WATERVIEW CONNECTION PROJECT
Environmental Overview - Owairaka
Outline

• Existing environment/investigations.
• Potential impacts on the environment.
• Proposals to avoid, remedy and mitigate adverse effects.
• Opportunities for enhancement.
Environmental Investigations

- Coastal processes
- Land/ Sediment contamination
- Marine ecology
- Birds
- Vegetation
- Lizards
- Freshwater ecology
- Flooding
- Archaeology
Coastal Processes - change in Waterview Inlet: 1940 to present
# Contamination Investigation

## Scale of Investigation

<table>
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<tr>
<th>Boreholes</th>
<th>Test Pits</th>
<th>Augers</th>
<th>Soil/ Sediment Samples</th>
<th>Groundwater Samples</th>
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<tr>
<td>133</td>
<td>56</td>
<td>25</td>
<td>338</td>
<td>61</td>
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**Investigation covered:**

- At Grade Section (SH20)
- Tunnel Section
- Interchanges (Maioro & Waterview)
- SH16 widening

**Assessed:**

- Soil
- Groundwater
- Landfill Gas
Contamination Investigation

- Currently ongoing
Contamination - Summary

**Soil Samples**
- No significant soil contamination
- Awaiting results from area of possible ‘refuse’

**Marine Sediment**
- No significant soil contamination found to date

**Groundwater**
- No significant groundwater contamination

**Contingency**
- Management Plans deal with random “hot spots”.

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Marine Ecology - Motu Manawa Marine Reserve

- Established 1995 and included in the Hauraki Gulf Marine Park.

- 500 ha of mudflats, channels, mangroves, saltmarsh, and shellbanks.

- Intertidal flats examples of mangrove and saltmarsh habitat support numerous wading birds.

- Mudflats and sandflats support a diversity of coastal invertebrates and fish.
Marine Ecological - Investigations

• Surface sediment sampling for contaminants and sediment grain size – intertidal & subtidal.

• Invertebrate community composition (shellfish, snails, mud worms and crabs).

• Literature review for fish

• Qualitative coastal vegetation inventories.
Marine Ecology - Sediment

Waterview Inlet

–Past and present landuse/ discharges have impacted sediment quality.

–Sediment predominantly very fine silt and clay fraction.

–Constriction of tidal exchange, stormwater and contaminant discharges has resulted in elevated contaminant concentrations in sediment.

–Contaminants often exceed ARC criteria
Invertebrate Ecological values within proposed area of disturbance:

- Waterview Inlet – patchy moderate
- Mouth of Oakley Creek – moderate to low
- Between Waterview and Te Atatu – patchy moderate to high
- Whau Bridge – moderate
Bird Surveys

- Terrestrial birds along SH20
- Marsh birds at various locations
- Coastal birds
  1) Overview survey around Marine Reserve
  2) Causeway survey – north & south sides
Bird Survey - Summary

- **Terrestrial birds:**
  - Common species only

- **Marsh birds:**
  - Within and immediately adjacent to the footprint
  - No banded rail or fernbird found

- **Coastal birds:**
  1) **Overview survey:**
     - 18 species recorded (9 species were wading birds)
     - ‘Threatened’ & ‘At risk’ species (pied shag, red-billed gull and wrybill)
  2) **Causeway survey:**
     - Three dominants (pied oystercatcher, white-faced heron, pied shag)
     - Northside bias: red-billed gull, black-backed gull
     - Southside bias: pied stilt, wrybill
Vegetation - *Mimulus Repens*

**Waterview Connection Project - Location of *Mimulus repens* (Maori musk)**

Key
- *Mimulus repens* habitat
Lizards

- **Copper Skinks** (*Oligosoma aeneum*)
  - Not threatened
  - Restricted to NI
  - Probably most common native lizard in NI
  - Commonly found in rank grass and bush edges
  - Suburban environments, reserves, roadsides
  - Relocation of population possible

- **Rainbow skinks** (*Lampropholis delicata*)
  - Introduced
  - Potential pest
  - Upper NI of NZ
Freshwater Ecology- Auckland’s Streams

Figure 3 – NIWA stream reaches, produced by KMA and Beca
FreshWater Ecology - Oakley Creek
Fish Species Below Waterfall:
- longfin eel
- shortfin eel
- common smelt
- inanga
- common bully
- redfin bully (one record)
- giant bully (one record)
- torrentfish (one record)

Fish Species Above Waterfall:
- longfin eel
- shortfin eel
- goldfish
- mosquitofish
- banded kokopu (one record)
Freshwater Ecology - Regional Invertebrate Data

[Bar graph showing average MCIab (soft bottom sites) for different regions and land uses]

ARC, 2008
Freshwater Ecology - Summary

- Three streams affected, the most significant being Oakley Creek.
- Receives stormwater/sewer overflows typical of urban environments.
- Macroinvertebrate communities indicate polluted conditions.
- Native fish diversity limited by waterfall.
- Rehabilitation guidelines prepared to detail how this will be achieved.
Flooding - Alan Wood Reserve
Archaeological Evaluation process

- Historic research, databases and early plans
- Detailed survey of archaeological remains
- Creation of a Heritage GIS constraints layer
- Identification of constraints and enhancement opportunities contributing to the appreciation of Auckland’s Heritage
Archaeology - Sites around the Great North Road Interchange
Potential Environmental Impacts

- Land disturbance (Erosion and sediment control)
- Reclamation/ channel excavation
- Stream diversion
- Vegetation removal
- Land contamination
- Construction Dust
- Groundwater abstraction
- Stormwater management
Motorway Construction
Motorway Construction - Shotcrete
Erosion Protection - Mulch
Erosion protection - Stabilisation
Sediment Retention Pond
Sediment Retention Pond
Sediment control
Stormwater - Design Philosophy

Stormwater treatment provided for

• all new impervious surfaces
• for existing impervious surfaces where practicable

Sediment removal achieved by:

• Wetlands
• Grassed swales
• Grassed filter strips
• Proprietary cartridge filters
Stormwater pond
Potential Stream Rehabilitation Works

Key:
- Potential rehabilitation of natural stream alignment Typology A
- Potential re-aligned stream channel Typology B
- Potential channel rehabilitation Typology C
- Potential channel rehabilitation Typology D
- Potential channel rehabilitation Typology E
- Potential future culvert
- Special feature areas
- Tributaries

1. Potential naturalisation of stream culvert at the park entrance
2. Potential pools upstream and downstream of potential culvert

“Cold Stream Insurance” property - Conserved stream re-alignment

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Streamworks - Design Philosophy

- Stream realignments and culverts required in Alan Wood and Hendon reserves
- Stream enhancement planned as offset mitigation to be developed with ecology, urban design, land use (parks) inputs
- Objective of net ecological benefit to stream
- Flood issues being investigated in conjunction with ACC/Metrowater. Integrated approach.
Stream Rehabilitation Concepts

Rehabilitation of the Re-aligned Stream Channel

[Diagram of stream rehabilitation concepts]

[Images of rehabilitated stream channels]

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Stream Rehabilitation Concepts

- Bank protection at the outside bend
- Boulders form low flow invert
- Inverted rock vanes redirect flows to the channel centre
- Low velocity shallow point bar planted with sedge and rush spp.
- Radius determined by flow quantities and channel width
- Inverted rock vanes or boulder placement to redirect and dissipate flow energy before the outside bend

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Stream Rehabilitation Concepts

- Low planting to achieve views
- Floodplain planting
- Slope planting
- Stream edge planting
- Planting as per ARC’s TP148

- Views to stream
- Sightlines to path ahead (acc/CPTED principles)
- Shrub vegetation to private boundaries

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Rehabilitation of the Natural Stream Alignment
Stream Rehabilitation Concepts

Rehabilitation with Stormwater Treatment Facilities
Conclusions

• Existing environment is diverse ranging from high value through to degraded.
• Extensive investigations have helped to understand the values.
• The project will generate effects that will need to be managed.
• There are a range of measures through the design and implementation to avoid, remedy or mitigate effects.