Auckland
Regional Council
TE RAUHĪTANGA TAIAO

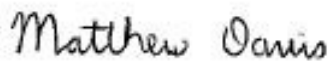
Whangateau Catchment and Harbour Study

Review of Environmental and Socio-economic Information

July 2009 TR 2009/004

Auckland Regional Council
Technical Report No.004 July 2009
ISSN 1179-0504 (Print)
ISSN 1179-0512 (Online)
ISBN 978-1-877528-11-8

Technical Report, first edition

Reviewed by:		Approved for ARC publication by:	
			
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Date:	1 July 2009	Date:	31 July 2009

Recommended Citation:
BOFFA MISKELL, 2009. Whangateau Catchment and Harbour Study:
Review of Environmental and Socio-economic Information. Prepared by Boffa Miskell Limited for Auckland Regional Council. Auckland Regional Council Technical Report 2009/004.

Whangateau Catchment and Harbour Study

Review of Environmental and Socio-economic Information

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Preface

Funding was allocated to scope the development of a Whangateau Action Plan during 2008/09. Three technical reports were commissioned to inform the development of the action plan. These reports document catchment and harbour state, record issues and values, and identify existing and potential threats. The three background studies (1) collate and summarise existing environmental information on the harbour, (2) describe the environmental and social characteristics of the catchment, and its management and planning framework, and (3) document initial consultation to identify iwi and community's views on the values, threats and pressures on the Whangateau harbour and catchment. The principal findings from the three reports are synthesized in a summary document.

The studies indicate that the current state of the harbour is relatively healthy and that there is no single, overall dominant physical threat to the harbour; rather there is a range of small threats that cumulatively have potential to affect the harbour health. All three background studies, furthermore, identified the opportunity to improve integrated planning and co-ordination between stakeholders. Additional work is required to clearly determine the threats and most effective manner to intervene in the catchment and harbour to make short term improvements that contribute to the overall long term protection and enhancement of the catchment and harbour.

Technical background reports

Technical Report TR2009/003

Whangateau Catchment and Harbour Study - Review of Marine Environment Information

Technical Report TR2009/004

Whangateau Catchment and Harbour Study - Review of Environmental and Socio-economic Information

Technical Report TR2009/005

Whangateau Catchment and Harbour Study - Review of Stakeholder Information

Technical Report TR2009/006

Whangateau Catchment and Harbour Study - Summary and Discussion

1 Executive Summary

The Whangateau Harbour, as the receiving environment to the Whangateau catchment, is potentially one of the highest quality estuaries within the Auckland region. This has been established through studies and monitoring of the harbour, that also show that high levels of tidal flushing is critical in maintaining the exceptional quality of its waters.

To date, there has been little background reporting into the relationship between the interior catchment environment with the Whangateau Harbour and the potential for land-based activities to impact upon this important marine environment.

This report has reviewed the Whangateau catchment in the context of bio-physical, human economic, social demographic and planning factors in order to document past, present and future drivers for land use change and development relative to its inherent values. Geographic Information System mapping and analysis has formed an integral part of these investigations, along with supporting literature and background reports.

In addition to the natural, scenic and amenity values associated with the harbour itself, this report identifies a range of existing values within the landscapes of the wider Whangateau catchment. These include a good representation of indigenous terrestrial ecological habitats that comprise almost half of the total area of the catchment, with associated biodiversity values.

Traditional agriculture and horticulture historically provided the economic basis in the catchment, Although currently under pressure from rising land values, there is still potential to further develop the horticultural industries through crop specialisation and diversification. Cultural heritage associations, although underrepresented, are strong throughout the Whangateau catchment, including the prominent feature of Mt Tamahunga and the harbour itself.

These combinations of factors have established distinct local resident communities that have a strong sense of custodianship towards the wider catchment. Tourists that have traditionally been drawn to the natural scenic qualities of the Whangateau Harbour environment are now additionally being offered a range of land-based attractions, directly resulting from the successful branding of the wider Matakana area.

In the context of the current pressures for development being experienced within the wider area and observed trends in land-based activities, a number of issues have been identified with the potential to generate both direct and indirect adverse effects on both the Whangateau catchment and harbour environments. These include:

Productive land management practices:

- An apparent lack of monitoring of small-scale plantation forestry operations within the steep erosion-prone northern portion of the catchment, closely associated with a number of headwater freshwater streams feeding directly into the harbour below, where sedimentation is evident.

- An absence of riparian vegetation along the majority of low-gradient stream courses located within the base of the catchment, associated with pastoral land use, potentially creating poor in-stream habitat conditions for spawning and migrating native fish and potentially compounded by uncontrolled stock access.
- A potential accumulation of agrichemical applications within the soil and groundwater resources underlying productive land uses.

Residential development and settlement:

- An historic loss of indigenous habitats to the development of settlements and infrastructure around the harbour foreshore that continue to represent a source of disturbance to endangered populations of native shore/wading birds.
- An inadequacy of current infrastructure services with the potential to directly impact on the harbour environment – particularly relating to sewage disposal from Pt Wells.
- Increasing land values resulting in the fragmentation of traditional farmland for subdivision, with a potential loss of "custodianship" relating to land management.

Capacity of natural resources:

- Lack of specific recognition (and protection against land use change) of existing productive soil resources located within the catchment.
- Additional demands on fully allocated groundwater supplies associated with a potential increase in either settlement (domestic supply) or intensifying land use activities (for irrigation).
- Incremental increases in impermeable surfaces, through built development, would potentially affect the replenishment of groundwater resources – on which the resident catchment population depends for domestic and productive land use activities.

Management of ecological sites:

- A lack of co-ordinated management and protection of ecological sites through the current administration of multiple agencies.
- Protection of landscape values:
- Potential for cumulative adverse effects on existing natural character and landscape amenity values to increase with incremental development of social and land use activities within the Whangateau catchment.

Ultimately, the lack of background environmental reporting of the wider Whangateau catchment currently prevents further speculation on the direct effects of both current and future land use activities on the Whangateau Harbour environment.

Additional investigations are recommended to provide a better understanding of the existing conditions of the catchment environment to plan for future change.

The recommended studies from this study about the catchment and socio-economic information, however, must be reconciled with recommendations from the other

Whangateau summaries that examined the marine environment, and iwi and community. Similarly, recommendations from the Whangateau investigations must be weighed up against regional priorities and investigations in other locations within the region.

Possible further investigations include:

- Stream Ecological Value (SEV) assessment of surface watercourses for water quality and ecological health, terrestrial habitat values and environmental context.
- Hydrologic/hydraulic modelling of the current and future relationships between surface and groundwater flows with the Whangateau Harbour.
- Extended coverage of groundwater quality monitoring.
- Further survey and investigation of the cultural heritage record in relation to the Whangateau catchment.
- Better identification and integrated management of significant natural resources.

2 Introduction and scope

This assessment of the Whangateau catchment, located on Rodney's rural north-east coast, forms one of three independent studies that have been commissioned by the Auckland Regional Council (ARC) in order to establish the current conditions of the catchment and the receiving Whangateau Harbour environment. The project is also a response to community concerns that have been raised about the future degradation of the Whangateau catchment environment.

This report considers the bio-physical environment, human economic factors and social cultural demographics and planning context of the Whangateau catchment in terms of documenting past present and future drivers for land use change and development relative to its inherent values. This has also involved a review of the statutory planning framework covering the Whangateau catchment, alongside other background reports and supporting literature.

Geographical Information System mapping and analysis has formed an integral part of these investigations, as presented in the supporting figures to this report.

Ultimately, this assessment seeks to establish the current and potential issues facing the future management of the Whangateau catchment, based on the scale and magnitude of potential effects that are associated with various land use activities. Recommendations for future studies and their prioritisation in terms of bridging current information gaps within the Whangateau catchment are also addressed by this study.

The study excludes a consideration of the marine harbour environment, which is reported separately (Kelly 2009). Likewise, consultation with the local community, including iwi and key stakeholders is reported in a separate document (Lees and Cole 2009). The content of both reports, however, has informed this study.

2.1 Catchment description

The boundary of the Whangateau catchment was determined using the Digital Terrain Model with 2 m contours. This resulted in a refinement of the catchment's original delineation from the River Environment Classification. An explanation of the refinement of the catchment boundary is contained in Appendix A. The location and extent of the redefined catchment boundary is referenced throughout the GIS mapping series produced for this study at the end of this report.

The Whangateau Harbour, as the receiving environment to the Whangateau catchment, is broadly defined by the coastal promontories of Cape Rodney to the north and the Tawharanui Peninsula to the south, on Rodney District's north-east coastline, shown in the Map A:0. The inland extent of the catchment surrounding the harbour is strongly defined to the north by the ridgelines extending from Mt Tamahunga, reaching a maximum elevation of around 440 metres above sea level (Map A:1). The catchment extends around to the Tawharanui Peninsula to the south, with its watershed defined

by the lower ridgelines of the Takatu hillsides. The Whangateau catchment covers a total area of 4190 hectares. This is a small catchment area relative to the scale of the receiving harbour environment, which is one of the largest estuaries on Rodney's north-east coastline.

Although several streams drain into the Whangateau Harbour, the largest is the Tamahuna tributary, which drains directly into the Omaha River and forms the western arm to the harbour waters. A number of smaller creeks drain directly into the harbour from the steep hillsides to the north of the catchment, including Birdsall and Coxhead Creeks seen in Map A:1. The southern arm of the harbour is defined by the broad Waikokopu Creek, which is contributed by a limited number of small shallow waterways of limited reach. The Whangateau catchment is comprised of waterways with a combined total length of approximately 45 kilometres.

2.2 Landscape context

With a maximum distance inland from the harbour shoreline of only 4 km, the Whangateau catchment is strongly influenced by its coastal proximity. The catchment is also steeply orientated towards the coastline by the elevated hillsides extending from Mt Tamahunga to the north-west, grading into a more gentle relief to the south. This environment is depicted in Maps A:2 to A:4.

The steep northern hillsides are essentially vegetated with a combination of mixed native bush and pockets of plantation pine forest, with the lower hillsides given to open pasture. Native forest extends from Mt Tamahunga into the Conical Peak and Dome Forests to the west of the Matakana. Collectively, these areas provide a significant block of continuous native forest within north-east Rodney. Fragmented pockets of native forest also extend around the northern and western ridgelines that define the Whangateau catchment. The catchment boundary in the south borders the inland extent of the Tawharanui Peninsula, which also includes some significant stands of native forest. Generally, the southern part of the catchment has been cleared for traditional pastoral land use activities, although commercial vineyards and olive groves have also established in this part of the catchment in recent years.

The Omaha (Mangatawhiri) Spit, which defines the eastern extent of the catchment and also encloses the Whangateau Harbour as its receiving environment, is today the main focus of contemporary settlement within the wider catchment. The establishment of settlement on the spit has occurred in two main phases, facilitated by the construction of Broadlands Drive across the Waikokopu Creek (in the 1970s), with development of the northern end preceding that of the southern half. Suburban density housing is accompanied by recreational golf courses on the spit's sheltered western shoreline, adjacent to a regionally significant area of Kahikatea Swamp Forest. Omaha Beach on the eastern side of the spit is separated from residences by a shallow foredune.

The Omaha Flats at the base of the catchment was also a former focus of settlement, amongst intensive orchard production activities. Today however, orchard production has largely been disbanded for the smaller scale cultivation of berries, fruits and vegetables more suited to the organic peat soils. However, the original cadastral

patterns of the orchard lots and their associated shelter belt plantings still remain. Point Wells, at the tip of the Omaha Flats remains as a key settlement within the catchment.

Including the string of clustered coastal settlements that flank the northern boundary of the Whangateau catchment along the Warkworth Leigh Road, much of the harbour shoreline has been modified by human occupation and activities. Lifestyle rural residential settlement and alternative rural industries and tourism ventures are also focused within the shallow valley base of the Tamahunga Stream, accessed by Omaha Valley Road directly from Matakana.

Matakana and Leigh are the nearest settlements located immediately beyond the catchment, with Warkworth the closest service town, located approximately 10 km to the south-west. This relative remoteness has contributed to maintaining a predominantly rural character within the Whangateau catchment.

The harbour environment, which is described in greater detail within the marine environment (Kelly 2009), is considered to be a regionally significant coastal landscape that retains high ecological values. The University of Auckland maintains a Marine Laboratory facility at Leigh from which the harbour and seaward environments are studied.

The diversity of coastal landforms associated with the harbour enclosure provides an attractive coastal environment for both recreational visitors and permanent residents. The contrast between the elongated sandy Omaha Spit with the rocky shores of Ti Point in defining the entrance to the Whangateau Harbour is particularly striking. The stature of Mt Tamahunga, representing a high point in the Rodney District is also a direct contrast with the level plains of the Omaha Flats.

3 Methodology/Approach

With the scope of this assessment being essentially desktop orientated, existing reports and documented research have been largely relied upon in conjunction with GIS databases as key information sources. The bibliography lists the reference documents used in this study.

Mapping data has been primarily obtained from the ARC and Rodney District Council (RDC) mapping services and used in combination with existing national data sets. Additional data was derived from various combinations of these sources and mapped.

The National New Zealand data sources used for mapping the Whangateau catchment include the New Zealand Land Resource Inventory and New Zealand River Environment Classification and Land Cover Data Base. The datasets created in this study were the Whangateau catchment boundary and selected social infrastructure, such as boat ramps delineated from aerial photography. Where applicable, the maps appended to this report are directly referenced in the relevant sections of text, using the prefix of A, B, C or D, with a corresponding map number.

The planning context to the Whangateau catchment has been established through a comprehensive review of relevant sections of both regional and district plans, alongside a consideration of other non-statutory planning documents.

The analysis and interpretation of the primary reference data has been considered under three key headings, as a basis to identify both the key values and management issues associated with the Whangateau catchment environment:

A Bio-physical environment

B Human economic factors

C Social cultural demographics

D Planning context

An explanation of the methodologies applied to each of these topics are covered within the individual report sections. This includes the identification of key information gaps that were discovered during the course of the investigations.

The study area was visited by the project team early on in the investigation, during which a superficial photographic record of the catchment was compiled. No targeted field investigations have been carried out as part of this study. However, a key outcome of the study has been in the prioritisation of areas requiring further research and investigations, where a lack of existing field data has been identified.

4 Bio-physical Environment

An interpretation of the bio-physical environment in relation to the Whangateau catchment and its surrounds has largely relied upon data supplied by national databases, including Land Environments New Zealand, Land Information New Zealand, New Zealand Land Resource Inventory Land Cover Data Base and New Zealand River Environment Classification mapping. The historical evolution of the natural physical environment has also been inferred from this data and cross referenced with a limited number of technical reports and studies that cover the catchment area. Natural hazards have also been identified from within the catchment in relation to its physical characteristics, including soil erosion, flooding and stormwater discharges.

4.1 Land resource

The Waitemata series of inter-bedded sandstones and mudstones underlie much of the steeper ground within the northern part of the Whangateau catchment, including the Mt Tamahunga Range up to 440 metres above sea level. This dominant geology is also consistent with the wider area and extends around to the southern slopes of the catchment. Lenses of uplifted basement greywacke are associated with the lower foothills flanking the harbour shoreline to the north of the catchment, and at the head of the Tamahunga Valley. Volcanic exposures of basalt, which are relatively uncommon in this area, are also evident along this section of coastline, particularly around the Ti Point headland (Map A:5).

The alluvial flats and valleys that characterise the catchment interior of Omaha Valley and Omaha Flats are underlain with alluvium deposits. Coastal processes have also contributed sand to the formation of harbour landforms including the Mangatawhiri Spit and the Omaha Flats surrounds. The Whangateau Harbour is a sandspit estuary created during the recent Holocene period. Its formation and resulting coastal processes are covered in detail within the marine environment report (Kelly 2009). The harbour is comprised of a nationally rare series of coastal habitats that support an abundant range of wildlife that are also documented by Kelly (2009).

The main substrates within the catchment are residual Waitemata soils, alluvium and sands directly reflecting the underlying geology and once again consistent with the wider area (Map A:6). The sub-groups of these key soil types vary from porous fertile organic peat and humate podzols within the Omaha Flats to impoverished yellow ultic and other recent soils on the upper catchment slopes. The formation of the humate podzols (from former beach ridges) within the Omaha Flats is the southernmost known distribution of this particular soil type. It is predominantly brown and ultic soils that cover the foothills that flank the coast, with fluid gley soils fringing the lowest lying sections of the harbour edge (Map A:7).

Ground drainage is reasonably good within the elevations of the upper catchment, but is poor on the low-lying Omaha Flats, coincident with an elevated water table and increased hydraulic capacities associated with the organic peat soils (Map A:8).

The current erosion rates within the Whangateau catchment have been interpreted from the Land Resource Inventory in Map A:9, which shows negligible/slight rates for the majority of the catchment, with a raised (moderate) rates below the Rodney Road ridgeline. This area coincides with relatively recent afforestation (from former pasture) over young (recent) soils.

This broad picture of the catchment is generally consistent with more recent national empirical erosion modelling covering the Auckland region, using Landcare Research's New Zealand Empirical Erosion Model map. The mapping of results from this latest model shows maximum erosion rates of 200 tonnes/km2/yr, for the majority of the catchment, with average rates expected to be in the order of 50 tonnes per square kilometre per year (tonnes/km^2/yr) (Map A:10). . Potential erosion "hotspots" also relate closely to those identified in the Land Resource Inventory maps, with a predicted yield of 500 to 2000 tonnes/km^2/yr in the same section of Rodney Road. Other localised areas of increased erosion potential (up to 500 tonnes/km^2/yr) occur in the south-east corner of the catchment on the boundary of the Tawharanui Peninsula, which has also previously been cleared of its native vegetation cover over sandy soils.

Based on the Empirical Erosion Model mapping of the Auckland region, potential erosion rates in excess of 500 tonnes/km^2/yr are reasonably uncommon. Therefore, in the locations for which this threshold level is exceeded within the Whangateau catchment, this is considered to be a potential land management issue.

The low-lying catchment interior provides a sheltered environment compared with the exposed ridgelines of the Tamahunga Range, with decreased average windspeeds and marginally lower rainfall receipt. For the Whangateau catchment overall, mean annual rainfall averages 90 to 160 cm, with mean annual windspeeds ranging between 3 to 6 m/s. Median average sunshine hours are between 2000 to 2100 for the majority of the catchment.

4.2 Freshwater streams

The flow of freshwater streams into the Whangateau Harbour is small (approximately 0.3 per cent of the total tidal prism) relative to the total volume of the estuary in which ocean forcing dominates the hydrodynamic processes. This is also reflected in the small size of the Whangateau catchment relative to its receiving environment.

The majority of natural watercourses within the Whangateau catchment are headwater streams – classified as Order 1 to 2 by the River Environment Classification data (Map A:11). These streams have an average length of only 0.56 km. The longest watercourse within the catchment is the Tamahunga Stream, an Order 3 to 4 tributary watercourse that extends from the Mt Tamahunga down to the Omaha River for a distance of approximately 5.60 km.

The River Environment Classification data set is also used to identify stream sections with differing physical features, based on the River Environment Classification

parameters of landcover, geology, and valley landform (slope) as shown in Maps A:12 to A:15. This information is useful help distinguish the riparian environments within the catchment in the absence of field data.

The geology underlying the steam networks within the Whangateau catchment are almost entirely made up of soft sedimentary substrates. The length of streams within hard sedimentary rock was insufficient to be useful in characterising habitats at the catchment scale. There is a demarcation between the low- and medium-gradient streams in the central and southern areas of the catchment with the steep slopes to the north of the harbour. These steeper headwater streams will differ in channel form and water velocity (and hence oxygenation, temperature, and substrate or bed material) ultimately being more favourable to a greater diversity of aquatic communities as a consequence.

Reference to recent aerial photography (flown in 2006) and the Land Cover Database Version 2 (2001/02) indicated that forest and scrub cover north of the harbour was far more extensive than indicated by the River Environment Classification maps, and that most of the northern stream sections are in fact under some form of forest cover. Riparian vegetation contributes to stream health and in the prevention of stream erosion through the retention and diffusion of surface run-off flows from adjacent land, whilst at the same time stabilising banksides through root binding.

The association of riparian vegetation with those watercourses located in the steepest, northern part of the catchment is therefore important. Riparian vegetation also regulates the microclimate of stream habitats whilst contributing organic matter and nutrients that sustain aquatic wildlife communities. The steeper gradient streams located to the north of the catchment will also have more incised profiles with more substantial tree cover resulting in diverse in-stream habitats, and more favourable water temperature and oxygen levels. The aquatic habitats of these headwaters are likely to be of medium-quality with some high-quality sections (ie supporting high ecological values). The vegetation removal from beside watercourses through either bush clearance of forest harvesting may therefore be associated with adverse effects on stream ecological health.

The medium- and low-gradient streams that occupy the central and southernmost parts of the catchment generally flow through open pasture with a lack of riparian vegetation. These watercourses are consequently likely to be slow-flowing, mud-bottomed and unshaded with high summer temperatures. Aquatic plants are likely to be common with fauna tolerant of environmental stress and habitats are expected to be generally of low-quality. The access of stock from adjacent pastoral lots is also likely to be a factor in the potentially poorer conditions of these streams within the lower catchment.

4.3 Aquatic wildlife

The New Zealand Freshwater Fish Database maintained by the National Institute of Water and Atmospheric Research provides survey data for native fish populations in New Zealand, which was reviewed for this report. There were total of twelve records collected in 2001 and 2003: eight from Tamuahunga Stream, one from Birdsalls

Stream, one from Coxhead Creek, and two from unnamed tributaries of the Omaha River – all located in the northern part of the Whangateau catchment (Map A:12**)**.

Fish recorded were: longfin and shortfin eel (*Anguillidae*); inanga and banded kokopu (*Galaxiidae*); common bully, Cran's bully, redfin bully and giant bully (*Gobiomorphidae*); and koura (freshwater crayfish, *Paranephrops planifrons*). Sites had between one and five species, with an average of 2.7 species per site. The most common species were longfin eel and koura, recorded at eight and seven sites, respectively. Uncommon species were inanga, redfin bully, Cran's bully and shortfin eel (three or four sites); and relatively rare fishes were common bully and giant bully and banded kokopu (one site each). All of the species are relatively common. However, the longfin eel is classified as threatened, gradual decline due to declining populations at a national scale (Hitchmough et al, 2007).

In the upper Tamahunga Stream area only eels and koura were recorded, plus a single record for Cran's bully. This low diversity of native fishes is suggestive of a barrier to fish passage, such as a culvert or dam, preventing most juvenile fishes from reaching upstream habitats.

All streams in the catchment are relatively close to the sea and of low elevation, and stream habitats are therefore readily accessible to juvenile migrating fish. Barriers to fish passage such as dams and some culverts may affect fish communities in some streams (possibly the Tamahunga Stream, as noted above). However, general habitat disturbance or modification is likely to be the most significant issue in the catchment, particularly in lowland areas which tend to be more intensively developed. Activities that can adversely affect streams include channelisation/excavation, removal of shading riparian vegetation, and stock watering (in which stock are able to directly access and enter watercourses).

Areas with highest stream values are likely to be upper headwaters with intact vegetation (such areas will have both low disturbance and high natural habitat diversity associated with steep channel gradient); and whitebait spawning areas near the upper tidal limits.

No documented data were sourced on macroinvertebrate aquatic communities as a key indicator of habitat health for streams within the Whangateau catchment.

4.4 Groundwater resources

The Omaha Waitemata Aquifer underlies the majority of the Whangateau catchment (Map A:16)**.** Despite the smallest aquifer in the Auckland region, this aquifer is also identified as one of eight High Use Management Areas (ARC 2008). Currently, based on existing consents for water-take and permitted activities, the aquifer is fully allocated at 105,000 m^3/yr. Groundwater is primarily used for stock and domestic supply and relative to surface water, provides an important freshwater resource within the Whangateau catchment.

Monitoring of groundwater quantity is routinely carried out by the ARC and reported annually. There is a selection of groundwater quantity monitoring sites within the Whangateau catchment, which has a groundwater management level set at 3.25 m

above mean sea level, in the *Proposed Auckland Regional Plan: Air Land and Water* (ARC 2005).

Natural groundwater storage provides essential baseflow to rivers and streams, supporting their surface water quality and ecosystems. However, groundwater quality may also be vulnerable to overlying land use impacts where they are unconfined or semi-confined. In unconfined situations, rural land use activities that may potentially affect groundwater quality include pastoral farming, horticulture and cesspit discharges. The quarrying of greywacke can also have a direct effect on the groundwater quality of underlying aquifers (Kermode 1992).

Groundwater quality is also routinely monitored by the ARC within the Whangateau catchment using an existing bore located on Quintals Road, within the Omaha Valley and downstream of the Matakana Quarry. The inclusion of this site is based on its high groundwater use and intensive land use to provide aquifer representativeness across Auckland region. However, the Quintals Road bore is the only groundwater quality monitoring site within the catchment. Recent State of the Environment reporting suggests that the groundwater in this location is an acceptable quality, based on the parameters used by the ARC and national drinking water standards (ARC 2007).

Without more comprehensive monitoring of groundwater quality, it is difficult to fully to assess the potential affects of different land uses on the Omaha Waitemata Aquifer: in particular, the long-term effects of horticultural applications within the Omaha Flats upon groundwater quality.

4.5 Stormwater discharges and flooding

Stormwater is discharged into the Whangateau Harbour from Omaha, Point Wells and Whangateau Settlements. Map B:11 shows the extent of reticulated residential drainage that feeds into these respective discharge points. The medium-to-low densities of these residential areas and their relatively low ratios of impervious ground surfaces are unlikely to result in an excess of stormwater discharge directly into the harbour. At Omaha, which has the highest residential population, most stormwater drains directly into the sandy substrates, rather than being collected and discharged into the sea. Stormwater flows are therefore small relative to the residential population and there are minimal stormwater outlets.

The current district and regional plan controls are relatively restrictive in requiring a resource consent for any subdivision and activities which are not rural in nature. This enables RDC to impose conditions on resource consents to avoid, remedy or mitigate the effects of activities, thus theoretically ensuring the existing quality of the catchment environment is maintained. The requirement to obtain resource consent also enables the council to expect low impact stormwater design solutions to minimise the adverse effects of developments proposed within the catchment.

According to Kelly (2009, p. 51), "near-complete harbour flushing, coarse sediments, limited urban development and stormwater treatment reduce the risk of stormwater contamination becoming a significant problem – in terms of the harbour environment".

Kelly (2009) is also of the opinion that current stormwater discharges do not appear to be a key issue within the Whangateau catchment.

However, his report does identify two key point sources of contaminants entering the harbour. These are those directly associated with leachate from the historic Ti Point Landfill site and periodically from septic tank overflows from Point Wells in raised groundwater conditions experienced during coastal inundations. Sampling of the harbour waters otherwise suggests that ambient concentrations of typical stormwater contaminants are similar to natural background concentrations.

Septic tank seepage was detected by high enterococci concentrations in shellfish following rainfall in an isolated study (De Luca-Abbott et al. 2000). However, there is no reported land-based monitoring of septic tank functions within the catchment. Leachate from the disused Ti Point Landfill site is monitored on a five yearly basis since December 2004 and reported to the ARC.

While current flooding within the catchment limited is to coastal inundations of the immediate foreshore (Map A:17), there is a potential future risk associated with rising sea levels to the foreshore environments of the Whangateau catchment.

4.6 Terrestrial ecology and landcover

According to the predictions of Leathwick et al. (2006) and as reproduced in the Land Environments New Zealand map series (Map A:18), there were originally three key forest types associated with the wider area of the Whangateau catchment. The relative distributions of climax forest were closely related to the bio-physical landscape types that are evident within the Whangateau catchment. These were dominated by kauri-taraire, kohekohe-tawa forest covering the upper hillsides of the outer catchment and grading to kahikatea-pukatea-tawa forest within the valleys leading down to the harbour. Swamp forest dominated by kahikatea is also likely to have been associated with former areas of wetland on the lower harbourside flats.

There are elements of all of these forest types still remaining within the Whangateau catchment, as well as intact sequences of coastal vegetation extending through parts of the harbour. A comprehensive survey of the Rodney Ecological District by the Department of Conservation in 1983 to 1984, under the Protected Natural Areas Programme, identified four Recommended Areas for Protection that fall within the Whangateau catchment: Omaha, Ti Point, Mt Tamahunga to the north of the catchment and Tawharanui Peninsula to the east (Map A:19). Omaha (incorporating the Mangatawhiri Spit, Omaha Flats and Whangateau Harbour) is defined by marine depositional landforms with associated with distinctive vegetation classes and sequences. At this time, the area was attributed with a High Conservation Need, due to the pressures of urban, marine and agricultural development. The marine habitats contained within the Whangateau Harbour are described by Kelly (2009) and are excluded from this review.

More recent ecological surveys conducted as part of the Omaha Beach development application in 1999 confirmed the rarity of harbour habitats on the Mangatawhiri (Omaha) Spit within the wider Rodney Ecological District (Boffa Miskell, pers. obs.).

This sequence includes saltmarsh, coastal shrubland, kahikatea forest/wetland and dunefield vegetation. The kahikatea swamp forest that is located on the harbourside of the Mangatawhiri Spit is considered to be the largest intact, coherent representative forest of this type within the Rodney Ecological District, with very high botanical conservation values that are considered of national importance. Through the development of Omaha South, this forest area has been vested with the Department of Conservation as a reserve.

Ti Point was included by the Department of Conservation Protected Natural Areas Report as a Recommended Areas for Protection for its landform rather than for its biological values, as described previously. The high conservation values associated with both Mt Tamahunga and the Tawharanui Peninsula (as Recommended Areas for Protection) are, however, attributed to the extent and diversity of their mature native forest cover. Mt Tamahunga contains both regenerating and virgin forest: including the largest and best area of rimu forest in the Rodney Ecological District. Mature associations of puriri, rata, kahikatea, totara, taraire, rewarewa and kauri are also present, with kahikatea dominating the eastern portion of the forest, inside the Whangateau catchment boundary. The Mt Tamahunga forest is closely associated with the Sunnybrook Dome-Conical Peak RAP forest area to the west, with a combined total area in excess of 1123 hectares, including 400 hectares of the largest area of virgin podocarp hardwood forest remaining within the Rodney Ecological District. Two native forest species: *Nestigis cunninghamii* and *Cyathea smithii* are at the southern limit of their recorded distribution within the Tamahunga Forest. As part of the Omaha Ecological Area, which is administered by Department of Conservation, this composite forest block it is considered of National Importance.

The Tawharanui Peninsula, extending to the east of the Whangateau catchment, retains some extensive areas of forest that include some best examples of manuka, kauri ricker, taraire and pohutukawa associations to occur on any peninsula within the Rodney Ecological District. Although the boundaries of this RAP just clip that of the Whangateau catchment, the vegetation associations of the Tawharanui Peninsula provide important ecological linkages with the catchment interior.

Additional ecological sites have since been identified from within the wider catchment. These include ARC Sites of High Natural Conservation Value, Significant Natural Area and Sites of Special Wildlife Interest (Map A:21). There are also a number of Natural Heritage Wetlands associated with the inland margins of the Whangateau Harbour, which include the kahikatea swamp forest lining the harbourside of the Managatawhiri Spit. The rare shrub *Pomaderris hamiltonii* (locally endemic with a distribution restricted to Rodney Ecological District) is in comparative abundance on the Omaha Spit and also in the Jones Road area of the Omaha Flats (ARC internal records).

RDC have also identified Sites of Natural Significance within its Proposed Rodney District Plan (RDC 2000), which include additional fragments of native bush, mainly located within the upper hillsides of the catchment (Map A:20). Both the Tamahunga Forest and the Omaha kahikatea swamp forest are identified as outstanding Significant Natural Area, whilst the remaining Significant Natural Areas that occur in the catchment have moderate to high ratings. A number of Bush Covenants (conservation bushlots) within and adjacent to the Whangateau catchment exist through the provisions of the Proposed Rodney District Plan, which allows for Conservation Lot

Subdivisions involving the planting of native bush on marginal farmland. There is an important potential in the creation of such bushlots to provide critical linkages between existing Significant National Areas within the Whangateau catchment in the future, in combination with QEII covenants.

The Proposed Rodney District Plan also identifies a number of Esplanade Reserves, (as Open Space Zone 1), along sections of the Tamahunga Stream, Omaha River, Birdsalls Creek and at Ti Point, with the majority of these being tidal. As well as having conservation values, these reserves are important in providing networks of public access to sections of watercourses and the coast in and around the Whangateau Harbour.

Reference to the Land Cover Data Base Version 2 in Map B:5, shows that the majority of the catchment has been cleared of its native vegetation cover for productive land use purposes, dominated by pastoral farming and horticultural cropping. There are also significant stands of exotic plantation forest located on steep upper hillsides to the north of the catchment, off Rodney Road. Following the clearance of its original native vegetation, the historic focus of intensive horticultural activities within the Omaha Flats is expected to have altered the properties of natural soils and groundwater levels within this former wetland swamp, as a result of its reclamation. Conversely, the extent of mangroves has increased around the harbour fringes in recent years, suggesting increased sedimentation levels within the foreshore.

In spite of these land use activities, approximately 20 per cent of the total catchment area remains under native scrub or indigenous forest cover. This cover, in combination with exotic vegetation, contributes to land stability, whilst providing potential habitat to a range of native wildlife. The potential connections that are provided by smaller fragments of native vegetation within the catchment are also important in extending the habitat opportunities for a range of native wildlife.

Exotic pest plants have also been recorded within the Whangateau catchment. At North Omaha Reserve these include hakea, wildling pines, gorse, wild onion, salinia and phoenix palms. Gorse is widespread on the upper pastoral slopes that surround the catchment whilst spartinia is also prevalent within and around the wider estuary along with exotic marram grass. Garden escapes also pose a threat to native coastal vegetation from adjacent coastal settlements, currently in evidence within the Omaha North Reserve.

4.7 Wildlife associations

Sites identified by the ARC of Special Wildlife Interest and Areas of High Conservation Value within the Whangateau catchment specifically recognise the wildlife values of particular habitats inland of coastal marine areas.

In combination, the mature native forest of the Tamahunga Range and the coastal shrublands of the Whangateau Estuary and Harbour provide important breeding and foraging habitats for a diversity of endangered native birds.

The coastal shrublands associated with the Mangatawhiri Spit support key populations of "at risk" birds, including fernbird and banded rail. The North Omaha Reserve on Te

Tamutu Point (at the northern apex of the spit) is a prime site for nesting New Zealand dotterels. There is a current breeding population on the spit of over one per cent – ie six breeding pairs remaining of a total national count of 600 breeding pairs (North Omaha Reserve Management Plan, 2000). Although the present population is presumed to be recent, it is likely that the Mangatawhiri spit has been an historical habitat for a diversity of native shorebirds and waders. Variable oystercatcher are also at more than 1 per cent of the national population for nesting and feeding on the Mangatawhiri Spit. Seasonally migratory birds, including bar-tailed godwits (approx 450 birds), South Island pied oystercatchers (approximately 250 birds) and banded dotterels (approximately 150 birds) are also all present.

Under the 1971 Ramsar Wetland Convention, the North Omaha Reserve site rates of international significance and has been managed by RDC as a wildlife reserve since 1999. In spite of comprehensive management (contributed by local ratepayers) and the activities of local protection working groups, many of these birds remain disturbed by the activities of adjacent residential areas and threatened by direct predation from cats, dogs, mustelids, gulls and harrier hawks. Hedgehogs and stoats also threaten New Zealand Dotterels, whilst the rabbit population on Omaha Spit attracts cats and mustelids into the area. The rare New Zealand green gecko that has also been found on North Omaha Reserve is similarly threatened by these pests.

The wider harbour is internationally significant for its combined populations of shore and wading birds that also include fairy terns and wrybills, which are considered by Kelly (2009).

A diversity of native forest birds (including several rare species) have been recorded at Mt Tamahunga (as part of the Omaha Forest) including the North Island kaka, harrier, New Zealand pigeon, kingfisher, fantail, grey warbler, tui, silvereye, chaffinch, yellow hammer and shining cuckoo. Kookaburra have also previously been spotted along with the rare long-tailed cuckoo within the wider Omaha Forest (ARC internal records).

The Coxhead Creek Forest is a secondary podocarp/hardwood and kauri forest and an ARC Site of Special Wildlife Interest for its populations of native parakete and the hochtsetters frog. Through exotic forest cover, the Coxhead fragment maintains ecological linkages with the Omaha Forest, in which hochtsetters frogs (*Leiopelma hoschstetteri*) have also been recorded.

4.8 Indigenous biodiversity values

In spite of its relatively small size, there are a good range of habitats provided in the Whangateau catchment scaling the estuarine banks of the harbour shoreline up to the forested peak of Mt Tamahunga. The range of landforms and associated soil cover contained within this area are also key factors influencing this diversity. Excluding the Whangateau Harbour, a relatively large proportion of the Whangateau catchment is recognised by a range of conservation designations for its botanical, wildlife as well as geological values by the ARC, RDC and Department of Conservation. Many of these sites also contain key connections with surrounding areas of protection.

The recorded presence of rare plant and animal species within the Whangateau catchment is also a key indicator of the potential biodiversity values that are inherent in its remaining natural habitats.

At the same time, a large portion of the catchment interior has been heavily modified by human occupation and land use activities, such that many of its original habitats and biodiversity values have been substantially degraded or lost altogether. This includes on the former wetland swamps of the Omaha Flats and the riparian forests flanking the Tamahunga Stream valley. The dune ecosystems of the Mangatawhiri Spit are also classified as "Chronically Threatened" in the threatened environments analysis generated by Landcare Research in Land Environments New Zealand mapping (Map A:22).

Plant and animal pests, along with human occupation are also potentially undermining the future ecological health and biodiversity values of many habitats within the catchment.

4.9 Landscape values

The resulting landscapes contained within the Whangateau catchment are associated with a number of landscape designations including for the natural character values associated with the harbour environment. The ARC identified seven Outstanding Natural Landscapes within or directly adjacent to the Whangateau catchment in the 2005 Proposed Plan Change 8 of the Auckland Regional Policy Statement 1999. These are listed as follows:

- Mt Tamahunga,
- Ti Point,
- South of Rodney Road, Leigh,
- Pukematakeo (near Omaha),
- Omaha Kahikatea Swamp Forest,
- Waikokopu Creek (inner Whangateau Harbour), and
- Northern end of Mangatawhiri Spit (Omaha) (ARC 1999, 2005).

Outstanding Natural Landscapes (which are often associated with high natural character values in this context) are recognised for their absence or subservience of built development in relation to natural elements. Many of these Outstanding Natural Landscapes are also associated with Natural Heritage Designations within both the Auckland Regional Policy Statement and the Proposed Regional District Plan. The Mangatawhiri Spit Peninsula is recognised for its significant landscape quality and also as a Natural Heritage Area with multiple values within the ARPS.

The Eastern Rodney coastline is broadly described by the ARC as a sequence of "passive and contained embayments……..with remnant coastal forest and dune systems framing some of Auckland's most heavily used recreational beaches". The adjacent Tawharanui Peninsula, Pakiri Coastline and Dome Conical Peak Forest

Outstanding Natural Landscapes also provide an important context to the Whangateau catchment.

Within the Whangateau catchment, its key landscape values are attributed to the reinforcement of natural topography by indigenous vegetation remnants within the upper catchment, culminating in the dramatic landform of Mt Tamahunga. The interplay between remnant vegetation and rural pasture is also important in maintaining this relationship on the slopes of the lower foothills, whilst the Omaha kahikatea swamp forest also reinforces the definition of the underlying coastal flats.

The productive settled interior of the catchment, including the Omaha Flats and the Omaha Valley, are rated with comparably lower landscape values in assessments produced for the ARC (Maps A:23 and A:24).

A previous review of Rodney District's rural landscapes was carried out in 1995 by LA4 Landscape Architects (1995). This review identified both Leigh and Tawharanui as Special Character Areas that were subsequently designated as Special Activity Areas in Plan Change 55 to the Operative District Plan (RDC 1993). The character of these areas was to be upheld by limiting the activities provided for, the extent to which provision is made for subdivision and the development controls applied.

The Proposed Rodney District Plan identifies Highly Valued Landscapes that are to be protected and enhanced for their natural amenity, scenic and intrinsic values. Within the Whangateau catchment these include:

- Cape Rodney-Leigh,
- Omaha Beach,
- Tawharanui, and
- Whangateau Harbour.

The special attributes of these landscapes that are considered susceptible to land use change include prominent ridgelines, coastal proximity and highly valued native vegetation cover. Subdivision, development and land use activities are cited as key threats to Highly Valued Landscapes, including as a result of cumulative effects.

The Whangateau Harbour, which provides the focus to the majority of the surrounding Whangateau catchment, is also associated with high amenity values, based on its high scenic qualities and inherent recreational values. A section of the Te Araroa National Walkway also passes through the Tamahunga Forest. The cultural heritage values that are also associated with the Whangateau catchment landscape are discussed in the Section 5 of this report.

4.10 Land Use Capability

Land Use Capability which uses New Zealand Land Resource Inventory Land Cover Data Base mapped data, determines the productive capacity of the underlying land resource, based on the physical characteristics of its soils, drainage and landform (MfE 2009). Within the Whangateau catchment, the most productive landscapes are located within the Omaha Flats and also within the Omaha Valley (Map A:25). These areas are

potentially most suited to productive arable use with an Land Use Capability rating of 2. There is also a moderate capacity (Land Use Capability 3 to 4) for arable production in the vicinity of Big Omaha, lying between these areas. The larger proportion of the catchment is classed as marginal farmland, unsuited to agricultural production, with the lowest capacity on the steep slopes of the Tamahunga Rodney Road ridgeline. The Mangatawhiri Spit is also unsuited to arable production.

4.11 Data sources: assumptions and limitations

When compared with larger coastal and inland catchments, located elsewhere on Rodney's north-east coast, there is a paucity of records of environmental surveys and monitoring that specifically target the Whangateau catchment. Whilst the receiving harbour environment has been extensively studied, particularly through the work of the Marine Laboratory at Leigh, there are still many gaps in published information and monitoring covering the condition of the interior catchment environment. The following have been identified as key gaps in existing environmental information:

- State of the environment monitoring of river environments by both RDC and ARC do not include any watercourses within the Whangateau catchment, with the nearest freshwater monitoring site being the adjacent Matakana River. Such monitoring could provide information on stream erosion and sedimentation rates, along with water quality levels, based on the identification of contaminants and turbidity.
- Although the quantity of groundwater in relation to the Omaha Waitemata Aquifer is covered by a number of sample sites within the Whangateau catchment, the monitoring of groundwater quality is currently limited to a single bore hole located on Quintals Road. It is uncertain whether the data provided by the monitoring of groundwater from this site reflects the groundwater quality of the catchment as a whole.
- The survey and monitoring of significant ecological sites that occur within the Whangateau catchment is currently undertaken on a site-by-site basis with varying frequency. The lack of co-ordinated monitoring of sites and features is a potential barrier to maximising the protection and enhancement of ecological habitats and sites, including for the adoption of pest and weed control strategies. Where routine monitoring has been required as a condition of resource consent for development (such as at Omaha Beach) these provide a valuable source of up to date information.
- Further information on the relationship and flows between surface drainage and groundwater as potential inputs to the harbour could be better understood and predicted.

5 Human Economic Environment

This section discusses the human economic environment of the Whangateau catchment. That is, the social, cultural and economic conditions and practices that have shaped the land over time. The combination of current and potential land use activities is inextricably linked to community and cultural values and expectations as well as the influence from wider economic trends. This combination of factors has clear potential to affect the natural values of the Whangateau Harbour environment.

5.1 Land use development

Aerial imagery from 1953 (Map B:1) are contrasted against more recent development of land use activities within the Whangateau catchment recorded in the first Geographic Information Ssystem Land Cover Data Base by Land Information New Zealand (in 1996/7). Historic information on land use change and development within the Whangateau catchment preceding 1953 was referenced from a range of accounts contained within cited literature and technical reports.

Early land use (pre-photographic record)

An early settler's observation of the district landscape in 1863 recorded that:

"the district was hilly and broken, intersected by many gullies. The natural growth was generally mixed bush – rimu, puriri, tawa, taraire, rata, rewarewa, manuka – with a dense undergrowth of ferns, nikau and supplejacks. ….Only manuka scrub grew on the Ti Point and Point Rodney ranges" (Mabbet 1977, p 105).

It was also noted around this time that the Matakana farming district (which incorporates portions of the Whangateau catchment) comprised:

"a series of joined kahikatea swamps" (Mabbet 1977, p 333)

The landscape that these references describe would have offered significant habitat for a range of fauna that, augmented by resources from the marine environment, provided for and promoted settlement of the area by Maori. The 1863 observation (ie the dominance of manuka on Ti Point) indicates that modification of the natural environment had already been affected by Maori to provide for settlement of the area, and that landscape change pre-dated European settlement.

The abundant timber resources of the wider Mahurangi area (extending between Waiwera-Leigh) are well recorded, and the "easy" coastal access to these resources promoted the clearing of major forest stands within the area by both early European settlers and Maori timber gangs from as early as 1832. The relative ease of access meant that the wholesale clearance of this area was undertaken before the Waitakere Ranges, whose timber resources proved more difficult to harvest and transport. Early timber supplied the Royal Navy with spars, construction material for the fledgling city

of Auckland, infrastructure (wharf piles), shipbuilding and firewood (Mabbett 1977 p 333).

A report by the NZ Herald Agricultural reporter in 1876 stated that within the Omaha Highway District (extending from "old" Omaha to Pakiri):

"Much of the area has already been denuded of trees. Sawn timber, logs and shingles and boatbuilding timber have all taken their toll. There are many fine patches of alluvial soil with good orchards and an apple trade with Auckland, but timber has so far been the chief source of income for settlers…. In the 13,000 acres of Pakiri-Omaha, the principal job has been to get the land into grass and then the erection of fences. Some settlers have been in occupation for 20 years but very little ploughing has been done. Most of the grass has been surface sown. Dairies are common, a considerable amount of butter is made, but one quarter of the settlers keep sheep, for which the country is well suited. There are many good orchards and gardens which provide both subsistence and a cash return" (Mabbett 1977, p 111)

A Kauri Gum industry is also documented within the study area, with the Omaha Flats area being noted as "probably the best gum-producing area in Rodney" (Mabbett 1977, pp 341-43). There is no record of the extent or profitability of this industry, however Omaha Flats is also noted for being one of the last areas within the Rodney District producing kauri gum on a commercial basis.

Shipbuilding began within the Whangateau catchment with the arrival at Big Omaha of the Meiklejohn family in 1858, who were: "greatly taken with the small tidal river, the Omaha, fringing the property, and the abundance of fine timber" (Mabbett p 30). (below), The area provided two prodigious ship yards: the Meiklejohn yard at Omaha River (1859-1891) and the D.M. Darroch yard in the small inlet behind the constructed causeway adjacent to Birdsall Road (1883-1913)

The shipbuilding industry was the major non-extractive industry in the Whangateau catchment, with the annual launching of a ship from either of these yards an annual occasion for approximately 60 years. The decline of the local shipbuilding industry was largely caused by the impending onset of World War I, with the D.M. Darroch yard re-opening in Stanley Bay in Auckland in 1920 (Mabbett 1977).

The descendants of these shipbuilding families survive within the study area, with a memorial to the Meiklejohn family located within Schollum Road. The former D.M. Darroch yard has become an ARC heritage site that records the historical importance of this industry to the area (Figures 3 and 4).

Figure 1 D.M. Darroch yard.

Dairying in the study area is also reported as coinciding with the arrival of the Meiklejohn family who settled at Big Omaha in 1858. Home dairying was common in the area, with small dairy herds kept largely for home-use, although sales of butter were common to local shops and outlying settlements such as timber camps. Rodney's co-operative dairy industry commenced at Matakana in 1902 or 1903, with a subsidiary creamery established at Big Omaha to service local suppliers (Mabbet 1977).

Horticulture has been a constant activity within the study area dating from the arrival of the first European settlers in the late 1850s, reaching its pinnacle with the boom development of the kiwi fruit industry on the Omaha Flats during the 1970/80's period. The Meiklejohn family are also credited with being the first to develop commercial orchard operations within the Whangateau catchment, with well established apple orchards being in full production in 1876. Fruit was packed into 50 lb cases and sledged to the Big Omaha Wharf for transport to Auckland by scow. Transportation of fruit to Matakana and finally to Warkworth for wider distribution by steamer followed the improvement of the roading network (Mabbett 1977).

The rugged nature of the study area meant that the waterways provided the main transportation and communication routes for early settlers. Early roading consisted of tracks laid by individual landowners to service their properties, and overland travel was by combining this track network and crossing areas of the harbour at low tide. The connection of the historic Big Omaha settlement around the western edge of the harbour and through to Leigh was completed in 1890 (Mabbett 1977).

Land use from aerial photo interpretation (1953-1982)

Aerial imagery shows that wholesale clearance of original forest cover (visible to the south in the Tamahunga area) had occurred by 1953 (Map B:1). This clearance included large areas of the steeper slopes of the study area associated with Rodney Road. By this stage, only patchy areas of remnant vegetation remained associated with Schollum, Birdsall and Ashton Roads, towards the base of these northern slopes. The Mangatawhiri Spit is fully vegetated behind the dune front of Omaha Beach, with pockets of cohesive vegetation also visible at the head of the Waikokopu Creek. Only the very base of the spit was farmed at this stage.

The alluvial flats of Omaha Valley Road and the Omaha Flats had been almost completely cleared of vegetation by 1953, with minor isolated pockets of forest and riparian vegetation tracing the mid-to-lower course of the Tamahunga Stream. Smaller paddocks are evident – particularly on the Omaha Flats, associated with shelterbelt plantings.

The current road network, (excluding access to Omaha) was largely in place by 1953. An additional causeway was formed between Birdsall and Ashton Roads to traverse the Birdsall Creek on the Warkworth Leigh Road sometime between 1953 and 1976.

By 1976 the apparent regeneration of some of the lower valley slopes is evident in the northern part of the catchment, particularly around Schollum, Birdsall and Ashton Roads (Map B:2). The clearance of forest from small areas of the upper catchment slopes, however, continued to occur along Rodney Road, and around the Omaha Valley Road (in the vicinity of the existing Matakana Quarry) around this time. In the initial stage of the Omaha North development, the majority of the central area of the Mangatawhiri Spit was cleared following the construction of the Broadlands Drive Causeway. A portion of the coastal wetland forest in the golf course area was retained. Modification of the inland dunes within the southern portion of the Spit had occurred by 1972.

An increase in productive land use activities was focused in the lower Omaha Valley in the vicinity of Big Omaha, extending inland from the harbour edge up to the catchment boundary at Pukematekeo. This is evidenced by the proliferation of small lots across this area.

By 1982 there is little obvious additional loss of forest cover from within the wider Whangateau catchment (Map B:3). However, by the early 1980s vegetation had been removed from the southern portion of the Mangatawhiri Spit. Around this time, the northern point of the spit was badly subjected to coastal erosion, which led to the construction of the existing groynes and changed the north-east profile of the spit. The other major land use change around this time was the intensification of horticultural activities within the Omaha Flats area, consistent with the growth of the horticulture industry within New Zealand.

Land Cover Data Base (1996 -2002)

The Land Cover Data Base Version 2 shows the division of land cover classes within the Whangateau catchment derived from aerial photography flown over 2001/02. At least 50 per cent of the catchment is in pasture, but with at least 20 per cent of the remainder under indigenous forest cover (Map B:5). Including exotic plantation forest (14 per cent) and native scrub (two per cent), just under 40 per cent of the catchment is covered by woody vegetation of some kind. By comparison, settlement constitutes only three per cent of the total catchment area. Traditional and contemporary horticultural activities, including recent vineyards, amount to just under five per cent of land use within the catchment.

Changes in land cover from the original 1996/97 version of the Land Cover Data Base (Map B:4), from, the 2007 Version 2 (Map B:6) show small areas of afforestation,(from former pasture) on the upper slopes of the northern catchment, along with the maturation of young pine forest from open to closed canopy. Tree cover has been lost

from a small area of plantation forest that has reverted to pasture on the steep slopes above Whangateau. The reversion of former pasture to indigenous forest has also occurred in a few locations within the northern catchment, some of which are likely to represent a portion of conservation bushlots, as a result of recent subdivisions of farmland. Overall, the proportion of natural watercourses draining from the northern part of the catchment that are associated with woody vegetation cover has increased over the 10-year period between 1997-2007. This is an important factor in managing the potential effects of erosion from this part of the catchment as well as contributing to stream health.

Elsewhere within the catchment, there has been minimal change in land cover, with very localised conversion of pastoral land to primary horticulture within the Omaha Flats.

Present economic land uses

Current economic land use activities within the Whangateau catchment include a combination of both traditional farming and cropping, alongside the more recent development of boutique horticulture and associated tourism. The relative distributions of these activities are described below and were confirmed on site.

In the majority, the original locations of traditional farming and horticultural activities within the Whangateau catchment have been maintained. This is a determination of the productive capacity of the land relative to its underlying physical attributes. However, in some cases the type or scale of primary production activities has changed in response to current market trends.

Pastoral/dairy farming

Whilst the majority of the study area retains a rural productive character and amenity, the number of identified operating pastoral/dairy units was generally observed to be low within the Whangateau catchment. These units are focussed around the lower foothills below the Mt Tamahunga/Rodney Road ridge, Omaha Valley and the south-western portion of the catchment beyond the Omaha Flats horticultural area rising to the Takatu Road ridge. A combination of rough and improved pasture is present, with both dairy and dry herds, sheep and horses visible at low stocking levels across these areas.

Horticulture

The Omaha Flats and lower Omaha Valley areas are the main locations of alluvial, highly productive soils within the study area, and consequently the main sites of historic and current horticulture operations.

Currently there are a range of horticultural activities in operation, centred within the Omaha Flats, that include berry growing (organic and traditional), pip-fruit and citrus orchards, vegetable cropping (including glasshouses). Specialist commercial nursery operations also operate out of the Omaha Flats area, including cultivating Palms and Cycads.

Small scale olive plantations are present at various points throughout the study area, including at Ti Point and along Omaha Valley and Takatu Roads. These plantings are

small scale operations which are consistent with the emerging "wine-trail tourism" theme developing within the wider Mahurangi area.

Viticulture

Viticulture is a relatively recent land use activity within the Whangateau catchment. Whilst there are only a small number of modestly scaled vineyards present, these operations are a highly visible extension of the developing industry within the greater Matakana and Mahurangi areas. Despite the intensive nature and ordered landscape structuring inherent in this industry, the rural productive appearance and character of the landscape is maintained through this cropping. Commercial vineyards are located on the lower slopes around the catchment periphery at Ti Point, Coxhead Road and Takatu Road.

Silviculture

There are currently a number of small areas of forest plantation spread throughout the catchment, tending to be confined to the steep slopes below Rodney Road and Mt Tamahunga ridge, but also associated with the upper reaches of some of the lateral roads running off Leigh Road. These are invariably small woodlots planted and maintained by individual landowners.

Quarrying

Although occupying a small area of the catchment, the Matakana Aggregate Quarry, located at the head of the Tamahunga Valley on Omaha Valley Road, is an important land use with management implications affecting the wider environment. The quarry has operated since the early 1980s and is zoned Rural within the Proposed Regional District Plan. The quarry is subject to a significant Aggregate Extension Resource Overlay within the Proposed Regional District Plan . A recent application has been made to the ARC to extend quarrying activities until 2043.

There are limited exposed greywacke deposits elsewhere within the catchment.

Tourism

The development of tourism within the Whangateau catchment is associated with activities within the wider area of north-east Rodney, extending between Pakiri and Warkworth. The catchment is richly endowed with natural resources and retains an overall rural productive character with strong coastal associations and good harbour access for water based activities. This area has a long history of being a recreational "playground" based on these natural assets, with a range of local attractions/facilities adding to its appeal to both residents and visitors alike. The contemporary expansion of tourism within the Whangateau catchment is evidenced by a number of galleries, cafes, small scale "theme parks" and associated holiday accommodation.

5.2 Settlement patterns

Early settlement of the Whangateau catchment was primarily influenced by the requirement for easy access to the harbour, reflected by the predominance of recorded Maori archaeological sites at coastal locations including Ti Point and

Whangateau. Subsequent settlement of the catchment has been influenced to a far greater degree by the development of the roading network and land use opportunities, with clear evidence of subdivision and associated land activities focused within the more accessible parts of the catchment. Map B:8 shows the existing patterns of land tenure within the Whangateau catchment, based on lot size intervals.

Historic settlement and cultural heritage

Historically, the wider Mahurangi area can be seen as an obvious human environment in terms of natural and physical resources. It is known that the wider study area is important for ahi kaa Ngati Manuhiri, as a battle associated with tupuna Maki occurred at Pukenihinihi pa, at the southern end of Omaha Beach, marking the ascendancy of Te Kawerau into the Mahurangi area (RDC 2006c). The centrality of Tamahunga for Ngati Manuhiri is encapsulated in the saying:

Ko Tamahunga te maunga

Ko Hauraki te moana

Ko Ngati Manuhiri te Hapu

Ko Omaha te marae.

Other manawhenua groups that whakapapa directly to this area include Te Kawerau a Maki, Ngati Whatua and iwi of the Marutuahu confederation, with other connections from iwi groups that travelled through and along this area and coastline. Overall, there is however a relative lack of historic reference material concerning the Manawhenua histories of the Whangateau catchment.

The ARC Cultural Heritage Index draws upon the databases of New Zealand Archaeological Association and Central Index of New Zealand Archaeological Sites. ARC also maintains archaeological records for the region. The Proposed Regional District Plan only identifies three heritage features within the study area, which are all included within the New Zealand Archaeological Association and Central Index of New Zealand Archaeological Sites databases.

A total of 209 Maori Heritage Sites are identified by the Cultural Heritage Index, including the presence of nine pa within Whangateau catchment and a number occurring just outside the catchment boundary (Map B:9). Middens comprise the majority of these recorded archaeological sites (200), which indicate and date resources and settlement by manawhenua. Despite the relative lack of recorded manawhenua histories, the obvious natural resources (mahinga kai, mahinga mataitai, and whakairo/rongoa/raranga from bush areas) would have meant that the area would have featured varying waves and intensities of settlement, associated in the main with the coastal areas, harbour fringes and historic wetlands.

In terms of recorded European Heritage Sites, the Cultural Heritage Index identifies 22 sites, which comprise:

- 12 industrial/commercial sites, and
- 10 cultural sites (indicating or referencing historic settlement).

Although European settlement in the Matakana area is noted from 1842 (RDC 2006c), historical European settlement of the study area is generally credited with the arrival of the Meiklejohns at Big Omaha in 1858, lured into the area by the safe anchorage of Whangateau Harbour and abundant timber resources (Mabbett 1977). Early settlement would have followed the general settler trends of the wider area, occurring initially on coastal fringes and moving progressively inland as land was cleared of forest cover and prepared for pastoral and horticultural use. The steep slopes in the elevated extremes of the catchment essentially precluded historic settlement of larger areas of the catchment, a situation that essentially remains unchanged today.

In 2001, the ARC undertook a survey of the Auckland region to identify known cultural heritage areas facing development pressures. This study identified the greater portion of the Whangateau catchment as a priority area requiring archaeological survey, based on the likelihood of the area holding significant cultural heritage values (refer to Appendix B). The current identification of sites within the catchment occurs on an ad-hoc basis, relying heavily on investigations on the back of resource consent applications for development, such as at Omaha South.

The settlement of Point Wells followed the initial subdivision of agricultural land in 1946 on the Omaha Flats area. Aerial images from 1953 show the first stages of the Point's development. This early development was further subdivided into small holdings in the early 1970s (RDC 2006c) with aerial images from 1982 showing that settlement was well established by this time. Subdivision of the northern Omaha Sandspit commenced following the construction of the Broadlands Drive causeway in the mid-1970s (Bioletti 1992), with progressive residential development of this area from that date. By 1982 the roading layout and first homes were established. Development of the southern end of the Omaha Sandspit was consented in 2000.

Current settlement patterns

Existing residential settlement within the Whangateau catchment can be broadly described as one of three types, with the relative locations of these settlements shown in Map B:10. It can be seen that there is a clear focus of residential centres along the coastal foreshore. The extent of human occupation along the harbour foreshore is a potential issue affecting the harbour as the immediate receiving environment.

Major residential settlements: Omaha Beach and Point Wells

The settlements of Point Wells and Omaha Beach (North and South) form the most densely developed areas within the study area. Both settlements are dominated by suburban housing layouts with very low levels of community based infrastructure (civic buildings/places of worship/schools/etc.) (Figures 4 – 6). Accordingly, these areas incorporate a component of non-permanent residences.

Figure 2

Point Wells' Community Hall and Library, Point Wells Road 2008.

Under the zoning of the Proposed Regional District Plan, Point Wells and Omaha North provide for medium intensity residential development, based on a minimum allotment size of 600 sqm, where serviced. At Point Wells, where the sewage systems are reticulated, the minimum site area is 1500 sqm, although there is provision within this zoning for more intensive integrated residential development. Aside from a small number of land parcels and reserve areas, all land holdings are less than 1.0 hectares within these settlement areas.

Figure 3

Typical Omaha North streetscape, Rita Way, 2008.

Omaha South is zoned Special 16 (Omaha South Development) Zone (12.8.16). This zoning provides a range of specific allotment sizes and housing typologies, down to a minimum Small Lot Residential minimum of 450 m^2 for stand alone dwellings and also providing for more intensive sub-urban cluster development typologies.

The historic coastal settlements are clustered around the northern Whangateau Harbour fringes and comprise Ti Point and Whangateau (including the adjacent Tramcar Bay). Residences at Ti Point occupy a small valley to the immediate north of the Ti Point Wharf. The settlement of Whangateau is located on either side of Leigh Road, in line with the original coastline before reclamation of the Whangateau Domain. These small settlements comprise a mixture of historic batches and contemporary infill residential development. There is a public campground, historic hall, sports club and public domain area at Whangateau and a public wharf at Ti Point with access along the coast provided by esplanade reserves.

These settlement clusters are also zoned for medium intensity residential development, with a minimum lot size of 600 sqm. There is again provision within this zoning for more intensive integrated residential development of these areas.

Figure 4

Terrace-type dwellings at Omaha South, Mangatawhiri Road, 2008.

Residual rural settlement

The remainder of the catchment is occupied by rural farm properties and residential lifestyle dwellings. The distribution of smaller lifestyle rural dwellings is closely tied to the roading network within the Omaha Valley and on the shallow foothills above the immediate coastline. There are also concentrations of smaller rural properties occupying the Omaha Flats. A minority of rural farm properties are scattered amongst the steep upper hillsides of the catchment, with a few recent developments also located on or just below the ridgeline of Rodney Road.

These residual areas of the catchment are zoned either East Coast Rural or General Rural by the Proposed Rodney District Plan. Whilst subdivision is a Restricted Discretionary activity in these zones, additional rural residential sites can be created through the enhancement of existing native bush and protection of areas.

5.3 Infrastructure and services development

Road network

The historic road network serving the Whangateau catchment provides access to the main settlements as well as connecting with the external centres of Matakana and Leigh. The construction of Broadlands Drive in the mid-1970s to Omaha across the Waikokopu Creek estuary is the most recent extension of the original network, enabling the residential development of Omaha Beach. Omaha Valley Road was also upgraded to provide heavy vehicle access to the Matakana Aggregate Quarry (Map B:11).

In contrast to the northern coastline of the Whangateau Harbour, which is directly accessed by the coastal Warkworth Leigh Road, the southern portion of the catchment

flanking the Waikokopu Creek is largely inaccessible by road. This is beneficial in terms of protecting the fragile estuarine habitats within this part of the catchment.

Water supply and wastewater disposal

The Jones Road Sewerage Treatment Works, located above the Omaha Flats, were constructed in 1989 following concerns of the effects of continuing residential development and individual septic wastewater treatment systems on the Omaha Spit. The Plant currently handles wastewater from the Omaha North and South residential areas, with treated wastewater disposed to an adjacent vegetated block. A component of the treated water is also utilised to irrigate the Omaha Golf Course (RDC 2006a). Currently all other settlements within the catchment rely on individual septic tanks for wastewater collection.

In 2004, RDC gained resource consent for further residential connections to be made to the Plant, sufficient to provide treatment of wastewater from the Omaha Beach, Point Wells and Matakana Village settlements at projected growth rates until 2015 (when upgrade of the plant would be required (RDC 2006c). The consented capacity for irrigation disposal of treated wastewater from the Jones Road plant is deemed sufficient to meet the combined demands of the permanent populations of Point Wells, Omaha Beach and Matakana Village until 2036.

The council have since commissioned independent studies examining the existing performance and potential capacity of the Jones Road treatment plant beyond 2015. This includes a review of the potential residual effects of irrigated treated wastewater applications on the Whangateau Harbour environment.

Domestic potable water is supplied to residential areas through a combination of rainwater and tank storage, in conjunction with permitted allocated groundwater takes. As discussed under the previous section of this report, there is a limited supply of groundwater available within the Whangateau catchment to provide for both domestic supply and productive land use activities.

Open space

Public open space resources comprise a mixture of active and passive recreation areas, with most providing access to the coastline including for boats, at a number of points around the Whangateau Harbour edge (Map B:12). The major open space areas in the eastern portion of the catchment have been created through the development of the Omaha Spit and include the Omaha Golf Club, which is a public facility owned by RDC. The Whangateau Domain is the main site for organised recreation, and is the home ground for the Rodney Rams Rugby League and Sports Club, featuring clubrooms, public toilets and the Whangateau Community Hall. Map B:13 shows the extent of public land tenure within the Whangateau catchment.

Community facilities

Community facilities are important points of focus that lend to local character and identity and are often linked to cultural heritage. The following facilities are identified within the Whangateau catchment, generally directly associated with individual settlements (Map B:14):

- Community hall and library at Point Wells.

- Community hall at Omaha Beach.
- Historic community hall at Whangateau.
- Boat ramps and associated boating facilities spread around the fringes of the Whangateau Harbour.
- A public jetty associated with the main boat ramp at Omaha North.
- The Whangateau Camping Ground (owned and operated by Rodney District Council).
- The historic Big Omaha wharf and facilities.
- Ti Point Wharf and facilities.
- Omaha Beach Bowling and Golf Clubs.
- Omaha Beach Surf Life Saving Club.
- Cemetery at Whangateau.

Whilst there is reasonable provision of social and recreational community facilities in the Whangateau catchment, there is a lack of essential services such as schooling, health care, public transport and retail choice. The absence of these essential services requires residents to travel to either Matakana Village or Warkworth, with a reliance on private vehicle ownership for transport.

5.4 Factors in land use change

The relative activities of different land uses within the Whangateau catchment have changed over time in response to local, regional, national and global factors. These have ultimately affected the patterns of land use that are observed within the catchment today, as well as the potential for land use change in the future. Fundamentally, the potential productive use of the land is determined by physical attributes as well as location. External factors that include all scales of economic market forces, local and national governance and changes in population demographics and distribution also have an important influence on land use. Cultural trends are also evident in causing changes in land use patterns within the Whangateau catchment and its surrounding area.

This section draws from the report on the current and future economic trends in the Greater Matakana Area that includes the majority of the Whangateau catchment (Rick Starr *et al.* 2005).

Alongside a continuing importance of agriculture and tourism industries, a series of emerging trends have been identified as applying to the wider area of the Whangateau catchment, which are summarised below:

- A demise/decline in traditional dairying and pastoral farming activities, associated with an increasing number of smaller rural residential lifestyle farming blocks resulting from land subdivision.

- A progressive decline in traditional horticultural orchard activities, replaced with a localised intensification of specialist "boutique market" produce, including vine, berry and olive production.
- An expansion and diversification of tourist-related activities and facilities associated with an increased demand for holiday home accommodation within the area.
- Increasing areas of new and intensifying residential development – including at Omaha Beach (Starr *et al*. 2005).

The following are attributed as key causal factors in the trends noted above:

- Pressures of increasing land values: making traditional extensive agricultural practices less viable whilst promoting land subdivision.
- Increased competition for land between diversifying land use activities.
- Increasing operational requirements and restrictions for traditional productive land uses such as dairying and horticulture.
- Increased pressure on groundwater resources – which are already fully allocated within Whangateau, for agricultural and horticultural activities.
- Cultural shift towards the diversification of tourism activities and recreational pursuits.
- The recent emergence and positive branding of specialist boutique produce markets within the Matakana area (Starr *et al*. 2005).

Agricultural/horticultural production

The common issues affecting all primary productive land use activities within the Whangateau catchment (including contemporary specialist produce) appear to be fundamentally based on land values and available groundwater supplies. A growing trend in the Whangateau catchment is sustainable agricultural systems and specialised organic produce.

Viticulture, challenged by the climatic conditions of the Whangateau catchment, is not expected to grow into a significant industry within the Matakana area. Existing vineyards, with cafes and wine tasting cellars, are as much a product of the growing tourism interests in the area as horticultural diversification. The requirements of the industry (ie horticultural sprays) do carry the potential to impact upon the amenity of neighbouring properties with reverse sensitivity issues. There may also be limited land opportunities to establishing additional vineyards within the Whangateau catchment, based on the physical factors of soils, slope and aspect.

Tourism activities

The historic development of the tourist industry within the Matakana area owes much to the attractions of natural character, heritage features and rural amenity values of the wider north-east Rodney Coast. The recent diversification of tourism activities within the Whangateau catchment now includes a Reptile Park at Ti Point, food and wine trails (cafes and vineyards), Omaha Golf Course, artists' galleries, Matakana Country Park and a series of visitor accommodation options including bed and breakfast and farmstays.

The frequency, location, scale and nature of these individual facilities would tend to have effects more on a cumulative scale rather than as stand alone features. However, the attraction of large numbers of visitors into the area does have potential implications for traffic and road safety within the Whangateau catchment. The Matakana Farmer's Market is a key weekly fixture and regional draw card that attracts large numbers of visitors into the area from as far away as Auckland. It is expected that tourist operations will continue to develop within the wider area of the Whangateau catchment, according to local, regional, national and international demands and market opportunities.

Silviculture

There is no formalised plantation forest inventory within the study area in terms of establishment dates, age of crop, or projected harvest dates. One problem affecting the monitoring of this activity is that the current market for logs is poor, resulting in harvest dates being extended beyond maturity (normally 25 years) in the hope that economic conditions will improve. Four hectares were harvested over the 2008/09 summer period in the upper reaches of Schollum Road, while additional harvesting is planned (Stephen Bryant for ARC, pers. comm.)

Traditional forestry practices are associated with both land disturbance, through forest clearance operations and increased soil erosion (resulting from lack of understorey and ground cover vegetation) and the applications of chemicals (including herbicides) with the potential to contaminate natural watercourses. There are difficulties in monitoring forestry activities within the upper hillsides of the Whangateau catchment, where a number of headwater streams coincide with an increased erosion risk, therefore presenting a potential threat to the catchment environment.

Residential development and subdivision

There are more residential choices available within the Whangateau catchment today than previously, potentially associated with greater numbers and diversity of residents. The development of new settlement at Omaha is accompanied by increasing subdivision within residual rural areas and increased numbers of rural lifestyle blocks. The creation of conservation bushlots from marginal farmland through rural residential subdivision is potentially an effective enhancement mechanism provided by the Proposed Regional District Plan, offering environmental benefits for the rural parts of the catchment. However, the progressive carving up of traditional agricultural land for rural residential development also raises reverse sensitivity issues with traditional farming practices.

The development of Omaha resulted in a nationally important kahikatea swamp forest, previously in private ownership, being vested in Department of Conservation as a national reserve. However, there has also been a direct loss of natural coastal habitats associated with the progressive development of residential settlement within the Whangateau catchment over time. A potential loss in both rural/natural character values is also associated with the introduction of new settlements into the Whangateau catchment.

Data sources: assumptions and limitations

The Point Wells/Omaha Flats Sustainable Development Plan identifies that there are no heritage items within the Point Wells/Omaha Flats area, whilst the Matakana Sustainable Development Plan does not identify any heritage items within the study area for this report. Both of these Sustainable Development Planss state that the communities consulted have identified that there are heritage items and features that require recognition for their heritage and cultural values. A literary review of the Whangateau catchment (as part of the wider Mahurangi area) undertaken during this study identified published materials and reports that could be drawn upon in this regard, documenting a limited range of accounts of manawhenua histories and wider range of settler histories. As this report, and the iwi and community report (Lees and Cole 2009) have identified that the study area has a complex Maori history, it is important that manawhenua histories are verified with local iwi groups.

The Land Use Capability mapping provided by the New Zealand Land Resource Inventory does not distinguish between the productive capacities and potentials of the subsoil groups identified within the Whangateau catchment. It would be useful, in planning for the future protection and maximisation of these natural soil resources, to develop a better understanding of the productive capacities for each type.

6 Socio-demographics

6.1 Introduction

The purpose of this socio-demographic analysis of the Whangateau catchment is threefold: to identify significant demographics or trends that may be present/absent within the catchment populous, to identify communities and community interests that may be present, and to identify how community generated pressures have the potential to affect the natural values of the Whangateau catchment environment.

A selection of census datasets have been extracted from the l2006 New Zealand census data to build profiles for the Whangateau catchment populous and its component communities (Statistics New Zealand 2007). These have been compared to the wider Rodney District and Auckland region populations. The community profiles of established settlements have been fitted to census meshblock units (Map C:1). As the definition of meshblocks is ultimately structured around known population numbers this does not always allow for an accurate fit. There is some variance in the representation of communities by New Zealand census data on this basis.

Interviews with a range of stakeholders and residents to assess attitudes, participation and involvement with both the community, specifically in regard to the management of the harbour and catchment area has been carried out as part of the iwi and community report (Lees and Cole 2009).

A "Social Survey of the Greater Matakana Area" was previously undertaken by Westbrooke (2005) for RDC. The survey included qualitative and quantitative analysis of the wider population that includes the majority of the Whangateau catchment area to identify social and cultural trends.

6.2 Population distribution

Whangateau catchment area

The 2006 New Zealand census identified a usual resident population of 1626 residents for the Whangateau catchment area, representing 1.8 per cent of Rodney District's population (89,562 people and 0.12 per cent of the Auckland region. In terms of population density, this places the Whangateau catchment in line with the average for Rodney District (at 0.4 residents per hectare), but at a far lower density than average for the Auckland region (at 2.5 residents per hectare).

The distribution of population within the Whangateau catchment is described below in terms of the three main settlement types identified in the previous section of this report. These broad categories identify similarities in population density and settlement

pattern, which also reflect the residential zonings of the Proposed Rodney District Plan.

Major residential settlements: Point Wells and Omaha (North and South)

These settlements are the most densely populated and developed areas within the catchment. A high proportion of the catchment's community facilities, open space holdings and infrastructure is associated with this settlement category.

Omaha Beach has a population of 468 people, representing 29 per cent of the catchment's total population, with approximately 75 per cent of this count occurring within Omaha North, whilst Point Wells has a population of 405 people, representing 25 per cent of the catchment's total population.

Combined, these main residential areas contain approximately 53 per cent of the Whangateau catchment's population and occupy an area of 181.7 ha, (approximately 4.5 per cent of the total catchment area). The population density for this category is five residents per hectare.

Historical coastal fringe settlements: Ti Point and Whangateau (including Tramcar Bay)

These settlements maintain their strong historic connection with the harbour and are smaller in scale and density than the main settlements, with lower levels of infrastructure service.

Ti Point has a population of 84 people, representing five per cent of the catchment's total population, whilst Whangateau has a population of 201 people, representing 12 per cent of the catchment's total population.

Combined, these two historic coastal fringe residential areas contain approximately 17 per cent of the Whangateau catchment's population and occupy an area of 21.8 ha, representing approximately 0.5 per cent of the total catchment area. The population density for this category is 1.25 residents per hectare.

Residual rural settlement

Settlement is scattered throughout the rural area at very low densities, with the highest concentrations of dwellings along Omaha Valley Road.

These residual rural areas have a resident population of 468 people, representing approximately 29 per cent of the catchment's total population and occupying an area of 3986.5 ha, representing approximately 95 per cent of the total catchment area. The population density for this category is 0.1 residents per hectare.

In summary:

- 65 per cent of the Whangateau catchment population is clustered into 5 per cent of the total land area. These residential centres are all located on the harbour fringe, with the potential to generate direct impacts on the harbour environment through their service and infrastructure requirements and recreational activities.
- The residual 35 per cent of the population occupies 95 per cent of the total land area, where the major primary productive land use activities occur. It is here that the indirect effects of land use activities rather than the direct effects of

settlement have the potential to impact on the harbour environment unless adequately planned for and managed.

Community profiles

Community profiles have been derived from the analysis of age composition, household income, employment status, tenure of residency, income sources, occupations and means of travel to place of work for the Whangateau catchment population, based on the most recent 2006 New Zealand Census statistics. The following descriptions provide a summary of the original statistical data which is appended to this report (Appendix C).

Gender composition by age: The Whangateau catchment population has a higher proportion of residents aged 60 or more (26 per cent) than for the Rodney District (19 per cent) and the Auckland region (13 per cent), with the highest concentrations occurring in the Ti Point, Whangateau and Point Wells areas and the lowest concentration at Omaha South. There is also a higher proportion of aging residents (aged 40 to 60), with considerably lower number of residents in the 20- to 40-year age group. There is an even split of male and female residents living within the Whangateau catchment, with only minor variation in the male:female ratios occurring within its constituent residential communities.

Ethnic origin: Ethnicity of the Whangateau catchment resident population is strongly New Zealand European, with 7 per cent identifying as Maori and an additional 10 per cent claiming Maori descent. This population structure is similar to the Rodney District, but lacks the diversity and range of other ethnic groups of the wider Auckland population. Omaha South has the highest concentration of residents identifying as Maori (at 17 per cent) or claiming Maori descent (18 per cent), with the lowest numbers occurring within the Rural Residential community (at 4 per cent Maori identity and 4 per cent Maori descent).

Household income: The Whangateau catchment is associated with lower household income levels than averages for both the wider Rodney District and Auckland region. Household incomes are generally consistent across settlement areas, with the exception of Omaha South.

Employment status: There are a higher proportion of residents working either part-time or not at all within the Whangateau catchment, compared with the Rodney District and Auckland region. The majority of full-time workers reside at Omaha South, with the highest non-working populations at Point Wells and Whangateau. In terms of labour division, the proportion of employers and self-employed is higher than for both Rodney and Auckland.

Sources of income: A higher percentage of workers within the Whangateau catchment are either self-employed or not working at all compared with the Rodney/Auckland working populations. A large proportion of the population are also reliant upon benefit payments (excepting unemployment but including government pensions/superannuation) and interest/dividends as primary sources of income.

Occupation: The Whangateau catchment population contains a higher proportion of primary production workers amongst the workforce than either Rodney/Auckland work forces, with a lower proportion of traditional white collar and service workers.

Travel to work: A higher proportion of the Whangateau catchment population work from home than in wider Rodney or Auckland. Residents working outside of the catchment are heavily reliant upon private or work-related transportation to travel to places of work.

Tenure – years at address: The Whangateau catchment population has a more stable resident population than either the Rodney District or Auckland regions, with almost a quarter of the resident population residing at the same address for more than 10 years. The obvious exception to this trend is the Omaha South settlement which has only been developed since 2000.

In summary:

- There is a higher proportion of aging and aged residents living permanently within the Whangateau catchment. Whilst this group generally provides for stable residency and tend to participate more actively within the community, the aged also tend to have lower fixed incomes, and require access to specific resources and services (eg medical care).
- There is a small representation of Maori residents remaining as residents within the Whangateau catchment.
- There is a low proportion of residents in the 0 to 20 and 20 to 40 age groups, (the youth/parenting age brackets) making this a "top-heavy" community in terms of age.
- The resident population generally has lower average household income figures relative to the wider Rodney and Auckland regions, potentially making the community less resilient and more susceptible to external economic and market pressures and influences and being reliant upon benefit support.
- There is a proportionally small workforce within the Whangateau catchment, with the limited range of employment opportunities heavily weighted towards the primary rural sector. This sector has had a chequered past historically (eg horticulture on the Omaha Flats), and reliance upon this sector creates a vulnerability to external economic and market pressures and influences.
- Residents not employed in the rural productive sector are forced to travel outside of the catchment area for other employment opportunities, creating reliance upon private/work-related transportation as there is no public transport servicing available.
- The recent settlers of Omaha South are more similar in demographic structure to the Auckland regional population than the Whangateau catchment population, being younger, generally having higher incomes and being employed in more "urban" professional sectors.
- The Omaha Beach communities contain the highest non-resident population within the catchment.

- Overall, there is minor variation in demographic themes between the individual catchment communities, with the exception of Omaha Beach and particularly Omaha South.

Community characteristics

In confirming the main residential centres of Omaha Beach (North and South), Point Wells, Whangateau and Ti Point, Coles and Lees (2009, p. 13) found that "each of these settlements has a distinctive character and usually separate groupings or organisations that serve the interests of that community."

The nature of the distinct communities that exist within the Whangateau catchment relates to the nature of residency (ie permanent/non-permanent resident mix), the tenure of residents (ie length of time in/relationship to place), social demographics (ie income/work status/age) as well as their physical nature and location. Consequently, Lees and Cole (2009, p. 13) described the residents and stakeholders of the study area as "a diverse range of individuals with varying interest and engagement with the area."

Point Wells

The historic association of Point Wells with horticultural activities on the adjacent Omaha Flats has created a "Garden Village" identity for this settlement. In occupying the northernmost point of the Omaha Flats peninsula that extends into the Whangateau harbour, this community is also directly linked to the harbour environment. There are eight permanent moorings provided at Point Wells. Point Wells currently relies upon individual on-site treatment of wastewater, although the Jones Road Treatment Plant has potential capacity for connection to this settlement.

Point Wells has an established community centre, comprising a community hall and library (which was established by residents but has since been transferred to the RDC). Lees and Cole (2009) identified that the majority of the Point Wells community are permanent residents, and that this community has been represented by the Point Wells Residents and Ratepayers Association for approximately 25 years, with current membership from 240 households within the settlement and adjoining areas. This is confirmed by New Zealand census data. Point Wells also has one of the highest concentrations of residents in the 60+ year group, with residents generally being longer term, having lower income levels and working less than other communities in the study area.

Omaha Beach

Omaha Beach maintains connection to both coastal and harbour marine environments, providing one of the unique features of this community. Lees and Cole (2009, p. 13) identified six groups and clubs listed within the Omaha Beach area, where "the major focus of community activity and identity takes place at weekends.". The largest of these community groups is The Omaha Beach Community Inc. boasts a membership of 1200 (Lees and Cole 2009). There are 50 permanent moorings provided at Omaha.

Omaha North

Dating from the late 1970s, this residential development features a range of sporting facilities such as the Golf Course, Yacht Club and Bowling Club. Whilst there are families and a permanent resident population, this community features a higher portion of residents in the 60+ year group, with less working residents than other communities in the study area.

Omaha South

As a contemporary planned coastal "community", which commenced development in 2000, Omaha South has a "contemporary" and "cohesive" aesthetic which differs markedly from residential character present within the remainder of the catchment. Community facilities at Omaha South currently only provide for recreational facilities, although there is a small retail centre under construction at the end of Broadlands Drive.

Omaha South is the major statistical anomaly within the study area, with the greatest proportion of its residents of working age, within higher income brackets, with a greater proportion of professional/technical workers. There is also a considerable discrepancy between the usual resident population figures and census night counts for Omaha South, which confirms a greater proportion of non-permanent residents in this community.

Ti Point

As an historic coastal settlement, Ti Point remains strongly connected to the harbour. The Honorary Harbourmaster is housed at Ti Point and charter fishing operates from the historic wharf, which remains a key focus for the community. Other local attractions include a coastal walkway and scenic reserve, and 45 permanent moorings.

Ti Point is comprised of a mix of holiday homes and permanent residents (Lees and Cole 2009). The community is stabilised by a high proportion of older residents who work less, but generally have higher income levels. Ti Point relies upon individual on-site treatment of wastewater, and there are no plans for its connection to the Jones Road Treatment Plant.

Whangateau (including Tramcar Bay)

Whangateau centres on the historic Domain, with a community hall and pubic campground. The small residential cluster of Tramcar Bay to the north is also included within this community and there is a local resthome on the fringes of Whangateau. This community is one of the original harbour settlements, with local roads named after settler families and a number of heritage features associated with historic connection to the harbour nearby, including an historic boatyard at Tramcar Bay.

There are 140 property owners in the settlement, which is represented by the Whangateau Residents and Ratepayers Association of 40 members (Lees and Cole 2009). The Big Omaha Wharf Restoration Society and Whangateau Harbour Care Group also associate with this community.

Not surprisingly, Whangateau features the highest proportion of non-working long-term residents aged 60 years+ within the catchment. Whangateau relies upon individual on-site treatment of wastewater, and there are no plans for connection to the Jones Road Treatment Plant.

Residual rural community

This area maintains the dominant rural productive character of the catchment alongside rural residential settlement and also contains a number of larger structures and features within the study area, including the Matakana Aggregate Quarry, Matakana Country Park, Puriri Tree Ecological Centre and Adventure Park, commercial vineyards and glasshouse operations and the Jones Road Wastewater Plant. All wastewater disposal within this area is currently treated by individual on-site treatment system.

There is a higher representation of youth and working age population associated with the agricultural and trade sectors within the outlying rural areas of the catchment – also associated with higher income levels. Their economic contribution (in terms of revenue and employment) and association with major infrastructure facilities creates an important role for the rural residential community within the Whangateau catchment.

Non-resident populations

There was little information available on the numbers of casual visitors to the catchment area, although the Omaha Coastal Compartment Management Plan (2003) mentions an historic inability to deal with parking volumes at reserve and boat ramp areas on the Omaha Sandspit area (Opus 2003).

This population will include recreational users of the immediate Whangateau catchment, visitors to the wider Warkworth/Matakana/Leigh tourism attractions, guests of local residents and visitors of longer duration staying in holiday accommodation.

This group can potentially place considerable pressure on community facilities and servicing at peak periods, particularly during summer holidays.

Cultural changes and future development

Overall, the population of Whangateau catchment has increased marginally by 7 per cent over the 10-year period from 1996-2006. By comparison, the population of Rodney District has increased by 34 per cent over the 10-year period, with the Auckland region experiencing a 22 per cent population growth over this period.

Dwelling values in the Rodney North area grew approximately 88 per cent in the five years to March 2008 (Bayleys 2008), well above the national median. The increasing accessibility of the Rodney North area with major roading projects nearing completion will make the area easier and quicker to access from Auckland.

Table 1 below shows that there have been considerable gains in population in the Omaha South and Residual Rural areas, which would relate to increasing holiday home development and an increase in lifestyle block living occurring. Omaha North has experienced a moderate gain over this period which would coincide with the later stages of subdivision development within this area occurring. All other areas experience minor losses in population, with the exception of Ti Point.

Table 1

Whangateau catchment population (Statistics New Zealand 2007)

Whangateau catchment population nos.

	1996	2001	2006	Cumulative change as % (1996-2006)
Omaha North	255	294	354	+38%
Omaha South	48	69	114	+137%
Point Wells	324	354	303	-7%
Residual Rural	420	495	570	+76%
Ti Point	99	93	84	-16%
Whangateau	219	201	201	-9%
WHANGATEAU CATCHMENT	1365	1506	1626	+7%
RODNEY DISTRICT	66,483	76,185	89,559	+34%
AUCKLAND REGION	1,068,645	1,158,891	1,303,068	+22%

The relative stability of the Whangateau catchment population over this period is presumed to be a reflection of small numbers of new residents moving into the area, since the aging profile of the long-term resident community is unable to replace itself through natural growth rates.

The rising pressures for residential development currently experienced within the wider Matakana area are associated with perceptions of rapid change within its local communities alongside a desire that the Matakana area retains its current country feel for the future. Within the Whangateau catchment, there are also heightened concerns for the loss of natural character and direct effects on the harbour environment (Lees and Cole 2009).

The increasing demands for infrastructure and services that are often associated with residential development and infill is also an issue facing the Whangateau catchment, where existing facilities are limited. A structure plan approach is therefore being sought by the local community in order to effectively plan for the future development of parts of the catchment, based on the recognition and sustainable management of its natural and social cultural values.

It is expected that the population of Whangateau catchment will increase mainly in the Omaha South area as the remaining undeveloped land is built out over the next five- to 10-year period. Some additional residential growth may also be provided by the Pt Wells/Omaha Flats Sustainable Development Plan, if this planning initiative proceeds. Continuing lifestyle block development of the Residual Rural area is likely to occur, although population gains from this change in land use would be expected to be relatively small and incremental.

Data sources: assumptions and limitations

The identification of social demographic trends within the Whangateau catchment has relied heavily on the interpretation of Census data, from the most recent 2006 record

and historic New Zealand census. The creation of community profiles for the individual settlements located within the catchment has involved the retrofitting of mapped census meshblocks to artificial boundaries around known population centres, which is likely to have resulted in minor distortions to the data. The inherent limitations of New Zealand census data providing a representative sample of particular populations are well known. However, for the purpose of this study, the key trends identified, are reasonably supported by observed changes in land use activities and settlement patterns within the wider area, and largely confirmed by Lees and Cole (2009).

In the future, it will be important tto better establish the proportion of non-permanent residents living within the Whangateau catchment to plan for its future development capacity, including infrastructure services. An inventory of the extent and adequacy of existing infrastructure services and community facilities would also be useful in this regard.

7 Statutory and Non-statutory Policy Framework Review

7.1 National level documents

Resource Management Act (1991)

The purpose and principles of the Resource Management Act (1991) (RMA) are set out in sections 5 to 8 (Part II) of the legislation. The aim of Part II of the RMA is to promote the sustainable management of New Zealand's environment, and to outline matters that are of national and significant importance in achieving that purpose, such as the preservation of the natural character of the coastal environment, wetlands and protection of them from inappropriate subdivision, use and development.

The RMA sets the overarching policy framework for the regional and district level statutory planning documents which apply to the Whangateau catchment, but does not include any rules which control day to day management.

New Zealand Coastal Policy Statement (1994)

The purpose of the New Zealand Coastal Policy Statement is to detail policies to achieve the purpose of the RMA within the coastal environment. The Coastal Policy Statement envisages coastal development, but requires that it be appropriately located, and designed in such a manner that natural character and resources are afforded a high-level of protection. The Coastal Policy Statement is a policy document which has relevance for the future management of the Whangateau catchment, but does not include any rules which would control its day-to-day management. Such rules are included in the documents discussed in Section 7.2.

New Zealand Historic Places Act (1993)

The purpose and principles of the Historic Places Act (1993) are set out in Section 4 of the legislation. The aim of the Historic Places Act is to promote the identification, protection, preservation and conservation of the historical and cultural heritage of Aotearoa/New Zealand, and aligns with Part 2 of the RMA in providing for the sustainable management and protection of heritage as a matter of national importance.

The HPA provides the Historic Places Trust with administrative, regulatory and advocacy powers and roles. The Act requires that any development that might occur within the Whangateau catchment associated with registered heritage sites will require an archaeological authority from the Historic Places Trust to destroy, damage or modify any part of that site. Additionally, the Historic Places Trust may also be

recognised by the ARC or RDC as an interested stakeholder in heritage management matters within the Whangateau catchment.

Hauraki Gulf Marine Park Act (2000)

The Hauraki Gulf Marine Park Act purpose is set out in section 3 of the Act:

(a) integrate the management of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments;

(b) establish the Hauraki Gulf Marine Park;

(c) establish objectives for the management of the Hauraki Gulf, its islands, and catchments;

(d) recognise the historic, traditional, cultural, and spiritual relationship of the tangata whenua with the Hauraki Gulf and its islands; and

(e) establish the Hauraki Gulf Forum.

By establishing overall objectives for the Gulf, its islands and catchments, the Hauraki Gulf Marine Park Act achieves integrated management across land and sea. This ensures the effects of urban and rural land use are given proper attention and the life supporting capacity of the Gulf is protected.

The Act provides integrated management of the Gulf across 21 other statutes by requiring that all persons carrying out functions for the Gulf under those Acts must have particular regard to sections 7 and 8 of the Hauraki Gulf Marine Park Act. There are also more specific requirements relating to sections 7 and 8 in terms of the Resource Management Act, Conservation Act and Fisheries Act.

7.2 Regional level documents

Auckland Regional Policy Statement (ARC 1999b)

The Auckland Regional Policy Statement provides an overview of the resource management issues applying within the Auckland region. It also establishes strategic objectives, policies and methods to achieve the integrated use, management and protection of natural and physical resources on a regional scale. The use of both Catchment Management Plans and Structure Plans, as non-statutory development tools are provided for by the Auckland Regional Policy Statement.

Auckland's coastal environment is recognised as sensitive to the adverse effects of inappropriate subdivision use and development, whilst being essential for the region's social and economic well-being. Rural resources are seen as enabling people and communities to provide for their social, economic and cultural well-being. Resource management issues arise as a consequence to changes in land use and increasing levels of human modification, particularly in rural residential subdivision (countryside living) and coastal development.

Designated areas of protection and/or management relating to key natural and cultural resources are identified by the Auckland Regional Policy Statement. Those with

particular relevance to the Whangateau catchment environment include: matters of significance to iwi; heritage (landscape, natural and cultural); coastal environment; water quality; conservation and allocation; natural hazards; soil conservation; minerals; contaminated sites; pests and esplanade reserves. Consequently, there may be multiple values attributed to certain areas/sites. The Auckland Regional Policy Statement allows for development to be appropriately located, whilst providing for the sustainable use, development or protection of natural resources. The anticipated environmental results of the policies provided under this plan are focused on the enhancement, preservation/conservation, and maintenance of natural resources.

Auckland Regional Growth Strategy (ARC 1999)

The Regional Growth Strategy was developed subsequently to the ARPS to provide: a vision for the Auckland region; desired regional outcomes; principles for evaluating growth strategies; a possible regional growth concept; and implementation criteria and mechanisms.

The Regional Growth Concept contained within the Regional Growth Strategy "is based on compact urban environments. This means where urban growth occurs, whether as part of the existing metropolitan urban area, satellite town, or rural or coastal town, it should result in a compact urban form to avoid spreading the effects of urbanisation over a greater area" (Regional Growth Forum 1999).

The 1999 Regional Growth Strategy focuses on containment of the population within the metropolitan urban limit, with very limited extension to greenfield sites. Accordingly, no new settlements within the catchment are anticipated by the Regional Growth Strategy, but growth of existing settlements may be possible.

Auckland Regional Coastal Plan (ARC 2004)

The Auckland Regional Coastal Plan (ARCP) provides the framework for the integrated and sustainable management of the Auckland region's coastal environment. The ARCP includes a range of objectives, policies and rules for the coastal environment, specifically the area below Mean High Water Springs,which is addressed in Kelly (2009).

Proposed Auckland Regional Plan: Air, Land & Water (ARC 2005)

The *Proposed Auckland Regional Plan: Air, Land and Water* applies to the management of air, land and water resources in the region including air, soil, rivers and streams, lakes, groundwater, wetlands and geothermal water.

The Plan includes a range of objectives, policies and rules relating to air quality, agrichemical application use, discharge to land and water and land management, water allocation, the beds of lakes and rivers, and diversion of surface water. A number of the streams within the catchment are identified as Natural Stream Management Areas (a mechanism which triggers a resource consent requirement for certain activities). Omaha, Ti Point and Pt Wells are identified as Urban Air Quality Management Areas and the Kahikatea Forest at Omaha identified as a Wetland Management Area. The entire catchment is identified as a High Use Aquifer Management Area. Recent

reporting on State of the Environment monitoring indicates that all of the water within in the aquifer has been allocated (ARC 2007).

The rules relating to agrichemical application and use, stormwater, wastewater, sewage treatment and disposal, production land activities, fertiliser use, landfills, discharge of contaminants, stock access, and the taking and using of water are all relevant to the quality of the Whangateau catchment. The rules are all based on standards and where a variety of standards are met, certain activities are provided for as a Permitted Activity. Where the standards are not met, resource consent is required. The requirement to obtain resource consent enables the council to avoid, remedy, mitigate and monitor the effects of the particular activity for which consent is sought. There may however, be cumulative effects associated with the application of agrichemicals and use of septic tanks as a method of sewage disposal (specifically – septic tanks that are not maintained can over time, malfunction and result in contamination of the surrounding groundwater) on the quality of water in the catchment.

Auckland Regional Plan: Sediment Control (ARC 2001)

The Operative Auckland Regional Plan: Sediment Control (ARPSC) seeks to manage sediment discharge from the removal of vegetation and earthworks on the surrounding environment, and provide methods to avoid remedy or mitigate potential adverse effects.

The Sediment Control Plan includes a range of objectives, policies and rules which seek to maintain or enhance the quality of water and water bodies and coastal water, reduce the exposure of land to the risk of surface erosion leading to sediment generation and minimise sediment discharge into the receiving environment.

The rules provide for small scale earthworks, roading/tracking/trenching and quarries as a Permitted Activity, subject to meeting a range of conditions such as the provision of silt and sediment control measures. A resource consent is required for all works other than those minor works provided for as a Permitted Activity. As mentioned above, the requirement to obtain a resource consent enables the council to avoid, remedy, mitigate and monitor the effects of individual activities. Provided the works are carried out in accordance with the standards specified in the ARPSC, the conditions imposed on resource consents and that monitoring is undertaken to ensure that the conditions and standards are being complied with the adverse effects on the quality of the Whangateau catchment should be insignificant.

The ARPSC provides for all vegetation removal on all soils as a Permitted Activity subject to meeting a range of consent conditions. The conditions require, amongst other things, that ARC be notified in writing where areas of 1 ha or more are being removed and that silt and sediment control measures be implemented. Through discussions with RDC planners, it is understood that these standards are not being met in all cases.

Auckland Regional Plan: Farm Dairy Discharges (ARC 1999a)

The Operative Auckland Regional Plan: Farm Dairy Discharges seeks to manage the environmental effects of farm dairy discharges. Uncontrolled and unmanaged

discharges from farm dairies can be a major source of water pollution. The number of dairy farms in the Whangateau catchment however is small. Subject to the appropriate management of discharges from these holdings, the potential effects of these activities are likely insignificant.

7.3 District level documents

Operative Rodney District Plan (RDC 1993, including Plan Change 55)

RDC is seeking to resolve the remaining appeals on the Proposed Rodney District Plan in 2009 (Craig Pratt, pers. comm..). Once the appeals have been resolved and the Proposed Plan becomes operative, the existing Operative Rodney District Plan and Plan Change 55 will become redundant in terms of the future planning of the Whangateau catchment. On this basis, and given that the intention of this document goes beyond early 2009, the Operative Plan is not commented on.

Proposed Rodney District Plan (RDC 2000, decisions version)

The Proposed Regional District Plan seeks to manage the effects of land use within the District, including the Whangateau catchment. The Proposed Rodney District Plan includes a range of objectives, policies and rules for the various zones identified within the catchment. Approximately half of the catchment is covered by the General Rural zone, with the remainder within the East Coast Rural Zone. The Matakana Quarry is identified as a Significant Aggregate Extraction Resource and the area within 500 m of the site is subject to a range of rules relating to reverse sensitivity effects. The settlements of Omaha, Point Wells, Whangateau, Tramcar Bay and Ti Point are zoned for residential use. There are pockets of land zoned for Open Space and Recreation uses. There are three areas zoned Inland Water General on the northern side of the Whangateau Harbour. The sewage treatment plant on Jones Road is Designated (no 112) as is the former landfill on Leigh Road (no 110). These are all identified in the zoning Map D:1. There are also a number of Significant Natural Area's identified in relation to the Whangateau catchment in Map A:23.

The following sections discuss each of the zones applying to the catchment and any issues identified.

General Rural Zone

The General Rural Zone is characterised by large properties, low intensity of settlement, significant natural areas and natural resources, an environment less modified by humans with opportunities to conserve and enhance native vegetation and wildlife. Farming activities dominate land within the zone.

Subject to compliance with the relevant development controls, the following are provided for as Permitted Activities within the zone: erection of buildings and household units; childcare; cleanfill sites up to 200 m^2; farming; farm stay; forestry (except within an Significant Natural Area); greenhouses (subject to size restrictions); horse training; pig keeping; planting of trees for amenity or conservation purposes;

poultry; prospecting and exploration for minerals not involving the use of explosives; sale of primary produce grown on site (subject to controls); and events (up to three days). With the exception of forestry (which is discussed further in this report) and assuming that the activities are carried out lawfully, none of these present significant issues for the catchment environment. All other activities in the zone require a resource consent which enables the council to impose conditions to avoid, remedy or mitigate the effects of such activities, thus ensuring the quality of the catchment is maintained.

The controls relating to the subdivision of land in the General Rural zone and East Coast Rural Zone (discussed below) are restrictive and are largely based around the protection of ecological features. Subdivision based solely on the size of the parent lot is not provided for. Subdivision is provided for by way of restricted discretionary or discretionary activity consent where a natural area is protected, esplanade reserve created, significant enhancement planting or land rehabilitation carried out, and to provide for household units on Maori Land. All other subdivision is a non-complying activity. Except where an important ecological feature is to be protected, these requirements restrict the ability to subdivide and subsequently fragment land with good quality soils. While these rules will enable some further subdivision within the catchment, a resource consent is required in all instances thus enabling the council to impose conditions to ensure that the integrity of the catchment is maintained.

The Matakana Aggregate Quarry is located within the General Rural Zone. The quarry has been operating since the early 1980s. Rodney District Council does not hold a record of a resource consent for the use, and on this basis it is assumed to operate under existing use rights. The Quarry holds ARC consents which are due to expire in 2014. These require the routine monitoring of the Tamahunga Stream as part of erosion and sediment control. New applications have been made to extend quarry operations until 2043, but are yet to be determined for water take, air discharge permit and streamworks. Subject to complying with all of the applicable consents, there should be no major issues with the extension of the existing quarry for this period having adverse effects upon the catchment environment.

The Jones Road Sewage Treatment Plant and Disposal Fields are located within the General Rural Zone. This treatment plant is identified by RDC for potential upgrading to accommodate the demands of Matakana and Pt Wells. For the purposes of this report, it was assumed that where upgrades are undertaken, that appropriate consents and management systems will be put in place to ensure that adverse effects on the catchment and the environment generally are avoided, remedied or mitigated. RDC have recently commissioned a series of independent studies to establish the current performance and potential future capacity of the existing Jones Road facility.

East Coast Rural Zone

The East Coast Rural Zone surrounds a number of smaller urban settlements at the northern extent of the catchment and in general it is an area of limited settlement having a non-urban and remote character, with a significant portion of the areas inhabitants residing in the coastal area between Cape Rodney and Whangateau. That part of the zone around the southern extent of the catchment has a remote and non-urban character. The activities provided for in the zone are generally consistent with

the rules for the General Rural Zone (where there are differences, the East Coast Rural Zone is more restrictive).

There are a number of forestry blocks of varying ages within the catchment and East Coast Rural Zone, which will at some point in time require harvesting. Forestry is a permitted activity in the district plan and subject to meeting the conditions listed in the Regional Sediment Control Plan (ARC 2001). There is a requirement to notify ARC where the area to be felled is greater than 1 ha, but where the area is less than 1 ha, there is no requirement thus creating a situation which is difficult to monitor. The felling of the trees, without the appropriate silt and sediment control measures and replanting programmes in place can potentially have a significant effect on water quality and land stability in the catchment.

The Ti Point Landfill is located within the East Coast Rural Zone, just north of the Ti Point settlement. The facility has been closed since 1994. A consent was issued in 2000 by the ARC to discharge contaminants to ground and groundwater from the southern and northern site and leachate holding pond. Monitoring and sampling was carried out annually until December 2004 with six-monthly reports provided to ARC. Monitoring and sampling is now carried out five yearly, with the next monitoring required in 2009. There are leachate ponds and stormwater control measures on site. In spite of these, contamination traced from the former landfill site has been detected within the harbour.

Residential and Open Space Zones

The settlements within the catchment are zoned for residential purposes (generally medium-density). There are also pockets of land zoned for Open Space purposes including Mt Tamahunga, the Omaha Golf Course, the esplanade reserve at Omaha, coastal margins and small local reserves within the settlements. The activities provided for as a permitted activity within these zones is limited to activities of a residential or recreational nature. All other activities require a resource consent. Subject to addressing sewage disposal issues (which are discussed in Section 7.2.4), such activities should not have an adverse effect on the catchment.

Inland Water Zone

The Inland Water Zone includes areas of water that are not within the Coastal Marine Area. The zone has controls on activities to deal with the impacts of structures on waterways, landscape values and the disturbance of wildlife, as well as native vegetation removal. Very little is provided for as a permitted activity; consequently, most activities require resource consent from ARC as they affect the river or stream bed, thus enabling adverse effects to be controlled through the resource consent process.

7.4 Non-statutory documents

Vision Rodney (RDC 2008b) and Planning Rodney (RDC 2008a)

Vision Rodney (RDC 2008b) and Planning Rodney (RDC 2008a) are two high-level strategic documents prepared by Rodney District Council which set out strategies and "maps" for the districts future. The desired future is described in a number of simple but clear statements in Vision Rodney, for example. Rodney is a district that has a country look and feel, and where the environment is looked after and enjoyed by all.

Planning Rodney provides a spatial interpretation and representation of Vision Rodney, aimed at achieving its outcomes, and paints a picture of the district. Planning Rodney is one of the main tools that the council will use in its endeavour to deliver Vision Rodney. In Planning Rodney, Point Wells and Omaha are identified as dormitory/resort villages. Planning Rodney states that no significant expansion of the residential components of these villages is envisaged at the strategic level and intensification (if any) will focus on redevelopment rather than greenfield development and will be considered subject to provision and on-going maintenance of services. RDC has no intention to introduce water and wastewater services to these settlements unless they have already committed to it. Ti Point, Whangateau is identified as a bach settlement. The strategic approach is to retain these small lifestyle settlements allowing either no or very limited residential expansion within strictly defined limits. RDC generally will not become involved in utility service provision and will limit its role to community infrastructure provision on esplanade reserves and around boat ramps. Overall these documents indicate that pressure for residential expansion within the Whangateau catchments will be contained, which will help to maintain the quality of the catchment.

Sustainable Development Plan for Pt Wells/Omaha Flats (RDC 2006a,b)

RDC has prepared a number of Sustainable Development Plans (RDC 2006a,b), an initiative to help achieve Vision Rodney (RDC 2008b). The Sustainable Development Plan considers local community aspirations and values, in the context of achieving a long-term sustainable environment and economy for future generations. The Sustainable Development Plan includes a Structure Plan as a means of aligning the Sustainable Development Plan with the growth strategies promoted by ARC. It as anticipated that the Sustainable Development Plan would lead RDC promoting a plan change/variation, which was expected once the Rodney Proposed District Plan has become operative. The Sustainable Development Plan covers a range of issues, with those relevant to this study being the sewerage problems emanating form local septic tanks, the high water table and the lack of reticulation, the processes of housing development and lifestyle block subdivision. In relation to wastewater and the rapid growth of Matakana and Point Wells communities which is anticipated to continue, the upgrade and utilisation of the Jones Road Treatment Plant is considered to be the most sustainable option. A structure plan for Point Wells is included in the Sustainable Development Plan which seeks to enable a new residential lifestyle zone providing for low density residential at the edge of the Point Wells settlement. Well-managed, particularly in relation to silt and sediment control, such development should not affect the quality of the catchment.

Omaha Coastal Compartment Management Plan (Opus 2003)

A Coastal Compartment Management Plan was prepared for the Omaha Compartment (Opus 2003). The purpose of the documents is to assist communication between RDC

and the community; help RDC and the community management the Omaha Compartment; help RDC prioritise, programme and budget for planning, maintenance and improvements; help the preparation of resource consent application for new works identified in the catchment management plan; and provide information for the Omaha compartment. The Coastal Compartment Management Plan includes a number of actions to be carried out, and some will have already been done. The actions listed will have positive effects on the quality of the catchment and therefore do not raise any issues. A similar Coastal Compartment Management Plan exists for the Leigh, Ti Point coastline, which is focused on the specific management issues of that coast area (Opus 2001).

Other existing management plans

Management Plans are also provided for a number of the existing reserves that occur within the Whangateau catchment, including for the North Omaha Reserve (RDC) and Omaha Ecological Area, Mt Tamahunga Forest (Department of Conservation). There is a conservation emphasis to these plans, based on the protection and management of individual ecological sites and their resident wildlife populations. There is otherwise no co-ordinated management of sites within the Whangateau catchment.

8 Summary of Catchment Values

Excluding the intrinsic values of the receiving harbour environment, the current study has identified a number of values associated with the wider Whangateau catchment. These have been summarised below.

8.1 Bio-physical

Just under half of the total area of the Whangateau catchment (47 per cent) is recognised by a form of ecological or geological/landform designation, independently administered by either ARC, RDC or Department of Conservation. This includes a stand of nationally significant original kahikatea forest (at Omaha Beach) and virgin podocarp forest on Mt Tamahunga, as well as a number of recently planted conservation bush lots that occur throughout the catchment. The matrix formed by the extent of both protected native and productive exotic vegetation cover within the Whangateau catchment provides for good ecological connections both within and beyond the immediate catchment boundaries. In places, this includes intact sequences of native habitats, with increased conservation values.

The diversity of habitats contained within the relatively small total area of the Whangateau catchment is also reflected in the diversity of its native wildlife associations, particularly of both forest and shore/wading birds. The coastal shrublands which flank the harbour have international recognition as prime sites for populations of rare shore birds that include the New Zealand dotterel. The rare native Hoschstetter's frog has also been recorded within the native forest of Mt Tamahunga, along with a diversity of native forest birds.

Even excluding the potential ecological values of the freshwater stream courses within the Whangateau catchment, the area is generally credited with good biodiversity values.

The Outstanding Natural Landscape and natural character values that were identified within the wider extents of the Whangateau catchment by the ARC and RD, also reflect its natural qualities alongside high scenic and amenity value ratings.

Key values:

- Intact sequences of diverse terrestrial native habitats maintained by good ecological connections, including through linkages with exotic vegetation cover.
- Approximately 47 per cent of the total catchment area is protected through various type of environmental designations.
- High natural character and outstanding landscape values are attributed to the wider catchment environment.
- Diversity of inland and coastal wildlife populations that include rare coastal birds, resulting in potentially high biodiversity values.

8.2 Human economic

The early clearance of original timber resources from within the base of the catchment provided the necessary land for the traditional farming and horticultural practices that have preoccupied the Whangateau catchment up to the present time. The fertile alluvial and organic peat soils that line the Omaha Flats and Omaha Valley areas have supported a diversity of intensive horticultural activities throughout time, allowing for the cultivation of various niche market crops. The productive capacity of the land has traditionally therefore been fundamental to its economic use. Horticultural activities have diversified significantly since the original apple and citrus orchards of the Omaha Flats into organic berry, fruit and vegetable production.

The Matakana Aggregate Quarry also taps into one of the isolated exposed gregwacke mineral resources that occur within the catchment area.

Most recently, tourism-related activities have become a significant industry within the wider area. Although fundamentally focused on the traditional recreational water-based activities provided by the of the Whangateau Harbour, additional tourist facilities now offered by the wider catchment extend to cafes, artists galleries and local theme parks. Whangateau also features in the wine and food trails of the Matakana area and offers a range of holiday accommodation to potential visitors.

Key values:

- Productive capacity of the fertile low-lying parts of the catchment for ongoing horticultural activities.
- Recent development of tourism-based activities associated with branding attractions of wider Matakana area.

8.3 Cultural heritage

The rich cultural heritage that is strongly associated with the origins of settlement within the Whangateau catchment is poorly reflected in the cultural heritage records covering this area. The natural resources of the harbour that attracted the original settlers to establish within Whangateau have formed the basis to the coastal settlement patterns of today. It is also the harbour environment that has provided the main focus for the subsequent development of communities within the Whangateau catchment by providing identity and character to these settlements.

Occupation of the wider catchment for traditional productive land use purposes is also associated with a "custodianship" that is developed from historical relationships with the land. The sharing of this acquired knowledge between generations has historically provided the basis of traditional land management practices for rural communities throughout the wider area.

Key values:

- Rich cultural histories associated with the immediate harbour environment and surrounding landscape features.

- Land "custodianship" fostered through traditional associations with the land and reliance on its natural resources.

8.4 Social amenity

While community facilities are otherwise limited within the Whangateau catchment, access to the harbour and coast is particularly valued by both residents and visitors alike. There are a number of established boating facilities providing access to the water via boat ramps, wharves and jetties at various locations around the harbour. One issue raised was the desire to improve public access, through walkway development to "help reconnect people with the harbour and so deliver a richer relationship with it"(Lees and Cole 2009, p. 23)

Contemporary recreational facilities associated with the harbour include a surf club and golf club (located on the harbour edge) at Omaha Beach.

The rural amenity and scenic qualities of the wider catchment landscape that have traditionally attracted visitors to Whangateau are equally valued by its resident communities. These values are also supported by its currently low population densities and rural landscape traditions.

Key values:

- Community facilities and social activities are strongly orientated around the harbour environment, including water-based recreational pursuits.
- The scenic and rural amenity qualities of the wider catchment landscape have attracted both residents and regular visitors to the Whangateau catchment over time.

9 Summary

The rich diversity of natural resources occurring within the Whangateau catchment (including the harbour environment itself) provided the basis for early settlement and ongoing development for productive land uses. The natural aesthetic qualities of the landscape have at the same time continued to attract residents and visitors into the area for a growing range of tourism and leisure-based pursuits and alternative rural lifestyle living opportunities.

10 Issues: Current and Future

The exceptional quality and ecological values of the Whangateau Harbour environment, as the receiving environment to the Whangateau catchment, are documented by Kelly (2009). According to Kelly (2009), the near complete levels of tidal flushing that are experienced within the Whangateau harbour are fundamental to maintaining the quality of the harbour and high ecological values. In adition, the inputs to the harbour from surface drainage via the freshwater streams of the Whangateau catchment are much smaller compared to the tidal flushing.

Studies of the harbour environment, through both routine monitoring and independent investigations, reveal that isolated point sources of contamination from immediate shore-based activities can be detected locally within the harbour. The significance of groundwater storage for the wider Whangateau catchment within the Omaha Waitemata Aquifer and its potential relationship to the harbour environment may also indirectly link the adverse effects of land-based activities to the harbour environment.

The pressures for development that are currently experienced within the wider context of the Whangateau catchment have the potential to increase pressure on the capacity of its natural resources. Whilst the effects of development activities within the wider catchment on the harbour environment may be currently unquantified, it is important that they are anticipated and considered in planning for its future protection.

The unknown potential of climate change to influence the capacity of natural resources within the Whangateau catchment should also be considered in planning for its future. This might include reduced inputs to groundwater supplies as a result of extended periods of drought and/or increased inundation of low-lying productive land and residential areas within the basin floor due to rising sea levels – also potentially resulting in the increased salination of soils.

The following provides a consideration of the key issues that have been identified through this review of the wider Whangateau catchment, with the potential to generate both direct and indirect effects on the Whangateau Harbour environment, based on the current trends in observed land-based activities.

10.1 Productive land management practices

The present productive land use activities of traditional extensive pastoral farming and dairying, alongside intensive horticulture and small scale commercial woodlots are potentially associated with adverse environmental effects. Directly, these include the physical removal of vegetation, particularly from within the steep upper slopes of the northern part of the catchment, that are also prone to soil erosion, resulting in the generation of sedimentation inputs into natural watercourses. The cyclical harvesting of productive timber is a key potential source of increased sediment loading within the northern slopes of the Whangateau catchment. The minimal reach of headwater streams draining directly from this part of the catchment into the harbour below may

well have contributed to the sedimentation of the series of stream outlets on the northern shores of the harbour that have been colonised by mangroves in recent times. The apparent lack of monitoring of small-scale forestry operations within the Whangateau catchment is therefore a potential issue for the future control of sediment inputs into this part of the harbour.

Within the lower catchment, where pastoral land coincides with lower-gradient steams, the lack of riparian vegetation cover, in combination with uncontrolled stock access, is potentially undermining the ecological health of these watercourses. The usual upstream migration of juvenile native freshwater fish from the harbour below is potentially impeded by the unfavourable habitat created by such land practices. It is also possible that constructed culverts also present barriers to fish passage at key locations within the stream network. Likewise, the spawning of native whitebait at the upper tidal limit of downstream sections would be adversely affected by poor stream health.

The current lack of surveyed information about the condition and quality of natural watercourses contained within the Whangateau catchment prevents further detailed assessment about the direct effects of current land use practices on stream health and anticipated downstream effects upon the harbour environment.

Sustained applications of agrichemicals to both horticultural crops, improved pasture lots and plantation forests throughout the contemporary history of the Whangateau catchment have also gone largely unmonitored. There is a particular concern for the potential accumulation of applied chemicals within both the groundwater and soil resources underlying the main areas of horticultural production within the Whangateau catchment. Whilst the recent replacement of traditional orchard crops within horticultural areas includes certified organic produce (such as Omaha Berries), the intensification of horticultural production within the catchment generally is likely to remain dependant on chemical applications.

Indirectly, the current patterns of land subdivision that have been observed within the surrounding rural areas of the Whangateau catchment, and the resulting fragmentation of land ownership, has the potential to undermine the traditional "custodianship" of the land that has been developed. Whilst the conservation bush lot provisions of the Proposed Rodney District Plan that enable subdivision to occur are beneficial (in terms of restoring extended native bush cover), the division of land ownership has the potential to complicate the delivery of integrated catchment management in the future.

Key issues:

- Potential sedimentation of freshwater streams generated through agricultural and forestry management practices and deposited around the foreshore of the receiving harbour environment.
- Possible poor freshwater stream conditions existing within the lower reaches of the catchment watercourses coincident with uncontrolled stock access, lack of riparian vegetation and possible in-stream barriers to migratory fish passage.
- Limited monitoring of freshwater stream habitat condition and associated water quality, preventing further speculation about potential downstream effects.

- Limited monitoring of groundwater quality within the Whangateau catchment, where both water and soil contamination from accumulated agrichemical applications is a possible issue.
- Division of land ownership through subdivision has the potential to fragment natural resources and complicate the delivery of integrated catchment management in the future.

10.2 Residential settlement and development

The focus of existing settlements along the coastal foreshore, and their associated infrastructure provision, has historically resulted in the direct loss of ecological habitats. This has most recently been observed in the reclamation of salt marsh in the creation of Omaha North Golf Course and in the construction of the Broadlands Drive Causeway – both in the 1970s. The realignment of Warkworth's Leigh Road, over the Birdsall Creek entrance has also contributed to the siltation and subsequent colonisation of this section of foreshore with mangroves. Disturbance to resident populations of native shore and wading birds is also an ongoing consequence of residential settlements and the provision of coastal access around the foreshore. Although a large portion of the harbour foreshore has already been "built out", it is important that the most vulnerable of its remaining habitats of value are given adequate protection in the context of increasing pressures for development. Ultimately, these habitats contribute to the biological diversity and overall health of the harbour environment.

The current stormwater infrastructure associated with existing coastal settlements, including at Omaha Beach have been planned and effectively managed to minimise adverse effects on the adjacent harbour environment. This is a reflection of the proportion of permeable surfaces that have been maintained within the permitted densities of existing settlements surrounding the harbour, enabling treated stormwater to be directed into the ground, rather than directly into the harbour waters. Were the intensity of residential development allowed to increase to greater levels within the Whangateau catchment, particularly along the coastal foreshore, stormwater discharges may become an issue in the future.

Other than at Omaha Beach, the majority of settlements within the Whangateau catchment rely on individual septic tank systems. There is currently no systematic monitoring of septic tank function on private properties. Following high rainfall events during tidal inundations, the failure of septic tanks at Point Wells have been detected in high enterococci concentrations in adjacent shell fish beds in an isolated study by De Luca Abbott et al. (2000). The high groundwater conditions of the Omaha Flats area have ultimately contributed to this scenario, which, in the absence of septic tank monitoring, has the potential to reoccur on a reasonably frequent basis.

The potential connection of Point Wells, along with Matakana, to the existing Jones Road treatment facility, (currently serving Omaha Beach) is subject to further investigations by RDC. However, the capacity for this facility to service additional areas of residential development within the Whangateau catchment in the future is as yet unknown.

The prospect of sea level rises in the future affecting existing and potential settlement of the harbour foreshore should also be given due consideration in future planning initiatives for the development of the Whangateau catchment.

The availability of land for rural subdivision within the remainder of the catchment has been facilitated by rising land values generally within the Rodney District, making traditional farming less economically viable. The resulting capacity for rural residential infill within the Whangateau catchment is therefore a current planning issue, alongside the decline in traditional farming. Indirectly, the development of the catchment for future residential growth is likely to be associated with increased pressures for associated infrastructure and services provision, with the potential for heightened environmental impacts.

Any substantial increase in impermeable surfaces, through built development, is also likely to affect the replenishment capacity of the underlying groundwater supplies, on which much of the catchment is already reliant.

Key issues:

- Direct loss of significant ecological habitats resulting from the concentration of both historic and recent residential development around the harbour foreshore.
- Disturbance to vulnerable wildlife populations through human occupation of the foreshore – particularly to native shore and wading birds.
- Lack of regular review and monitoring of private residential septic tank system performance within Point Wells which are known to periodically leak during high rainfall and conditions of tidal inundation, resulting in direct contamination of the adjacent harbour.
- Potential large-scale built development within the catchment would diminish the replenishment of groundwater resources on which the catchment relies.
- Rising pressures for residential development and subdivision coincide with the declining economic viability of traditional agricultural practices, resulting in infill rural lifestyle residential development within the wider catchment.
- Limited capacity of existing infrastructure services for sewage treatment and stormwater to support increased levels of development.

10.3 Capacity of natural resources

The capacity of the natural soil and water resources within the Whangateau catchment are both threatened by the current pressures for built development. The fertile alluvial and organic peat soils that cover the Omaha Flats and Omaha Valley area are currently unprotected in their own right. Historically, the cultivation of these soils has made a significant contribution to the economy of the Whangateau catchment. Although horticultural production within the catchment has declined since its heyday in the 1980s, there remains a potential for horticultural diversification to continue as a key industry. This would require continued controls on chemical applications and allocations of ground water takes for irrigation, in avoiding potential adverse effects on

the harbour environment. In this way, a potential shift to organic cropping is seen as particularly appropriate for the Whangateau catchment, in managing the future protection of the harbour environment.

The alternative prospect of parts of these productive areas, (eg the expansion of Pt Wells) being either lost or fragmented by rural residential settlement would also affect the potential ability of the existing groundwater resources to be replenished through natural infiltration. The combination of fully allocated groundwater resources, potential increase in domestic water demand (through residential development), and potential decrease in groundwater recharge due to increasing impervious surfaces (through building and road construction) could create a problematic situation to manage groundwater. Likewise a substantial intensification of productive land use activities, with increased irrigation requirements, could also pose a challenge.

Key issues:

- Lack of specific protection of the productive capacities of natural soil and water resources within the Whangateau catchment, threatened by the activities of land subdivision and built development by loss and/or fragmentation.
- Continuing need for regulation and monitoring of natural resources – such as groundwater supply.
- Potential influence/effects of climate change to be anticipated in planning for the future development and/or protection of natural resources within the Whangateau catchment.

10.4 Management of ecological sites

The present ecological values of the Whangateau catchment are clearly reflected in the extent of designated sites which, when including significant landforms, amount to just under half of the total catchment area. This extent of ecologically significant sites is likely to directly benefit the ecological health of both the harbour and wider catchment environments.

However, at least 38 per cent of protected sites are covered by more than one mechanism. This includes a degree of overlap between ARC, RDC and Department of Conservation administrations. Examples include the Omaha Ecological Area – which is recognised by no less than six mechanisms, through ARC, RDC and Department of Conservation in combination.

The protection and ongoing management of significant ecological sites is fundamental at a site level, but also to the wider management of the catchment and adjacent ecological features. Consistent management of ecological sites and features is therefore required to facilitate the future integrated management of the catchment at the catchment-wide scale. With the current situation, the same site may be subject to different management provisions under the combined administrations of several different authorities.

The co-ordination and sharing of ecological survey and monitoring data would also benefit in the long-term management of the Whangateau catchment, in the interests

of protecting and enhancing its ecological values. This is particularly important in reviewing the relative merits of subdivision applications for conservation bush lot enhancement planting, provided by the provisions of the Proposed Regional District Plan. It is also important in managing and controlling the spread of exotic weeds and pests within the Whangateau catchment.

Key issues:

- Lack of co-ordinated management of significant ecological sites identified within the Whangateau catchment by various agencies and mechanisms. Potentially this could undermine an integrated management approach being applied to the wider catchment.

10.5 Protection of landscape values

The landscape values that have been attributed to the Whangateau catchment are strongly based in qualities of rural amenity and natural character. Under the statutory planning framework provided by the RMA, both values must be duly considered in the assessment of affects associated with individual developments. With the increasing pressure for multiple developments to take place within the Whangateau catchment in the future, the potential for cumulative adverse effects to be experienced in relation to both rural amenity and natural character values is raised.

It is important to realise the significance of these fundamental landscape qualities of the Whangateau catchment to both residents and visitors, in order to prevent levels of landscape change that would be perceived as unacceptable. It is likely that any change of this magnitude would also be associated with adverse environmental effects.

Key issues:

- Increased potential for cumulative adverse effects on rural amenity and natural character values through incremental development of the wider Whangateau catchment, particularly associated with rural lifestyle residential infill. Associated with an increased potential for environmental impacts.

10.6 Recognition and protection of cultural heritage

Many of the strong traditions that are associated with the historic settlement and development of the Whangateau catchment are not fully recognised in today's environment. Manawhenua expressed a "strong sense of loss of the everyday signs of Maori heritage and presence today in and around the Whangateau Harbour" (Lees and Cole, 2009 p.10). The lack of recorded cultural sites, through archaeological records, was also confirmed by this review.

The "custodianship" that is fostered in historical relationships by settlers with both the harbour environment and wider catchment landscape is potentially undermined by the current pressures of land subdivision and residential development. The present population of the Whangateau catchment, which includes a large proportion of ageing

residents that have lived within the area for some time, are not being directly replaced by the existing communities who share in this history and knowledge.

The introduction of new residents into the Whangateau catchment, including through residential development, is potentially associated with changes in cultural outlook and expectations that may be misaligned to its traditional character and local values. Likewise, a shift to more non-permanent residency within the Whangateau catchment is also likely to result in a decline in the current levels of community engagement with protecting and managing the Whangateau catchment environment.

Key issues:

- Traditional cultural values and custodianship associated with the traditional settlement of the Whangateau catchment may be lost/diminished by the introduction of new residents (including non-permanent) with misaligned cultural expectations and outlook.
- Lack of recognition and documentation of early cultural heritage records.

Summary

The pressures of productive land use activities and residential settlement patterns on the natural resources of the wider Whangateau catchment are current issues beyond the environmental health of the receiving harbour environment. The adverse effects associated with these human activities range from the direct loss of ecologically significant habitat and/or diminishment of natural resources to a perceived loss of natural character and rural amenity values resulting from the cumulative effects of built development. The changing nature of the resident and working populations of the Whangateau catchment is also associated with a potential loss of traditional custodianship for the interior landscape and harbour resource.

11 Conclusion

There is a common perception by the resident community and stakeholder interest groups that the high-quality of the Whangateau Harbour environment is directly at risk from degradation by land use activities within the wider catchment. There is evidence to suggest that this potential relationship may be at least partially offset by the tidal flushing of the harbour and the relatively low inputs into the harbour from the surface drainage.

However, in the current situation, there is limited information on the relationships between ground and freshwater inputs entering the harbour and details regarding the water quality and ecological health of these land-based systems. It is likely that upstream erosion has contributed to the sedimentation of the foreshore around the northern boundary of the harbour in particular. There is also a strong possibility that the prolonged application of agrichemicals for productive land uses within the Whangateau catchment may be affecting groundwater and soil quality in certain locations. The relationship between ground and surface water flows entering the harbour have not been clearly established.

With the levels of tidal flushing being maintained throughout the majority of the Whangateau Harbour, any direct effects of land-based activities are most likely to be experienced at the sensitive interface of the foreshore environments. This includes residential built development being focused around the harbour's coastal margins where sensitive habitats and wildlife populations also occur.

As traditional farming practices become less economically viable within the wider area there is growing pressure for rural residential lifestyle development becoming established within the Whangateau catchment. This trend is associated with a potential loss and/or fragmentation of fertile productive soils, which are scarce within the wider Rodney District.

The existing provisions of the Rodney District Plan are reasonably restrictive in preventing major developments within the Whangateau catchment on environmental grounds, whilst allowing for small-scale "infill" developments under certain conditions. A structure plan approach to the planned distribution of future development within the Whangateau catchment, applied at the catchment scale, is considered important if its natural resources are to be appropriately managed and protected against further loss and fragmentation. Tight controls are also required in relation to infrastructure planning for stormwater, sewage and groundwater supply associated with development activities in protecting the receiving harbour environment.

Spatial planning at this scale would also protect against the piecemeal fragmentation of land ownership and natural resources, which has the potential to complicate the future delivery of integrated catchment management at Whangateau, whilst potentially contributing to cumulative adverse effects. The involvement of the local community in planning for the future management of the Whangateau catchment is important alongside input from environmental experts in confirming its current and future issues.

The ongoing input of the local community into the management of the Whanagateau Catchment should also be anticipated as part of any long-term planning or management process.

12 Recommendations

Additional investigations are recommended to provide a better understanding of the existing conditions of the catchment environment to plan for future change.

The recommended studies from this study about the catchment and socio-economic information, however, must be reconciled with recommendations from the other Whangateau summaries that examined the marine environment (Kelly 2009) and iwi and stakeholder information (Lees and Cole 2009). Similarly, recommendations from the Whangateau investigations must be weighed up against regional priorities and investigations in other locations within the region.

The following recommendations mainly identify those areas of information that are currently missing from existing studies of the Whangateau catchment, identified by this assessment, but are considered critical in informing any planning decisions on its future management and protection.

- Stream ecological valuation to assess the hydrological, biochemical, habitat provision and biodiversity function of watercourses within the Whangateau catchment in relation to adjacent land management activities. This information would be used as a basis to identifying the adverse effects of particular land use activities on those freshwater streams that drain directly into the harbour environment.
- Extend groundwater sampling to determine the potential capacity of the Whangateau catchment for future development, based on groundwater supply from the Omaha Waitemata Aquifer, more comprehensive information is required on the quality and availability of groundwater underlying the catchment.
- Hydraulic modelling of the exchanges between surface and groundwater flows as potential inputs to the harbour environment would also assist in understanding the potential effects of both existing and future land use activities. This information can help improve to plan for the future development of the Whangateau catchment based on its capacity for land use change and residency.
- The location and extent of natural resources (such as fertile soils and groundwater) can be better identified by District Plans as part of informing decision-making on the relative location of potential development. The anticipation/evaluation of the potential effects/influence of climate change factors in relation to natural resources is also fundamental in planning for its future protection/development.
- Further efforts can be directed to update the existing cultural record of the Whangateau catchment, based on the collation of independent records, and additional site surveys. It is important that this information is mapped along with other protected sites and designations within the catchment in the planning of its future management.
- Better co-ordinated recognition and management of significant natural features and ecological sites between various administering authorities active within the

Whangateau catchment. This would enable better decision-making through the sharing of survey information and identification of common management objectives.

The structure planning that is currently being developed for parts of the catchment should have access to the above information to planning for the future allocation of natural resources. Future structure plans should also be designed to be effectively integrated with catchment management plans of the wider catchment.

The adoption of an holistic co-ordinated integrated approach to managing the Whangateau catchment in the future is ultimately seen as the best means to protect the wider landscape and harbour environment, alongside social concerns. Ultimately, the potential effects of any future development of the Whangateau catchment should be considered and assessed on a catchment-wide basis.

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14 Appendix 1

Whangateau catchment analysis, list of figures.

Map Series A:

A:0 Whangateau catchment Location

A:1 Whangateau aerial (2006 aerial)

A:2 Hillshade analysis

A:3 Slope analysis

A:4 Elevation analysis

A:5 Geology: ARC

A:6 Soil types: ARC

A:7 Subsoil classes: NZSC

A:8 Drainage: LENZ

A:9 Erosion: NZLRI

A:10 Erodability: NZEEM erosion rates

A:11 Rivers and catchments: REC

A:12 Network position: REC

A:13 Valley landform: REC

A:14 Landcover: REC

A:15 Landcover, geology, valley landform: REC

A:16 Omaha Waitemata Aquifer: ARC

A:17 Flood risk: RDC

A:18 Predicted potential vegetation: LENZ

A:19 Scheduled ecological sites: ARC, DOC and QEII

A:20 Bushlots and Significant Natural Areas (RDC)

A:21 Protected Natural Areas: ARC

A:22 LENZ threatened environments

A:23 Special Landscape Areas: ARC

A:24 Natural Character Areas: ARC

A:25 Land Use Capability: NZLRI

Map Series B:

B1 Aerial photography - 1953

B2 Aerial photography – 1976

B3 Aerial photography – 1982

B4 Land cover: LCDB1 (1996/97)

B5 Land cover: LCDB2 (2001/02)

B6 Updated land cover (LCDB2): ARC (2007)

B7 Land cover change: from LCDB1 to LCDB2 (updated by ARC)

B8 Land tenure: lot size

B9 Cultural heritage

B10 Settlement

B11 Infrastructure

B12 Public open spaces

B13 Land tenure: public land

B14 Community facilities: RDC

Map Series C:

C1 Census 2006 meshblocks: Statistics NZ

Map Series D:

D1 RDC Proposed District Plan (2000)

15 Appendix 2

GIS procedures for determining Whangateau catchment boundary (BML).

+ to add

16 Appendix 3

ARC recorded cultural heritage Recommended Survey Area (after Cultural Heritage in the Auckland Region: Priority Areas For Survey and Assessment April 2001 – Prepared by Kim Tatton for the Auckland Regional Council).

+ to add

17 Appendix 4

2006 NZ Census community demographics and community demographic profile comparison.

+ to add