

MoMento

Issue 13 March 2013 **photo**forum

Motu Manawa
Whau River
Rosebank Road

The content for this issue of MoMento came about via Marcus Williams' invitation to participate in The Rosebank Project – a curated art event involving many multi-disciplinary artists - for the 2013 Auckland Arts Festival.

The Rosebank project begins with the premise that through a better knowledge of place, communities grow and that culture is the mechanism by which this occurs. The project is centered in the industrial precinct and suburban area of Rosebank Rd in Auckland, New Zealand, built over an estuarine peninsula of significant ecological worth and geological interest; the site of the oldest market gardens in Auckland. In the western reaches of the upper Waitemata Harbour, Rosebank Peninsula has the Whau river on its western side, Pollen Island and Motu Manawa Marine Reserve at the northern end and Avondale Racecourse and Jockey Club at its southern end.

Marcus Williams

I am only vaguely familiar with the Rosebank peninsula as location. I recall spending some time looking for a warehouse suitable for a photographic studio in the mid 1990s. Later I had my old Renault car repaired there many times by a specialist mechanic with his workshop on the edge of an industrial precinct near a bank of the Whau River. So I was most appreciative of Marcus' incentive to involve local organisations to assist and inform the artists, such as Avondale/Waterview Historical Society Inc., Avondale Community Gardeners, Whau River Catchment Trust, and the Rosebank Business Association. Their websites, as well as the former Waitakere Council-produced brochure *The Whau: our streams, our river, our backyards*, acted as excellent guidebooks for this tourist photographer. But the most memorable and informative was the guided tour to the Motu Manawa/Pollen Island Marine Reserve organised by the Forest and Bird Motu Manawa Restoration Group. The weekend jaunt into the mangrove and bird sanctuary (scientific reserve) positioned right along the North Western Motorway, was led by Michael Coote, Kent Xie and Raewyn Michael. Their excellent commentary spanned the geological time scale and more recent natural and cultural markings left on this spectacular site. Zooming along the motorway will never be the same again, knowing what is just beyond the barrier. The jostling of the marine reserve against the expanding causeway that cuts across it and the urban and industrial development staking claim to the edges, became the prime attraction for this tourist.

So, what is in this publication is not art or research, but a collection of snapshots by a tourist: a scrapbook souvenir impression of a place, enriched somewhat thanks to the help of local knowledge. When I was walking along the Avondale Rd industrial area it felt just as exotic as other charged tourist destinations I have walked, such as the Valley of the Kings in Luxor. The layers of history and the present day industry humming along all around swamping my senses: the sense of loss of what has been removed, that once thrived, the sense of dynamism of the present occupants, their hopes and aspirations, their continuing will to change, adopt and survive. The integration of all enriching histories makes a better tourist destination, moreover, somewhere the tourist may choose to linger longer and perhaps even to stay on and participate. Maybe that elusive studio space could be found here after all.

Haruhiko Sameshima

*Pleistocene fossilised shrimp beds
made by burrowing shrimps in mud in last interglacial
(150,000 years ago) period - cast in sand cemented by limonite
from Forest and Bird Motu Manawa Restoration Group guided tour note*







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Rosebank Rd, Avondale, Auckland, New Zealand



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Motu Manawa / Pollen Island

Motu Manawa (Pollen Island) Marine Reserve Restoration

At about 500 hectares in area, the Motu Manawa (Pollen Island) Marine Reserve is Auckland's largest inner city estuarine wildlife refuge still preserved in its mostly natural state. Situated in the Waterview inlet of Waitemata Harbour, the marine reserve was established in 2005 to protect a diverse saltwater wetland habitat comprised of intertidal mudflats, tidal channels, mangrove swamp, saltmarsh, shellbanks, tussock and scrubland. From the 1880s until the 1950s, over 90% of Auckland's wetlands were drained or otherwise compromised, so the marine reserve's rich area is prized by wetland birds as one of their most significant feeding and breeding grounds in the upper Waitemata Harbour. Forest and Bird was responsible for sponsoring the marine reserve's establishment.

Birds to be found within the boundaries of the marine reserve include fernbird, grey warbler, banded rail, pukeko, spotless crane, white-faced heron, red billed gull, black backed gull, white-fronted tern, Caspian tern, godwit, knot, sandpiper, black oystercatcher, South Island pied oystercatcher, wrybill, pied stilt, pied shag, royal



spoonbill, New Zealand dotterel, banded dotterel, kingfisher, harrier and on one very rare occasion in 2013, three Australian pelicans. These birds are drawn in by vast quantities of food for the taking including insects, mud crabs, mud snails, bivalves, and schooling fish such as yellow eyed mullet.

Two islands are surrounded by the marine reserve. One is Pollen Island, an open scientific reserve under management by the Department of Conservation. The other is Traherne Island, which is Crown land held for public works under management by NZTA. From the 19th to the 20th centuries, both islands were historically in private ownership and exploited for their cockle shellbanks, with the shells collected and burned into lime



for use as construction mortar and agricultural fertilizer. Since the 1950s, previously isolated Traherne Island has had the State Highway 16 motorway causeway running directly across it. Before it became an open scientific reserve, Pollen Island was leased from the Auckland Harbour Board and managed as a private wildlife sanctuary by Forest and Bird from 1995 to 2005.

In recent years, in part stimulated by the Waterview Connection Project and reconstruction planned for the State Highway 16 motorway causeway, there has been revived interest in the Motu Manawa (Pollen Island) Marine Reserve and the pair of islands it encloses, with more resources being dedicated progressively to conservation and restoration in this precious wetland habitat



by authorities such as Auckland Council, NZTA and the Department of Conservation. Official weed and pest management plans are being implemented, boardwalks and other public access amenities are proposed, and environmental community groups like Forest and Bird have actively returned to provide volunteer services such as guided walks to the islands and predator control. For those with a bigger picture in mind, it would be wonderful to see the marine reserve extended to protect the wading bird feeding grounds of tidal foreshore and seabed along the eastern coastline of Te Atatu Peninsula. For more information, see the webpages of the Forest and Bird Motu Manawa Restoration Group at : www.forestandbird.org.nz key words "motu manawa".

Forest & Bird Motu Manawa Restoration Group 2013





Te Whau, which takes its name from the whau tree, is the Maori name for the tidal creek flowing into the Waitemata Harbour. It is also the name of a headland off Blockhouse Bay, on the shores of the Manukau Harbour. Te Whau is part of the vast area known as 'Te Wao nui o Tiriwa', or, 'The great forest of Tiriwa', the ancient Maori name for West Auckland and surrounding districts. Maori have used the Whau for centuries as an important transport route, which gave access into the Manukau Harbour. The Whau was also rich in food resources. Large trees nearby also provided the locals with all that they needed to build canoes. Hence the name of a creek at the headwaters of the Whau on the eastern side known to tangata whenua as 'Te Kotuitanga', or, 'The dovetailing of canoes'. Over the centuries, a number of related hapu or sub tribes lived around the Whau district. The first occupants of the area were

Whau River



the Patupaiarehe, also known as turehu and Tahurangi. They were the earliest ancestors of the Kawerau and Te Waiohua people. Specifically, the Whau is the domain of the Ngati Poa Taniwha sub tribe of the Kawerau people who lived around the western and northern shores of the Waitemata Harbour and maintained many Pa throughout the district.

Throughout Aotearoa, Maori gave names to places of importance. Often, an area is known by more than one name. The Whau is no exception. To the Kawerau and Waiohua people, the Whau is also known by the name of 'Waitahurangi', or, 'Waters of the Tahurangi'. Today, Waitahurangi refers to a creek on the Western side of the Whau, however, the tangata whenua also use the name to refer to the whole of the Whau.

While the definition of a "catchment" is one way of looking at and talking about land and water in New Zealand, tangata

whenua understand ancestral waterways in terms of tribal boundaries and relationships. The "tribal catchment area" is identified in terms of key geographic features such as maunga (mountains), awa (rivers) and puna (water sources/ springs), which form the basis of iwi and hapu identity and spiritual and physical sustenance.

Maori view water and other natural resources as taonga (treasures) with spiritual and metaphysical properties. These properties, both practical and spiritual, are bound together within the mauri or life force that empowers all living things, makes human beings a part of the natural world and is central to the mana and lifeblood of iwi, hapu and whanau.

When Pakeha talk about restoring the health of streams and rivers they often talk in terms of ecological health. In Maori terms, this is expressed as restoring the mauri. Both viewpoints serve to protect our streams and rivers.



These different ways of seeing are enshrined in the Treaty of Waitangi and the Resource Management which require Local Government organisations, such as City and Regional Councils, to take into account both viewpoints, including the unique role and distinct cultural beliefs and traditions of Maori.

The Whau: our streams, our river, our backyards Jo Mackay, Waitakere City Council, 2001 p8



The Kurt Brehmer Walkway

Species List for Kurt Brehmer Walkway

Botanical Name - Maori Name - Common Name

(P = planted)

GYMNOSPERM TREES

Agathis australis - kauri - kauri

Podocarpus totara - totara - totara

MONOCOT TREES

Cordyline australis - ti kouka - cabbage Tree

Cordyline pumilio - ti rauriki - dwarf cabbage tree

Rhopalostylis sapida P - nikau - nikau

DICOT TREES

Alectryon excelsus P - titoki - titoki

Avicennia marina var. *resinifera* - manawa - mangrove

Coprosma lucida - karamu - karamu

Coprosma repens - taupata - taupata

Coprosma rhamnoides

Coprosma robusta - karamu - karamu

Corynocarpus laevigatus - karaka - karaka



Cyathodes juniperina - mingimingi - soft mingimingi
Dysoxylum spectabile - kohokohe - kohekohe
Geniostoma rupestre - hangehange - maori Privet
Griselinia littoralis P - papauma / kapuka - broadleaf
Hebe stricta - koromiko - koromiko
Knightia excelsa - rewarewa - rewarewa

Leptospermum scoparium - manuka - manuka
Leucopogon fasciculatus - mingimingi - prickly mingimingi
Macropiper excelsum - kawakawa - pepper Tree
Melicytus ramiflorus - mahoe - whiteywood
Metrosideros excelsa - pohutukawa - pohutukawa
Myoporum laetum - ngaio - ngaio

Myrsine australis - mapou - red Matipo
Nestegis apetala P - - coastal maire
Oleria furfuracea - akepiro/tanguru -
Oleria travarsii P
Pittosporum crassifolium P - karo - karo
Pittosporum eugenoides - tarata - lemonwood





Pittosporum tennuefolium P - kohuhu - kohuhu

Pseudopanax lessonii P - houpara - houpara

Sophora microphylla - kowhai - kowhai

Sophora tetraptera P

Streblus banksii P - towai - large leaved milk tree

Vitex lucens P - puriri - puriri

DICOT LIANES

Parsonsia heterophylla - kaihua/kaiwhiria - n.z jasmine

FERNS

Adiantum cunninghamii - tawatawa/huruhuru tapairu - common maidenhair

Asplenium flaccidum - makawe - hanging Spleenwort

Asplenium oblongifolium - huruhuru whenua - shining Spleenwort

Asplenium polydon - petako - sickle Spleenwort

Blechnum novo-zealandii - kiokio - palm leaf Fern

Cyathea dealbata - Ponga - silver tree fern

Cyathea medullaris - mamaku - black tree fern

Doodia australis - pukupuku - rasp fern

Gleichenia microphylla - waewaekaka - carrier tangle

Histiopteris incisa - mata - water fern

Microsorium pustulatum - kowoawao - hounds tongue

Paesia scuberula - matata - hard fern

Pneumatopteris pennigera - pakauroraro/piupiu - gully fern

Pteridium esculentum - rarahe - bracken

Pyrrosia eleagnifolia - ngarara wehi/ota - leatherleaf fern

Tmesipteris elongata - - fork fern

FERN ALLIES

Lycopodium deuterodensum - puakarimu -

GRASSES

Anemanthele lessoniana P - - gossamer Grass

Ghania lacera - mapere - cully grass

Ghania xanthocarpa - mapere - cutty grass

Oplismenus hirtellus var. *imbecillus* - -

SEDGES

Carex secta P - -

Uncinia uncinata kamu * / matua a maui - hook grass

REEDS

Baumea juncea - -

Baumea rubiginosa - -

Lepidosperma australe - -

Leptocarpus similis - oiioi -

Schönous tendo - -

MONOCOT HERBS



Astelia banksii - -
Astelia solandri - kowharawhara - perching lily
Collospermum hastatum - kahakaha - widow maker
Dianella nigra - turutu - n.z blueberry
Libertia grandifolia P - mikoikoi - n.z iris
Machaerina sinclairii - -
Phormium tenax - harakeke - n.z flax
Phormium cookianum P - wharakiki - mountain flax
 DICOT HERBS
Haloragis erecta - toatoa - shrubby haloragis
Sarcocornia quinqueflora - - glasswort
 WEEDS
Acanthis mollis - - bears britches
Araucaria sericifera - - moth plant

Arundo donax - - giant reed
Acacia spp. - - wattle
Bambusa spp. - - bamboo
Cortaderia selloana - - pampas grass
Elaeagnus x reflexa - - elaeagnus
Hedychium gardnerianum - - kahili ginger
Ligustrum lucidum black - - tree privet
Ligustrum sinense - - chinese privet
Pennisetum clandestinum - - kikuyu grass
Pinus radiata - - radiata pine
Rubus fruticosus agg. - - blackberry
Paraserianthes lophantha - - brush wattle
Solanum mauritanium - - woolly nightshade
Tradescantia fluminensis - - wandering jew

Ulex europaeus - - gorse
Watsonia bulbifera - - watsonia

Report on the Vegetation Composition of the Kurt Brehmer Walkway.
 Prepared for The Friends of the Whau Inc.
 by Thomas Emmitt (Dip.Sust.Hort) and
 Michael Ngatai (Dip.Sust.Hort)
 31st July 2003 pp10-13
<http://www.whauriver.org.nz/gallery/kurt-brehmer-walkway-june-2012>



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Waterview Estuary







"The Waterview Estuary and Oakley Inlet (up to where Oakley Creek enters the CMA). This estuarine system has been substantially modified by catchment land-use changes and the construction of the original Causeway. Catchment run-off has lead to an accumulation of muddy sediments since land clearing or urban development commenced. Decades of industrial activity and a long history of poor environmental practices have also resulted in degradation in water quality within the Estuary. The construction of the Causeway in 1952-53 also had a significant effect on the flow dynamics of the two previously separate inlet systems, including the scouring of the outlet channel under the Causeway Bridges. However the outlet from Waterview Estuary has been relatively stable since the mid to



late 1970s. The existence of the Causeway will continue to exacerbate sedimentation in Waterview Estuary arising from catchment run-off and sediment inputs from Central Waitemata Harbour. Due to the short wind fetches within the Estuary and protection of the Causeway from northerly wind fetches, the Estuary is a low wave energy environment."

Western Ring Route-Waterview Connection - Assessment of Coastal Processes
 Tonkin and Taylor / NIWA. Prepared for NZ Transport Agency July 2010 p3



Rosebank Road

5.7.4 Industrial Parklands at Rosebank – Modernism in practice.

Elizabeth Moorehouse's planning study published in 1967 focused on two objects: fields and factories. The latter, the creation of the factories, were documented with clear insight about the new modern architectural and spatial landscape form that

landscape historian Marcucci called keystone processes. Moorehouse's research reads as written by an insider, a local who studied reports written by the Rosebank Peninsula Industrial and Property Owners Association. She said that the "Larger firms designed lawns and gardens with... playing fields for their staff on land reserved for future expansion...". Her intelligence stated that "31% of industries" had "foreign connections." And the zoning that was designated by the Town Planners scheduled at this time three zones, "Industrial B1 (south) and C1 (North and central). Commercial C (one spot centre)..."



Moorehouse describes this new functional landscape with a freshness and awareness of the 'modern' and how the built form that she witnessed being constructed was initially less imposing than what we may judge what is found along Rosebank peninsula today.

"... the new appearance and modern layout of plants is a striking feature of the area today, and one which... Building regulations specifying a maximum site coverage of 60 percent, and off-street parking have given an air of spaciousness, and gone a long way in largely preserving the parklike (sic) nature of the peninsula inherited from the market gardeners."

The planning policies she states took on new meaning since the development took place when then new Regional Council was in place. She said that:

"...desire of both Auckland Regional Planning authority and Auckland City Council to develop this centre as a modern industrial parkland resulted in a code of ordinances strictly regulating such factors as frontages and the size of subdivision ..."

But she also reveals some examples of the industrial conflicts, such as pollution, that itself changed the final selection of plants grown for food production:

"Vegetables grown in 1967 [were the] same as 1950s but more cabbage and

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kumara and dust outfall from a wood factory rendered cauliflowers unsaleable and a move to root crops... Six market gardeners remaining. More fungicides and insecticides with scattered lots leased by same grower." But with all the industrial development in 1972 the community could still read the parks as country?

Industrial Parklands at Rosebank – Modernism in practice.
The Rosebank Peninsula: A landscape thematic study
John P. Adam
Avondale-Waterview Historical Society 2011 p27

"This assessment can be summarised by comparing the effects of the new works on physical coastal processes with the existing environment for three environmental areas of the Waitemata Harbour as described below.

- The Whau River. This is a sheltered tidal creek, currently used primarily for recreational boating and mooring. The original Whau River Bridge and associated abutments were constructed around 1952. The bed sediments are predominantly fine sand, though a high proportion of mud and silt is found where the river enters into the Central Waitemata Harbour. The river channel depth through the bridged section appears to be stable. New structures within the Whau River will include temporary piers (to support staging platforms for construction) and additional permanent bridge piers and widened abutments. Although the bridge pier groups are set at 15-20° to the tidal flow, the overall effect of these additional structures on hydrodynamics and general geomorphology of the river channel is expected to be no more than minor. This takes into account the effect of wakes, hydraulic backwater head differences, local scour, channel bank erosion and tidal flushing of the Whau River system. Discharges or seabed disturbances in this bridge area, using erosion and sediment control measures where feasible, are expected to have only minor effects on sediment processes and water appearance (after allowing for reasonable mixing). On the southern side of SH16 to the east of Rosebank Park Domain, a 125 m section of a relatively small (3-5 m wide) channel that drains into the Whau River, will be require infilling or permanent occupation of the CMA for ground treatment. The channel will be allowed to naturally migrate laterally and reform a channel on the outside of the ground-treatment works. To this end, the infilling works need to be carried out in successive stages to provide sufficient response time for the channel to migrate laterally. Also, mangroves and their rooting systems will need to be removed (excavated) on the southern side of the existing channel to allow erosion processes to operate more freely on the southern flank of the channel. With these measures in place, the effects on drainage patterns and sediment processes will be no more than minor, but the migration of the channel should be monitored regularly to ensure drainage of the intertidal flats is not impeded.

- The Central Waitemata Harbour (north of SH16 Causeway). Coastal fringes of the Harbour have been extensively modified as Auckland has developed, including the SH16 Causeway constructed in the early 1950s. The seabed material generally consists of sand with a higher proportion of fine grained sediments (muds and silts) typically found along the intertidal and sheltered embayment areas of the Harbour. The CMA surrounding Pollen Island on the northern (seaward) side of the Causeway is largely unmodified. The main drainage channel that services the extensive wetland behind Pollen Island plays a key hydraulic control of drainage and inundation in the wetland. The upper intertidal morphology and associated chenier (shell) ridges also appear to have been relatively stable throughout the last 60 years, although the upper-tidal beach along the Causeway to the west of the Causeway Bridges has been controlled to some extent by groynes placed during the original construction. .Chenier ridges also occur offshore (to the north of the Causeway), with the western group having migrated shorewards, but do not appear to have been directly affected by the introduction of the Causeway (based on 1959 and 2001 aerial photographs). No new structures will be located within this water body, with the Patiki Road Off-ramp and Rosebank Road On-ramp structures in the CMA remaining as they are. The proposed widened reclamation is not expected to change the flow regime of this environment, particularly as most of the reclamation works have either avoided the CMA (e.g., the design includes vertical retaining walls to avoid encroachment of the main Pollen Island drainage channel) or are located on upper-intertidal areas that are only inundated around high tide periods. The reclamations to widen the Causeway will cause minor adjustments to the upper-intertidal geomorphology, particularly along the wave-exposed northern toeline, which will occur over periods of months as waves and tides re-work seabed sediments into a readjusted morphology. Small areas of chenier (shell) deposits would have been buried by the widened reclamation. However remediation can be achieved by excavating these shell deposits, stockpiling them and subsequently re-positioning them in the same area after the reclamation has been widened, to allow waves to re-form the chenier ridges and re-attach them to the unmodified ridge deposits.

- The Waterview Estuary and Oakley Inlet (up to where Oakley Creek enters the CMA). This estuarine system has been substantially modified by catchment land-use changes and the construction of the original Causeway. Catchment run-off has lead to an accumulation of muddy sediments since land clearing or urban development commenced. Decades of industrial activity and a long history of poor environmental practices have also resulted in degradation in water quality within the Estuary. The construction of the Causeway in 1952-53 also had a significant effect on the flow dynamics of the two previously separate inlet systems, including the scouring of the outlet channel under the Causeway Bridges. However the outlet from Waterview Estuary has been relatively stable since the mid to late 1970s. The existence of the Causeway will continue to exacerbate sedimentation in Waterview Estuary arising from catchment run-off and sediment inputs from Central Waitemata Harbour. Due to the short wind fetches within the Estuary and protection of the Causeway from northerly wind fetches, the Estuary is a low wave energy environment. Structures within this area will include temporary piers (to support staging platforms) and additional permanent bridge piers



Figure 1.2: Sectors making up the Waterview Connection Project

(including the cycleway bridge) and widened bridge abutments. These will cause no more than minor changes to the flow regime when compared to the existing environment. This takes into account the effect of wakes, hydraulic backwater head differences, and tidal flushing of the Waterview Estuary and Oakley Inlet system. The widened Causeway Bridge abutments to the south may cause minor erosion on the flanking banks and channel depth in the shortened confluence area, where channels from Waterview Estuary and Oakley Inlet converge. Mitigation of these effects have been incorporated into the design of the widened Causeway, by paring back the bridge abutments under the cycleway and introducing additional piers for the cycleway bridge, to provide a smoother flow transition in the confluence area. Discharges or seabed disturbances in along the Causeway and bridge abutment works, using erosion and sediment control measures where feasible, are expected to only have minor effects on sediment processes and water appearance (after allowing for reasonable mixing). Discharges into the CMA also include discharges of sediments sourced from works and activities in the Oakley Creek catchment. Several discharge scenarios for the Oakley Creek works were undertaken for different storm recurrence intervals and degree of erosion and sediment control. Given the model results and the existing background water quality (including turbidity within the Waterview Estuary), the potential physical effects of sediment discharges on Waterview Estuary and Oakley Inlet are assessed as no more than minor. Seabed disturbances within this area include construction works associated with widening the Causeway (including ground treatment), building new piers (Oakley Inlet) and reclamations. The managed excavation of three separate channel re-alignments have been included in the proposed works to mitigate potential hydrodynamic and geomorphological effects of the existing channels being infilled by reclamations or ground treatments to widen the Causeway. With these channel re-alignment options included, the long-term effects on coastal physical processes from temporary or permanent occupation of the CMA are also assessed as no more than minor. In summary, the coastal marine area has been substantially modified by the construction of the original Causeway in the early 1950s and, to a much lesser extent, the protruding abutments for the original Whau River Bridge. The Causeway was widened further in 1959 and additional bridge widening took place in the 1990s. The new works proposed for SH16 between the Great North Road Interchange and Te Atatu are further lateral extensions of the existing footprint into the CMA. As a result of the lengthy assessment process, some mitigation or avoidance measures for potentially adverse effects have already been incorporated into revisions of the engineering design and construction plans. With these measures included in the proposed design and other mitigation measures or remediation included (as outlined in this Report), the short- and long-term effects of the new works on coastal physical processes in the three coastal environment areas have been assessed as either minor or no more than minor."

<http://www.nzta.govt.nz/projects/completing-wrr/docs/docs-enquiry/application/g4-assessment-of-coastal-processes.pdf>

Western Ring Route-Waterview Connection - Assessment of Coastal Processes
Tonkin and Taylor / NIWA. Prepared for NZ Transport Agency July 2010 p3



The Department of Conservation recognises the mud flats, shell banks, mangroves and salt marshes of Motu Manawa Marine Reserve and Pollen Island Scientific Reserve as a nationally significant example of this type of ecosystem and a high priority to protect and maintain. The challenge for Auckland is to maintain the national significance of this ecosystem while urban development occurs around it.

Bibliography, sources of quoted texts, further references.

The Whau: our streams, our river, our backyards

Jo Mackay, Waitakere City Council, 2001

<http://www.whauriver.org.nz/wp-content/uploads/2013/02/Whau-booklet.pdf>

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Prepared for The Friends of the Whau Inc. by Thomas Emmitt (Dip.Sust.Hort)

and Michael Ngatai (Dip.Sust.Hort) 31st July 2003

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