

Infrastructure, Transportation, Access & Soils

Client: Western Bay of Plenty District Council

Matakana Island Review

August 2011

Water, Transportation, Access & Soils

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1. Introduction and Project Brief

Land Matters Limited have been commissioned by the Western Bay of Plenty District Council (WBOPDC) and others to prepare a report that will specifically address constraints and opportunities on the infrastructure, soils, water supply, wastewater disposal, transportation, and access/roading that currently exist within Matakana Island, Tauranga.

We understand that this report will be utilised in assisting an overall structure plan/framework for on-going development of Matakana Island.

This report has been prepared as a result of reviewing all existing relevant reports and documentation that Land Matters Limited currently possesses as well as other relevant information that we have requested and received from WBOPDC and the Bay of Plenty Regional Council records.

A visual inspection of Matakana Island with respect to the soils, water supply, roading, and access/transportation has also been carried out to verify and confirm findings and statements within this report.

2. Matakana Island Landforms

Matakana Island is a flat barrier island that has formed into an elongated strip which is approximately three kilometres wide and twenty four kilometres long and lies in a northwest to southeast direction. It is located between the Mt Maunganui in the southeast and Bowentown Heads in the northwest. The island forms a sand barrier between Tauranga Harbour and the Pacific Ocean.

Matakana Island has two distinct landforms and because of this, soils are quite different depending on the position on the Island. The inner part of Matakana – or Matakana Island Core – consists mainly of Pleistocene terraces covered with up to ten metres of volcanic deposits and pyroclastic flow material. The outer part of the island, being the younger of the two landforms mainly consists of Holocene sands with a light covering of volcanic deposits.

Matakana Island and particularly the barrier landform is dynamic in nature and the formation has and continues to be influenced by geographical, environmental (both natural and manmade) factors.

2.1 Matakana Island – Core

The core of Matakana Island is the oldest part of the Island landform which is made up of Pleistocene Terraces with the eastern side of the core being the lower terraces (interglacial Coastal plain with relict foredune tendencies) and the western side the higher terraces (sandstone, siltstone and conglomerates). The cores terraces are dissected by a relict Pleistocene Marine Cliff, which also separates the two distinct higher landforms on the core. Generally these Pleistocene terraces are mantled with volcanic deposits and expected to be underlain with marine deposits. The western side rising up to approximately 60 metres in height above mean sea

level (amsl) with a steep to rolling contour. The eastern side rises up to 15 metres in height (amsl) at its highest point, with a rolling to flat contour.

The western side of the core comprises a number of small sandy beaches separated by low headlands or estuaries.

2.2 Matakana Island - Barrier

From data collected, analysed and recorded from previous bore logs, along with several past documented investigations and studies of Matakana Islands geomorphology and geology, as well as our own site investigations, we can state that the barrier is made up of landforms such as relict foredunes, transgressive dunes (blowouts and parabolic), low lying swamp areas with a few small lakes at the Northwest end. The main part of the barrier is a relict foredune plain with a continuous foredune ridge which almost runs the full length of the barrier. Both ends of the barrier are lower in landform, with the north west end containing wetlands along with several converging and diverging sand ridges. The south east end is characterised by hummocky dune landform.

In general these landforms have been created by, off shore sediment supply, wind blown supply, alongshore sediment supply, ebb tidal influences, and wash over. In the main these factors has determined the progradation of the barrier

Both the North Western and South Eastern ends of the Barrier, which are more susceptible to ebb-tidal influences have been and are subject to a higher rate of erosion and/or growth accordingly.

There are large areas off the northwest sides of Matakana Island (Harbour side) that are submerged in high tidal influences and support vegetation in part.

3. Matakana Island Soils and Land Use

As part of recent resource consent applications 4 reports have been completed on soils and there influence on buildings, roading and service provision on particularly the sand barrier forested part the Island. Detailed soil maps have also been investigated for other parts of the Island and extracts have been included in **Appendix 1**.

3.1 Matakana Island - Barrier

The predominant soil type on the barrier is windblown sands. These broadly range from the younger outer edge sands which are generally, greyish in colour and do not support any topsoil, to the older inland sands. These older sands where the original foredunes that have been and are continually being covered by windblown sands and vegetation which have consequently contributed to the accretion of the island, particularly on the seaward edge of the barrier. Recent bore logs taken in the southwest part of the barrier were generally found to comprise two different layers of fixed fore-dune sands, with increasing marine deposits/shell fragments at depths greater than one metre below ground level. The two layers of dune sands generally encountered were:

1. Fine to medium sand, light brown, loose to medium density. Root feeders are present in the topsoil.
2. Fine to coarse sand, light grey to grey, loose to dense. Frequent shell fragments and/or layers encountered at depths below 1.0m from ground level.

Ground water was encountered in all of these bore logs and generally recorded at between 1.5m to 2.0m below ground level. Measured salinity indicated that the groundwater encountered was fresh.

Human arrival on the island (approx. 800 years ago) has altered the natural vegetation extensively, with the island being deforested from that time until the late nineteenth century. In this time the Island (both core and barrier) was extensively farmed. In the 1920's the majority of the barrier land was planted in *Pinus radiata* which in turn brought about the formation of a network of access tracks, for logging and maintenance of the forestry blocks. Firebreaks were also established, with forestry continuing to be harvested to the present day. Currently the barrier is predominantly covered in stands of *Pinus radiata* at various stages of growth and harvest. There are a few small areas of kanuka/Manuka, indigenous vegetation and herbaceous fresh water vegetation on the barrier as well as some small fresh water lakes at the northern end.

3.2 Matakana Island - Core

The predominant soil types on the core are fertile yellow-brown clay and sandy loams which are underlain with sandstones, silts, and volcanic conglomerates. There are also a few isolated areas of shallow peaty loams.

The west side of the core of the island is derived from sandstone, siltstone and conglomerates and underlie at least ten metres of tephra.

The majority of the land on the core of the island is still used for farming (mainly dairying, refer photos appendix 4) with a small percentage of cropping and horticulture. The core also has some small areas of Manuka/Kanuka, wetlands and estuarine areas with herbaceous fresh water vegetation.

As a general comment, the predominant soils types found on Matakana Island are suitable for light framed domestic buildings foundations provided that they are specifically tested and either reworked or piled by specific design as test results dictate. Topsoil and organic material such as peat would need to be removed and any building site must be individually evaluated and specifically designed for the suitability of buildings.

4. Matakana Island - Waste Water and Water Supply

It appears no comprehensive analysis has been completed on the provision or otherwise of waste water and water on the Island. Our analysis of these areas has included a site visit, liaison with the District Council which is responsible for public reticulation (if any), a review of the Regional Council records, investigating other reports that have been completed for water and waste water, and an assessment of ground conditions on the two distinct parts of the Island (which would be important for particularly the disposal of waste water).

The two main aspects of waste water disposal are supporting sanitary living conditions (dwellings) and ability to sustain economic activity on the Island. Economic activity on the core is mainly in the form of agriculture and horticulture.

From discussions with the District Council it is clear that no public reticulation is provided on the Island for either dwellings or industry. The only public infrastructure is a pipe through the Island draining waste water to a seaward outfall for the Katikati community on the mainland. The pipe is laid beneath the Tauranga Harbour, through the

Blakely Pacific land, and discharges to the ocean approximately 1.5km from the high tide mark. Given the potential complexities and cost factors it is not likely to be economic to 'tap' into this facility.

In terms of discharges from agriculture on the Core, it appears that from the Regional Council database in appendix 2 that there are no major constraints to the discharge of dairy effluent given consents are in place for pond and ground soakage systems. Domestic dwellings and Marae on the core are likely to have individual systems and presumably are covered by rules in the relevant regional plans.

URS New Zealand Limited and BECA have completed reports into the feasibility of providing for waste water disposal from dwellings for the purposes of rural subdivisions on the forested area of the Island. The sandy soils and sufficient depth to ground water level provides only design constraint for new systems to be provided with little impact on the receiving environment.

From our observations and investigations potable water supply on Matakana Island is currently by way of either roof water collection and/or water bores (Refer photos 1 & 2 appendix 4). Generally, production forestry and farming blocks have water supplied by way of bores and individual dwellings have predominantly water supplied by roof water collection to tanks.

There is anecdotal evidence of at least 19 water bores that have been located on the Island for the benefit of farming and horticulture. The existing consents for water abstraction (appendix 2) demonstrate little constraint for bore provision and/or roof collection and tank storage means of water supply.

A number of individual fire fighting tanks are also located at strategic points around Matakana Island, particularly within the barrier forestry blocks.

There is no record of any public or private reticulated water systems on Matakana Island, and this has been confirmed by the Western Bay of Plenty District Council assets department.

5. Telecommunication and Electricity

Reticulated electricity and telecommunication are available on the 'core' part of the island, mostly by way of overhead reticulation. The main feeds to the island are submerged beneath the Tauranga Harbour and coastal permits have been granted for their installation and are in place for maintenance activities. The current service appears to support the agricultural, horticultural and dwellings on the core.

Rangiwaea and the forested part of the island also have services available which extend from the core, through Hunters Creek, and stop at or about the mill and mill housing area. The existing supply has provided for the historical operation of the Hunters Creek mill.

Until recently very little information was available for potential upgrades to telecommunication and electricity on the island, although the existing RMA consent applications broadly point towards it being feasible within the forest lands.

Given mobile technology (including internet) telecommunication is perhaps less of a constraint than secure electricity supply.

One forest owner (TKC Holdings) have commissioned some work into upgrades to the electricity network. Stones Group Limited, in conjunction with Line Work Power Contractors, report that the submerged electricity cables have capacity for additional loading however upgrades would be needed on the mainland and also on the island

(transformers and feed line upgrades). Their report suggests that up to 300 additional households are feasible and the only constraint is the cost to install and upgrade the power supply at each end (est. at some \$2.79M for the forested area).

For the forested area other energy supply options could involve off the grid service and according to central government agency EECA, these systems comprise wind and/or solar technology with back up generators for additional security.

6. Matakana Island – Transportation Links, Roothing and Access

Being an Island, Matakana has been and will probably always be dependent on the sea or air transportation to enable occupation and access to all goods and services. Subsequently there a number of jetties/ramps and an airstrip (non-operational at the time of writing this report) to facilitate access to the Island.

Matakana Island has mainly developed its internal access tracks and roading, using original walking/bridle tracks and supply tracks from the main barge/boat ramps. The internal roading network has been developed ultimately to facilitate the occupation, gardening, farming and forestry and other community services on the island. In the 1900's a main arterial road was formed to connect the farms and community buildings and in the early 1920's the first commercial harbour barges were introduced bringing an increased growth and change to the way of life on Matakana Island. The advent of forestry also brought about its own harbour links and facilitated further upgrading of the existing roading and jetties.

5.1 Transportation Links to Mainland

At the date of writing this report there are a number of harbour transportation links to and from the Island. The main links to the Island from the main land are by barge/ferry. The barges are as follows:-

1. The "Omokoroa" Ferry which operates a regular service from Omokoroa Ramp (Mainland) to Oपुरeroa Ramp (southern end the core - Matakana Island). This ferry is owned and operated by a private company and is run as a commercial operation. This ferry carries vehicles, goods, and passengers.
2. The "Forest Lady" Ferry, which is an 'on demand' service from the Cross Road ramp (Tauranga City-mainland) to Pane Pane ramp (Southern end of the Barrier-Matakana Island: refer photo 5 appendix 4). This ferry is owned and operated by a private company and is run as a commercial operation, and is licensed to dock in Tauranga City. This ferry carries vehicles, goods and passengers. As demand requires it also can dock at Rangiwaea Island ramp to cater for the transportation of goods and passengers to the Island, but particularly for the exporting of Island fruit crops.
3. The "Skookum" Ferry, is owned and operated by a private company and is run as a commercial operation for the sole usage of the owners. Its operation times are as required by the owner when demand warrants. This ferry operates between The Port of Tauranga (Butters Crane-Tauranga City) to Pane Pane ramp (southern end of the barrier, Matakana Island). This ferry will transport the public at its owners discretion.

Historically there were barges operating from the Port of Tauranga to Hunters Creek Mill/wharf which is located on the western side of the barrier (refer to photo 6 in appendix 4). Hunters Creek Mill/Wharf is now not operational.

At Pane Pane, Opureroa and Hunters Creek there are also operational jetties that are used for public and private recreational purposes. Pane Pane jetty is mainly used in the transportation of children to and from the mainland for schooling.

Informal access by boat can also be gained onto Matakana Island coastline for its entire perimeter.

Access by air to Matakana Island was obtained by way of an airstrip that had been formed directly across the barrier close to the Hunters Mill site on land owned by TKC Holdings, however this airstrip is no longer operational. We understand that an airstrip has been proposed at the northern end of the barrier by the Blakely Pacific Ltd (Forestry owner), however is still under consideration within the RMA consenting process.

Another form of access to Matakana Island is by Helicopter, being an easy hop from Tauranga Airport. Helicopters are used from time to time for spraying, and general maintenance by some of the island landholders, or relevant Councils.

5.2 Roothing and Access

Presently Matakana Island has not road link to the mainland. All vehicles are transported to and from the Island by Barge. With the advent of extensive farming and forestry activities on Matakana Island, a network of roads, Rights of way and tracks have been established on the island.

Matakana Island-Core

This is the only part of the Island that has Public Roads that are either formally vested in Council or registered as Maori Roadways. These roads in the main provide public access to farms and small holdings on the core and as such are linked to harbour ramps and the network of Rights of Ways within the barrier apart from a missing link within the forest area which is not currently registered (refer to the photos in appendix 4 and the blue area shown as DP 366899 in appendix 3).

The standard of roading formation varies throughout the Island, with only a small percentage of the current roading, being chip sealed and/or culverted on the core. The balance of main roading/rights of way have varying thicknesses of roading aggregate (graded). The minor roads and tracks throughout the island are roughly formed and metalled and/or compacted sand/soil.

Matakana Island-Barrier

The only registered forms of roading within the barrier are Rights of Way. There is an extensive network of Rights of Way throughout the barrier, including one Right of Way that runs from the Pane Pane Ramp at the south end of the barrier to the northern end of the barrier. These Rights of Way mainly link and provide access to the large forestry holdings. All other access through the barrier is on an informal basis.

The main Right of Way (Hume Highway) is unsealed. The unsealed rights of way have varying thicknesses of roading aggregate (graded) with layers of wind blown sand interspersed. Stormwater runoff from the rights of way on the barrier is generally channelled into soak holes or adjacent low areas.

7. Summary

The Operative Regional Policy Statement (method 17A.4(iv)) provides that the Western Bay of Plenty District Council will:

Investigate a future land use and subdivision pattern for Matakana Island, including papakainga development, through a comprehensive whole of island study which addresses amongst other matters cultural values, land which should be protected from development because of natural or cultural values and constraints, and areas which may be suitable for small scale rural settlement, lifestyle purposes or limited Urban Activities.

Council is collaborating with stakeholders on Matakana Island and has, through the forested land owners, commissioned constraints and opportunities reports to inform the development of a structure plan. With that in mind - and in view of the purpose of this report to investigate infrastructure, transportation, access and soils - the following conclusions and recommendations are made:

Building Foundations and Soils

- *The soils on both the core and the forested area generally present no constraint to construct light timber framed buildings (in terms of NZS 3604); provided individual sites are tested to ascertain any specific requirements for the foundations.*
- *Buildings would require specific foundation design by a suitably qualified person at the time of Building Consent;*
- *The sandy soils on the forested area could support either piled foundations or be re-worked to provide a suitable base for concrete slab buildings.*

Roading

- *Much of the roading on the core is pre-existing, vested, and maintained by Council;*
- *Subject to sound engineering design and good contract management practice (NZS 3910)there would be no constraint to road/access construction on the forested land areas;*
- *There may be an opportunity to utilise the existing right of way alignment for future roading because years of traffic will have consolidated the subbase;*
- *The Regional Policy Statement method guides towards a lifestyle environment and it is recommended that any specific road design uses a 'soft engineering' approach for amenity considerations. Any structure plan for the Island should include a series of indicative cross sections to guide conditions of construction for that purpose.*

Waste water

- *It is recommended any development of the forested land area use similar methods of on-site waste water disposal to that of the core because of the 'lifestyle' driver. However new on site effluent disposal systems should be constrained to the latest technology and be in general compliance with AS/NZS 1547:2000, as well as comply to the Regions Discharge to Land Plan. Modern on site effluent systems have a higher environmental standard than the traditional 'septic tank and field drainage' for the benefit of ground water quality, public health and protection of the environment. It is also recommended that any new system is monitored and maintained to ensure ongoing compliance. Low pressure on site effluent treatment systems are ideal for sandy soils.*
- *In keeping with an island lifestyle , it would appear that a centralised or community based system would potentially be cost prohibitive and would therefore be considered a possible constraint.*

Water

- *Individual on site water, supply ,treatment and storage is recommended for any new demand on the Island. Rain water collection and tank storage provide for a sustainable option and have indirect benefits of reducing stormwater runoff from any new dwelling. The choice of water supply , treatment and storage should be by reference to the Ministry of Health publication "Household Water Supplies 2006". Individual water provision should also be addressed in terms of the New Zealand Fire Service Code of Practice SNZ PAS 4509:2003.*

Transportation

- *Given the distance from the Omokoroa to Tauranga City, it would be desirable from a transportation perspective to maintain or enhance the link to and from the city between the south eastern ramp and Cross Road. From the nautical chart in appendix 1, and the coastal permit (63226 in appendix 3), it appears there is a constraint for the Omokoroa service – maintenance dredging and tidal areas.*
- *An opportunity is presented by additional users of the barge services between the dominant crossing point between the City and the Council lands (Pane Pane) may lead to a more sustainable service.*
- *The rights of way networks between the core, the forested area, and the ramp at the south eastern ramp are incomplete and have gaps in legal access. It is uncertain whether legal access is available to the community on the core. There would appear to be an opportunity to address this through a structure planning process.*

Attached:

- Appendix 1 Soil Map with legend and Nautical Chart of Tauranga Harbour
- Appendix 2 Regional Permits – Discharges, Infrastructure, Water, Coastal Structures and Land Use
- Appendix 3 Plan of Existing Access Arrangements – Roads, Maori Roadways and Rights of Way
- Appendix 4 Photographs from Various Parts of Matakana Island

References

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URS New Zealand Limited, 17 June 2008. Report for Matakana Island Barge Access. Preliminary Geotechnical Investigation.

URS New Zealand Limited, 20 June 2008, Matakana Island New Entry Report on Engineering Issues.

URS New Zealand Limited, January 2009. Engineering Aspects of a Matakana Island Rural Subdivision.

APPENDIX 1 – Soil Map & Nautical Chart

LEGEND

A INVENTORY CODE

Rock Type Soil Unit Slope
Erosion degree and type Vegetation

ROCK TYPE

Rock Type	Soil Unit	Slope
Maicaco lithologies	Sedimentary lithologies	
Nq Ngaurunoe ash	Pr Peat	
Ta Tarawera ash & lapilli	Wt Sands, windblown	
Rn Rotomahana ash	Lo loess	
Kt Kaharoa & Taupo ashes	At and Orientated	
Mb Ashes older than Taupo ash	Ttcl tephra tephra	
Ta Taupo ash	Gt Gravel	
Lp Lapilli	Uc Unconsolidated silts	
Tp Taupo & Kaharoa pumice & volcanic alluvium	Tasb sands, silts & breccias	
Tt Tephra older than Taupo pumice	Mn Mudstone or fine siltstone, massive	
LA Laminar deposits	Mb Mudstone or siltstone banded	
Vol Volcanic intrusions	Mt Mudstone or siltstone jointed	
Tr Crystalline intrusive rocks	Mt Mudstone, bentonitic	
	Ss Sandstone or siltstone massive	
Note	Sh Sandstone, banded	
denotes deep weathering	A Argillite	
(Al) silt/clay in patches	Ar Argillite, crushed	
(L)Gw stratigraphic	L Limestone	
Surface and surface rocks	Gw Greywacke	
(F)F		

Rock Type adapted from NZ Geological Survey, Map 1:250 000 Sheet 5 Rotorua 1st Edition.
Healy J, Schofield J.C. & Thompson B.N. 1964

SOIL UNIT

Soil information and boundaries are based on top maps supplied by Soil Bureau DSIR with additions from fieldwork and air photo interpretation.
DSIR 1964 General Survey of Soils of North Island, N.Z. Soil Bureau Bulletin 1965

BR Bare Rock

SLOPE

Slope	Additional Slope Symbols
A 0 - 3°	D/F Average slope borderline between the two slope groups
B 4 - 7°	A+B Compound slopes first slope group dominates
C 8 - 15°	A Dissected slopes
D 16 - 20°	
E 21 - 25°	
F 26 - 35°	
G > 35°	

EROSION

Type of Erosion	Degree of Erosion
Se sheet	0 negligible
W wind	1 slight
Sv stone creep	2 moderate
sSl soil slip	3 severe
eSl earth slip	4 very severe
Su slump	5 extreme
dal debris avalanches	
ef earth flow	For a more detailed description see Land Use Capability Handbook (1981)
sf mud flow	
R rill	
G gully	
F ravinous gully	
SR streambank	
D deposition	

VEGETATION

Vegetation	Degree of Erosion
(GRASS) AND	
P1 tussock-free grassland	P2 Short tussock grasses
P1 high producing pasture	mainly sward & hard etc
P2 low producing or native grassland	P4 Short tussock grasses
	P5 Red tussock grasses
	P6 Sand dune grasses

CROPLAND

Cropland	Degree of Erosion
L unspecified crops	L3 Root & green fodder crops
L1 Cereals	L4 Horticulture
L2 Orchards & vineyards	

SCRUB AND

Vegetation	Degree of Erosion
M unspecified scrub	M6 Mixed native scrub
M1 Manuka kamuka	M7 Broom
M2 Tauhoui Casuarina	M8 Gorse
M3 Drosera	M9 Blackberry
M4 Fern	M10 Sweet briar
M5 Sub alpine scrub grasses	M11 Mulberry
	M12 Mangroves

FOREST

Vegetation	Degree of Erosion
N unspecified forest	N4 Nothofagus (all Newland)
N1 Coastal forest	Highland
N2 Kauri	N5 Hardwood
N3 Podocarp forest	N6 Exotic forest
Lowland to Mid altitude	N7 Podocarps
	N8 Conservation trees

WILDS HERBS ETC

Vegetation	Degree of Erosion
H unspecified herbaceous	H4 Sub alpine herb grasses
H1 Swamp grasses	H5 Salt tolerant grasses
H2 Rushes sedges	H6 Paks
H3 Sand dune grasses	H7 Semi-arid herbland

Capital letter indicates type of vegetation comprises > 40% of unit area small letter < 40%
c indicates cut over forest

B LAND USE CAPABILITY ASSESSMENT

For classification refer to accompanying Bay of Plenty-Volcanic Plateau legend

Revised edition of the Inventory Code
NZMSST 1965

Prepared by PR Stephens Dec 1963
KW Steel Aug 1977

Completed by KW Steel 1977

Drawn by S J Middlemiss-Kraak

Printed by New Zealand 1977

INDEX TO ADJOINING SHEETS



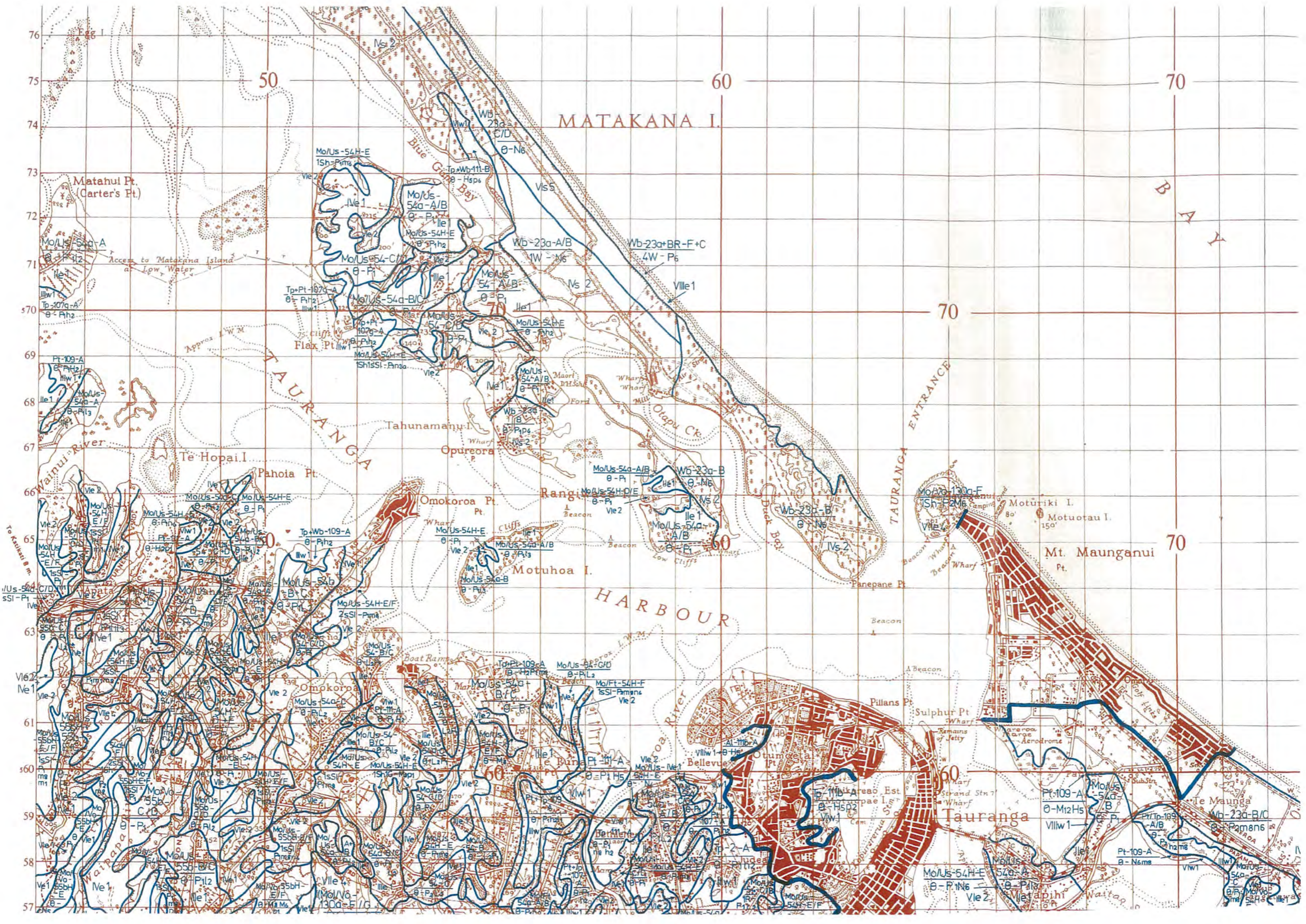
For reference to the basic data refer to the Department of Land and Survey NZMSST Topographic series

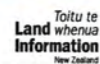
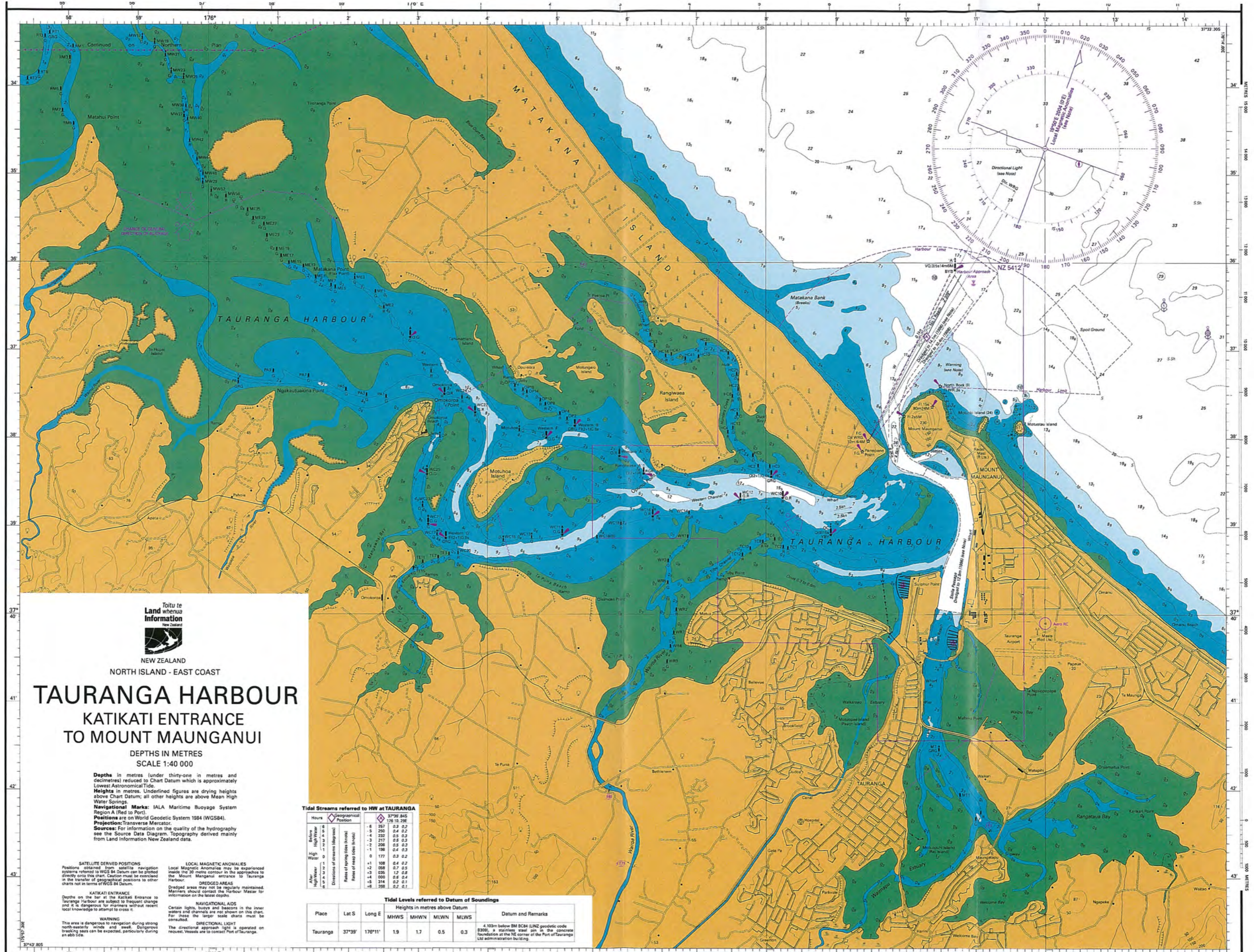
NEW ZEALAND LAND RESOURCE INVENTORY WORKSHEET

PRODUCED FOR THE NATIONAL WATER & SOIL CONSERVATION ORGANISATION
BY THE
WATER & SOIL DIVISION, MINISTRY OF WORKS & DEVELOPMENT

Scale 1:63360 1 Inch to 1 mile







NEW ZEALAND
NORTH ISLAND - EAST COAST

TAURANGA HARBOUR

KATIKATI ENTRANCE TO MOUNT MAUNGANUI

DEPTHS IN METRES
SCALE 1:40 000

Depths in metres (under thirty-one in metres and decimetres) reduced to Chart Datum which is approximately Lowest Astronomical Tide.
Heights in metres. Underlined figures are drying heights above Chart Datum; all other heights are above Mean High Water Springs.
Navigational Marks: IALA Maritime Buoyage System Region A (Red to Port).
Positions are on World Geodetic System 1984 (WGS84).
Projection: Transverse Mercator.
Sources: For information on the quality of the hydrography see the Source Data Diagram. Topography derived mainly from Land Information New Zealand data.

SATELLITE DERIVED POSITIONS
Positions obtained from satellite navigation systems referred to WGS 84 Datum can be plotted directly onto this chart. Caution must be exercised in the transfer of geographical positions to other charts not in terms of WGS 84 Datum.

KATIKATI ENTRANCE
Depths on the bar at the Katikati Entrance to Tauranga Harbour are subject to frequent change and it is dangerous for mariners without recent local knowledge to attempt to cross it.

WARNING
This area is dangerous to navigation during strong north-easterly winds and dangerous breaking seas can be expected, particularly during an ebb tide.

LOCAL MAGNETIC ANOMALIES
Local Magnetic Anomalies may be experienced inside the 30 metre contour in the approaches to the Mount Maunganui entrance to Tauranga Harbour.

DREGGED AREAS
Dredged areas may not be regularly maintained. Mariners should contact the Harbour Master for information on the latest depths.

NAVIGATIONAL AIDS
Certain lights, buoys and beacons in the inner waters and channels are not shown on this chart. For these the larger scale charts must be consulted.

DIRECTIONAL LIGHT
The directional approach light is operated on request. Vessels are to contact Port of Tauranga.

Tidal Streams referred to HW at TAURANGA

Hours	Geographical Position	Direction of stream (degrees)	Rate of flow (knots)
Before High Water	37°39' 34S 178°15' 28E	135	0.8
High Water	37°39' 34S 178°15' 28E	135	0.8
After High Water	37°39' 34S 178°15' 28E	135	0.8

Tidal Levels referred to Datum of Soundings

Place	Lat S	Long E	Heights in metres above Datum				Datum and Remarks
			MHWS	MHWN	MLWN	MLWS	
Tauranga	37°39'	178°11'	1.9	1.7	0.5	0.3	4.10m below BM BC84 (LINZ geodetic code 8309), a stainless steel pin in the concrete foundation at the NE corner of the Port of Tauranga Ltd administration building.

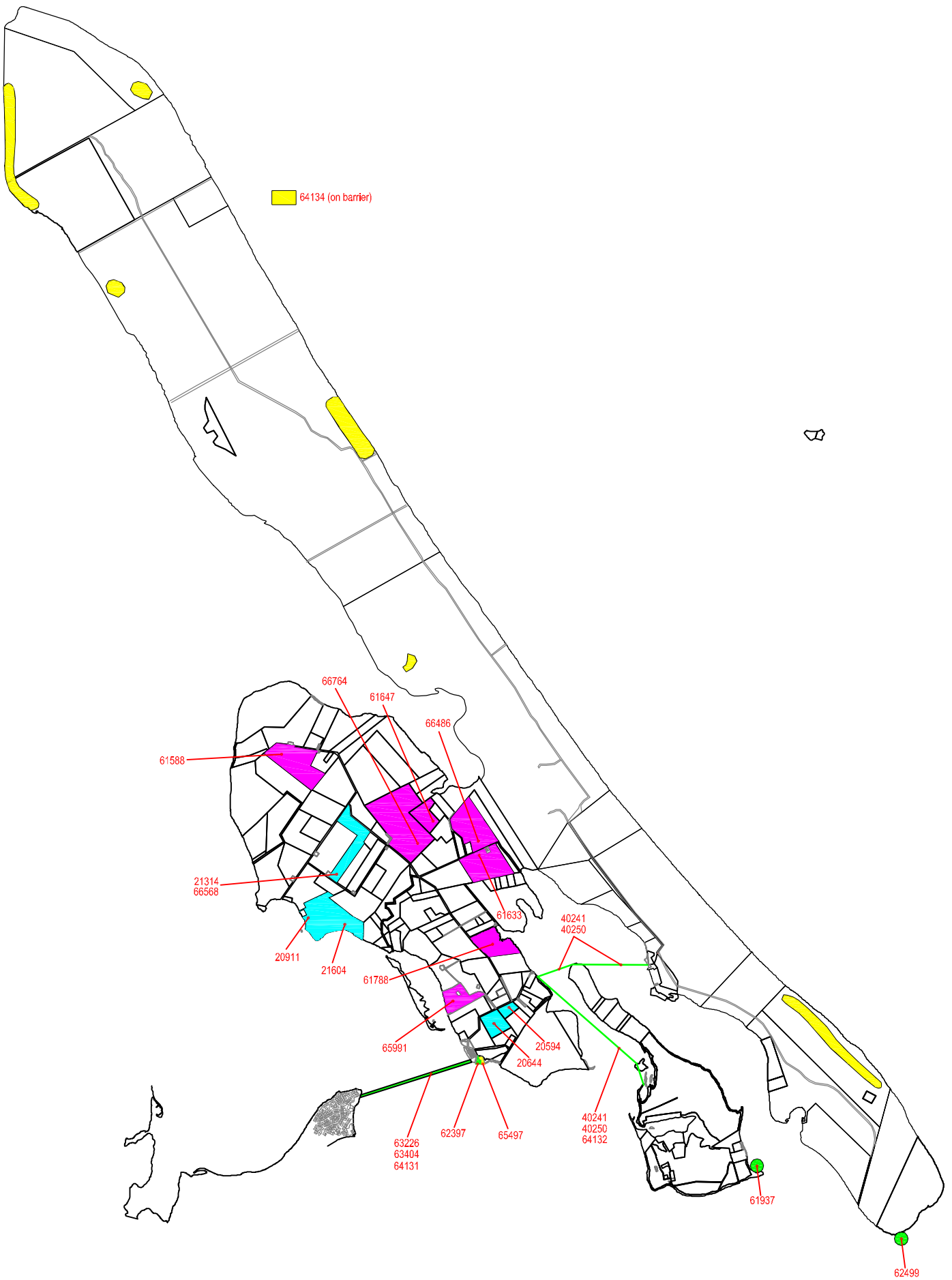
**APPENDIX 2 – Regional Permits – Discharges, Infrastructure, Water, Coastal
Structures and Land Use**

Bay of Plenty Regional Council – Consent Index Matakana Island

CONSENT_NO	NAME	PURPOSE	EXPIRYDATE	EASTING	NORTHING	CONSENTED LIMIT
20594	Tauranga Moana Maori Trust Board	IRRIGATION & DOMESTIC USE	20261001	2782181	6394091	74m ³ /day
20644	Tauranga Moana Maori Trust Board	ORCHARD IRRIGATION	20261001	2781688	6393882	262m ³ /day
20911	Ratahi Holdings Ltd	ORCHARD IRRIGATION	20261001	2779081	6395762	157m ³ /day
21314	Murray Orchards	ORCHARD IRRIGATION	20261001	2779746	6396957	350m ³ /day
21604	Ratahi Holdings Ltd	IRRIGATION, STOCK & DOMESTIC USES	20261001	2779457	6395417	135m ³ /day
66568	Murray HT on behalf of Murray Orchards	Install & test a bore	20111130	2779320	6396130	N/A
61588	Tirohanga Whanau Trust	DIS DAIRY EFFLUENT TO PASTURE IRRIGATION	20211231	2778555	6398081	27.5m ³ /day
61633	David Ngatai Family Trust	DIS DAIRY EFFLUENT TO GROUND SOAKAGE	20111231	2781694	6396493	11m ³ /day
61647	Murray DT	DIS DAIRY EFFLUENT TO GROUND SOAKAGE	20111130	2780733	6397236	9.9m ³ /day
61788	Gardiner JI	DIS DAIRY EFFLUENT TO GROUND SOAKAGE	20111031	2781643	6395126	16.5m ³ /day
65991	Webb JCK	Dis dairy effluent to pond soakage	20150131	2781590	6394260	11m ³ /day
66486	Murray R & R	Discharge dairy effluent to pond soakage	20201130	2781500	6396660	12.3m ³ /day
66764	Murray DT	Dis dairy effluent to ground & pasture	20211130	2780730	6397250	11m ³ /day
61937	Tauwhao Te Ngare Trust-The	INSTALL FLOATING PONTOONS	20380131	2786010	6391480	265m ² occupation of the CMA
62397	Opureora Marae Management	CONSTRUCT SEAWALL & EARTHWORKS ON BANK	20401231	2781776	6393227	280m ² occupation of the CMA
62499	Blakely Pacific Limited	ERECT RAMP, DISTURB BED AND OCCUPY CMA	20390430	2788360	6390510	480m ² occupation of the CMA
63226	BOP Regional Council	DREDGING OF OPUREROA CHANNEL AND DIS	20150731	2781580	6393000	12,000m ³ of capital dredging in the CMA
63404	Telecom New Zealand Limited	DISTURB SEABED WITH EXISTING CABLES	20410531	2781400	6393400	N/A
63405	Telecom New Zealand Limited	DISTURB SEABED WITH EXISTING CABLES	20410531	2782600	6394500	N/A
64131	Telecom New Zealand Limited	Disturb the seabed with existing cables	20410531	2781400	6393400	N/A
64132	Telecom New Zealand Limited	Disturb the seabed with existing cables	20410531	2782600	6394510	N/A
40241	UNITED NETWORKS LTD	DISCHARGE SEAWATER AFTER USE IN A JET	20301130	2783173	6395440	Submerged cable
40250	UNITED NETWORKS LTD	REMOVE POWER POLES AND CABLES	20301130	2783173	6395440	Remove structures and submerge
64134	Blakely Pacific Ltd	EARTHWORKS FOR HARVESTING	20161031	2774386	6409042	N/A
65497	Opureora Marae Management	Land disturbance to construct erosion pr	20130831	2781520	6393180	N/A
65497	Opureora Marae Management	Land disturbance to construct erosion pr	20130831	2781780	6393230	N/A

Key (also see plan attached for location):

	Discharge Permits
	Water Abstraction/Bore Permits
	Works within the Coastal Marine Area (CMA)
	Land Use Activities – Close to CMA or Erosion



No.	Date	Revision Details	By	Ver.	App.

Prepared by



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Client
VARIOUS

Project:
MATAKANA ISLAND

Drawn	Signed	Date

Drawing Title:
Regional Permit Locations (indicative only)

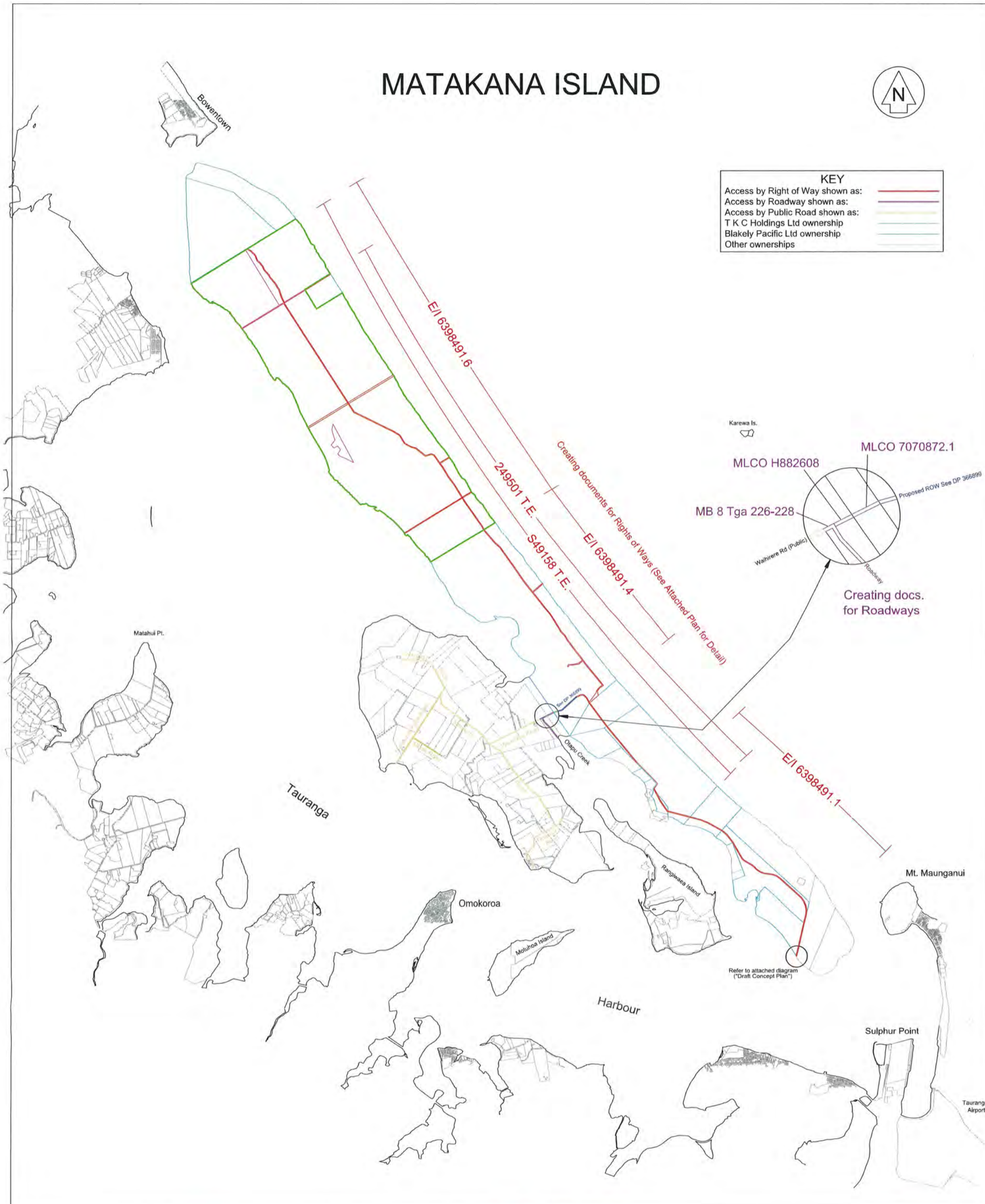
Project No.	00
Scale	N.T.S
Drawing No.	Rev. 00

**APPENDIX 3 – Plan of Existing Access Arrangements – Roads, Maori Roadways
and Rights of Way**

MATAKANA ISLAND



KEY	
Access by Right of Way shown as:	
Access by Roadway shown as:	
Access by Public Road shown as:	
T K C Holdings Ltd ownership	
Blakely Pacific Ltd ownership	
Other ownerships	



No	Date	Revision Details	By	Ver/APP

Prepared by
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Project:
MATAKANA ISLAND

Drawn	Signed	Date
BH		Aug 07
Designed	Signed	Date
Verified	Signed	Date
Approved	Signed	Date

Drawing Title:
**Blakely Pacific Limited
 Rights of Way**

Project No.	00
Scale	1:40000
Drawing No.	MROW-02
Rev.	00

APPENDIX 4 – Photographs from Various Parts of Matakana Island



Photo 1: Water Bore at Hunters creek Mill on Barrier



Photo 2: Water Bore on Core



Photo 3: Dairy Farm on core of Island looking towards Barrier



Photo 4: Dairy Farm on Core of Island looking South



Photo 5: Pane Pane Ramp at South end of Island("Forest Lady" barge)



Photo 6: Hunters Creek Jetty looking West



Photo 7: Right of Way formation looking North from Pane Pane Ramp



Photo 8: Main Right of Way (Hume Highway) unsealed formation on Barrier



Photo 9: Waihirere Road sealed formation on Core



Photo 10: Matakana Road on core (sealed formation) looking South



Photo 11: Matakana Point Road on Core (unsealed formation)



Photo 12: Oपुरeroa Road Intersection with Matakana Road (sealed formation)



Photo 13: Pipeline Road (Right of Way) on Barrier (unsealed formation)