall use best endeavours to also include the land held for road purposes by Auckland Council to the immediate west, subject to permission from that Council."

Weed Control Period

- 29 Dr Julian is concerned that the weed control period specified in Condition V.8 will last for only 2 years, whereas she considers that it should be undertaken on an on-going basis and that Condition V.8 should be amended to reflect this.²⁰
- 30 It is my understanding that the weed control mitigation period of 2 years as stipulated in Condition V.8 refers to that period in which the construction contractors are responsible for such. After that period the responsibility will shift to the NZTA, which is required to implement weed control on all land that it manages (both within and outside of highway designations), pursuant to the provisions of the Auckland Regional Pest Management Strategy (ARPMS).²¹ Within highway designations in Auckland the NZTA achieves this through its Network Operations and Maintenance contractor, presently the Auckland Motorway Alliance (AMA).²² The two year period when weed control is the responsibility of the constructor(s) will be

²⁰ Julian Evidence, paragraphs 6.4-6.5.

²¹ Rule 18.2.1.1 of the present Auckland Regional Pest Management Strategy 2007-2012 requires that "*roading authorities and rail corridor managers shall*

- (a) *within 1 year of this rule becoming operative, create with the ARC agreed Management Plans for land for which they are responsible, to control specified pest plant species to prescribed standards; and*
- (b) *successfully destroy to prevent seeding all adult and juvenile plants of species listed in the Management Plan on land they occupy; and*
- (c) *shall not distribute by any means, any species listed in the Management Plan or otherwise act in such a manner as is likely to encourage or cause the propagation or multiplication of any species listed in the agreed Management Plan".*

²² The AMA is responsible for the implementation of all post-construction consent conditions relating to NZTA highway maintenance, including matters such as weed control, revegetation success and stormwater pond maintenance.

subject to the provisions of the AMA's Pest Plant Strategy and Activity Management Plan, which requires the effective control of plant pests.

- 31 After the specified 2 year period the Network Operations and Maintenance contractor is likely to only accept hand-over from the construction contractors if weed control in the area to be handed over is up to scratch. In relation to the Project, once hand over has been achieved the Network Operations and Maintenance contractor will be required to manage these lands in a manner that is consistent with the ARPMS (2013-2018).²³ Weed control will be an on-going obligation on NZTA within the lands it manages so long as there is a Regional Pest Management Strategy (or similar) in place that requires such.
- 32 An amendment to condition V.8 to clarify this ongoing responsibility was agreed by the vegetation experts. That amended condition is set out in my response to Mr Havell below.

Traherne Island Protection

- 33 Dr Julian considers that, as mitigation for the effects of the Project on the botanical values of Traherne Island, the NZTA should legally protect the areas of the island that lie outside of the designation. She considers that this would constitute better mitigation than the creation of new eco-tones as proposed in **Annexure C** of my **Rebuttal Evidence** (*Eric Armishaw Park Restoration Plan*).²⁴
- 34 While I concur that the protection of existing natural areas is a fundamental tenet of ecological mitigation, so too is the creation of new habitat - both have their place. NZTA are pursuing the latter option in relation to off-setting the unavoidable adverse ecological effects associated with the Project.
- 35 Notwithstanding the above, it is my understanding that the area of Traherne Island which is outside of the designation already enjoys a substantial level of legal protection. It is designated in the Auckland Regional Policy Statement as a Significant Natural Heritage Area, and is additionally zoned as Open Space 1 (Conservation) in the Auckland City Plan, and furthermore as a Significant Ecological Area in Plan Change 88 to the Auckland City Plan.
- 36 While I recognise that there exist mechanisms by which these designations and zonings may be altered or removed, I note that these need to be via a public process and are subject to the

²³ Regional Pest Management Strategies have a 5 year term before being subjected to review (with the present ARPMS being operative for the 2007-2012 period) While it is recognised that the Auckland Council has the power to amend or revoke the ARPMS, I consider that the latter (i.e. revocation) would be an unlikely outcome of any future review.

²⁴ Julian Evidence, paragraph 7.1. A similar point is raised in the evidence of Mr Michael Coote at paragraph d.

possibility of legal appeal. In my opinion the chances of a weakening of the existing level of protection afforded to the area of Traherne Island located outside of the designation are relatively remote.

- 37 Given the above, it is my opinion that there is little need for any additional protective measures to be applied here. However, notwithstanding this, should Auckland Council wish to pursue a greater degree of protection here outside of its powers to impose under the various statutes it operates under, then that should be the subject of a separate process between it and the Crown outside of this present Resource Management Act (*RMA*) process that applies to the Project.

Traherne Island Weed & Pest Management Plan

- 38 NZTA should, in Dr Julian's opinion, be required to prepare a Weed and Pest Management Plan for Traherne Island subject to Auckland Council approval.²⁵
- 39 I do not consider that such a plan is necessary, since NZTA, in conjunction with DOC, ARC, ACC (both now Auckland Council) and AMA has already prepared a Traherne Island Natural Heritage Restoration Plan 2009 - 2014 (the *Restoration Plan*). A copy of the Restoration Plan is attached as **Annexure D** to my rebuttal evidence.
- 40 The Restoration Plan is consistent with the AMA Pest Plant Management Plan (*PPMP*), prepared under the provisions of Rule 18.2.1.1(a) of the ARPMS. The AMA PPMP includes²⁶ the list of plant pests that the ARC require NZTA to control on all of the lands that it manages within the Auckland Region (including Traherne Island) – there are 32 such species. The AMA PPMP applies to the SH16 designation on Traherne Island, while the Restoration Plan applies to the remainder of the Island. Regardless however, the obligation on NZTA is to control the 32 species listed by the ARC across the entire Island. I note that the Restoration Plan identifies the suggested priorities in terms of weed control²⁷ (based upon an earlier site visit by DOC and ARC), and also includes species that are additional to those in Appendix A of the AMA PPMP. These include Sydney golden wattle, kikuyu, blackberry and climbing dock. In addition, the weed control operations on the Island presently include some other troublesome weed species that are neither included in Appendix 3 of the **Restoration Plan nor on the ARC's list of 32 plant pest species to be controlled by NZTA, including black wattle.**

²⁵ Julian Evidence, paragraph 7.2.

²⁶ See Appendix A of the AMA PPMP.

²⁷ Appendix 3 of the Restoration Plan.

- 41 The Restoration Plan has a vision and goals,²⁸ which in summary envisages the island becoming a natural environment for indigenous biota free from significant impacts of plant and animal pests. It includes actions, timeframes and budgets to achieve this. The evidence of Dr Julian acknowledges the existence of the Restoration Plan (although not the Auckland Council input to its formulation) but presumably she does not consider that it goes far enough. Having carefully read the Restoration Plan I am of the opinion that it is fit for purpose, and I am unconvinced that there would be any benefit from having a second separate Weed & Pest Management Plan for the Island.
- 42 Additionally, I emphasise that the Auckland Council (in its former guise as ARC and ACC) has had direct input to the preparation of the Restoration Plan already. The Council is also a member of the Traherne Island Restoration Technical Working Group – as such it should be in a position to influence any additional weed control works it considers necessary in the future by amendment to the existing Plan.

DAVID HAVELL (FOR DEPARTMENT OF CONSERVATION)

- 43 The evidence of Mr Havell (EPA No. 32-2) has raised several points relating to vegetation, which I discuss below.

**Points of Agreement or Partial Agreement
Relocation Costs**

- 44 Mr Havell supports the proposals specified in Condition V.11 to translocate the *Mimulus repens*, but considers that the condition should specify that this is to be at the cost of NZTA.²⁹
- 45 It is my understanding that the fact that Condition V.8 is a condition imposed on NZTA means that NZTA will be responsible for the costs incurred in its implementation. Given this, Condition V.11 does not need to specify that NZTA will be responsible for all costs associated with its implementation.

Weed Management Plan Reference

- 46 Mr Havell is also concerned that Condition V.8 does not specifically reference a Weed Management Plan, and thinks it should be amended to do so.³⁰
- 47 I note that this condition was discussed at the Vegetation caucusing, with agreement being reached instead on a recommended rewording of Condition V.8, as follows:

²⁸ Refer pages 5-10 of the Restoration Plan.

²⁹ Havell Evidence, paragraph 23.

³⁰ Havell Evidence, paragraphs 33-36.

“V.8. ***Immediately*** prior to planting, and for a period of 2 years following completion of construction, the ***Project constructor(s)***³¹ shall undertake weed control and management of ***all invasive plant pests*** within the ***portion of the Project designation outside of the tunnel as well as all other vegetation management areas associated with the Project***. ***Following this 2 year period, on-going control and management of all invasive plant pests within these same areas shall be the responsibility of the NZTA.***”

Points of Disagreement

- 48 Mr Havell also considers that Condition V.8 should include reference to weed control within areas of high value and significant vegetation on Traherne Island.³²
- 49 I do not concur with this recommendation, for the reasons I have outlined earlier in paragraphs 38 to 42 of this statement, being that weed control on Traherne Island outside the designation is being implemented already under the Traherne Island Natural Heritage Restoration Plan (2009-2014).
- 50 Finally Mr Havell considers that Condition V.8 should be amended to increase the weed control period from 2 years to 5 years.³³
- 51 I do not concur with this recommendation, for the reasons I have outlined earlier in paragraphs 29 to 31 of my rebuttal.

WENDY JOHN (FOR FRIENDS OF OAKLEY CREEK)

- 52 The evidence of Ms John has several points relating to vegetation, which I discuss below.

Points of Agreement

Extent of Oakley Creek mitigation

- 53 Ms John considers that the proposed mitigation is not connected along the length of the Creek (and therefore does not provide a corridor for wildlife to move along). She therefore considers the mitigation should extend to include rehabilitation and restoration along the full length of Oakley Creek and its tributaries in Owairaka from Richardson Road to Bollard Avenue.³⁴
- 54 This submission from Ms John is consistent with what is actually being proposed, as is shown on the Urban Design and Landscape

³¹ Construction contractors

³² Havell Evidence, paragraph 36.

³³ Havell Evidence, paragraphs 28-31.

³⁴ John Evidence, paragraphs 4.8-4.9.

Plans Sheets 218-222 inclusive. Indeed, a main objective of the urban design, open space and ecological proposals of the Project in **this area is to extend the vegetated cover of the creek's riparian** margins between Richardson Road and Bollard Avenue, within Alan Wood Reserve and Hendon Park. This concept is reinforced in the Oakley Creek Realignment and Rehabilitation Guidelines (which are specific to this area). The NZTA has confirmed its commitment to this concept, and given such it is evident that this desire of Ms John will be met in full.

- 55 Of interest in this context, I note that the extent of vegetation that will be cleared in this area (i.e. Hendon Park and Alan Wood Reserve) measures in the order of 1.7ha (being almost exclusively exotic, but including 0.14ha of native plantings and 0.12ha of mixed native –exotic vegetation). This will be replaced by 8.8ha of native revegetation (deriving a ratio of 1:5 loss vs gain).

Points of Disagreement Construction Yard 7 Impacts

- 56 Ms John is concerned that Construction Yard 7 (located within the Waterview Glades and Waterview Esplanade Reserves) will have a negative impact on the riparian margins of Oakley Creek, including a naturally occurring wetland.³⁵
- 57 Construction Yard 7 impinges upon riparian vegetation that is comprised in the main of Chinese privet and willow (with the native component being restricted to a few young mahoe, mapou, karamu and ponga). This bestows beneficial shade to Oakley Creek for a length of approximately 20m. A seepage area beneath this canopy supports a very small colony of the native sedge *Carex lessoniana* (a very common wetland species in Auckland) of some 50m².
- 58 Away from the creek margins the south west corner of the Yard boundary is adjacent to a coherent area of kanuka and ponga.³⁶ In this general area, within the Yard itself the vegetation is predominantly comprised of exotic trees with some kanuka and ponga. The majority of the kanuka and ponga identified in the evidence of Ms Myers lie outside of the Yard boundary.
- 59 While some native vegetation is within the footprint of Construction Yard 7, Condition V.4 (which seeks to minimise the amount of vegetation cleared) will apply. In the case of the vegetation needing to be cleared, the adverse effects of such clearance would, in my opinion, be less than minor. In relation to the loss of the 50m² of Carex wetland, this would be off-set by the (approximately) 1ha of wetlands that will be created within the stormwater

³⁵ John Evidence, paragraphs 9.1-9.2. This is also raised in paragraph 5.9 of the evidence of Shona Myers for Living Communities Auckland Inc and Friends of Oakley Creek.

³⁶ Referred to in paragraph 5.9 of the evidence of Shona Myers.

treatment wetlands associated with the Waterview section of the Project (i.e. a ratio of 1:200 loss vs gain).

Specific Vegetation Concerns

60 Ms John considers that recent plantings by FOOC and local residents, together with self seeded native species, large oak trees near the Oakley Creek Inlet and large pine trees located at the end of Cowley Street and at Waterview Glades should all be included in **the definition of "Valued Vegetation"**,³⁷ while also acknowledging that these in their own right do not have any botanical conservation value.

61 While the exotic trees specifically mentioned may be sizeable or of some other note, it appears that none are scheduled in the Auckland City Plan. Furthermore, while the recent native plantings reflect the considerable enthusiasm and effort of the local community in restoring and beautifying the Oakley Creek area, the areas of such vegetation affected by the Project are small and localised, and will be replaced by virtue of the revegetation specified in the Urban Design and Landscape plans (and the Oakley Creek Realignment and Rehabilitation Guidelines).

62 Furthermore, Condition V.4 specifies that the clearance of all vegetation be minimised as far as practicable. Given the urban environment through which the Project traverses, I am in agreement that this should include both exotic trees as well as native vegetation, and I recommend that the wording of Condition V.4 be amended to reflect this (while specifically excluding weeds, both woody and herbaceous).

63 Given the above, I recommend that Condition V.4 be amended to read as follows:

"V.4. The NZTA shall minimise as far as practicable the amount of vegetation (both native and exotic) which is to be cleared within the designation, with the exception of weeds (both woody and otherwise). All vegetation clearance shall be undertaken in accordance with the measures set out in the ECOMP".

64 Further to the above, I recommend that Condition V.3 be amended as follows:

"V.3. Prior to any site works commencing, a pre-commencement site meeting shall be held so that the conditions of designation that pertain to the Significant Vegetation, Valued Vegetation and all vegetation in general (both native and exotic) within the designation are explained by the nominated botanist

³⁷ John Evidence, paragraphs 10.6-10.14.

to all contractors or sub-contractors who will be working on site within close proximity to that vegetation.”

65 I consider that these amendments to Condition V.3 and V.4 may address at least some of the concerns of Ms John.

SHONA MYERS (FOR LIVING COMMUNITIES (AUCKLAND) INC & FRIENDS OF OAKLEY CREEK)

66 The evidence of Ms Myers raises several points relating to vegetation, which I discuss below

**Points of Agreement or Partial Agreement
Rock Forest**

67 Ms Myers supports the proposed restoration of the rock forest adjacent to the Great North Road Interchanges, but considers specific reference needs to be made to this in the proposed conditions.³⁸

68 I concur with this, and note that this has been addressed earlier in my response to concerns raised by Dr Julian.

Stream Realignments and Rehabilitation

69 Ms Myers refers in her evidence to the four realignments of Oakley Creek that are associated with the Project, with all four being located within Alan Wood Reserve and Hendon Park. She comments that these four realignments will need to be treated in accordance with the Oakley Creek Realignment and Rehabilitation Guidelines.³⁹ I can confirm that this will be the case, with these realignments being rehabilitated in accordance with Typology B of the Guidelines, (with this typology specifying ecological restoration). These same realignments will also be implemented in accordance with the Urban Design and Landscape Plans – Sheets 220-222. In order to make this requirement explicit I recommend a new Condition V.17, as follows:

“V.17 All realignments and riparian enhancements of Oakley Creek shall be carried out in general accordance with the Oakley Creek Realignment and Rehabilitation Guidelines and the Urban Design and Landscape plans.”

70 Ms Myers notes further that these four realignments will result in a net loss of 137m of stream length.⁴⁰ Application of the SEV has determined that this needs to be mitigated by way of 343m of riparian rehabilitation, and Ms Myers questions whether this will be

³⁸ Myers Evidence, paragraph 5.6.

³⁹ Myers Evidence, paragraphs 5.21- 5.22.

⁴⁰ Myers Evidence, paragraph 5.18.

undertaken in areas away from the four Project realignments which already require an ecologically-based treatment.⁴¹

- 71 In relation to this concern, I can confirm that the entire 343m of **riparian restoration required by virtue of the Project's SEV obligation** will be additional to the rehabilitation of the four realignments associated with the Project. I have discussed this above in response to the concerns of Dr Julian about riparian planting.⁴²

Waterview Esplanade Reserve

- 72 Ms Myers suggests that the ECOMP include identification of the riparian vegetation in the Waterview Esplanade Reserve, and recommends that vegetation clearance in that area be kept to a minimum.⁴³
- 73 This area has been discussed earlier in my rebuttal evidence (paragraphs 56 to 59). While I do not consider the vegetation here to be of any particular botanical conservation value I note that it will be subject to Condition V.4, which requires the minimisation (as far as practicable) of vegetation clearance within the designation. This should ensure that the (primarily exotic) vegetation that is present here will be retained unless the space it occupies is absolutely needed for the operational requirements of Construction Yard 7.

Points of Disagreement

Stream Shading and Minimum Riparian Planting Widths

- 74 Ms Myers supports the general mixtures of species specified for riparian planting in the Urban Design and Landscape plans, but recommends a greater inclusion of shrubs and trees for stream shading purposes. She also suggests a 20m riparian buffer along the length of the stream.⁴⁴
- 75 I do not concur with a greater inclusion of trees and shrubs, for the reasons I have given earlier in paragraphs 17-24 of my rebuttal evidence. In relation to the suggested 20m stream riparian planting width, I note that in the majority of places this will be met (and in many instances exceeded), although in some areas close proximity to private land will curtail this. The Urban Design and Landscape Plans illustrate this, with the majority of the riparian planting depicted on the north bank of Oakley Creek being up to 50m in width.
- 76 Further to the above, as noted in paragraph 21 of this statement, Oakley Creek is a significant community asset and the community should be allowed to enjoy it in multiple ways (including visual

⁴¹ Myers Evidence, paragraph 5.21.

⁴² Refer paragraph 18 to 25.

⁴³ Myers Evidence, Proposed Vegetation Conditions section, V.1.

⁴⁴ Myers Evidence, paragraph 5.23.

amenity, recreational, access, etc). Not all of these uses are consistent with a strict 20m wide riparian buffer in all locations. I also note that in her evidence⁴⁵ Ms Myers correctly notes that the **minimum riparian width recommended in the ARC's Riparian Management Strategy is 10m** – that Strategy also stipulates a **"preferred" width of 15m** (as opposed to the 20m width referred to in her evidence).

- 77 All in all, I do not consider that a new Vegetation Condition is necessary in relation to the concerns expressed by Ms Myers regarding minimum riparian widths. I note that Condition LV.4 requires NZTA to implement the Urban Design and Landscape Plans, so there is already a condition that would generally achieve >20m riparian widths.

Sector 8 Riparian Planting

- 78 The fact that no riparian revegetation is being proposed in Sector 8 (below New North Road) is also raised by Ms Myers,⁴⁶ who suggests that potential effects on stream hydrology and on groundwater could have significant effects on Oakley Creek and its existing riparian vegetation, some of which may be able to be mitigated by such planting. She also suggests that such planting would provide an ecological linkage to the stream rehabilitation proposed for Sector 9.
- 79 This was a matter that was raised at the Vegetation Caucusing, with no agreement being reached, and I remain unconvinced as to the necessity for this proposal. To begin with, the report by **NZTA's** freshwater expert⁴⁷ has specifically assessed the potential effects on stream hydrology and groundwater flows, and has concluded that there will be less than minor effects in relation to these. In my opinion, with no direct impacts (such as vegetation clearance) here nor with any significant indirect effects being anticipated, there is no need for any mitigation planting in Sector 8 downstream of New North Road.
- 80 In relation to the point on ecological linkages, the riparian margins of Oakley Creek are generally well vegetated from its mouth all the way through to New North Road (i.e. including Sector 8). While there are small gaps in this continuum of vegetation these are generally only on one side of the creek or the other, and are very localised and intermittent in their distribution. For all intents and purposes, the riparian margins of the creek presently operate as a functional ecological linkage (although noting the severances caused by New North Road and Great North Road – which will remain regardless of what planting may be associated with the Project).

⁴⁵ Myers Evidence, paragraph 5.23.

⁴⁶ Myers Evidence, paragraph 5.15.

⁴⁷ Technical Report G.6: Assessment of Freshwater Ecological Effects.

CONDITIONS

- 81 As noted above a copy of the proposed Vegetation Conditions, as agreed in vegetation caucusing, is attached as Annexure A. Additions since my EIC are noted in blue and bold to distinguish them from earlier post-lodgement additions in red. I am advised that the NZTA accepts the majority of the attached conditions, but considers that Conditions V.8 and V.14 require amendment. These amendments are set out in the rebuttal evidence of Ms Amelia Linzey.



David Slaven
February 2011

ANNEXURE A:

PROPOSED VEGETATION CONDITIONS

- V.1 The NZTA shall finalise the Ecological Management Plan (ECOMP) submitted with this application, prior to works commencing on site. The ECOMP shall be implemented through the CEMP. The ECOMP shall clearly identify the location and identity of:
- (a) All Significant Vegetation within the designation that is to be fully protected or relocated; and
 - (b) All Valued Vegetation within the designation that is to be protected as far as is practicable.

Note: Significant and Valued Vegetation shall be as defined in the ECOMP.

- V.2 The NZTA shall employ a suitably experienced botanist ('nominated botanist') for the duration of the works to monitor, supervise and direct all works affecting or otherwise in close proximity to the Significant Vegetation and Valued Vegetation identified in the ECOMP.
- V.3 Prior to any site works commencing, a pre-commencement site meeting shall be held so that the conditions of designation that pertain to the Significant Vegetation, Valued Vegetation **and all vegetation in general (both native and exotic) within the designation** are explained by the nominated botanist to all contractors or sub-contractors who will be working on site within **close proximity to that vegetation."**
- V.4. The NZTA shall minimise as far as practicable the amount of vegetation **(both native and exotic)** which is to be cleared within the designation, **with the exception of weeds (both woody and otherwise)**. All vegetation clearance shall be undertaken in accordance with the measures set out in the ECOMP.
- V.5 The NZTA shall install protective fencing around, or otherwise clearly demarcate, all of the Significant Vegetation identified in the ECOMP as requiring full protection, under the supervision of the nominated botanist.
- V.6 The NZTA shall replace any **terrestrial** Valued Vegetation that is required to be removed as a result of construction activities, in accordance with the ECOMP and the Urban Design and Landscape **Management** plans.

- V.7 The nominated botanist shall supervise all trimming, pruning and relocation work associated with the Significant Vegetation and Valued Vegetation required as part of the works.
- V.8. **Immediately** prior to planting, and for a period of 2 years following completion of construction, the **Project constructor(s) NZTA** shall undertake weed **control and** management of **all invasive any plants pests** within the **portion of the Project designation outside of the tunnel as well as all other vegetation management areas associated with the Project. Following this 2 year period, on-going control and management of all invasive plant pests within these same areas shall be the responsibility of the NZTA. designated areas that are identified as plant pests in the Auckland region by the Auckland Regional Council (including Total Control/Containment Pests/Surveillance Pests and Research Organisms)**
- V.9 The nominated botanist shall undertake a monitoring program throughout the construction period, including monitoring of:
- (a) The condition, repair and location of the temporary protective fencing or other forms of demarcation used to identify the Significant Vegetation;
 - (b) Any works within the vicinity of the Significant Vegetation and Valued Vegetation;
 - (c) The general health of the Significant Vegetation and Valued Vegetation (including any valued vegetation that has been relocated away from the works area); and
 - (d) Compliance with the vegetation conditions of designation by way of fortnightly inspections during the construction period.
- V.10 ~~**Where practicable,**~~ Any planting utilising native plants shall use plants genetically sourced from the Tamaki Ecological District ~~**or where this is not possible, then preferably where possible, or otherwise shall use plants that have been genetically sourced**~~ from within the Auckland Ecological Region.
- V.11 Prior to commencement of works adjacent to Traherne Island, the NZTA shall employ a suitably qualified and experienced plant translocation expert to uplift and protect all areas of *Mimulus repens* on Traherne Island that will be affected by the work. The *Mimulus repens* shall be relocated to suitable and safe habitat away from the works area, or otherwise held and protected for the duration of the works in the vicinity of their original location and be replanted back at that location (or in close proximity to it) upon completion of the works. The location of the recipient sites will be determined in consultation with the Department of Conservation

and in general accordance with the Traherne Island Natural Heritage Restoration Plan (2009-2014). **Trials will be undertaken to identify appropriate recipient sites, with these trial sites being monitored for a period of no less than 5 years, or until their failure. Where possible, recipient sites will be located in currently weed-free areas. Where recipient sites may potentially be affected by weeds they will be subject to an on-going weed management plan. Should translocation attempts fail at all trial sites then the NZTA, in consultation with DOC, will determine an alternative appropriate form of mitigation.**

- V.12 Should the taxonomic and rarity status of the Geranium species growing alongside Oakley Creek in Hendon Park and Alan Wood Reserve not be confirmed before the commencement of works in this area, then this species shall be treated as Potentially Significant Vegetation and shall either be :
- (a) Protected in full, of practicable; or
 - (b) If protection in full is not practicable, relocated to a suitable and safe habitat elsewhere; or
 - (c) If protection in full or translocation are not practicable, this population shall be cleared in locations where required to allow works to proceed, but replaced with an equal extent of replacement plantings of the same species (from propagated material sourced from the existing population) planted at a safe a suitable habitat nearby in Hendon Park/Alan Wood Reserve.
- V.13 Any clearance of the Geranium in accordance with Condition V.12 shall be restricted to the minimum necessary to facilitate the works.

V14. A rock forest restoration programme will be undertaken by the NZTA on the northern banks of the Oakley Creek Inlet in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix H 'Rock Forest Provisional Concept Plan'. Detailed planting plans shall be submitted to Auckland Council for approval prior to implementation of the planting, with these designs to include planting specifications and management techniques. The detailed planting plan shall be integrated with cultural heritage values including, but not limited to, those shown on the plan entitled 'Oakley Inlet Heritage Area' (Urban Design & Landscape Plans Sheet 224 – 20.1.11-3-D-L-810-224 Rev B).

V15. Planting along and within the rock revetment of the widened SH16 causeway will be undertaken by the NZTA at locations in general accordance with the Urban Design and Landscape Plans, as identified in those plans under the label "Rock Armour with Saltwater Revetment Planting". The planting treatments will be in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix I 'Conceptual Rock Revetment Planting Designs'.

V16. A restoration programme will be undertaken by the NZTA within the designation adjacent to Eric Armishaw Park, in general accordance with Appendix H of the Construction Environmental Management Plan (CEMP) : Ecological Management Plan (ECOMP), Appendix J: 'Eric Armishaw Park Restoration Plan'.

Advice Note : In addition to the lands within the designation at this location the NZTA shall use best endeavours to also include the land held for road purposes by Auckland Council to the immediate west, subject to permission from that Council.

V.17 All realignments and riparian enhancements of Oakley Creek shall be carried out in general accordance with the Oakley Creek Realignment and Rehabilitation Guidelines and the Urban Design and Landscape plans.

ANNEXURE B: STREAMWORKS PLAN

**STREAMWORKS & FLOOD PROTECTION OAKLEY CREEK
REALIGNMENT LAYOUT PLAN**

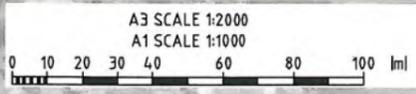
(DRAWING 20.1.11-3-D-D-330-211 REV A)



THE OAKLEY CREEK REALIGNMENT AND REHABILITATION GUIDELINES TO BE USED AS THE BASIS FOR DETAILED DESIGN FOR STREAM WORKS

FLOOD PROTECTION BUND/WALL ALONG TUNNEL PORTAL TBC

TYPICAL DETAILS OF STREAM REALIGNMENTS REFER TO DWGS 20.111-3-D-D-330-201 & 202



PRELIM. DRAFT
NOT FOR ISSUE

Base level: MSL AUCK. VERT. DATUM 1946
Grid Reference: MT EDEN 2000

No.	Revision	By	Chk	Appd	Date
A	CONSENT ISSUE	JATG	KANM	KJD	30.07.11

Drawing Originator:
Tonkin & Taylor
 Environmental and Engineering Consultants

Original Scale (A1)	1:1001	Designer	EHF
Reduced Scale (A3)	1:2111	Reviewer	TSRF
		Drafting Checked	-
		Consultant Approval	-
		Received by Beco	RM

NZ TRANSPORT AGENCY
WAKA KOTAHU

Project: WATERVIEW CONNECTION PROJECT
SH16 / SH20

Title: STREAMWORKS & FLOOD PROTECTION
OAKLEY CREEK REALIGNMENT
LAYOUT PLAN

Originator No.	
Project No.	20.111-3-D-D-330-211
Rev.	A

I:\WaterView\Beco\PI\CA0\201111-3\DWG\300_SWM\330\20.111-3-D-D-330-211.dwg, 210, 29, 10:43:53 p.m., 29/07/11

Document No. 20.111-3-D-D-330-211.dwg

**ANNEXURE C:
ERIC ARMISHAW PARK RESTORATION PLAN**

These plans have been produced as a result of information provided by the client and/or sourced by or provided to Boffa Miskell Limited by a third party for the purposes of providing the services. No responsibility is taken by Boffa Miskell Limited for any liability or action arising from any incomplete or inaccurate information provided to Boffa Miskell Limited (whether from the client or a third party). These plans are provided to the client for the benefit and use by the client and for the purpose for which it is intended.

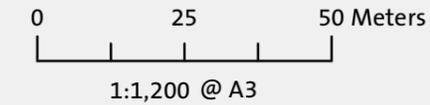


-  Area Within NZTA Designation
-  Area Within ACC Open Space 2 Zone
-  Construction Footprint
-  Operational Footprint
-  Archaeological site
- Proposed Ecotone Revegetation
 -  Coastal Forest
 -  Flax-Cabbage Tree Wetland
 -  Salt Scrub (Olearia dominant with some Plagianthus)
 -  Rock Forest

Eric Armishaw Park Restoration Plan: Concept

Page 1 of 2

Data Sources: ALGGi (2008 Aerials), Aurecon, Boffa Miskell
File: A09178_Ecotone_OS2_NZTA_Waypoints.mxd
Printing Date: 01/02/2011
Author: nicoles



These plans have been produced as a result of information provided by the client and/or sourced by or provided to Boffa Miskell Limited by a third party for the purposes of providing the services. No responsibility is taken by Boffa Miskell Limited for any liability or action arising from any incomplete or inaccurate information provided to Boffa Miskell Limited (whether from the client or a third party). These plans are provided to the client and for the purpose for which it is intended.



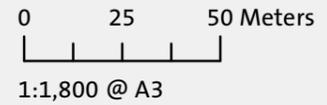
N

Area Within NZTA Designation	Salt Scrub (Olearia dominant with some Plagianthus)	Mangroves	Proposed Ecotone Revegetation
Area Within ACC Open Space 2 Zone	Saltmarsh (Wiwi-Oioi)	Shellbanks	Coastal Forest
Construction Footprint	Saltmarsh/Salt Scrub (Wiwi/Oioi-Plagianthus-Glasswort-Needlegrass)	Freshwater Wetland	Flax-Cabbage Tree Wetland
Operational Footprint	Glasswort	Native Plantings	Salt Scrub (Olearia dominant with some Plagianthus)
Archaeological site	Needlegrass	Native Trees & Shrubs	Rock Forest
Dominant Vegetation	Flaxland	Exotic Trees & Shrubs	
Salt Scrub (Plagianthus)	Flaxland with Emergent Wattle	Mixed Native Plantings & Exotic Trees & Shrubs	
Salt Scrub (Olearia-Plagianthus-Oioi-Flax)	Flax-Cabbage Tree Wetland		

Eric Armishaw Park Restoration Plan: Context

Page 2 of 2

Data Sources: ALGGi (2008 Aerials), Aurecon, Boffa Miskell
 File: A09178_Ecotone_OS2_NZTA_Waypoints_20110117.mxd
 Printing Date: 01/02/2011
 Author: nicoles



ANNEXURE D:
TRAHERNE ISLAND NATURAL HERITAGE RESTORATION PLAN

Traherne Island / Te Kou Natural Heritage Restoration Plan

2009 - 2014





Department of Conservation
Te Papa Atawhai



NZ TRANSPORT AGENCY
WAKA KOTAHĀ

Traherne Island / Te Kou Natural Heritage Restoration Plan

Prepared by Stephen Benham (Department of
Conservation)

Reviewed by David Greig (NZTA)

Telephone: +64 9 539 9100

Facsimile: +64 9 520 0232

Date: November 2009

Reference: DOCDM 527191 (DoC)

Status: Approved

MS Word ref

k:\38102 - special projects\387608 - traherne island biodiversity strategy implementation\03 design & drawings\03a traherne restoration plan\387608_traherne island restoration plan.doc

Document Status				
Issue	Date	Author	Released	Description
4	November 2009	S. Benham	November 2009	Approved plan with corrections
5	February 2010	C.Bannock	February 2010	Re-formatted version of approved plan (Issue 4).

Contents

1	Introduction.....	1
2	Background.....	2
2.1	Location, Physical Landscape and Geology	2
2.2	Flora.....	3
2.3	Fauna.....	3
2.4	Management to Date	4
3	Vision and Goals.....	5
3.1	Vision	5
3.2	Goals.....	5
4	Action Plans	6
4.1	Goal 1 – Protect and Enhance Existing Native Plant Species.....	6
4.2	Goal 2 – Control of Invasive Weeds	8
4.3	Goal 3 - Protect existing native animal species and enhance their habitat.....	9
5	Technical Working Group	10
5.1	Actions	10
5.2	Resourcing Requirements	10
6	References	11

Appendices

Appendix 1: Vascular plant species list for Traherne Island landward side of SH16

Appendix 2: Vascular plant species list for Traherne Island seaward side of SH16

Appendix 3: Suggested prioritisation and control levels for weed species present at Traherne

Appendix 4: Estimated costs

.

Glossary

ACC	Auckland City Council
AMA	Auckland Motorways
ARC	Auckland Regional Council
DoC	Department of Conservation
NZTA	New Zealand Transport Agency
PARP:ALW	Proposed Auckland Regional Plan: Air, Land and Water
Pest plant	Weeds that can cause serious harm to the natural environment, be an economic threat or affect human health.
The Plan	Traherne Island Natural Heritage Restoration Plan (this document)
The Reserve	Motu Manawa -Pollen Island Marine Reserve
RMA	Resource Management Act 1991
RPMS	Regional Pest Management Strategy
Vector	Any agent that acts as a carrier or transporter of pests or diseases and aids in their spread.
Weed	A plant considered undesirable, unattractive, or troublesome, especially one growing where it is not wanted.

1 Introduction

Traherne Island / Te Kou and neighbouring Pollen Island / Motumanawa are situated in the Waitemata Harbour and are surrounded by the Motu Manawa -Pollen Island Marine Reserve (the Reserve). Created in 1995 as a representative example of inner harbour ecosystems Pollen Island is managed by the Department of Conservation (DoC) while Traherne Island is owned by the Crown, with the responsibility of management residing with NZTA.

Traherne Island was bisected in the early 1950's when two lanes of State Highway 16 were constructed. This section of the highway was widened again in 1960-63 to four lanes. The island has significant visual value for Auckland City and vegetation present on it are visually very noticeable from vehicles travelling east and west.

The island is home to a number of native species of plant that are naturally uncommon. The biodiversity of the island is threatened by the large number of aggressive environmental weeds that have invaded the island since 1963. Ewen Cameron reported in the 1989 Auckland Botanical Society Journal that "the construction of the motorway onto neighbouring Traherne Island appears to have allowed woody weeds easy access to the island where they now dominate the vegetation".

NZTA has received numerous complaints from stakeholders including ARC Councillors and general public regarding the extensive pest plant infestations. NZTA, through the Auckland Regional Pest Management Strategy are legally required to control weeds on all land it manages.

NZTA has met with ARC and DOC representatives to discuss ways forward in the management of Traherne Island. Because of its ecological value it is proposed to undertake a natural heritage restoration programme where pest management forms a large component.

This natural heritage restoration plan (the Plan) for Traherne Island has been developed through the combined efforts of NZTA, AMA, DOC and ARC. Its purpose is to describe Traherne's ecological values and identify actions required to restore and maintain these values. It introduces the Traherne Island Technical Working Group and their roles and responsibilities.

The Plan recognises that a major motorway improvement project is likely to start construction within the next 5 years. It is anticipated that associated works are likely to affect parts of Traherne Island therefore this Plan includes mitigation recommendations that can be applied closer to the time of the SH16 improvement scheme works.

2 Background

2.1 Location, Physical Landscape and Geology

Traherne is an island of 13 hectares (Refer to Figure 1) and is situated in Auckland's upper Waitemata Harbour close to Rosebank Peninsula. It is surrounded in part by the Motu Manawa - Pollen Island Marine Reserve. It is relatively low lying with the seaward side comprised of shellbanks built up from the remains of estuarine bivalve molluscs. Alongside the southbound highway lies a shallow drain that is most probably affected by tidal flows. This supports several square metres of *Mimulus repens* (GPS E2660232 N 6479753) (Section 2.2).

From bores taken on neighbouring Motumanawa, Chapman and Ronaldson (1958) found at varying depths 6ins. – 5ft. a freshwater peat deposit (at least 160-170 thousand years old) laid down when the sea level was lower. Above the peat is an older saltmarsh (800-2,300 yrs old) which was submerged by an increase in sea level, eroded then exposed 300-400 yrs ago which allowed the present saltmarsh to form.



Figure 1: Traherne Island (location map to be inserted)

2.2 Flora

2.2.1 Native flora

The island's native vegetation is characteristic of a truncated succession of manuka dominance due to the islands' topographical position and geological formations. Pioneer native species such as harakeke, manuka, karamu, ti kouka, mapou, karo currently dominate the island's ecology.

The naturally uncommon and regionally declining saltmarsh herb – native creeping musk (*Mimulus repens*) is present both on the landward and seaward sides of SH 16 where it bisects Traherne Island. This herb occupies a shallow 1.5 m. wide drain now slightly effaced. The drain receives flows of brackish water from incoming tides. The drain also supports large populations of the native saltmarsh herb *Samolus repens*, *Baumea juncea*, *Triglochin striata* and *Juncus krausii* var. *australiensis* have been recorded as co-existing species. A single specimen of the fern *Rumohra adiantiformis* was recorded in November 2007.

Suaeda novae-zelandiae a chenopodiaceous herb was recorded as abundant on the shell beach above the high-tide zone in July 2009. There is one small population of *Typha orientalis*.

The island is surrounded on three sides by intertidal muds with mangroves (*Avicennia marina* subsp. *australasica*) and a significant marginal band of needlegrass (*Austrostipa stipoides*) – sea-rush (*Juncus krausii* var. *australiensis*), marsh ribbonwood (*Plagianthus divaricatus*), *Sarcocornia quinqueflora* var. *quinqueflora* and oioi (*Apodasmia similis*).

A number of vegetation surveys and investigations have been undertaken on the last 3 years. These are detailed in Section 2.4.1. Appendix 1 and 2 houses a list of vascular plant species recorded on the island.

2.2.2 Exotic flora

Aggressive environmental weeds on the landward side of Traherne include climbing asparagus (*Asparagus scandens*) brush wattle (*Paraserianthes lophantha*) blackberry (*Rubus fruticosus* agg.), pampas (*Cortaderia selloana*), moth plant (*Araujia sericifera*), Sydney golden wattle (*Acacia longifolia*) and woolly nightshade (*Solanum mauritianum*). *Rumex sagittatus* occurs on the eastern (seaward) side of Traherne together with those species listed above. Appendix 1 and 2 houses a list of vascular plant species recorded on the island, including weeds.

2.3 Fauna

2.3.1 Native fauna

Fauna surveys on Traherne Island have been limited. A recent site visit (January 2010) confirmed the presence of banded rails in the saltmarsh habitat on the southern side Traherne Island. This species is present at nearby Pollen Island.

Fernbirds occur on Pollen Island. This is the closest population to urban Auckland and is the stronghold for this species within the Tamaki Ecological District. Traherne has suitable habitat which could of have been colonised by fernbird from Pollen Island, however it is unknown whether fernbird occur on Traherne (Tim Lovegrove pers.comm. Nov. 2009).

No known lizard surveys have been undertaken on Traherne Island. Ground conditions are such that the likelihood of ground dwelling lizards being present within the interior of the island is unlikely. Lizards may be present in the drier areas around parts of the island, and there is potential for arboreal species.

2.4 Management to Date

2.4.1 Surveys and Investigations

The table below summarises known surveys and investigations undertaken on Traherne Island and nearby Pollen Island.

Date	Survey Type	Undertaken By	Comments
October 2007	Vascular plant	DOC	35 vascular plants recorded, including a single specimen of the fern <i>Rumohra adiantiformis</i> .
November 2007	Vegetation	DOC	<i>Mimulus repens</i> re-recorded from both landward and seaward sides of SH16.
March 2009	Bird, flora and lizard survey	BioResearchers Group	Did not survey on the island. Area covered was footprint of potentially affected area from SH16 widening works.
July 2009	Vascular plant	DOC	29 vascular plants recorded, including <i>Mimulus repens</i> , <i>Typha orientalis</i> and <i>Suaeda novae-zelandiae</i> .
November 2009	Bird survey	F&B	Signs of fern bird on Pollen Island and suggestions that it is likely to be on Traherne.
December 2009	Bird survey	F&B	Signs of banded rail on Traherne Island

2.4.2 Physical Works

In April 2007, it was decided by DoC that weed control should be undertaken on Traherne Island using community workers. Te Ngahere was employed as the local managing contractor. The control was to initially focus on the extensive 'forest' of brush wattle (*Paraserianthes lophantha*) as it is an easily identifiable weed and can be killed by ring – barking using hand tools.

In May 2007, community workers commenced work on ring-barking brush wattles and creating access tracks across the landward side of the island. Te Ngahere was involved in the initial control of blackberry.

2.4.3 Key Stakeholders

Key stakeholders in the island's restoration are NZTA, Department of Conservation (DOC), Auckland Regional Council (ARC), Auckland City Council (ACC), Forest and Bird (F&B), and the Pollen Island Care Group. The care group comprises of a small group of volunteers who have looked after island's ecology for over 15 years.

3 Vision and Goals

3.1 Vision

The vision for Traherne Island is that it will be a natural environment for indigenous flora and fauna free from significant impacts of plant and animal pests.

3.2 Goals

The primary strategic objective for Traherne Island / Te Kou is to restore and enhance indigenous biodiversity by actively controlling and monitoring plant and animal pests. Three goals of the plan are:

1. To protect and enhance existing native plant species, and their natural habitats, biodiversity and ecosystems.
2. To eradicate, control to zero density or sustain control over all invasive environmental weeds.
3. To protect existing native animal species and enhance their habitat.

An outline of planned action for each of these goals is given in Section 4.

4 Action Plans

4.1 Goal 1 – Protect and Enhance Existing Native Plant Species

There are two main threats to the native vegetation on Traherne Island; pest plants and animals, and the proposed widening of SH16. Management to protect and enhance native vegetation shall be through three targeted approaches; through the protection of existing vegetation, research and translocation of *Mimulus repens* and through restoration planting.

4.1.1 Protection of native vegetation

Excluding the exotics, the island, notably the landward side is dominated by ti kouka, harakeke, coprosmas and manuka. With the proposed widening of SH 16, the island boundary, which is currently clothed in harakeke and ti kouka, will be seriously affected. In the long term (just before widening works) it is recommended harakeke is removed off site prior to the widening earthworks commencing. Specimens should then be divided and potted on in readiness for replanting once the site has stabilised.

In the short term management specific to the protection of the creeping musk (*Mimulus repens*) and to prepare for the destruction of its current habitat should occur. This is further described below.

4.1.2 *Mimulus repens* research and translocation

The entire Traherne population of naturally uncommon and regionally declining saltmarsh herb – native creeping musk (*Mimulus repens*) is threatened by the proposed widening of SH 16. Very little is known about *Mimulus repens* and it must be physically removed from its current position before the start of highway construction works. Suitable safe and local translocation sites need to be surveyed and the necessary permits applied for, for the purpose of establishing viable populations of this species before works.

It is recommended that samples of the Traherne population are brought into ex-situ cultivation e.g. ARC Botanic Gardens / Oratia Native Plant Nursery for species conservation, horticultural research and for propagation to bulk up this species for restoration planting. It is also recommended several replicas of the existing habitat be constructed with the addition of a filtered stormwater flow through the habitat for replanting *Mimulus repens* and associated taxa as a form of environmental compensation by NZTA. This replicated habitat would also provide optimum conditions for re-introducing the regionally threatened *Carex litorosa*, *Chenopodium glaucum* and *Ranunculus acaulis*, the latter being recorded from Pollen Island by Ewen Cameron in 1990. Potentially a scientific research project involving a University Masters student can be instigated with *Mimulus repens* ecology, morphology, pollination, and phenology.

4.1.3 Restoration planting

Indigenous vegetation must be protected and where appropriate, enhanced by supplementary planting so as to create a fully functioning ecosystem. With natural regeneration occurring on Traherne Island, it is envisaged that planting will be minimal, apart from the need by NZTA to restore the 'edge' community of flax and harakeke along the margin following completion of highway construction.

It is questionable whether the islands vegetation will extend beyond the primary pioneer stage due to the possibility of the island having a high saline water-table. The vegetation maybe an example of a truncated successional phase vegetation type that is dominated by manuka. Soil core samples from across the island would be useful in determining soil water salinity.

If salinity does not prove to be a constraint, then the establishment of a mature phase canopy species is recommended. For example, puriri (*Vitex lucens*), kohekohe (*Dysoxylum spectabile*), porokaiwhiri (*Hedycarya arborea*).

Pioneer species which appear to be currently absent and could be planted include ngaio (*Myoporum laetum*), koromiko (*Hebe stricta*), mahoe (*Melicytus ramiflorus*), whau (*Entelea arborescens*), houpara (*Pseudopanax lessonii*) and kanuka (*Kunzea ericoides*). These must be of local provenance meaning that seed is collected from within the same ecological district as Traherne.

Native plant regeneration will help to suppress this flux of weed seedling growth in approximately year 5 of this programme.

4.1.4 Actions

- Initial vegetation assessment to assemble and up to date vascular plant species list (August – October 2009)
- Establish a saltwater level and concentration monitoring programme on Traherne Island.
- Provide *Mimulus repens* research opportunities e.g. determining its requirements with respect to phenology, pollination, salinity requirements, etc.
- Provide compensation measures where threatened species on Traherne Island are at risk as a result of transport activities, e.g. *Mimulus repens*
- Mitigate transport-related activities with sound ecological principles.
- Re-instate the indigenous ‘edge-effect’ around the margins of the island where this has been or likely to be removed by construction activity. Currently comprising mainly harakeke and ti kouka on the landward side parallel with SH16 (this is after the widening works have occurred).



Figure 2: Mimulus repens in flower (Photo courtesy of Michael Cootes)

4.2 Goal 2 – Control of Invasive Weeds

Plant pests pose a major challenge to the success of the natural heritage restoration programme. Virtually the entire island is infested with environmentally damaging plant species capable of smothering or outcompeting indigenous plants.

The goal is to eradicate, control to zero density or sustain control over all invasive environmental weeds. Control techniques will be selected on the basis of lowest impact and practicability. Physical control will be employed in preference to herbicides where it can achieve effective results. In reality, herbicide application will be required for the majority of situations and in these cases the least toxic herbicide that is effective will be used.

Due to difficult access to the seaward part of the island and high densities of woody weeds, such as brush wattles and Australian wattles, these should be ring-barked and left standing. Woolly nightshade should be cut and stump-painted. Pampas, climbing asparagus and blackberry should be foliar sprayed. Moth plant vines, where they are growing up into vegetation should be cut at soil level and stump-painted. All moth plant seed pods should be removed off site. Where moth plant is growing through grass then foliar spraying is advocated. Natural regeneration of native species is prolific and due care must be exercised when controlling weeds to prevent damage to emerging native vegetation.

The seed-bank of environmental weed species will be substantial thus It is envisaged that once the initial weed control has been completed, there will be ongoing germination of weed species from the seed-bank for the next 5 –10 years, which will need controlling. Native plant regeneration will help to suppress this flux of weed seedling growth in approximately year 5 of this programme.

4.2.1 Actions

- Conduct an initial vegetation assessment to establish occurrence of pest plant species on the island
- Establish weed control techniques based on lowest impact and practicability (Control systems will adhere to ARC and DoC best practices guidelines as detailed through documentation of websites to ensure up to date and approved approaches are used).
- Management, monitoring and auditing will be agreed and controlled through one agency (working party).
- Plan will link into NZTA network management pest management plan as required / necessary (link to Auckland Motorway Alliance).



Figure 3: Brush wattle (Photo courtesy of ARC)

4.3 Goal 3 - Protect existing native animal species and enhance their habitat

Through a recent site visit to Traherne Island (January 2010), the presence of banded rails (*Rallus philippensis*) has been confirmed on the southern part of the Island (see Figure 4). Traherne Island is also likely to harbour fern birds (*Bowdleria punctata*). Fern birds have been adversely affected by widespread destruction of their natural wetland habitat and are now by IUCN as 'near threatened'.

Pollen Island has a population of fern bird present. If fern bird are not currently present on Traherne Island it is probable that they will eventually colonise the Island once Pollen becomes too crowded.

4.3.1 Actions

- Survey for native fauna prior to highway widening and establish a fauna baseline database.
- Assess the banded rail population using the footprint method (Anne Botha pers. comm.).
- Survey for fern bird.
- Survey, gridline search and control all unwanted animal pests by using bait stations
- Monitor mammalian predators using tracking tunnels, report and analyse data



Figure 4: Banded rail footprint observed on the southern part of Traherne Island (C. Bannock)

5 Technical Working Group

The Department of Conservation in consultation with NZTA, and ARC will be responsible for managing the restoration programme. To ensure delivery of the goals and actions set out within Section 3 and 4, a Technical Working Group (TWG) is to be established that will advise and oversee all activities required for implementing the Traherne Island Natural Heritage Restoration Management Plan (Plan). The AMA is responsible for the coordination of the TWG which should comprise a minimum number of members representing the key stakeholders of the DoC, ARC, and NZTA as assigned by each stakeholder. Auckland City Council representation is recommended for inclusion to ensure integration with wider ecological management issues.

The functions of the Traherne Island Technical working group (TIWG) are:

- a) To coordinate the resourcing and implementation the Traherne Island Natural Heritage Restoration Management Plan.
- b) To undertake a six monthly review of the progression of the work undertaken on the Plan in respect to meeting its goals.
- c) To report progression of the Plan in respect to the goals to the stakeholder parent organisations with any recommendations for changes to the Plan.
- d) To provide a key point of contact for external parties in respect to work undertaken on implementing the plan.

DoC and ARC will provide management and technical assistance as well as advice on surrounding landscapes that impact on Traherne Island. The wider costs of the Working Group and delivery of the management plan shall be provided by the NZTA.

5.1 Actions

- Establish the Working Group with Terms of Reference as per its functions.
- Preparation of overall management plan covering activities 1, 2 and 3 and resourcing, and allocation of responsibilities.
- Initiate vegetation assessment to establish base botanical assemblages and occurrence of pest plants.
- Implementation of other aspects of management plan as agreed.
- Annual Review and reassessment of compliance.
- Allowance for actions to modify for compliance.

5.2 Resourcing Requirements

- Initial set up:- Internal staff time of ARC, DOC and NZTA (AMA) - 1 day
- Bi monthly:- 1 day per member (initially in set up period= First six months)
- Six monthly:- 1 day per member (5 years)

6 References

Cameron, E.K. 1990. Flora and Vegetation of Motumanawa (Pollen) Island – Waitemata Harbour, Auckland. (Auckland Botanical Society Journal – Vol. 45 (1) Pages 9-16)

Don, G.L. et al June 2009. The Ecological Effects of the SH 16 Corridor Upgrades. In draft form. (BioResearchers Group Ltd.)

Gardner, R.O. 2007. Vegetation and Flora. (BioResearchers Group Ltd.)

Appendix 1

Vascular Plant Species List for Traherne
Island/ Te Kou landward side of SH 16
(western section)

- October 2007

<i>Apodasmia similis</i>	<i>Microsorium pustulatum</i> subsp. <i>pustulatum</i>
<i>Asplenium oblongifolium</i>	<i>Mimulus repens</i> *
<i>Austrostipa stipoides</i>	<i>Muehlenbeckia complexa</i>
<i>Avicennia marina</i> subsp. <i>australasica</i>	<i>Myrsine australis</i>
<i>Baumea articulata</i>	<i>Olearia solandri</i>
<i>Baumea juncea</i>	<i>Olearia solandri</i> - white haired form
<i>Carex dissita</i>	<i>Paesia scaberula</i>
<i>Carex virgata</i>	<i>Phormium tenax</i>
<i>Coprosma macrocarpa</i> #	<i>Pittosporum crassifolium</i>
<i>Coprosma repens</i>	<i>Plagianthus divaricatus</i>
<i>Coprosma robusta</i>	<i>Pyrrosia eleagnifolia</i>
<i>Coprosma robusta</i> hybrid	<i>Rumohra adiantiformis</i>
<i>Cordyline australis</i>	<i>Samolus repens</i>
<i>Cotula coronopifolia</i>	<i>Sarcocornia quinqueflora</i> var. <i>quinqueflora</i>
<i>Cyathea dealbata</i>	<i>Triglochin striata</i>
<i>Cyperus ustulatus</i>	<i>Typha orientalis</i> +
<i>Dicksonia squarrosa</i>	
<i>Ficinia nodosa</i>	
<i>Histiopteris incisa</i>	*Addition November 2007
<i>Isolepis cernua</i>	# Addition November 2009 (Mike Wilcox)
<i>Juncus kraussii</i> var. <i>australiensis</i>	+ Addition February 2010 (Stephen Benham)
<i>Leptospermum scoparium</i>	
<i>Lobelia anceps</i>	

Appendix 2

Vascular Plant Species List for Traherne Island / Te
Kou seaward side of SH 16 (western section)

- July 2009

Apium prostratum
Apodasmia similis
Austrostipa stipoides
Avicennia marina subsp. *australasica*
Baumea articulata
Baumea juncea
Carex testacea
Carex virgata
Coprosma repens
Coprosma robusta
Coprosma robusta hybrid
Cordyline australis
Cyperus ustulatus
Isolepis cernua
Juncus krausii var. *australiensis*
Leptospermum scoparium
Lobelia anceps
Mimulus repens
Muehlenbeckia complexa
Myrsine australis
Olearia solandri
Phormium tenax
Pittosporum crassifolium
Plagianthus divaricatus
Samolus repens
Sarcocornia quinqueflora var. *quinqueflora*
Suaeda novae-zelandiae
Triglochin striata
Typha orientalis

Appendix 3

Suggested prioritisation and control levels for weed species present at Traherne Island

Eradicate	Control to zero density	Ongoing control
Boneseed	Brush wattle	Kikuyu
Smilax	Sydney golden wattle	Gorse
Pampas	Moth plant	Climbing dock
	Dimorphotheca	Blackberry
	Climbing asparagus	

Appendix 4

Estimated Costs

1. Protection of native flora: Habitat management and Species management

- Initial vegetation assessment to establish occurrence of pest plants

\$5000 (August –October 2009)

- Establish / Provide replicate habitat (2010)

To be established (Minor earthworks on work on Trahene)- ASSUME \$10000

- Roading activities are mitigated with sound ecological principles (As required).

Internal staff time as required through consultation with NZTA.

- Re-instate current edge-effect comprising of mainly harakeke and ti kouka (During construction phase) .

SH16 project cost with Internal staff time of DOC and NZTA

- Provide Mimulus repens research opportunities e.g. phenology, pollination, salinity requirements etc (2009/2010).

To be established ASSUME \$5,000

- Establish saltwater level and concentration monitoring program on Traherne Island (2010).

To be established ASSUME \$10,000

- Prevent the dominance, invasion or re-invasion of plant pest species (Ongoing).

Part of Plant Pest Management

- Species monitoring and reporting (yearly).

To be established ASSUME \$2000 (Doc, ARC and NZTA may be able to resource with internal staff)

2 Plant Pest Management Plan

- Conduct an initial vegetation assessment (2009)

As above

- Establish weed control techniques based on lowest impact and practicability (2009).

Development of Specification : Internal staff resourcing of Doc and NZTA (AMA) (be determined)

- Management, monitoring and auditing plan developed (2009)

Internal staff resources

- Implementation of plan (5 Years)

\$15000 for 1st year, \$10000 for 2nd and 3rd years , \$5000 for 4th and 5th years for weed contractor. Coordination by working group Internal staff time

3 Protection of native fauna: Habitat management and Species management

- Survey for native fauna prior to highway widening and establish a fauna baseline database (2009/2010).

\$5000 for external support, Internal staff time

- Survey and control all unwanted animal pests (2009/2010)

As above

- Monitor, report and analyse data (5 years)

\$2 000 per yearly survey for contractor. Coordination by Working Group = Internal staff time

External Resources

Activities

1. Native flora	Current year	Subsequent years
Survey 2009	\$5000	0
Replicate habitat 2010	\$10000	0
Mimulus repens research opportunities	\$5000	0
Saltwater monitoring program (5 years)	\$2000	\$8000
Species monitoring and reporting 5 (years).	\$2000	\$8000
2. Plant Pests	0	0
Implementation of plan	\$15000	\$30000
3. Native fauna	0	0
Survey of native fauna	\$5000	0
Monitor, report and analyse data	\$2000	\$8000
	\$46000.00	\$54000.00

Forecast

<i>Year</i>	<i>Cost</i>
2009/2010 :-	\$46000
2010/2011:	\$16000
2011/2012	\$16000
2012/2013	\$11000
2013/2014	\$11000
	\$100000.00

ACTION PLAN

1. Initial vegetation assessment to establish occurrence of pest plants (August – October 2009)
2. Preparation of management plan covering activities and resourcing, and allocation of responsibilities (August)
3. Annual Review and reassessment of compliance, actions to modify for compliance (TBA)
4. Implementation of management plan