Mounga Ecology Ltd
Taranaki

Ph: 021 0820 4503
Email: sarah@mounga.eco
Website: www.mounga.eco

To: Consents office
Taranaki Regional Council

Consents office
New Plymouth District Council

From: Sarah Roth, Ecologist
Mounga Ecology Ltd
sarah@mounga.eco

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Subject: Wetland Delineation Results and Assessment Against National Environmental Standards – Freshwater 2020

This technical report as been prepared on behalf of Robe and Roche Investments Limited with regards to the a proposed subdivision of Lot 2 DP 521660 (56 Pohutukawa Place, Bell Block, New Plymouth). Significant ecological features are present along the western and eastern boundary of the northern extent of the project area in the form of the Waipu Lagoons. These water bodies are well studied, with an existing esplanade reserve including a riparian buffer that fringes the project area.

Background

In light of the National Policy Statement for Freshwater Management (NPS-FM) and National Environmental Standards for Freshwater (NES-FM), a review of the existing water bodies within the project area has been requested as part of the resource consent application for a subdivision and development at 56 Pohutukawa Place, Bell Block. The primary reason for the survey was to provide certainty that appropriate riparian buffers are in place surrounding the Waipu Lagoons, situated along the north-eastern and north-western boundaries of the proposed subdivision. Furthermore, areas of wetland outside the existing reserve were identified during initial site walkover; certainty that the vegetation in these areas meet determinants of wetland vegetation according to MFE (2020) was required to ascertain the status of the potential wetland with regard to the definition of a natural wetland under the NES-FM.

The wetlands were surveyed on 15 June 2021 by Sarah Roth (Mounga Ecology Ltd) where the wetland boundaries of the existing Waipu Lagoons (Figure 1a and 1b) were documented based on Rapid Test protocols (MFE 2020) and elsewhere vegetation plots (Figure 2a and 2b) were carried out to determine status based on Dominance Test and Prevalence Index vegetation assessments (MFE 2020). This letter presents the results of the survey and discusses the status of the potential wetland with regards to the definitions under the NPS-FM and NES-FM. Non-complying activities under the NES-FM are discussed. Furthermore, recommendations for future works, particularly around restoration and storm water management are briefly discussed.


Figure 1a, left, Rapid visual assessment of wetland boundary within reserve; vegetation type changes from flax/harekeke (*Phormium tenax)* a Facultative Wetland Species to kiokio (*Blechnum novae-zelandiae*) a Facultative species and mamaku (*Cyathea medullaris*) a Facultative Upland species. **Figure 1b**, right, Rapid visual assessment of wetland boundary within reserve; vegetation type changes from raupō (*Typa orientalis*) an Obligate species to kikuyu (*Cenchrus clandestinus*) a Facultative Upland species.


Figure 2a, left, South-western most vegetation plot for Dominance Test and Prevalence Index test calculations; dominated by buttercup (*Ranunculus repens*) a facultative species. This plot passed the Dominance Test and failed the Prevalence Index but shows clear wetland hydrology with likely hydric soils. **Figure 2b**, Eastern most of the western vegetation plots for Dominance Test and Prevalence Index test calculations; dominated by mercer grass (*Paspalum distichum*) a facultative wetland species. This plot passed both the Dominance Test and Prevalence Index tests.

Definitions

Natural wetlands

The NPS-FM defines natural wetlands meaning a wetland (as defined in the Act[1]) that is not:

i. a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or

ii. a geothermal wetland; or

iii. any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.

Improved pasture

The NPS-FM defines improved pasture as an area of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing.

[1] Resource Management Act 1991. Wetland includes permanently or intermittently wet areas, shallow water and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.

Hydrophytic vegetation (hydrophytes)

Hydrophytic vegetation, also known as hydrophytes, are plant species capable of growing in soils that are often or constantly saturated with water during the growing season. The hydrophyte categories (wetland indicator status ratings: Clarkson *et al*. 2013 and subsequent updates) are:

- Obligate (OBL): occurs almost always in wetlands (estimated probability >99% in wetlands)
- Facultative Wetland (FACW): occurs usually in wetlands (67–99%)
- Facultative (FAC): equally likely to occur in wetlands or non-wetlands (34–66%)
- Facultative Upland (FACU): occurs occasionally in wetlands (1–33%)
- Upland (UPL): rarely occurs in wetlands (<1%), almost always in 'uplands' (non-wetlands).

Hydric soils

The Hydric Soil Tool (Fraser *et al.* 2018) defines hydric soils as those that have formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (low oxygen) conditions in at least the upper 30cm of the soil. A soil core is required to compare soil colours and mottles against the standards (Musell Soil Color Chart 1994).

Hydrology

Hydrology protocol has not yet been released for NZ; in the interim MPI recommends following the 1987 COE Wetland Delineation Manual by the US Army Corps of Engineers. To meet the wetland criteria the hydrology must conform with the area being inundated either permanently or periodically (at least 7 consecutive days in most years) during the growing season of the prevalent vegetation OR the soil is saturated to the surface at some point (14 consecutive days in most years) during the growing season of the prevalent vegetation. The growing season is generally defined by soil and ambient air temperature thresholds above freezing.

Methods

Wetland delineation

The NPS-FM refers to the Ministry of the Environment wetland delineation protocols (August 2020) in order to determine the status of wetlands. These rely on the presence of hydrophytes, hydric soils and/or appropriate hydrology.

In accordance with the MFE (2020) method the vegetation model for wetland delineation was followed as such:

1. Determine project area and whether 'normal' circumstances are present (i.e., no recent disturbances such as drought or flood, or historic disturbances such as filling, draining or clearing of wetland).
2. Identify major vegetation types in project area and establish a representative plot in each major vegetation type (since project area is less than 2ha in size). A total of 7 plots were established; Figure 3.
3. Sample 1m x 1m plots using the Dominance Test (DT) and Prevalence Index (PI):
    a) all species in each stratum (i.e., tree, sapling/shrub, herb) were identified and percent cover estimated. Note that only the herb layer remained intact within the

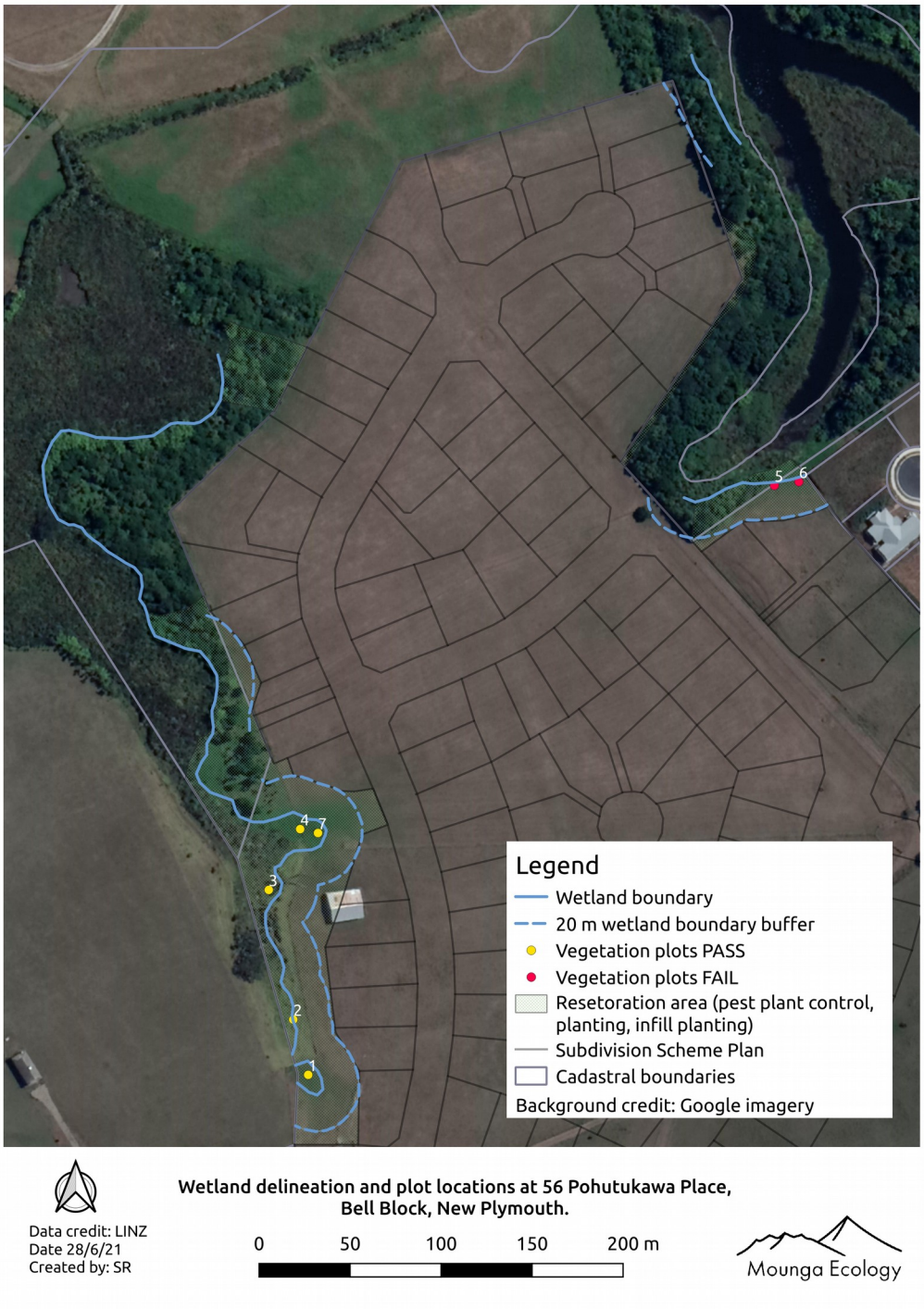

Figure 3. Wetland delineation, plot locations and restoration areas at 56 Pokutukawa Place, Bell Block, New Plymouth.

wetlands on site due to historical land clearance and grazing. All species identified were accounted for in the rating system (Clarkson *et al.* 2013).

b) hydrophytic vegetation determination and quantification using Clarkson *et al*. 2013 was completed for each plot following flow-chart analysis. Data was compiled and Dominance Test and Prevalence Index scores were calculated according to Clarkson *et al*. 2013 to determine PASS or FAIL of criteria.

4. The wetland boundary was refined on the ground using Rapid Visual Assessment; this was marked with GPS track.

For more detailed methodology refer to MFE (2020) and/or Clarkson *et al.* (2013).

Wetland

The potential wetlands identified were assessed on the definition of natural wetland defined above. The definition of improved pasture was used with support of pasture species list from NZ Grasslands Association (Stewart *et al*. 2014).

Hydric soils

Soils were not assessed during the site visit.

Hydrology

This was assessed with repeated aerial imagery, anecdotal evidence and visual clues.

Results

Wetland delineation

A total of seven plots were established within in the project area. Five plots were situated along the south-western finger of the western lagoon and two plots at the southern extent of the eastern lagoon. The two key vegetation types were (1) herbfield dominated by buttercup (FAC) and (2) grassland/rushland dominated by kikuyu (FACU), mercer grass (FACW), yorkshire fog (*Holcus lanatus*, FAC) and/or perennial ryegrass (*Lolium perenne*, FACU); none of the plots surveyed were dominated by indigenous vegetation.

All plots passed the hydrology assessment. All five of the western plots passed the DT; the northern three plots also passed the PI with score below 3. The southern two plots failed the PI but were still considered wetland since they passed the hydrology test and are in a low basin with likely hydric soils. The two eastern plots failed both the DT and PI. See Figure 3 for mapped results and Appendix 1 for detailed plot data.

Wetland definition against NPS-FM 2020 and NES-FM 2020

With regards to pasture species, two out of seven plots were dominated by pasture species (>50%). Anecdotal evidence (landowner, W. Bolton, 15 June 2021) suggests the grazed area has not been re-sown for decades and no control of wetland species has been carried out in recent history (decades). However, initial clearance and sowing of pasture species for the benefits of livestock grazing was carried out in the past and the current grazing regime maintains the modified standard. The two plots which are dominated by pasture species are subject to temporary and longer term rain-derived water pooling especially during winter which is still considered growing season under the definition. As such, the hydrophytic vegetation present at two (Plot#2 & Plot#5) of the seven plots is not considered to meet the definition of a ‘natural wetland’ according to the NPS-FW, and are instead considered to be ‘improved pasture’ by definition.

Of the other five plots, four (Plots #1, 3, 4 and 7) meet the criteria of 'natural wetland'. Plot #2 passed the DT and hydrology test with vegetation dominated by kikuyu, which is considered an invasive weed; this is likely the reason the hydrophitic vegetation present within Plot #2 fails to meet the criteria of a 'natural wetland'. This has been considered in the decision to include this area as a wetland.

NES-FM2020 – Regulation 54

Regulation 54 states that the taking, use, damming, diversion or discharge of water within, or within a 100 m setback from, a natural wetland is a non-complying activity if they do not have another status under any other subpart of the policy. Discharging low energy and high quality (i.e., low contaminants according to Taranaki Regional Council 2001 and ANZECC 2002) storm water within 100 m of the wetland, which is proposed for this development, falls under this activity.

A report provided by New Plymouth District Council written by D. Mandeno (2004) provides comprehensive results of hydrology and environmental testing to investigate the possible adverse effects of catchment development on the Waipu Lagoons. The report concludes that

> *future development of the catchment should implement private on-site storm water collection and discharge to soak holes where possible. This will assist in maintaining groundwater recharge levels, whilst minimising volumes of surficial flow entering the storm water system*. Mandeno 2004

If recommendations are carried out as per the aforementioned report, any storm water discharge to the wetland (not directly; the storm water will first receive primary and secondary treatment to achieve low energy and high quality outputs) should have less than minor effects on the ecology and hydrology of the wetlands. To ensure certainty in this area, ongoing water-monitoring programme is essential, as outlined in the report, to ensure contaminants in run-off do not increase and remediation plans can be implemented at the first sign of problems.

Conclusion & recommendations

In most places, the existing reserve around the Waipu Lagoons provide sufficient vegetation buffer of 20 metres or wider. Areas where the buffer is less than 20m width were surveyed through Rapid Assessment to establish a wetland edge. Wetland areas not currently included in the reserve were assessed according to MFE protocols for wetland delineation and included in the wetland boundary. From the wetland edge a 20m wide buffer is shown (blue dash line) in Figure 3. This 20m buffer will provide a sufficient ecological buffer to improve habitat for indigenous flora and fauna that utilise the area, as well as provide filtering of overland water flow to reduce sedimentation and potential contaminants entering the water bodies. The design scheme accommodates the significant areas of concern and new areas proposed to be vested as part of the Waipu Lagoon Reserve area.

Further to the 20m restored riparian buffer, we propose building restrictions within 2m of the reserve boundary fencing to ensure garages, sheds, etc., are not constructed on or near the boundary. The storm water from roads is to be collected, processed and discharged at designated locations, whilst storm water from buildings and driveways is to be processed on-site via soakage pits (as recommended in the Mandeno report).

To ensure ongoing appropriate level of service, water testing is recommended as part of the storm water management plan at each of the outfall point to ensure high water quality standards are being met; ideally this will be carried out quarterly (3 monthly) and tested for the same water quality parameters as described in the D. Mandeno (2004) report. Appropriate storm water outfall infrastructure, such as rock riprap, is recommended to slow velocity and dissipate energy of storm water flows before reaching the natural wetland.

Lastly, restoration of suitable indigenous species is recommended throughout the existing and proposed extension to the reserve area. Focus should be on areas currently dominated by exotic/pest plants, existing canopy gaps within reserve or currently grazed areas (Figure 3 shows recommended restoration areas). An ecological management plan should guide all restoration works, with detailed plans for pest plant control, indigenous species planting size, schedules and spacing, recommended timing of works completed and predator control methodologies.

I trust this technical report assists in providing information for this application. Please do not hesitate to contact me for any clarification.

Ngā mihi

Sarah Roth – Senior Ecologist and Director

Mounga Ecology

Appendix 1: Data sheets from field survey 15 June 2021

Plot 1 19384475.12 , -4726557.56

Dominance test: Pass

Prevalence test: Fail (3.14)

Hydrology test: Pass

Pasture species: 15%

Notes: pugging from recent (many days) grazing

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Ranunculus repens	RANrep	80	FAC	No
Holcus lanatus	HOLlan	15	FAC	Yes
Lolium perenne	LOLper	5	FACU	Yes
Cenchrus clandestinus	CENcla	10	FACU	Yes

Plot 2 19384466.95, -4726527.20

Dominance test: Pass

Prevalence test: Fail (3.09)

Hydrology test: Pass

Pasture species: 65%

Notes: Invastive week (kikuyu) considered pasture species and FACU spp; it is dominating plot and will likely throw off calculations; this area appears to be a wetland

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Cenchrus clandestinus	CENcla	30	FACU	Yes
Juncus effusus	JUNeff	20	FACW	No
Ranunculus repens	RANrep	20	FAC	No
Lotus pedunculatus	LOTped	10	FAC	Yes
Holcus lanatus	HOLlan	25	FAC	Yes

Appendix 1: Data sheets from field survey 15 June 2021 (cont'd)

Plot 3 19384453.5, -4726456.0

Dominance test: Pass

Prevalence test: Pass (2.17)

Hydrology test: Pass

Pasture species: 30%

Notes:

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Carex virgata	CARvir	5	FACW	No
Holcus lanatus	HOLlan	20	FAC	Yes
Cenchrus clandestinus	CENcla	5	FACU	Yes
Lemna disperma	LEMdis	5	OBL	No
Ranunculus repens	RANrep	10	FAC	No
Juncus effusus	JUNeff	10	FACW	No
Paspalum distichum	PASdis	30	FACW	No
Lotus pedunculatus	LOTped	5	FAC	Yes
Cyperus ustulatus	CYPust	5	FACW	No
Juncus acuminatus	JUNacu	5	OBL	No
Isolepis prolifera	ISOpro	10	OBL	No
Juncus planifolius	JUNpla	5	FACW	No

Plot 4 19384471.0, -4726422.6

Dominance test: Pass

Prevalence test: Pass (2.85)

Hydrology test: Pass

Pasture species: 65%

Notes:

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Isolepis prolifera	ISOpro	5	OBL	No
Cenchrus clandestinus	CENcla	20	FACU	Yes
Paspalum distichum	PASdis	30	FACW	No
Ranunculus repens	RANrep	40	FAC	No
Holcus lanatus	HOLlan	5	FAC	Yes
Lolium perenne	LOLper	5	FACU	Yes

Appendix 1: Data sheets from field survey 15 June 2021 (cont'd)

Plot 5 19384731.32, -4726233.86

Dominance test: Fail

Prevalence test: Fail (3.65)

Hydrology test: Pass

Pasture species: 76%

Notes: Recent grazing

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Lolium perenne	LOLper	40	FACU	Yes
Cenchrus clandestinus	CENcla	20	FACU	Yes
Ranunculus repens	RANrep	25	FAC	No
Lotus pedunculatus	LOTped	10	FAC	Yes
Melicytus ramiflorus	MELram	1	FACU	No
Plantago lanceolata	PLAlan	1	FACU	Yes
Trifolium repens	TRIrep	5	FACU	Yes

Plot 6 19384744.83, -4726231.83

Dominance test: Fail

Prevalence test: Fail (3.48)

Hydrology test: Fail

Pasture species: 50%

Notes: Recent grazing

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Lolium perenne	LOLper	15	FACU	Yes
Ranunculus repens	RANrep	50	FAC	No
Plantago lanceolata	PLAlan	25	FACU	Yes
Trifolium repens	TRIrep	5	FACU	Yes
Lotus corniculatus	LOTcor	5	FACU	No
Lotus pedunculatus	LOTped	5	FAC	Yes
Taraxacum officinale	TARoff	1	FACU	No

Appendix 1: Data sheets from field survey 15 June 2021 (cont'd)

Plot 7 19384480.7, -4726424.7

Dominance test: Pass

Prevalence test: Pass (2.29)

Hydrology test: Pass

Pasture species: 15%

Notes: Recent grazing

Species	Species code	% cover	Status (Clarkson *et al.* 2013)	Pasture species?
Paspalum distichum	PASdis	85	FACW	No
Cenchrus clandestinus	CENcla	10	FACU	Yes
Lolium perenne	LOLper	5	FACU	Yes
Persicaria maculosa	PERmcl	1	FACW	No