

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Resource Consents and Notices of Requirement for the Central Interceptor main project works under the Auckland Council District Plan (Auckland City Isthmus and Manukau Sections), the Auckland Council Regional Plans: Air, Land and Water; Sediment Control; and Coastal, and the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

**STATEMENT OF EVIDENCE BY DAVID CHARLES SLAVEN ON BEHALF OF WATERCARE
SERVICES LIMITED**

ECOLOGY

1. INTRODUCTION

Qualifications and experience

- 1.1 My name is David Charles Slaven. I hold the qualifications of Master of Arts (Honours) and Master of Science (Honours) from Auckland University. I have been a professional ecologist for the past twenty years.
- 1.2 Currently I am a Director of the company and head the Ecology Section of the Auckland office of Boffa Miskell. Previously, I have worked for the World Wide Fund for Nature – NZ (Manager Conservation Science), the Bay of Plenty Regional Council (Senior Resource Planner), at Ecology Specialist Services (Director), the Department of Conservation (Flora Conservation Officer) and the Auckland Regional Authority (Ecologist).
- 1.3 I have undertaken numerous ecological surveys in differing types of habitats, including assessments of the conservation values of given areas. In many instances these investigations have also involved an assessment of the effects of a proposed project on the terrestrial ecological values of that project area. In addition, I have considerable experience in the fields of ecological restoration and mitigation.

Involvement in the Central Interceptor Project ("Project")

- 1.4 Boffa Miskell were commissioned by Watercare Services Ltd ("**Watercare**") in mid-2011 to undertake:
- (a) an assessment of the terrestrial, freshwater and marine ecological values along the proposed route of the Central Interceptor tunnel;
 - (b) an assessment of the potential adverse effects of the construction of the Project on those values; and
 - (c) identification of the possible means by which any adverse ecological effects could be remedied or mitigated.
- 1.5 I personally undertook (with assistance of colleagues) the investigations for herpetofauna (lizards), avifauna (birds), freshwater and vegetation. I also undertook a qualitative assessment of the intertidal area at the location of the Emergency Pressure Relief ("**EPR**") structure at the proposed Mangere Pump Station.
- 1.6 My colleague, **Dr De Luca** (also from Boffa Miskell and a specialist marine ecologist), undertook the quantitative coastal marine survey at Pump Station 23. While not presenting separate evidence at this hearing, **Dr De Luca** is in attendance today and is available to answer any questions the Commissioners may have in relation to the marine ecology at that site. I note that potential marine ecological effects associated with the operation of the proposed EPR structure at the proposed Mangere Pump Station site will be addressed separately in the evidence of **Mr Roan**.

Purpose and Scope of Evidence

- 1.7 The purpose of my evidence is to outline the potential ecological effects of the Project, and to identify how these can be avoided, remedied or mitigated.
- 1.8 Specifically, my evidence addresses the following:
- (a) Executive Summary;
 - (b) Project Context;
 - (c) Methodologies;

- (d) Ecological Investigations Results;
- (e) Synopsis of Ecological Values;
- (f) Assessment of Ecological Effects;
- (g) Mitigation of Adverse Ecological Effects;
- (h) Response to Submissions;
- (i) Response to Council Pre-hearing Report; and
- (j) Conclusions.

Expert Witness Code of Conduct

1.9 I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Updated Practice Note 2011 which took effect on 1 November 2011. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

2. EXECUTIVE SUMMARY

Ecological Effects

2.1 The proposed works within the Project's construction footprints will have a greater than minor ecological effect at only three sites, being Lyon Avenue, Pump Station 23 and Pump Station 25. Depending upon the specific site, the ecological effects associated with these areas include the loss of indigenous vegetation; effects on existing ecological corridors; loss of habitat for native lizard species (including "At Risk" species); loss of intertidal habitat (both soft-bottom and rocky reef); and loss of intertidal feeding habitat for shorebirds, including "At Risk" species.

Vegetation

2.2 The majority of the proposed construction sites are located within public open space that is presently in a cover of mown grass (with or without amenity plantings). Coherent stands of indigenous vegetation are generally present at only three sites, being Lyon Avenue, Pump Station 23 and Pump Station 25.

Notwithstanding this, while it is considered that these effects are likely to be more than minor, they are not likely to be greater than moderate in terms of their gravity or significance and are all temporary in nature. Given this, it is considered that these effects can all be appropriately mitigated.

- 2.3 The principal form of mitigation in relation to vegetation loss will be tree protection within the designated footprints in accordance with Condition T.1 of Watercare's Proposed Designation Conditions. Additionally, site reinstatement plans will address replanting and revegetation requirements, including addressing opportunities for replanting (at a greater ratio to that which was removed) and/or enhancement of the three existing bush areas associated with Lyon Avenue, Pump Station 23 and Pump Station 25.

Herpetofauna (i.e. Lizards)

- 2.4 Two species of native lizard are present in a limited number of the proposed construction sites, being copper skink (Not Threatened) and ornate skink (At Risk – Declining). Numbers of both species appear to be low.
- 2.5 The principle form of mitigation in relation to herpetofauna will be to undertake a salvage and relocation operation in those areas where lizards were either directly observed to be present (i.e. Pump Station 23 and Pump Station 25) or where they are otherwise potentially likely to be present (i.e. even in those locations where the surveys failed to find them – specifically Mount Albert War Memorial Reserve (if the Reserve site is implemented), Lyon Avenue, May Road and Motions Road). This would entail another comprehensive search of these areas using intensive techniques that entail the dismantling of all potential refuges.

Avifauna (Birds)

- 2.6 Terrestrial bird populations are unremarkable and dominated by introduced species. None of the native bush birds observed are "At Risk", and all are common species. Shore birds utilise the intertidal area adjacent to Pump Station 23 as a feeding ground all year round. In addition, the proposed construction site at Kiwi Esplanade Reserve is in close proximity to high tide roosts utilised by significant numbers of shorebirds from December to July, in particular migratory NZ pied oystercatcher (At Risk – Declining).

- 2.7 While there is likely to be some level of bird displacement during the works due to noise and other disturbances there is an abundance of similar habitat adjacent to the construction sites. Similarly, while there will be some permanent loss of vegetation useful to birds, the extent of this is very small and in the local context there are ample alternative resources available.
- 2.8 In relation to shore bird roosts, programming will result in the most disruptive works proposed at Kiwi Esplanade Reserve to take place outside of the peak shore bird season (i.e. the trenching of Link Sewer 4 will occur between August 1st and November 30th). This should reduce any potential effects on those birds to minor levels (at worst). Additionally, there is ample suitable alternative roosting habitat available elsewhere in Kiwi Esplanade and Ambury Park.

Freshwater

- 2.9 The effects of the Project's construction works on local freshwater communities are generally considered to be at worst only minor, temporary and localised. Notwithstanding this, if not appropriately managed, there could be some increases over existing background levels in the amount of suspended sediment in the local waterways within the Project area, and it is appropriate that the potential effects of this be mitigated. Of positive significance will be the targeted 80% reduction in average annual wastewater overflows to the local waterways following completion of the Project and associated works.

Coastal Marine

- 2.10 The works at Pump Station 23 require a temporary platform of 1,300m² within the Coastal Marine Area ("**CMA**"). The intertidal area here has Moderate to High ecological values, despite having been disturbed by a temporary construction platform in 2007 of a similar footprint to the proposed works. Remediation following the 2007 works simply consisted of removing the platform material. Given the Moderate to High ecological values we recorded here in 2011, this strongly indicates that moderate recovery of this intertidal area under natural processes occurred within four years.
- 2.11 Further to the above, the same area has been more recently disturbed in 2012 and 2013, when a temporary bypass pipe was installed and subsequently removed. Hence it is likely to be presently in a disturbed (but recovering) state.

- 2.12 While the temporary platform within the CMA at Pump Station 23 will occupy an area of 1,300m² that is utilised by shore birds for feeding purposes, the area accounts for only 0.009% of the intertidal flats of the Manukau Harbour. Abundant alternative feeding grounds are available, and the construction platform represents a temporary and highly localised effect.
- 2.13 In addition to the temporary platform as described above, up to a further 150m² of CMA may also be occupied as a result of the outlet and scour protection works associated with the EPR (although the size of these works may be able to be reduced to below this maximum extent). The area affected was until recently part of the Mangere Waste Water Treatment Plant oxidation ponds and supports common upper estuarine biota. The permanent loss of up to 150m² of CMA at this site is considered to be an effect of less than minor significance.

Conclusion

- 2.14 All in all the extent of adverse ecological effects associated with the Project are limited (and generally concern just three sites), and the ecological benefits that would result from the Project in terms of significantly reduced annual average overflows to the environment are major. In my opinion Watercare's Proposed Conditions are adequate to ensure that the appropriate levels of mitigation are implemented and the ecological effects of the Project are appropriately managed.

3. PROJECT CONTEXT

- 3.1 The Project area is located within metropolitan Auckland. The majority of the works are underground and the potential for any adverse ecological effects are restricted to the 19 surface sites associated with construction of the Central Interceptor tunnel. These sites are generally small, with the smallest being 500m² and the average being <0.5ha. Most of the proposed surface sites (both construction and operational) are located in public open space, with a small number of sites located on privately owned or Watercare owned land. These site locations have been described previously by other witnesses.
- 3.2 None of the proposed terrestrial sites are identified as being a Significant Natural Area in the Auckland Council District Plan: Isthmus or Manukau Sections, although Kiwi Esplanade is mentioned in the Auckland Regional Plan: Coastal as

being part of CPA 23b "Ambury", which is noted as being the most important winter roost on the Manukau Harbour for NZ pied oystercatcher. Further to this, the foreshore and shoreline area from Mangere Bridge westwards along Kiwi Esplanade is noted in the Auckland Regional Policy Statement as being an important roosting area for seabirds and waders.

3.3 The works proposed at Pump Station 23 and the EPR structure at the proposed Mangere Pump Station will require activities within the CMA. The intertidal areas affected by these are located within the Manukau Harbour, which is a Significant Natural Heritage Area identified in the Auckland Regional Policy Statement ("**RPS**") (Site 215 – Manukau Harbour).

3.4 In summary, the Project is generally set within a highly urbanised landscape with little in the way of significant ecological features or attributes, although there are a few exceptions to this general rule. I elaborate upon these later in my evidence, together with the proposed means of managing any potential adverse effects on these.

4. ECOLOGICAL INVESTIGATIONS METHODOLOGIES

Vegetation

4.1 A preliminary desktop assessment of vegetation communities was undertaken using recent high resolution aerial imagery of the Project area. Vegetated sites for subsequent more detailed surveys were identified from this analysis, and all of the proposed sites were surveyed in June 2011. I was instructed to take a "worst case scenario" approach and work on the assumption that all vegetation within the identified footprints of the proposed sites would be cleared (although in reality this is not likely to occur and some existing vegetation may be retained where possible and/or transplanted if practicable).

Herpetofauna

4.2 Herpetofauna (i.e. lizards) encompass two generally distinct groups, being skinks and geckos.¹ Skinks were surveyed by a combination of techniques, including a search of the Herpetofauna Database, an assessment of habitat quality (for lizards), an Artificial Cover Object ("**ACO**") survey at selected sites where food

¹ Skinks are predominantly ground dwelling whereas geckos are predominantly arboreal (i.e. they live in trees, forest and shrublands).

and shelter resources for lizards were favourable and refuge searches wherever good potential shelters were encountered. Geckos (which are nocturnal) were surveyed by way of night time spotlight searches at vegetated sites supporting favoured tree and shrub species.

Avifauna

- 4.3 Avifauna (i.e. birds) were sampled at all of the proposed works sites. The sampling took the form of 5-minute point counts, with all species heard or seen within the 5-minute period being noted (including those seen flying overhead). Any noteworthy observations obtained while traversing the sites were also recorded. Potential shore bird roosting sites at Kiwi Esplanade and proposed Mangere Pump Station were also visited and sampled at high tide on several occasions.

Freshwater

- 4.4 Stream works associated with the Project are proposed to be of small scale, localised and temporary, including such things as temporary bridge crossings of waterways, discharges of treated construction-phase stormwater and the provision of overflow structures at some sites. Given the restricted and low key nature of these stream works, the freshwater investigations were restricted to a collation of existing information in relation to the four local waterways (being Oakley Creek, Meola Creek, Motions Creek and a tributary of the Whau Creek).

Marine

- 4.5 Quantitative field studies involving three transects were carried out in the intertidal area adjacent to Pump Station 23 where the temporary construction platform is proposed. These included infauna (species living in the substrate, such as polychaete worms), epifauna (species living on the substrate, such as mud snails), sediment grain size and contaminants (analysed for total copper, lead, zinc, polycyclic aromatic hydrocarbons ("**PAH**") and total organic carbon).
- 4.6 A qualitative survey was carried out in relation to the intertidal area at the proposed Mangere Pump Station where the EPR structure is proposed. Qualitative surveys were chosen (rather than quantitative) in recognition that the particular habitat type was ubiquitous in the wider area (being soft mudflats dominated by mud snails). In addition, these works are small in size, involve

minimal intrusion into the intertidal area, will mainly be carried out at low tide and will include appropriate sediment control devices.

Summary of Methodologies

4.7 A summary table of the sites surveyed is set out below in **Table 1**.

Table 1: Sites Assessed

Name	Habitat Type Within the Construction Footprint	Vegetation Assessment	Avifauna Assessment	Herpetofauna Assessment	Freshwater Assessment	Marine Assessment
Western Springs	Grass with a few exotic trees	yes	yes	no	n/a	n/a
Mount Albert War Memorial Reserve	Grass, native trees, flax and other plantings	yes	yes	ACO ¹ only	n/a	n/a
Lyon Avenue	Mainly native bush (mature plantings)	yes	yes	ACO & night	Yes	n/a
Haverstock Road	Grass with cabbage tree mass plantings	yes	yes	no	n/a	n/a
Walmsley Park	Grass with a few exotic trees, shrubs + low plantings	yes	yes	no	yes	n/a
May Road	Overgrown weedfield + a few exotic trees	yes	yes	ACO only	yes	n/a
Keith Hay Park	Homestead, grass + ornamental trees	yes	yes	no	yes	n/a
Pump Station 23	Planted shrubland, coastal forest + coastal mudflats/ reef	yes	yes	ACO & night	n/a	yes
Kiwi Esplanade	Grass, planted pohutukawa + coastal edge	yes	yes	no	n/a	n/a
Proposed Mangere Pump Station	Grass, gums, planted shrublands + coastal edge (EPR)	yes	yes	no	n/a	yes (qualitative)
Motions Road	Grass + native shrub plantings	yes	yes	night only	yes	n/a
Western Springs Depot	Yard with some pines	yes	yes	no	n/a	n/a
Rawalpindi Reserve	Grass with some flax and exotic trees	yes	yes	no	yes	n/a
Norgrove Avenue	Grass, plantings + exotic treeland	yes	yes	no	yes	n/a
Pump Station 25	Weedy native bush, plantings + grass	yes	yes	ACO & night	yes	n/a
Miranda Reserve	Grass + children's playground	yes	yes	no	yes	n/a
Whitney Street	Grassed road-side verge	yes	yes	no	n/a	n/a
Dundale Avenue	Grass + native plantings + adjacent manuka shrublands	yes	yes	night only	yes	n/a
Haycock Avenue	Homestead + mature exotic tree	yes	yes	no	yes	n/a

¹ Artificial Cover Object (see paragraph 4.2)

5. ECOLOGICAL INVESTIGATIONS RESULTS

5.1 Results of the investigations are reported in this section, with the consideration of effects in the section that follows.

Vegetation

5.2 The results of the vegetation survey are summarised in **Table 2** below.

Table 2: Vegetation Summary

<i>Predominantly Managed (Mown) Grass</i>	
Western Springs	Grass + a few exotic trees
Proposed Mangere Pump Station	Grass + a few exotic trees + coastal edge (EPR)
Miranda Reserve	Grass + children's playground
<i>Managed (Mown Grass with Plantings and/or some Trees)</i>	
Mount Albert War Memorial Reserve	Grass + native trees + flax + other plantings
Haverstock Road	Grass + cabbage tree plantation
Walmsley Park	Grass + oioi, <i>Carex</i> spp. & toetoe
Kiwi Esplanade	Grass + pohutukawa + coastal edge
Motions Road	Grass + planted native shrubs
Rawalpindi Reserve	Grass + flax, willows & 1 Norfolk Pine
Norgrove Avenue	Grass + mature native plantings + willows
Whitney Street	Road-side grass verge
Dundale Avenue	Grass + a few native plantings
<i>Unmanaged Grass and Weedfields</i>	
May Road	Kikuyu, blackberry, wattle & pampas
<i>Homestead / Council Yards</i>	
Western Springs Depot	Car park, yard & pines
Keith Hay Park	Homestead with grass & gardens
Haycock Avenue	Homestead & garden
<i>Indigenous Bush and Shrubland</i>	
Lyon Avenue	Mature bush (planted) & some exotics
Pump Station 23	Planted shrubs, coastal bush
Pump Station 25	Natural native bush, shrubs & plantings

5.3 Only three sites support native bush, being Lyon Avenue, Pump Station 23 (land) and Pump Station 25. However, all three are compromised to some degree by weeds. Notwithstanding this, they have some ecological value, and although the draft Auckland Unitary Plan has no formal status at this point in time, I note that the native bush areas growing at the Lyon Avenue and Pump Station 25 sites

are both proposed to be identified as Significant Ecological Areas.

- 5.4 The most mature bush area is at the Lyon Avenue site. This is part of the Roy Clements Treeway, which is a revegetated area of native trees planted over the past 35 years by community groups and the adjacent Mount Albert Grammar School. This site supports a large number of good sized native trees (mainly lemonwood but also totara, karo, ngaio, karaka and puriri) together with a few exotics. These were all planted here a few decades ago.
- 5.5 At Pump Station 23 there is a small narrow band of native shrubland plantings that grade into (and are well connected with) the mature coastal forest fringing Hillsborough Bay. The largest trees are on the coast and include pohutukawa and puriri of up to 8m in height, together with naturally regenerating sub-canopy and understory. The planted shrublands line the driveway leading into the site road and are characterised by native species together with plentiful weeds.
- 5.6 At Pump Station 25 the bush is a mix of maturing historic plantings (predominant) together with a small remnant of native bush and shrublands growing along the riparian margins of the adjacent creek. The canopy is characterised by ngaio (planted) kohuhu (probably planted), mapou (abundant throughout), mahoe, ponga, pigeonwood and exotic trees. Weeds are plentiful in the ground tier.
- 5.7 While of some botanical interest in its own right, the bush at Pump Station 25 also has ecological value by virtue of its contribution to riparian benefits (for the local stream) and also its contribution to local wildlife corridors. To a lesser extent the bush at Lyon Avenue would provide similar benefits to the reach of Meola Creek that flows between it and Mount Albert Grammar School, and likewise the bush and plantings associated with Rawalpindi Reserve and Norgrove Avenue would also provide such benefits to the lower reaches of Meola Creek.

Herpetofauna

- 5.8 **Appendix A** shows the herpetofauna listed on the Department of Conservation herpetofauna database as having been recorded within a 10km radius of the proposed sites (and therefore potentially present at them). The results identify five

lizard species (two being native skinks, one of which is threatened), two native gecko (one of which is threatened) and one introduced skink species.

- 5.9 The most commonly recorded species was the native copper skink with three records. Copper skink is a common species that is widespread throughout the Auckland region.
- 5.10 Habitat quality for terrestrial lizards within the proposed sites was generally low due to the predominance of mown grass at most of the sites. However, small areas of good quality habitat were found scattered across the Project area, as described in **Table 3** below.

Table 3: Good Quality Habitats for Terrestrial Skinks

Habitat Type	Site
Isolated pieces of deadwood	Lyon Avenue and Pump Station 25
Dense thickets of planted flax	Mount Albert War Memorial Reserve
Naturally colonised pampas (including dead pampas)	Pump Station 23
Boulder fields	Lyon Avenue
Dumped rubble and construction debris	Pump Station 23
Extensive rank grasslands with clumps of pampas	May Road
Rank grassland at park boundaries with private properties, around hedgerows, under fence-lines and bordering bush patches	Various
Bush patches where leaf litter and/or suitably thick ground-tier vegetation were present	Pump Station 23 and Pump Station 25

- 5.11 Habitat quality for arboreal lizards such as Auckland green gecko, forest gecko and Pacific gecko was generally low due to the scarcity of bush habitat within the proposed sites and the scarcity of suitable tree species (in particular kanuka) in those few areas that did support bush. The majority of the trees present within the proposed sites were also unsuitable exotic species.

- 5.12 No geckos were found to be present in any of the bush patches searched. Two native skink species (in low numbers) were found sheltering beneath the ACO's that had been deployed, being copper skink at Pump Station 25 and ornate skink at Pump Station 23. Copper skink is protected under the Wildlife Act 1953, and is a Non-Threatened endemic species. Ornate skink is also protected under the Wildlife Act 1953, and is an "At Risk (Declining)" endemic species.
- 5.13 In addition to these two native skinks, the introduced rainbow skink was also captured at three sites (Lyon Avenue, Mount Albert War Memorial Reserve and May Road). This is a widespread species and is considered to be a pest.
- 5.14 In summary the proposed sites were generally lacking in any suitable habitat for native herpetofauna (in particular geckos). However, a few sites did support low numbers of native skinks, and some others also had potentially suitable habitat present.

Avifauna

- 5.15 The results of the avifauna surveys are presented in **Appendix B**. The great majority of birds observed were introduced species, with, the most commonly recorded species being blackbird and sparrow. Song thrush, starling, myna, chaffinch and goldfinch were also relatively common, with a few observations also of magpie, rock pigeon and mallard.
- 5.16 Among native species, the only numerous counts were at Pump Station 23 (on the open mudflats adjacent to the site) and at Kiwi Esplanade (on the open mown grassland areas of this reserve). On the tidal mudflats adjacent to Pump Station 23 a few dozen New Zealand pied oystercatcher were present, along with lesser numbers of red billed gull, pied stilt and black-backed gull. A few variable oystercatcher and white-faced heron were also present. It is likely that at some periods of the tidal cycle the area within the footprint of the proposed temporary construction platform would also be used by some of these same species.
- 5.17 The area of Kiwi Esplanade in the immediate vicinity of the proposed site is a well-utilised high tide roost for shore birds, especially NZ pied oystercatcher. On most (but not all) of the surveys this species numbered a few hundred here, being

normally present on the open field to the immediate west of the proposed site. NZ pied oystercatcher split their time each year between the North and South Islands (where they breed), and typically from late December until July, large flocks are present in the Manukau Harbour. Large numbers of these birds could be expected on the reserve areas at Kiwi Esplanade over this period.

- 5.18 In this context it is noteworthy that while NZ pied oystercatcher have been observed on occasion utilising the fields immediately alongside the proposed site at Kiwi Esplanade, the open fields further to the east (i.e. on the other side of the reserve car park) are a more important high tide roost, with many hundreds of NZ pied oystercatcher being observed at these fields on all surveys. In addition to the above, both black-backed gull and red-billed gull were also seen at Kiwi Esplanade, and on one occasion a few dozen little black shag were also observed feeding in the sea adjacent to the proposed site.
- 5.19 Away from the coast, the most commonly observed native birds were fantail and silveryeye and these were present at all sites with a bush cover. However, overall, the majority of the sites are characterised by a lack of suitable habitat for native avifauna, with the exception of the bush areas present at Pump Station 23, Lyon Avenue and Pump Station 25.
- 5.20 The "Threatened" and "At Risk" species observed to be present at sites were red-billed gull (Nationally Vulnerable), NZ pied stilt (Declining), NZ pied oystercatcher (Declining), little black shag (Naturally Uncommon) and variable oystercatcher (Recovering). These were observed only at two locations, being Pump Station 23 and Kiwi Esplanade Reserve. It is very likely that both sites are used routinely by all of these species for feeding and/or roosting purposes. To minimise disturbance to these birds (and in particular the NZ pied oystercatcher) at Kiwi Esplanade, Watercare's Proposed Conditions restrict the trenching of Link Sewer 4 to the period starting 1 August and ending 30 November.
- 5.21 In summary, with two exceptions, the avifauna associated with the proposed sites is unremarkable and typical of what normally utilises garden and park resources in the urban landscapes of Auckland. The diversity of indigenous bush birds is not of any particular note, but the shore bird communities at the proposed Kiwi

Esplanade and Pump Station 23 sites do include “At Risk” and “Threatened” species. These are the two key habitats where the avoidance or mitigation of adverse avifauna effects need to be particularly considered.

Freshwater

- 5.22 Descriptions of the freshwater ecological values of the four waterways potentially affected by the construction of the Project are given in the Ecological Technical Report prepared by Boffa Miskell in 2012 ("**Ecology Report**") attached as Technical Report C of Part D of the Central Interceptor Main Project Works Assessment of Effects on the Environment submitted to the Council, dated August 2012 ("**AEE**"). This is summarised below.
- 5.23 The Oakley Creek tributary flowing alongside the May Road site supports moderate numbers of shortfin eel and gambusia (a pest fish species). Its macroinvertebrate community biometrics is dominated by pollution-tolerant taxa and indicative of poor environmental conditions. Over six surveys spanning 2002 – 2009 found the taxonomic richness was 6 – 8, there were no EPT (pollution-sensitive taxa) and the MCI was 57 – 70 (in the “poor” range). This consistently low biodiversity and absence of pollution sensitive taxa indicated poor water quality conditions. The Stream Ecological Valuation score for this tributary was 0.4 (out of a maximum value of 1.0), also indicating poor values. This is as a result of a modified flow regime, poor connectivity for species migrations, low shade, high oxygen demand, low aquatic habitat quality and low fish and invertebrate biodiversity.
- 5.24 Bio-metric analyses for Meola Creek from a 1998 survey, immediately downstream of the SH16 motorway crossing, recorded a total of 10 taxa, being dominated by snails (predominantly *Potamopyrgus* but also *Physa*) and amphipods. No sensitive taxa were present, with the only caddisfly present being *Oxyethira* (a pollution-tolerant taxa). The creek is considered to be typical of an urban stream with a relatively high degree of habitat modification and low water quality. A total of seven species of fish have been recorded from the creek, although two of these are marine wanderers found only at the creek’s mouth (being yellow-eye mullet and cockabully). The other fish recorded from the creek are shortfin eel, common bully, banded kokopu,

inanga and torrentfish. The latter two species are classified as "At Risk – Declining" species.

- 5.25 Most of the Whau tributary flows within a natural channel, although there are a few kilometres of concrete lined channel in the upper reaches. Fish recorded here consist of shortfin and longfin eel, koaro, banded kokopu, inanga, common bully, giant bully, torrentfish and goldfish, with three of these species being "At Risk – Declining". Potential inanga spawning habitat was present at the stream mouth. While water quality samples indicated good baseflow water quality, macroinvertebrate communities were characterized by low diversity (i.e. 22 taxa in three samples) and few sensitive taxa (only one EPT taxa recorded). This indicates that water quality is likely to be poor during rainfall events.
- 5.26 Motions Creek is piped for more than 60% of its total length, with the only open areas being downstream of Western Springs Park. The stream has a healthy sized native fish population below the Western Springs lake, with five species present – banded kokopu, inanga, longfin eel, shortfin eel and a bully species (identity uncertain). Inanga spawning habitat is present in the downstream reaches alongside the Seddon sports fields. In addition three introduced fish species are present, being mosquitofish, koi carp and grass carp. The rare aquatic moss *Fissidens berteroi* is present (Morphum, 2010), at two sites within stream reaches flowing through Auckland Zoo and at three sites immediately downstream of Old Mill Road. Water quality was within an acceptable range for instream plants and animals (Suren, 2001; Morphum, 2010). The macroinvertebrate community was considered to be moderate, with a high diversity of species typical of low-mid water quality conditions.
- 5.27 It is appropriate to emphasise that one of the results of the Project will be a substantial decrease in the frequency of wastewater overflows, particularly in relation to Meola Creek. Presently, within the Central Interceptor catchment area there are some 122 active overflow points which discharge in the order of 2,200,000m³ of untreated wastewater to the environment each year. These overflows have a detrimental effect on the local ecology of the receiving environments, and (if no action is taken) this can only be expected to get worse as population growth continues to expand. As explained by Mr Cantrell, the

Project will pick up 18 overflows (50 - 60% of total overflow volume to be "picked up") and enable the CSO Collector Sewers which will target an additional 104 overflows (40 - 50% of total overflow volume to be picked up).

Marine

Pump Station 23 site

- 5.28 A temporary construction platform measuring 1,300m² will be placed within the CMA adjacent to Pump Station 23. Three intertidal transects were analysed in and around this site (Transects West, Central and East, with the West Transect being directly within the footprint of the proposed works and the other two being to the east – refer **Appendix C**). A brief summary of the results is given below.
- 5.29 There are a variety of substrates across the wider site, including gravel and cobbles, fine sand, gravel and sand, sandstone reef and fine mud. These substrates are commonly found in intertidal inner harbour environments.
- 5.30 Species richness ranged from 3 to 17 across the wider site. Such variation is explained by the differing levels of habitat opportunities afforded by the different substrates present. The species richness was relatively high, but the species comprising this, and the community compositions, were otherwise unremarkable. All in all the community assemblages present here are generally typical of inner harbours and are well represented in the local and wider area.
- 5.31 The concentration of common stormwater contaminants (copper, lead, zinc and High Molecular Weight PAH) were measured across the three transects and compared against the Environmental Response Criteria ("**ERC**") of the former Auckland Regional Council ("**ARC**") and the Australian and New Zealand Environment and Conservation Council Interim Sediment Quality Guidelines ("**ISQG**"). The metal contaminants of copper, lead and zinc were detected at concentrations below the low effects threshold concentrations under both the ERC and ISQG. However, elevated levels of High Molecular Weight PAHs were detected. Concentrations were within the ARC ERC Amber threshold range, but below the ISQG Low threshold, indicating that the benthic community here

could be experiencing adverse effects as a result.

- 5.32 The average proportion of sediment grain size across the three transects was comprised mostly of smaller sizes (fine sand to silt and clay). Sediment grain size at the surface was dominated across all sites by silt and clay.
- 5.33 In summary, the marine habitat at and around Pump Station 23 is comparable to many other locations around the Harbour. As part of the wider Harbour environment it is considered to have moderate to high ecological value.
- 5.34 With specific regard to the West Transect, the infaunal community is different to the other two primarily due to the gravel component of the substrate and its proximity to a stormwater drain. As a result of the latter it is dominated by organisms more tolerant of freshwater inflows than the other two transects. The species diversity at Transect West is moderate, and the Shannon-Wiener diversity index suggests that organism abundance is dominated by only a few taxa.
- 5.35 Interestingly, Watercare has recently worked in this same intertidal area, in 2007, 2012 and 2013. These previous works are discussed in Section 6 of my evidence. Our marine investigations in 2011 found that while invertebrate abundance was lower at the site of the 2007 works than in the surrounding CMA, species richness and sediment grain size were similar among the three sites. The invertebrate community assemblage that is now present within the previously disturbed area indicates that moderate recolonisation has occurred at this site following the disturbance (i.e. within four years).

Proposed Mangere Pump Station

- 5.36 The EPR structure at this site could occupy up to 150m² of the CMA as a result of its outlet and scour protection armour (although the size of these works may be able to be reduced to below this maximum extent). As described in paragraph 4.6, a qualitative survey was undertaken of the intertidal area in the vicinity of the proposed EPR structure. The site was visited and the general habitat visually inspected. The findings of this survey demonstrate that the area within the proposed footprint of this structure is typical of the surrounding intertidal mudflats, being characterised by an abundance of mud snails together with numerous mud crab burrows. The ecological values of the affected CMA area were

assessed as being Moderate-Low, although the wider Pump Station site had an overall Low ecological value.

Overall Summary of Ecological Values

5.37 The ecological values at the proposed sites are summarised in **Table 4** below.

Table 4: Summary of Ecological Values at Each Construction Site

Name	Habitat Within Construction Footprint	Vegetation Values	Bird Values	Lizard Values	Freshwater Values	Marine Values	Overall Values
Western Springs	Grass with a few exotic trees	Nil	Low	Low	n/a	n/a	Low
Mount Albert War Memorial Reserve	Grass, native trees, flax and other plantings	Low	Moderate-Low	Low	n/a	n/a	Moderate-Low
Lyon Avenue	Mainly native bush (mature plantings)	Moderate	Moderate	Low	Moderate	n/a	Moderate
Haverstock Road	Grass with cabbage tree mass plantings	Low	Low	Low	n/a	n/a	Low
Walmsley Park	Grass with a few trees, shrubs + low plantings	Low	Low	Low	Moderate-Low	n/a	Low
May Road	Overgrown weedfield + a few exotic trees	Low	Low	Low	Moderate-Low	n/a	Low
Keith Hay Park	Homestead, grass + ornamental trees	Low	Low	Low	Low	n/a	Low
Pump Station 23	Planted shrubland, coastal forest	Moderate	Moderate-High	High	n/a	Moderate-High	Moderate-High
Kiwi Esplanade	Grass, planted pohutukawa + coastal edge	Low	High ²	Low	n/a	n/a	Moderate-High
Proposed Mangere Pump Station	Grass, a few gums + planted shrublands	Low	Low	Low	n/a	Moderate-Low	Low
Motions Road	Grass, native shrub plantings	Low	Low	Low	Moderate	n/a	Low
Western Springs Depot	Yard with some pines	Low	Low	Low	n/a	n/a	Low
Rawalpindi Reserve	Grass with some flax and exotic trees	Low	Low	Low	Moderate	n/a	Low
Norgrove Avenue	Pavement, grass + plantings + exotic treeland	Low	Low	Low	Moderate	n/a	Low
Pump Station 25	Weedy native bush + plantings + grass	Moderate	Moderate	Moderate-High	Moderate-High	n/a	Moderate-High
Miranda Reserve	Grass + children's playground	Low	Low	Low	Moderate	n/a	Low
Whitney Street	Grassed road-side verge	Low	Low	Low	n/a	n/a	Low
Dundale Avenue	Grass, native plantings + adjacent shrublands	Low	Low	Low	Moderate	n/a	Low
Haycock Avenue	Homestead + mature exotic tree	Low	Low	Low	Low	n/a	Low

2

NZ Pied Oystercatcher split their time each year between the North and South Islands (where they breed). From late December until July the open fields of Kiwi Esplanade in the vicinity of the construction site are an important high tide roost for this species, along with adjacent areas of Kiwi Esplanade to the immediate east and west – the ranking given applies to this period of each year only.

6. ASSESSMENT OF ECOLOGICAL EFFECTS

Vegetation Effects

Clearance of Vegetation

- 6.1 A large proportion of the land within the Project area is located within public reserves that are dominated by mown grass. Such areas have no botanical conservation value. In a few instances the grass is complemented by planted strips, specimen native trees and/or ornamental/naturally established exotic trees. The loss of all of this vegetation (in a worst case scenario) would constitute less than minor adverse ecological effects. However, there are three sites that support a cover (or at least partial cover) of native bush (Lyon Avenue, Pump Station 23 and Pump Station 25). As discussed earlier, some of this bush appears to be the result of historic plantings of (mainly) native tree species (in particular at Lyon Avenue). At these sites there is the potential for adverse effects from clearance. I discuss this below.
- 6.2 **Lyon Avenue:** I understand that Watercare has sought to minimise the area required for construction and the siting of the permanent works. It is proposing to keep as close to the existing structure as practicable, while putting in place the features required to connect the existing structure to the new system in order to reduce overflows into Meola Creek. In this context the proposed designation area has been reduced to 3,920m² and within this is an area of 2,561m² comprised of approximately 130 trees and shrubs (although it is not certain how many of these will need to be cleared as part of the works). The site is part of the Roy Clements Treeway, which is a revegetated riparian reach of Meola Creek that runs alongside Mount Albert Grammar School, the St Lukes Garden Apartments and the St Lukes Mega Centre. However, in saying that, the creek is piped both upstream and downstream of this site, and the riparian vegetation ceases at the mouths of those pipes. While the Lyon Avenue site is confined to the eastern side of the creek (leaving the mature mainly exotic trees on the western bank intact), it occupies a relatively sizeable portion of the wider Treeway here, being in the rough order of 10%. The loss of all or part of the bush within this site will likely constitute a more than minor (Moderate) adverse effect on vegetation unless mitigated. I address mitigation later in my evidence.

6.3 **Pump Station 23:** The shrublands growing along the eastern margins of the driveway to this site together with the coastal trees measure 853m² and are relatively mature. While quite weedy, they nevertheless retain some coherency and are well connected to the coastal forest of Hillsborough Bay. While these shrublands are included within the boundary of the site, at least some of the shrublands could possibly be retained, given that they occupy a steep bank on the periphery of the site. The works will however affect a number of mature shrubs/trees at the coastal edge, including pohutukawa. The effects at this site will also include the adjacent CMA, due to the 1,300m² temporary construction platform. While some vegetation might potentially be retained, the proposed loss of at least some (possibly all) vegetation at this site is likely to constitute a more than minor adverse effect unless mitigated. In saying this however, it is noted that the adverse effects here are likely to be only marginally greater than minor and the extent of mitigation required only modest. I address mitigation later in my evidence.

6.4 **Pump Station 25:** This construction site includes both mown grass and mature (and semi-mature) shrubland and bush. The quality of this bush is not particularly high, with the canopy being somewhat patchy, and with a high degree of weed infestation in the understorey and ground tier. There are a few large native trees within the site, with the largest being ngaio and kohuhu (all planted) together with a few mahoe, manuka, puriri, lacebark and mamaku. The extent of vegetation within the site area is in the order of 2,252m². Notwithstanding the weed issues present, the proposed loss of vegetation at this site is considered to be an adverse effect of a greater than minor nature (at least Moderate) unless mitigated. I address mitigation later in my evidence.

Loss of Significant ('Threatened' and 'At Risk') Species of Flora

6.5 While wider ecosystem/habitats are usually the focus of effects assessments, in some circumstances individuals can be worthy of protection, for example, where they are notable specimens or are uncommon. In relation to the Project area however, no "threatened" or "at risk" species of flora were observed to be present at any site. Furthermore, while a number of reasonably sized native trees are present at the Lyon Avenue site, none of these are considered to be notable specimen trees.

Increase in the Extent of Edge Effects

6.6 Edge effects occur where vegetation clearance creates edges. They refer to the differences in micro-climatic conditions that exist between forest margins and forest interior. Edge effects can be important where the interior habitat is reduced, but are not as problematic where the area is already characterised by edge processes. Scientific studies show that edge effects can penetrate up to 50m into forest habitats, on all sides.³ Hence, habitats that are less than 100m in width are generally dominated by edge effects and processes, and contain little, if any, habitat interior conditions. In relation to the Project area, all of the vegetation is already compromised by edge effects (including the three stands of coherent bush at the proposed Lyon Avenue, Pump Station 23 and Pump Station 25 sites). For this reason, it is considered that the creation of new edges will not be a significant issue in relation to the Project.

Habitat Fragmentation and Loss of Ecological Corridors

6.7 Vegetation clearance can result in the fragmentation of habitats which creates a physical barrier to the flow of species and individuals, and can potentially reduce the overall resilience of ecosystems. There is an existing ecological corridor at Pump Station 25. This bush is part of a larger corridor that stretches from the Whau River in the west through to the Maungakiekie Golf Course in the east.⁴ While the corridor is not in a pristine and fully connected condition, and its width and coherency decreases in an easterly direction, at the Pump Station 25 site the corridor is generally at its widest, being in the order of 40m (and being present on both sides of the stream). The site, at its widest point, intrudes some 25m into this bush and comes in close proximity to the stream.

6.8 While this level of disturbance diminishes in the operational phase of the Project, the permanent structures would continue to occupy space here, resulting in a small reduction in corridor width. It is considered that both the temporary and permanent effects of the Project works at this site constitute adverse effects on the corridor that need to be mitigated.

3 Young & Mitchell, 1994, Davies-Colley et al., 2000.

4 It is recognised that this corridor is truncated by Boundary Road to the east and by both the North Auckland Rail Line and Great North Road to the west, so is not in a pristine and fully connected condition. Nevertheless it retains at least some functionality.

6.9 Another ecological connection exists at Pump Station 23, where bush is connected to part of the vegetated coastal cliffs that run below Seacliffe Road in Hillsborough Bay. This site is also loosely connected to a large local network of contiguous forested reserves located to the west. However, given the existing infrastructure that is already present at this site (i.e. an access road, turning area and a pump station) the works proposed for this site are unlikely to alter the existing situation here in relation to ecological corridors or connectivity.

Avifauna Effects

6.10 Direct and indirect impacts can adversely impact on avifauna. The magnitude of effects is proportional to the rarity of the species, and extent of habitat affected relative to that which remains unaffected.

6.11 The only "At Risk" birds within the Project area were all restricted to the intertidal mudflats of Hillsborough Bay opposite Pump Station 23, the foreshore adjacent to Kiwi Esplanade, and the open grasslands of that same reserve. The species concerned were red-billed gull, NZ pied oystercatcher, variable oystercatcher, little black shag and pied stilt. It will therefore be important that disturbance is kept to a minimum during the proposed construction works at these two sites, and that the temporary construction platform at the Pump Station 23 site is removed and the site reinstated once works are complete.

6.12 At Kiwi Esplanade, shore birds do not consistently use the area in the immediate vicinity of the site, and indeed on some of the surveys the roosting flocks were found only on the open fields to the east of the reserve access road and car-park. The fact that cars routinely utilise this road and car-park suggests that construction noise is unlikely to be much of an issue here. In addition, ample roosting habitat will continue to exist in the general area well outside of the site (including at the neighbouring Ambury Park). Further to this, Condition 2.3 of Watercare's Proposed Consent Conditions restricts trenching works associated with the Link Sewer 4 across this area to the period between 1 August and 30 November, thereby avoiding the time when large flocks of migratory shore birds are present here. Given this, the Project is unlikely to result in adverse effects upon roosting shore birds.

- 6.13 In relation to the other (non-coastal) mown areas of the proposed sites, while these may be utilised by birds for feeding, loafing or roosting purposes, there would remain ample similar habitat at each location, and the temporary loss of the site area for construction purposes is considered to be an adverse effect of less than minor significance to avifauna.
- 6.14 The only areas where vegetation loss may possibly have some noticeable adverse effects in relation to avifauna are at the three bush sites. However, it is noteworthy that the majority of the bird species utilising these areas are introduced passerines, and that (in general) numbers of all species observed here were low. Additionally, the extent of bush loss is relatively small, especially with regard to Pump Station 23, at least within the context of the wider coastal forest of Hillsborough Bay which it is functionally connected to. The affected bush area is also relatively small at Pump Station 25, at least in the context of the vegetated corridor of which it is a part. It is considered that ample alternative bush habitat is available at both of these sites to the extent that the effects of the Project upon avifauna will be less than minor.
- 6.15 The effects on bush birds resident or utilising the Lyon Avenue site have the potential to be somewhat more pronounced. This is due to the smaller size of the wider bush area compared to that at Pump Station 23 and Pump Station 25, together with the fact that the construction footprint encompasses a sizeable portion of this wider bush area. Notwithstanding this however, the only native birds observed to be present here were fantail and silvereye, and these are quite common in urban landscapes. While some displacement of resident birds (including native birds) may occur at Lyon Avenue as a result of the proposed works, it is likely that these effects would be minor only.

Herpetofauna Effects

- 6.16 No geckos were observed to be present within the Project area, despite intensive searches in all areas of likely habitat. Two species of skink were found, being copper skink (at Pump Station 25 in low numbers) and ornate skink (at Pump Station 23 in low numbers). An introduced (and pest) lizard species was also observed to be present, being rainbow skink at May Road, Lyon Avenue and Mount Albert War Memorial Reserve.

6.17 Given that all species of native lizard are protected pursuant to the Wildlife Act 1953, and that ornate skink is an “At Risk – Declining” species, the potential effects on any individuals resident within the construction footprints requires an appropriate response. Later in my evidence I propose salvage operations as part of the pre-construction site works to mitigate any potential effects if lizards are present. Provided this salvage work is undertaken, I conclude that any adverse effects on native lizards as a result of the Project are unlikely to be more than minor.

Freshwater Effects

6.18 The expectation is that the Central Interceptor Scheme will reduce the average annual volume of wastewater discharging to the environment by more than 80%. This is a significant ecological benefit deriving from the Project.

6.19 In contrast, the nature of the potential adverse ecological effects on freshwater communities is limited. The only activities which may impinge upon these are access crossings, discharges of either construction or operational phase stormwater and the construction of overflow structures (recognising that consent is being sought separately for the actual discharge from these overflow structures as part of the Network Discharge Consent application currently before the Council that is not within the scope of this present Hearing).

6.20 The adverse ecological effects of these works are anticipated to be minor. To begin with, the number of waterway crossings is low, and where they are needed the terrain is easy. This should result in any culverts that may be used being only a few metres long, thereby minimising the temporary reduction in the amount of in-stream habitat available. The construction of any new overflow outlet structures will employ best practice approaches in order to minimise the mobilisation of any *in situ* sediments and prevent the discharge of contaminants leaching from the materials used in the construction of the structures.

6.21 In this context, it is noteworthy that draft Erosion and Sediment Control Plans (consistent with ARC TP 90) have been prepared for each of the construction sites (see Part D of Technical Report K of the AEE) and updates submitted as part of the Section 92 process.

6.22 Provided the measures identified in these are implemented, and the control devices maintained as planned, there should be only localised minor adverse effects in terms of sediment discharge to the local streams.

Marine Effects

6.23 The temporary construction platform at Pump Station 23 will result in the mortality of common intertidal invertebrates and create anoxic (oxygen depleted) sediment characteristics within an area of approximately 1,300m², which would account for approximately 0.009% of the intertidal flats of the Manukau Harbour. Once the temporary platform is removed, the area will be re-colonised by common intertidal invertebrates over time, and the sediment will become more oxygenated through bioturbation and other natural biological and chemical processes. Hence, the habitat loss associated with the temporary construction platform comprises only a moderate (and temporary) adverse ecological effect.

6.24 This conclusion is supported by the historic works at this site which occupied a very similar footprint to that proposed as part of the Project. The original site establishment works were undertaken in the late 1950's, with the footprint being similar to the proposed temporary platform. More recently, a temporary platform was constructed in 2007 to upgrade the existing rising main, with this footprint again being very similar to that which is presently proposed (**Plate 1**). Our marine investigations in 2011 found that while invertebrate abundances was lower at the site of the 2007 works than in the surrounding CMA, species richness and sediment grain size were similar among the three transects. The invertebrate community assemblage within this previously disturbed area indicates moderate recolonisation at this site following the disturbance (within four years).

6.25 More recently still, consented works were undertaken within the intertidal area adjacent to Pump Station 23 in 2012 and 2013, involving the installation and subsequent removal of a temporary bypass pipe (during replacement of cast iron pipework) (**Plate 2**). This demonstrates that the area concerned has been very recently modified and is presently in an already disturbed state.

PLATE 1 : Pump Station 23 - 2007 Coastal Works



PLATE 2 : Pump Station 23 - 2012 Works



6.26 The only other area where works in the CMA might occur is at the proposed Mangere Pump Station where the EPR structure is proposed. These works include scour protection and potentially an outlet structure located in the intertidal zone. Qualitative investigations identified that the affected area is typical of the surrounding mudflats and is characterised by common upper estuarine biota, in particular mud snails and mud crab. This site was until recently part of the Mangere Wastewater Treatment Plant ("**Mangere WWTP**") oxidation ponds, and its ecological values were assessed as being Moderate-Low.

6.27 Adverse ecological effects here would be less than minor (or minor at worst), given the type of habitat that would be affected as well as the fact that the proposed works are relatively small (in the order of 150m²), involve minimal intrusion into the CMA, will include all appropriate sediment control practices and devices and are restricted to an area that has only recently been rehabilitated from its previous use as part of the oxidation ponds associated with the Mangere WWTP.

Summary of Ecological Effects

6.28 **Table 5** below summarises the effects assessment. It illustrates that, during construction, the Project has the potential to have a greater than minor ecological effect at only the following three sites:

(a) *Lyon Avenue*

- Loss of indigenous vegetation (including riparian vegetation).

(b) *Pump Station 23*

- Loss of indigenous vegetation;
- loss of habitat for "At Risk" lizard species (ornate skink);
- temporary loss of intertidal habitat and loss of associated benthic and epifauna communities; and
- temporary loss of intertidal feeding habitat for shorebirds, including "At Risk" species.

(c) *Pump Station 25*

- Loss of indigenous vegetation (including riparian vegetation);
- impacts on existing ecological corridor; and
- loss of habitat for native lizard species (copper skink).

6.29 This is the level of effects anticipated if no mitigation is carried out. I turn now to discuss the means by which these effects can be mitigated.

Table 5: Summary of Ecological Values and Effects

Name	Habitat Type Within the Construction Footprint	Ecological Values	Overall Ecological Effects with no mitigation
Western Springs	Grass with a few exotic trees	Low	Less than minor
Mount Albert War	Grass, native trees, flax & other plantings	Moderate-Low	Minor
Lyon Avenue	Mainly native bush (mature plantings)	Moderate	Greater than minor (needing mitigation)
Haverstock Road	Grass with cabbage tree mass plantings	Low	Less than minor
Walmsley Park	Grass with exotic trees & shrubs + plantings	Low	Less than minor
May Road	Overgrown weedfield + a few trees	Low	Less than minor
Keith Hay Park	Homestead, grass + ornamental trees	Low	Less than minor
Pump Station 23	Planted shrubland, forest + coastal flats/reef	Moderate-High	Greater than minor (needing mitigation)
Kiwi Esplanade	Grass + planted pohutukawa + coastal edge	Moderate-High	Minor
Proposed Mangere Pump Station	Grass + gums + plantings + coastal edge (EPR)	Low	Less than minor
Motions Road	Grass + native shrub plantings	Low	Less than minor
Western Springs Depot	Yard with some pines	Low	Less than minor
Rawalpindi Reserve	Grass with some flax and exotic trees	Low	Less than minor
Norgrove Avenue	Grass + plantings + exotic treeland	Low	Less than minor
Pump Station 25	Weedy native bush + plantings + grass	Moderate-High	Greater than minor (needing mitigation)
Miranda Reserve	Grass + children's playground	Low	Less than minor
Whitney Street	Grassed road-side verge	Low	Less than minor
Dundale Avenue	Grass + native plantings + adjacent manuka	Low	Less than minor
Haycock Avenue	Homestead + mature exotic tree	Low	Less than minor

7. MITIGATION OF ADVERSE ECOLOGICAL EFFECTS

7.1 As set out above, only three of the 19 proposed construction sites have the potential for ecological effects to be more than minor. These effects have been predicted to be of moderate significance, and as such can be appropriately mitigated. The proposed mitigation is described below.

Loss of Indigenous Vegetation and Impacts on Existing Ecological Corridors

7.2 The most effective ways to mitigate the effects of the loss of indigenous vegetation are to minimise the extent that it is cleared and to replace that which must be cleared. Minimising the extent of clearance would involve keeping the actual construction footprints as small as practicable, retaining all woody vegetation that lies within the construction footprints but is not in the way of any of the proposed site facilities, and configuring the access roads and site facilities in such a way as to avoid (as far as practicable) large trees and other significant woody vegetation.

7.3 In this context it is noteworthy that Watercare has already reduced the construction site areas at Lyon Avenue, Pump Station 23 and Pump Station 25 as much as practicable. Condition T.1 of Watercare's Proposed Designation Conditions requires that Construction Management Plans ("**CMPs**") provide details as to how potential impacts of construction on trees will be managed, including procedures for identifying and protecting significant trees. In addition, where trees must be removed, transplanting will be undertaken where possible and practicable. Hence, while I was instructed to undertake my vegetation assessment on the assumption that all vegetation within the construction sites would be cleared, I believe that this condition will limit actual tree clearance to minimum practicable levels.

7.4 In addition to the above, following construction the opportunity exists to replace part of the vegetation that has been cleared by way of re-vegetation. Condition SR.1 of Watercare's Proposed Designation Conditions requires a Site Reinstatement Plan for each construction site, which will include details of proposed landscaping and planting.

- 7.5 In this regard it should be noted that the vegetation clearance associated with the two pump stations (i.e. Pump Station 23 and Pump Station 25) will be confined to within the existing Watercare designations and these works are allowed as of right. Given this, the Site Reinstatement Plans for both of these sites will be restricted to that land located within the designation boundaries. It is anticipated that the primary focus of the Site Reinstatement Plans for these two sites will include weed control, infill planting and new areas of planting.
- 7.6 Conversely, a sizeable portion of the proposed vegetation clearance associated with the Lyon Avenue site is located outside of the existing Watercare designation and impacts on the Roy Clements Treeway. Given this, it is proposed that in addition to the Site Reinstatement Plan for this area a Vegetation Enhancement Plan will be prepared that goes beyond the designation boundary to include other parts of the Roy Clements Treeway (i.e. in the area between Fergusson Reserve and Alberton Avenue – see Watercare’s Proposed Designation Conditions RC.1 – RC.5). The details of this Plan will only be finalised following consultation with Council and other affected parties. It is intended that such works will be undertaken prior to the commencement of any construction activities here.

Loss of Habitat for Native Lizard Species

- 7.7 Effective management of lizard populations would involve salvaging the resident populations before vegetation clearance occurs at sites where skinks have been detected (or where their presence is considered to be potentially likely despite no records), as well as implementing appropriate relocation strategies prior to their release (primarily habitat enhancement and pest management). The sites in question are Pump Station 23, Pump Station 25 (where skinks were found), Mount Albert War Memorial Reserve, Lyon Avenue, May Road and Motions Road (where, despite no observations, habitat appears to be suitable). Salvage operations for native arboreal geckos should be undertaken at Lyon Avenue, Pump Station 23, Motions Road and Pump Station 25 (due to their apparent potential habitat suitability).

7.8 It is my understanding that Watercare will comply with this best practice approach in relation to the management of lizards within the construction sites listed above.

Avifauna Effects

7.9 In relation to shore birds, Condition 2.3 of Watercare's Proposed Consent Conditions programmes the most disruptive works proposed at Kiwi Esplanade (i.e. the trenching of the Link Sewer 4) to take place outside of the peak shore bird season (i.e. between 1 August and 30 November). This should reduce any potential adverse effects on those birds to minor levels (at worst). With regard to the main works at this construction site, there is ample alternative roosting habitat available in adjacent parts of Kiwi Esplanade, as well as at the neighbouring Ambury Park. These areas would provide shore birds with an alternative place to roost at high tide should they be disturbed by construction activities at the Kiwi Esplanade site.

Freshwater Effects

7.10 On the whole the freshwater effects of the Project are of significant benefit to freshwater ecology of the four streams within the project area, which presently are the receiving environment for periodic wastewater overflows. As described earlier in paragraph 6.18, Watercare's hydraulic modelling predicts the Project will result in a reduction in the annual volume of wastewater overflows to the environment by at least 80%. This is a major and significant ecological benefit of the Project that amply mitigates any adverse freshwater effects of construction.

7.11 The effects of the Project on local freshwater communities are generally considered to be, at worst, only minor. Notwithstanding this, if not appropriately managed there could be some increases over existing background levels in the amount of suspended sediment in the local waterways within the Project area, and it is appropriate that the potential effects of these be mitigated. This will principally be achieved during construction by implementation of erosion and sediment controls, and on completion by way of the riparian planting as part of the Site Reinstatement Plans that Watercare is proposing (by way of Condition SR.1 of Watercare's Proposed Designation Conditions) to be mandatory for all

construction sites. These plans will specify the landscaping and planting treatments for each of the proposed construction sites following completion of construction activities at each.

Marine Effects

- 7.12 The intertidal area occupied by the proposed temporary construction platform at Pump Station 23 was previously occupied in 2007. Given that the results of our 2011 surveys indicated a healthy marine community in this same area (with similar results to those of the wider unaffected CMA, with the exception of a lower faunal abundance), it is evident that there was moderate recovery here following the disturbance (within four years). Additional works occurred in 2012 and 2013 and the site is presently in an already disturbed state.
- 7.13 I have been informed that in terms of site reinstatement the only measure taken in the past was to place the excavated materials back into the excavated area and level out the resultant mudflats. Since this approach has been successful in the recent past in reinstating the previous habitat, then a similar approach to reinstatement should similarly be equally successful in relation to the presently proposed works here.

8. RESPONSE TO SUBMISSIONS

General

Several submissions cited "*ecological effects*" but did not provide further details. As a consequence I have not been able to address these specifically, although my response to other submissions below might address some of these.

Birds

- 8.1 The submission of the Mangere Bridge Residents & Ratepayers Association Inc raises concerns regarding the bird roosting area at Kiwi Esplanade Reserve. I have addressed this earlier in paragraph 6.12 of my evidence, but to summarise, the construction site hugs the existing access road, toilet block and car park and largely avoids occupation of any of the open spaces that are the normal

shore bird high tide roosts. Additionally, while the field to the west of the site is such a roost, the primary roost for the area is on the other side of the car park.

- 8.2 The birds utilising Kiwi Esplanade must also be reasonably habituated to movement, traffic, people and noise given the proximity of these roosts to the access road, car park and public toilet. Furthermore, the potentially most-disruptive activities proposed at this site (i.e. trenching Link Sewer 4), are proposed to take place outside of the period when the roost is mainly in use (see Proposed Consent Condition 2.3). In summary, effects on shorebird roosting sites at this location will be less than minor.
- 8.3 Additional submissions raise concerns in relation to the effects of the works on “shorebird habitat” (Laingholm District Citizen’s Association). I interpret this to mean both roosting sites (discussed in the preceding paragraph) and feeding grounds (in this case being the intertidal area between Green Bay and Kiwi Esplanade). The temporary construction platform required for the works at Pump Station 23 will result in the temporary loss of some 1,300m² of what is presently a well utilised feeding habitat (i.e. for a period of up to 5 years). However, notwithstanding this loss, there is an abundance of similar intertidal mudflats in the wider area (being the vast Manukau Harbour), and additionally once construction is completed, the temporary platform will be removed and the harbour bed is likely (based on past experience) to recover relatively quickly. Given this, it is anticipated that effects on intertidal habitat will be localised and of a temporary nature.
- 8.4 The submission of Mr & Mrs Boyd and Mr & Mrs Archer suggest that the bird values of the Mount Albert War Memorial Reserve are actually moderate-high, noting several native species that they have observed to be utilising the vegetation of the park. Regardless of the avifauna values of the park, it is proposed to confine the construction site to either the reserve car-park or a corner of the reserve where the only vegetation is grass, with groves of planted flax and a few shrubs. Even were the "Reserve" option to be implemented, there would be ample alternative resources available for native birds in the remainder of the park and the surrounding gardens. Furthermore, following construction

the site would be subject to a Site Reinstatement Plan, including landscaping and planting.⁵

Rare Habitat Types and Species

- 8.5 The submission from St Lukes Environmental Protection Society Incorporated ("**STEPS**") identifies the presence of the rare Auckland volcanic rock forest within the footprints of the Lyon Avenue site and the Norgrove Avenue site. This vegetation type once covered large areas of Auckland but has since been reduced to a handful of remnants. The STEPS submission queries whether all vegetation within the proposed designated areas will be cleared or only that which is necessary to accommodate construction. I had been advised by Watercare to take a precautionary approach in this regard and to assume that all vegetation within the designation footprints would be cleared in undertaking my assessment. However, as noted in the AEE (Section 13.1 – Mitigation Measures), during the more detailed design phase of the Project attention will be given to reducing the extent of vegetation clearance, and any vegetation that must be removed will be transplanted or replaced via plantings.
- 8.6 The Norgrove Avenue site is part of the Chamberlain Park rock forest. While the underlying substrate here is basalt, the vegetation it supports is dominated by exotic trees and weeds (i.e. it is not "rock forest" as it should be). The canopy is predominantly mature willow together with Phoenix Palm and tree privet. Semi-mature native trees are present (being lemonwood and puriri) but these appear to have been planted. Approximately a dozen of these native trees are within the designation footprint. The understorey is open with a few mahoe, and grassy areas and weedfields are present. The proposed construction site is at the eastern end of the Chamberlain Park rock forest. While having a basalt substrate, virtually all of this rock forest is actually exotic and full of weeds. The overall ecological values of the construction site were therefore assessed as being Low, and the loss of this vegetation was assessed as being less than minor.
- 8.7 I concur with the STEPS submission in its desire to see this area enhanced by way of restoration planting, and point out that the removal of the exotic canopy trees within the construction site will facilitate this in the post-construction phase

5 See Condition SR.1 in Watercare's Proposed Designation Conditions & in the Council Pre-hearing Report.

of the Project. I also note that Watercare is proposing a condition⁶ requiring a Site Reinstatement Plan for each construction site, and this will include landscape and planting details.

8.8 The Lyon Avenue site is part of the Roy Clements Treeway. The vegetation here is the result of revegetation plantings and weed control over the previous 35 years or so by the adjacent Mount Albert Grammar School and a large variety of community groups. I note that Watercare has reconfigured earlier designs of this site with the intent to minimise effects on the vegetation present and to avoid the loss of trees to the greatest extent practicable. Reference to the layout plan for the site (Page 62 of the Hearing Drawing Set) shows the new configuration, which makes use of the most open parts of the Treeway.

8.9 In addition, as stated in the AEE (Part B - Site Specific Assessments section 3.5.4):

In developing the detailed design and setting out the construction area, consideration will be given to whether any additional trees within the construction area can be retained if possible.

8.10 Furthermore, Watercare is committed to reinstating the site, as stated in the AEE (Part B - Site Specific Assessments section 3.5.4):

Watercare will work with the landowner, Auckland Council, the Albert-Eden Local Board and other key parties to develop appropriate reinstatement planting to mitigate these effects.

8.11 At this site there is both a Site Reinstatement Plan for the designated area (which will be implemented after construction) and a Vegetation Enhancement Plan for outside the designated area. The details of this enhancement will be formalised in a specific Vegetation Enhancement Plan (see Watercare's Proposed Designation Conditions RC.1 - RC.5). This plan is required to cover the wider Lyon Avenue site (i.e. to include other parts of the Roy Clements Treeway between Fergusson Reserve and Alberton Avenue).

8.12 Mention is also made in the STEPS submission to the nationally threatened aquatic moss *Fissidens berteroi*. To the best of my knowledge the nearest populations of this species to any of the Project construction sites is in Meola

6 See Condition SR.1 in Watercare's Proposed Designation Conditions & in the Council Pre-hearing Report.

Creek, Motions Creek and the Western Springs lake. This moss is sensitive to smothering from sediment, so care will be needed during the construction works to ensure minimal inputs of silt. The draft details of how sediment and erosion effects will be managed at these construction sites are given in the draft Erosion Sediment Control Plans included in Part D of Technical Report K of the AEE.

- 8.13 Condition 3.7 of Watercare's Proposed Consent Conditions also requires that an Erosion and Sediment Control Plan ("**ESCP**") be prepared prior to any earthworks commencing which clearly identifies the type and location of the controls proposed. Provided these, or very similar devices and techniques are implemented, there should be no adverse effects on local populations of *Fissidens berteroii*.
- 8.14 A final ecological matter raised in the STEPS submission refers to the historic wetland (referred to as Cabbage Tree Swamp) at what is presently the Plant & Food Research site. Notwithstanding this, the submission concedes the cabbage trees presently growing here are all planted, and concludes that their loss is simply "*disappointing*". While I concur with that sentiment, I note that such a loss is not an adverse ecological effect of more than a minor nature. I also concur with the submission's recommendation that what remains of these planted cabbage trees be enhanced by way of augmentation plantings of appropriate semi-wetland species (given that the historic swamp here has long-since been drained). This can be achieved through the inclusion of such an outcome in the Site's Reinstatement Plan.

Tree Clearance and Vegetation Removal

- 8.15 The submission of Mr & Mrs Eades, Mr & Mrs Hume, Ms France, Mr & Mrs Boyd and Mr & Mrs Kerridge refer to mature native trees and open space located within the Mount Albert War Memorial Reserve site. I note that there are two options presently proposed at this site, with one footprint being within a grassed portion (pages 38 and 39 of the Hearing Drawing Set – known as the "Reserve site") and the other confined entirely to a portion of the car park (pages 49 and 50 of the Hearing Drawing Set - known as the "Car Park site"). The Car Park site will have minor effects on vegetation, involving a single flowering cherry tree and some landscape plantings (low shrubs) in the vicinity of the pedestrian access ramp. The Reserve Site will not affect any mature native trees and will

only impact upon established flax and other plantings. These include some 18 or so native trees between 3-6m high, predominantly puriri and karaka. The submission of Ms Sally Kedge requests that the absolute minimum of vegetation is removed and that the physical environment is restored at this reserve. I can confirm that both of these requests will be met by Watercare regardless of which option is eventually implemented, by virtue of the consent and designation conditions being proposed.

Marine

- 8.16 The main focus of several submissions (i.e. the Onehunga Business Association, the Manukau Harbour Restoration Society Inc, and the Forest & Bird Motu Manawa Restoration Group) appears to be the concern at the existing periodic overflow discharges from Watercare's wider network, existing discharges from the Mangere WWTP, and future overflows from the proposed EPR structure. It is only the future overflows from the proposed EPR that form part of the application before the Commissioners. The effects of this potential discharge is covered in the evidence of Mr Roan.
- 8.17 Their submission also states (as does that of Mr & Mrs Furse) that the works will have adverse effects on the ecological values of the Manukau Harbour. This is within the scope of this present Hearing insofar as it relates to the loss of intertidal habitat from the temporary construction platform at Pump Station 23 and the EPR structure (and its associated scour protection). The proposed construction platform at Pump Station 23 is temporary, is within the footprint of recent works involving disturbance of the intertidal area, and history has shown that this actual site can become ecologically reinstated without any assistance (i.e. with moderate recovery within four years). While the EPR could potentially result in the permanent loss of up to 150m² of benthic habitat, the structures themselves will provide a platform for colonisation by intertidal encrusting organisms. Additionally the area of loss is very small relative to the size of the wider Manukau Harbour (i.e. 0.001% of the total intertidal area).

Mitigation

- 8.18 Several submitters make suggestions as to what they consider to be an appropriate level of mitigation for unavoidable ecological effects of the Project (i.e. the STEPS and Mr and Mrs Whitehead). In dealing with mitigation it is most important that the proposed mitigation be at a level that is commensurate with the adverse effects associated with a particular project. Additionally, mitigation should ideally be located as close to the affected site as practicable, and attempt in the first instance to replicate in full (or better) the ecological features which will be lost. In this context I agree with some of the suggestions for mitigation put forward by submitters but I do not agree with all of them.
- 8.19 The submission of the Friends of Oakley Creek Te Auaunga Inc ("**FOOC**") raises concerns with three sites, being May Road, Walmsley Park and Keith Hay Park. Their submission suggests stream day-lighting, riparian restoration and naturalisation of channelised streams as appropriate forms of mitigation for adverse freshwater effects. What they overlook is the fact that the May Road site could have been developed for industrial purposes which would be more detrimental to the local ecology There. In addition they overlook the significant ecological benefits that are associated with the Project as a result of reducing annual average overflow volumes into local waterways by at least 80%.
- 8.20 Notwithstanding this significant benefit, in relation to the Walmsley Park and Keith Hay Park sites the extent of construction activities is relatively minor, especially given that the proposed access crossing at the former site is going to be via a temporary bridge and there are no stream works at the latter site.
- 8.21 In my opinion the potential for adverse ecological effects at either site is low, and consequently, there is no need for any ecological mitigation (although site reinstatement will be necessary). The FOOC submission suggests stream daylighting at the Keith Hay Park site, which I consider unrealistic in relation to the extent of the potential adverse effects here. I concur with the suggestions relating to planting, and note that this will be addressed in the Site Reinstatement Plans for these two sites. I note that Council also has enhancement plans for this part of Keith Hay Park, and the Project works will not impact upon those plans except for a small area of carpark.

- 8.22 In relation to the May Road site, the FOOC submission seeks the provision of a 15m planted riparian buffer here. As set out in detail in the evidence of Mr Cantrell and Mr Cooper, this site is a primary construction site that will involve considerable construction activities for a period of around five years. Sediment runoff to the creek is the primary potential concern here and the draft ESCP for this site sets out measures designed to keep sediment discharges to minimal levels. However, given the duration of the works at this site and the sizeable population of shortfin eels in the creek, I generally concur with the FOOC submission in relation to the riparian planting as sufficient mitigation. The exact dimensions and type of planting would be finalised in the May Road Site Reinstatement Plan that Watercare will prepare prior to site disestablishment.
- 8.23 Lastly, the FOOC submission also recommends that the constructed wetland for stormwater treatment be built with natural ecological outcomes in mind and incorporate Low Impact Urban Design Development ("**LIUDD**") principles. I note that this treatment wetland will need to be consistent with the ARC's TP10 which requires such outcomes, so this recommendation will be achieved.

9. RESPONSE TO COUNCIL PRE-HEARING REPORT

9.1 I have read the Council Pre-hearing Report and the background inputs from Council's ecological experts. I provide a summary of their conclusions and my response below under the appropriate sub-headings.

9.2 The Council Pre-hearing Report states:

The application has been reviewed by Claire Webb, the Council's Senior Ecologist for the Biodiversity Central/South team. Ms Webb advises that her team do not have any further issues with respect to the project as the shorebird issues have already been sufficiently addressed following earlier meetings with the applicant to discuss wafer issues and timing for the works at Kiwi Esplanade (being the most sensitive part of the project area for shorebirds). ...

In summary it is considered that the proposal will have less than minor adverse ecological effects.

9.3 I agree with these conclusions.

Vegetation

- 9.4 The Council Pre-hearing Report concludes that the proposed vegetation removal will have adverse effects on trees at each location to varying degrees, but that on balance the adverse effects are generally less than minor (although some sites require a significant degree of mitigation to meet this level). The Council Pre-hearing Report continues that the proposal will in the long-term have insignificant effects on urban tree cover.
- 9.5 The Council Pre-hearing Report notes in Section 9.3.11 that the process of individual assessment, evaluation and approval of Outline Plans of Works ("**OPW**") for each stage of the project will allow Watercare to address the environmental effects of the works on a site-by-site basis with potential input from Auckland Council to ensure appropriate controls and mitigation are implemented.
- 9.6 In section 9.3.19 the Council Pre-hearing Report notes that no vegetation was identified as being of significance, although adverse effects were expected as a result of tree removal at Lyon Avenue, Pump Station 23 and Pump Station 25. The Council Pre-hearing Report correctly identifies that mitigation of these effects is proposed by way of revegetation planting. In my opinion this level of mitigation is adequate, and the details will be dealt with in each Site Reinstatement Plan.
- 9.7 I concur with the conclusions expressed and endorse the proposed process of individual assessment and OPWs for each stage of the project. I further note that the use of CMPs for each site will provide the means by which any trees that might not necessarily need to be removed can be identified (as required by Designation Conditions CM.2(n) and T.1 recommended by Watercare and the numbers of trees required to be cleared thereby minimised. I note that Watercare has proposed deleting the Council's proposed Designation Conditions CM.4 and CM.5, and I concur that they appear unnecessary given Watercare's proposed Designation Conditions CM.2(n) and T.1 as described above.

Herpetofauna

- 9.8 In Section 9.3.19 the Council Pre-hearing Report simply summarises the AEE and no further comment is made in the Council Pre-hearing Report about herpetofauna. It is my understanding that Watercare will comply with the best

practice approach in relation to the management of lizards as described earlier in paragraph 7.7 of my evidence.

Avifauna

- 9.9 Both the expert's report and the Council Pre-hearing Report identify the high tide roost at Kiwi Esplanade as being the largest potential avifauna issue associated with the Project. However, both conclude that the solution proposed by Watercare (i.e. to confine the most disruptive works – being the trenching of Link Sewer 4) to the months of the year when migratory shore birds are absent (see Condition 2.3 of Watercare's Proposed Consent Conditions) appropriately mitigates effects on avifauna at that roost site.
- 9.10 The expert's report and the Council Pre-hearing Report also confirm that the other construction works proposed at the Kiwi Esplanade Reserve site should not cause a problem for shorebirds given the ample alternative roosting space within the reserve, as well as the adjacent Ambury Park.
- 9.11 I concur with these conclusions.

Marine

- 9.12 *Tunnel:* In relation to the seabed between Pump Station 23 and Kiwi Esplanade, Mr Morgan's Report, for the Council, does not consider this to be adversely affected by the Project. The Council Pre-hearing Report confirms that Mr Morgan's Report has not raised any concerns with respect to the effect of the proposed tunnel on the seabed of the Manukau Harbour. I concur that any effects as a result of the tunnel will be less than minor (if at all).
- 9.13 *Temporary Construction Platform:* In relation to the temporary construction platform at Pump Station 23, Mr Morgan's Report and the Council Pre-hearing Report concur with my findings that recolonisation of this site by intertidal biota can be expected once the temporary material is removed. The Report also notes that because of the relatively short residence time, the temporary platform's position within the tidal range and the relatively low energy setting, no appreciable impact on coastal processes is expected. The Council Pre-hearing Report adopts this assessment and confirms that it considers any adverse effects

on the ecology of the CMA adjacent to Pump Station 23 will be less than minor. I concur with these conclusions.

- 9.14 *EPR Structure*: In relation to the EPR structure, Mr Morgan's Report and the Council Pre-hearing Report note its location within a modified environment and its relatively small size mean it does not represent a significant enough change in the form of this part of the CMA to significantly impact upon local coastal processes. They both further note that while the construction of the outfall structure will create some disturbance to the local ecology it is expected that there will be rapid recolonisation of the disturbed area following construction. Overall both Mr Morgan's report and the Council Pre-hearing Report conclude that the proposed outfall structure will have less than a minor adverse effect on the coastal environment of this part of the Manukau Harbour. I concur with these conclusions.

Section 7 (Resource Management Act) - Other Matters

- 9.15 In relation to Section 11.3 of the Council Pre-hearing Report ("Section 7 – Other Matters" in reference to section 7 of the Resource Management Act ("**RMA**")), I concur with the conclusion that the Project will enhance the water quality of streams currently affected by wastewater overflows, while maintaining the high quality of wastewater discharges to the Manukau Harbour presently authorised by existing Watercare permits. As such I agree that the Project is consistent with sections 7(d) and 7(f) of the RMA, insofar that the Project does have particular regard to the intrinsic values of ecosystems and the maintenance and enhancement of the quality of the environment.

Further Evidence

- 9.16 In Section 14.1.1 of the Council Pre-hearing Report, it is recommended that Watercare provide further evidence at the Hearing to help clarify several matters. These include two that relate to vegetation, being as follows:

(c) *In regards to Pump Station 23 (Frederick Street), the matter of the retention of the existing pohutukawa tree in the north-west corner of the reclamation (nearest to 33A Frederick Street).*

(d) *In regards to the Kiwi Esplanade site, the feasibility of transplanting the pohutukawa trees proposed to be removed, elsewhere on the esplanade.*

9.17 In relation to the first matter (i.e. 14.1.1(c)), I note that discussions have been held with the project engineers to investigate the potential retention of this tree, but they have concluded that this is not viable and the tree needs to be removed to facilitate the proposed works here. While this situation is unfortunate the loss of this tree (and any others at this site) is not a significant adverse ecological effect.

9.18 In relation to the second matter, the transplanting of the pohutukawa is feasible, especially given that the species is hardy and naturally resilient to disturbances to its root zone (which gets regularly damaged on eroding coastal cliff situations with little obvious effect on tree health). Additionally, the machinery necessary to perform tree transplanting will already be on site during the construction works. As a result, it is proposed that at least some of the pohutukawa within the construction footprint in Kiwi Esplanade will be transplanted.

10. PROPOSED DESIGNATION ECOLOGICAL CONDITIONS

10.1 The Council Pre-hearing Report includes Watercare's recommended designation conditions and proposes amendments to those conditions. This includes several that relate to Construction Management ("**CM**"). CM.1 requires the preparation of a CMP or Plans that cover all sites. CM.2 specifies what each CMP needs to include, and CM.2(n) requires "*measures for the protection of trees as identified in Condition T.1*". Condition T.1 covers Tree Management Conditions, and both the Watercare and Council Pre-hearing Report versions of this condition specify that CMPs must include details as to how potential impacts of construction on trees will be managed, including:

(a) *Identification of trees to be protected, pruned, removed or transplanted and procedures for marking these out on site.*

(b) *Procedures for identifying and protecting significant trees to be retained where works occur in the dripline of such trees as identified by a suitably qualified person.*

- 10.2 I concur with these measures. I note also that Watercare proposes to amend Condition T.1 to include a third point, with this requiring the provision of details in the CMP on the proposed location for any transplanted trees, including details of any required landowner agreements if these locations are outside of the designation. I concur with this proposed amendment.
- 10.3 In addition, the Proposed Designation Conditions include Site Reinstatement ("**SR**") conditions. SR.1 specifies the requirement for Reinstatement Plans to be prepared at each of the construction sites, with these plans detailing the proposed landscaping and planting and setting out the implementation and maintenance programmes (see Condition SR.1(d)). I note that Watercare propose to delete the additional SR conditions proposed by Council. I have reviewed the Council's proposed additional SR conditions and conclude that (with one exception) they are not necessary, since they add little, if any, additional ecological material not already sufficiently covered under SR.1.
- 10.4 The exception is their reference to Crime Prevention Through Environmental Design principles. However, I note that Watercare proposes to retain two additional SR conditions that reference these principles (see Conditions SR.1A and SR.1B). I support Watercare's Proposed Conditions as put forward by Ms Petersen and consider that the Council's proposed conditions are not necessary.
- 10.5 I further note that a specific Vegetation Enhancement Plan is required under Watercare's proposed new Designation Conditions RC.1 - RC.5 for the Roy Clements Treeway outside of the designated Lyon Avenue site. This is to include enhancing the ecological values of Meola Creek and its adjacent riparian habitat. I concur with these proposed new Designation Conditions.

PROPOSED RESOURCE CONSENT ECOLOGICAL CONDITIONS

- 10.6 The conditions proposed to be proposed to be attached to the resource consents include similar provisions as those in the Designation Conditions in relation to tree protection to be achieved by virtue of measures to be included in CMPs for each construction site (Condition 1.7(n)). I concur with these conditions.

10.7 Similarly, Proposed Consent Condition 2.2 repeats verbatim the words of Proposed Designation Condition T.1 quoted in paragraph 10.1 of my evidence. It additionally specifies (Consent Condition 2.3) that the trenching of the Link 4 Sewer across Kiwi Esplanade Reserve is to be undertaken between August 1st and November 30th in any one year so as to limit potential effects on roosting shorebirds. I concur with these conditions.

10.8 Proposed Consent Conditions 9.1 - 9.10 relate to the works proposed in the CMA (i.e. the temporary construction platform at Pump Station 23 and the EPR structure at the proposed Mangere Pump Station). Consent Condition 9.4(c) requires the CMP for these sites to confirm "*details of all practicable steps to be taken to minimise disturbance of the seabed during the construction activities*". Consent Condition 9.5 requires the preparation of a Site Restoration and Landscape Plan at the two CMA construction sites (to be approved by Council) which will specify:

- (a) *Methods for removal of the temporary construction platform at PS 23;*
and
- (b) *Measures, methodology and timetable for reinstating disturbed areas of the CMA and coastal margins.*

10.9 This is agreed with. However, Proposed Consent Condition 9.11 requires that within one week following completion of the works the seabed shall be reinstated and:

*... any remaining disturbance of the foreshore and seabed is able to be rectified by the operation of natural processes **within seven days.***

10.10 This is ambiguous in-so-far that it is not entirely clear whether the intent is for the rectification of the seabed disturbance (by natural processes) to be completed within seven days (i.e. full recovery of the community here within one week – which is impossible) or whether the intent is to ensure that natural processes (which will eventually lead to a full recovery at the site) would have begun within seven days.

10.11 The reinstatement works will need to include the full removal of any deposited material from the seabed, the “smoothing” out of the seabed by mechanical means, and then simply leaving it to recover by way of natural recolonisation processes. It is certain that such recolonisation will occur (based on previous experience, including specifically within the CMA adjacent to Pump Station 23), but it will not occur within seven days. Previous works at PS 23 occurred four years ago, and the specific site of those works has shown a moderate recovery in that space of time. I recommend that Proposed Consent Condition 9.11 be amended such that the phrase “*within seven days*”, set out above, is struck out. This removes any doubt and ambiguity in this proposed condition.

11. CONCLUSIONS

11.1 As described in **Table 5**, there is potential for the proposed works to have more than minor adverse ecological effects at only three sites, being Lyon Avenue, Pump Station 23 and Pump Station 25. I consider that these effects can all be appropriately and sufficiently mitigated in the manner set out previously in my evidence and summarised below.

11.2 The principal form of mitigation in relation to vegetation loss is tree protection within the designated footprints in accordance with Watercare's Proposed Designation Condition T.1. Additionally, site reinstatement plans will address replanting and revegetation requirements, including addressing opportunities for enhancement of the three existing bush areas associated with Pump Station 23 and Pump Station 25. In addition a specific Vegetation Enhancement Plan is required under Watercare's proposed new Designation Conditions RC.1 - RC.5 for the Roy Clements Treeway.

11.3 The principle form of mitigation in relation to herpetofauna is to undertake a salvage and relocation operation in those construction sites identified in paragraph 7.7.

11.4 In relation to shore birds, programming the most disruptive trenching works proposed across the reserve at Kiwi Esplanade to take place outside of the peak shore bird season (as proposed by Watercare) should reduce any potential adverse effects on those birds to minor levels (at worst).

- 11.5 The effects of the Project on local freshwater communities are generally considered to be at worst only minor. Notwithstanding this, if not appropriately managed there could be some increases over existing background levels in the amount of suspended sediment in the local waterways within the Project area, and it is appropriate that the potential effects of these be mitigated. Mitigation will be delivered during construction by way of implementation of erosion and sediment controls, and on completion by way of the riparian planting as part of the Site Reinstatement Plans that Watercare is proposing for all construction sites. This principally involves the reinstatement, landscaping and replanting of these construction sites following completion of construction activities at each.
- 11.6 In addition, when considering freshwater effects associated with the Project it is necessary to bear in mind that following construction the Project will result in an 80% reduction in annual average wastewater overflows to local streams, which is a very significant benefit to the local freshwater (and marine) environments.
- 11.7 Past records demonstrate that moderate ecological reinstatement of the intertidal area at the Pump Station 23 site has occurred within four years following previous very similar levels and types of disturbance. A similar approach to reinstatement is recommended for this site (i.e. removal of the deposited material and smoothing of the intertidal area).
- 11.8 In this regard I note there is one proposed condition for which I recommend a wording amendment. This is in relation to Proposed Consent Condition 9.11, for which I recommend the deletion of the last three words as it presently reads (as discussed in paragraph 10.7 of my evidence).

11.9 All in all the extent of adverse ecological effects associated with the Project are limited (and concern just three sites), and the ecological benefits that would result from the Project in terms of significantly reduced annual average overflows to the environment are major. In my opinion Proposed Conditions recommended in the Council Pre-hearing Report are adequate to ensure that the appropriate levels of mitigation are implemented and the ecological effects of the Project are appropriately managed.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke that tapers to the right.

David Slaven

12 July 2013.