

Sand Dune Assessment

Paraparaumu Town Centre
Prepared for Kāpiti Coast District Council

4 December 2014


The logo for Boffa Miskell, consisting of a large, white, stylized letter 'B' that is partially cut off by the right edge of the page.

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1.0 Introduction

- 1.1 As part of the Paraparaumu Town Centre investigations, Boffa Miskell was commissioned by Kāpiti District Council to undertake a landscape assessment of prominent sand dunes ('the site') between Kāpiti Road and Ihakara Street and the MacKays to Peka Peka Expressway (M2PP), which is currently under construction (Figure 1). The aim of the assessment is to describe the character of the sand dunes and their intrinsic landscape values.
- 1.2 The assessment involved a site visit and field work and discussions with Matiu Park, an ecologist who led the ecological investigations for the MacKays to Peka Peka Expressway (M2PP) project, Dr Mike Shepherd, a geomorphologist with specialist expertise in dunefields along the west coast of the North Island, and Mary O'Keefe, an archaeologist who has led the M2PP archaeological investigations.
- 1.3 For ease of description, in this report, the dunes that form the subject site are referred to as 'two dunes' or 'dune ridges' or by their geographic position – 'easternmost dune' or 'westernmost dune.' However, it is acknowledged that the dunes were originally one dune formation and part of a similar more extensive dune sequence to the west, where there is now suburban residential development.

2.0 Geomorphology and Landscape Context

- 2.1 The sand dunes that are the focus of this assessment are situated on the Kāpiti sand plain, which is part of an extensive dunefield along the west coast of the North Island stretching from Paekakariki in the south to Mokoia near Hawera in the north and covering 3500km². The two dunes are part of the foreland¹ development that has formed along this part of the coastline at Paraparaumu. The foreland has developed during the past c.6000 years in response to the sheltering effect of Island and a good sediment supply.²
- 2.2 Around 6000 years ago the sea retreated from significantly higher earlier levels. As it did, sand was thrown up in stages to form the coastal dune system. This gave rise to the largest and most extensive sand dune system in New Zealand. The width of this dune system varies from a narrow band of dunes between the coast and the escarpment at Paekakariki to dunes stretching well inland further north in Horowhenua and adjoining districts northwards. Ecologically, this sand dune country is recognised as the Foxton Ecological District.
- 2.3 Formation of the dunes impeded water movement and wetlands formed behind them, giving rise to extensive peatlands. The peatlands have been extensively drained. On the dunes closest to the coast the soils are thin, have poor water retention and are prone to wind erosion. Inland dune soils have higher organic material but are also prone to wind erosion and drought.

¹ Forelands are above sea level accumulations of sediment that bulge out from the coastline

² Pers comm. Dr Mike Shepherd

- 2.4 The dune is are probably 3000-4000 years old. It is probably part of the Foxton Dune Phase of development but could possibly be part of the more recent Motuiti Dune Phase (c.2000-3000 years ago).³ This dune is not like the foredunes and the parabolic dunes that occur to the west and southwest on the foreland (Figures 1 & 2). It has an unusual orientation and does not conform to what is expected of either of these particular dune types. While there is no certainty, it may have formed around the margins of a deflation basin⁴ rather than having developed at the edge of an estuary meander or lagoon early in the evolution of the foreland.⁵ The dune is likely to be of significance if any future research was to be carried out into the evolution of the foreland.
- 2.5 Development has occurred on many of the dunes on the foreland, mostly residential subdivision, where the dunes have been modified and re-contoured to accommodate building platforms as opposed to being completely flattened. The dunes immediately west of the site where the Quadrant Heights subdivision is located, were extensively re-contoured and the MacKays to Peka Peka Expressway, which is aligned between the subdivision and the site, will result in further modification. The Expressway designation, which at this location is approximately 100m wide, will cut into and disturb the western edge of the larger of the two dunes (Figure 3).
- 2.6 The dune ridges are locally prominent landscape features primarily because of their context; they remain undeveloped in contrast to the surrounding dune areas and the area immediately around them is flat thus highlighting their height and form. The dune ridges fall into two parts with the larger and higher dune furthest to the west (20m asl) and the smaller and lower dune ridge to the east (17m asl). The two ridges are also in separate titles and different ownership (Figures 3 & 4).
- 2.7 The dunes are almost surrounded by peatlands that extend from Kāpiti Road to the Wharemauku Stream; separated by Drain 5 which runs between them. This drain was cut through a low point between two parts of the dune formation probably in the late 1950s (Figure 5). Drain 5 is a tributary of the Wharemauku Stream which is listed in the Regional Freshwater Plan accordingly.
- 2.8 Most of the site is grazed but there are areas of blackberry and gorse, which have been recently cleared in the part of the dune within the M2PP construction designation. A dwelling is located on the southern flank of the easternmost dune and there are two farm sheds on the adjoining flattish area that has been formed between the dunes, adjacent to Drain 5.

³ An analysis of the stage of soil development would probably confirm this.

⁴ Landforms that develop where sand is removed from an area by wind action. Damp sand just above the water table limits further deflation.

⁵ Pers. comm. Dr Mike Shepherd

3.0 Ecological Values

- 3.1 There is very little of ecological value associated with these dunes, largely as a result of vegetation clearance and grazing during the last century. Apart from a small, badly cattle damaged stand of three old cabbage trees (*Cordyline australis*) on the western dune, the only indigenous species are approximately 6-8 scattered mahoe trees (*Melicytus ramiflorus*). No regeneration was observed near these older scattered trees because of the regular cattle and sheep grazing of this area (Figure 6).
- 3.2 The large areas of gorse and blackberry scattered across some areas of these dunes provide some future potential in terms of a likely natural succession to mahoe forest. However, there is very little sign of native seedlings establishing in these areas – being dominated by rapidly expanding blackberry, inkweed (*Phytolacca octandra*) and lupin (*Lupinus arboreus*) and still subject to ongoing grazing by stock and rabbits.
- 3.3 The lower peatlands associated with these raised dune formations also have very little ecological value currently – again as a result of historic swamp drainage of the peats and ongoing cattle grazing and soil compaction. Some of the more regularly inundated areas of these peatlands had scattered *Juncus* (predominantly *J. effusus* with *J. articulatus*), although these were predominantly dominated by exotic species with an almost total absence of other native wetland species typically present in these areas (i.e ferns, herbs etc). These low-lying peatlands adjacent to the raised dunes have not been identified in any ecological site databases searched, nor have they been identified in GWRC’s unpublished wetland database prepared as part of the Regional Plan.⁶
- 3.4 During the Board of Inquiry for the MacKay’s to Peka Peka Expressway project, there was substantial discussion on the ecological values of similar low-lying wet depressions subject to regular grazing and whether these areas comprised ‘wetlands’ for the purpose of the RMA. The ecologists present agreed that “*under Policy 22 of the proposed WRPS wet pasture including pasture that supports patches of rushes, is not indigenous wetland*”. Further, the ecologists agreed that “*the loss of areas of wet pasture, including pasture that supports patches of rushes (Juncus spp.) do not require mitigation*”⁷.
- 3.5 Given that it is a tributary of the Wharemauku Stream, Drain 5, which runs through these dunes and peatlands from Kāpiti Road to the Wharemauku Stream, should be considered an important watercourse in any future work in this area in terms of habitat for freshwater fish species. Wharemauku Stream itself is channelised and with its steep banks, lack of riparian vegetation, and straight alignment drains the Wharemauku Basin.

⁶ *Unpublished Database of Regionally Significant Wetlands in the Wellington Region* prepared by Boffa Miskell Limited for GWRC, 2011.

⁷ Pages 3 & 4 Terrestrial Ecology Conferencing Statement, MacKays to Peka Peka Expressway, Board of Inquiry, 2011.

4.0 Archaeological Values

- 4.1 Extensive archaeological investigations were carried out as part of the M2PP Expressway project, which revealed a great deal about occupation and settlement along the Kāpiti Coast. As part of the initial construction phase of the Expressway blackberry and other vegetation has been recently cleared within the designation immediately adjoining the two dune ridges. One known shell midden site, disturbed during clearance operations was revealed (Figure 6).
- 4.2 There are no other recorded sites but there is a high probability of sites based on the M2PP archaeological predictive model prepared by archaeologist Mary O’Keeffe⁸. Sites on the coast are generally found in dunes and given these dunes are older and away from the coast and are largely undisturbed so there is a likelihood that other middens are present in this area. A site was found in 1999 in the adjacent Midlands subdivision comprising five areas of midden plus several areas of ovens (R26/290).⁹
- 4.3 As part of determining the future of these dunes digging some investigative test pits could be useful; this work would require authority from Heritage New Zealand.¹⁰

5.0 Landscape and Visual Values

- 5.1 In the Kāpiti Coast District Landscape Study the Paraparaumu Foreland is recognised as a separate landscape character unit¹¹. At a finer landscape grain, the Wharemauku Basin¹² sits within this character unit and the two dune ridges form a distinctive element within the basin. This low-lying basin is fringed by undeveloped dunes, suburban residential development and the current Paraparaumu Town Centre. Construction of the Expressway along the long-standing designation through this area will affect some of the undeveloped dunes (Figures 6 & 7).
- 5.2 In landscape and visual terms, the two dunes are important for several reasons – their lack of modification, their landscape context and contrast with adjoining areas, and their role as a backdrop, buffer and separation (Figures 8 & 9).
- 5.3 A review of aerial photographs since 1952 clearly shows there has been excavation of the site in the past, including removal of material from a low ‘saddle’ between two arms of the dune where Drain 5 is aligned. Currently there is excavation on one of the flanks of the easternmost dune. However, the dunes are essentially

⁸ Pers. Comm. Mary O’Keeffe

⁹ Ibid

¹⁰ Ibid

¹¹ Pages 38-39, Kāpiti Coast District Landscape Study, prepared for Kāpiti Coast District Council, Isthmus, 2011

¹² In the MacKays to Peka Expressway Assessment of Landscape and Visual Effects, the Wharemauku Basin was identified as a separate landscape character area.

unmodified and development is restricted to a dwelling and two farm sheds, although in the past it appears other farm buildings were present (Figure 6).

- 5.4 The original vegetation that would have once covered the dunes is long gone and they have been grazed for at least the last 60+ years. Apart from a large isolated cabbage tree, and a few scattered mahoe in the vicinity there is no other woody vegetation on the actual dunes. However, there is a stand of eucalypts and a small group of conifers on the flat land at the base of the dune flank to the south.
- 5.5 In terms of landform, the dunes are a representative example of the extensive coastal sand dune system, much of which has been destroyed or modified. Suburban subdivision and other forms of development now envelop these largely intact dunes; the construction of the Expressway and the proposed Paraparaumu Town Centre will result in development on the adjacent flat land and this will affect the landscape context and also visually contain the dunes.
- 5.6 In their current undeveloped state, the dunes also provide a backdrop and buffer to adjoining land use activities. The Kāpiti Aquatic Centre on Kāpiti Road is set against the backdrop of the lower easternmost dune; the curved roof form of the Aquatic Centre works particularly well against the dune backdrop when viewed from various angles. The westernmost dune will provide an important separation between the Expressway and the proposed Town Centre development. Extensive mitigation planting is proposed along both sides of the Expressway and will form part of an ecological corridor along the route. This planting will help to reinforce the separation between the Expressway and the site.
- 5.7 The height of the dunes, their relative intactness and limited amount of modification all contribute to their landscape and visual values. The dunes should however, not be considered in isolation; it is the adjoining land that provides both the context and contrast to the surrounding environment (Figures 8 & 9).

6.0 Summary and Conclusions

- 6.1 The dunes, or more correctly dune, is a remnant of a larger dune formation on the Paraparaumu foreland. They are interesting geomorphologically because they are not like the foredunes and the parabolic dunes that occur in elsewhere on the foreland. The unusual orientation does not conform to what is expected of either of these particular dune types. How the dunes were formed is also interesting, and could be determined by research.
- 6.2 Like so many dunes throughout the Kāpiti Coast, there is evidence of occupation; a recent site inspection confirmed the presence of a shell midden and there is a high probability of other sites, based on archaeological modelling and what has been previously found in the adjoining areas developed for residential subdivision.
- 6.3 The dunes are prominent features because of their height, form and their contrast with the surrounding landscape. They have been subjected to a limited amount of landform modification, most of which appears to have occurred many years ago.

There is very little of ecological value associated with these dunes, largely as a result of vegetation clearance and grazing. However, the fact that the dunes are grazed and there is an absence of trees and other woody vegetation, accentuates their simple form.

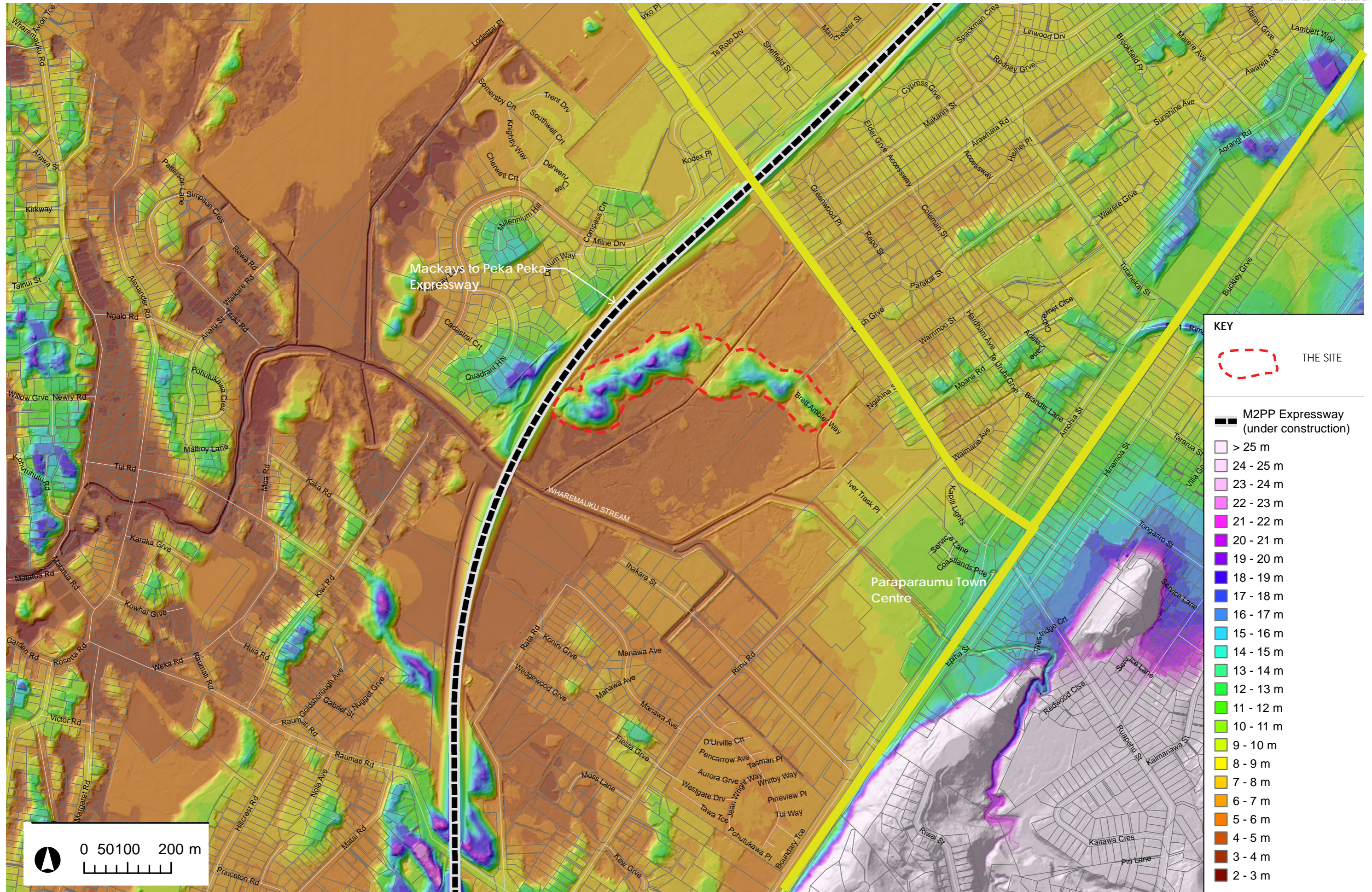
- 6.4 Currently the dunes occupy a 'no man's land' situated between the Paraparaumu Town Centre to the south and suburban residential development to the north and west and Kāpiti Road to the east. Construction of the MacKays to Peka Peka Expressway along the north-western boundary of the site will provide and a very defined edge and the dunes in their current form would provide a buffer and separation between the Expressway and the proposed town centre.
- 6.5 In addition to the development of the open grazed flat land surrounding the dunes for the town centre, there is also the proposed extension of Ihakara Street to link to the airport. Consequently, the intrinsic value of the dunes as prominent and distinctive landscape elements will increase as development encroaches on the adjoining flat land.
- 6.6 These dunes are remnants of a much larger and extensive sand dune system, representative of a past landscape. Retaining them intact has merit because of their landscape, visual, geomorphological and archaeological values. Their intrinsic values are likely to increase over time as more of Kāpiti's coastal dune system is subject to residential and other development.

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4 December 2014*

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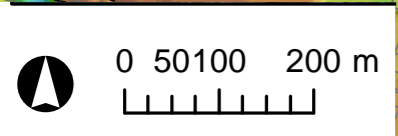
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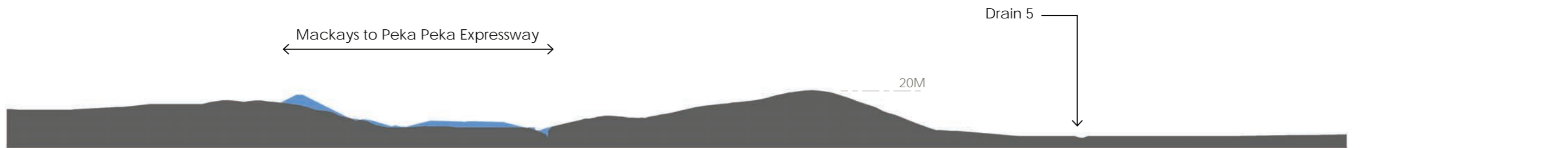
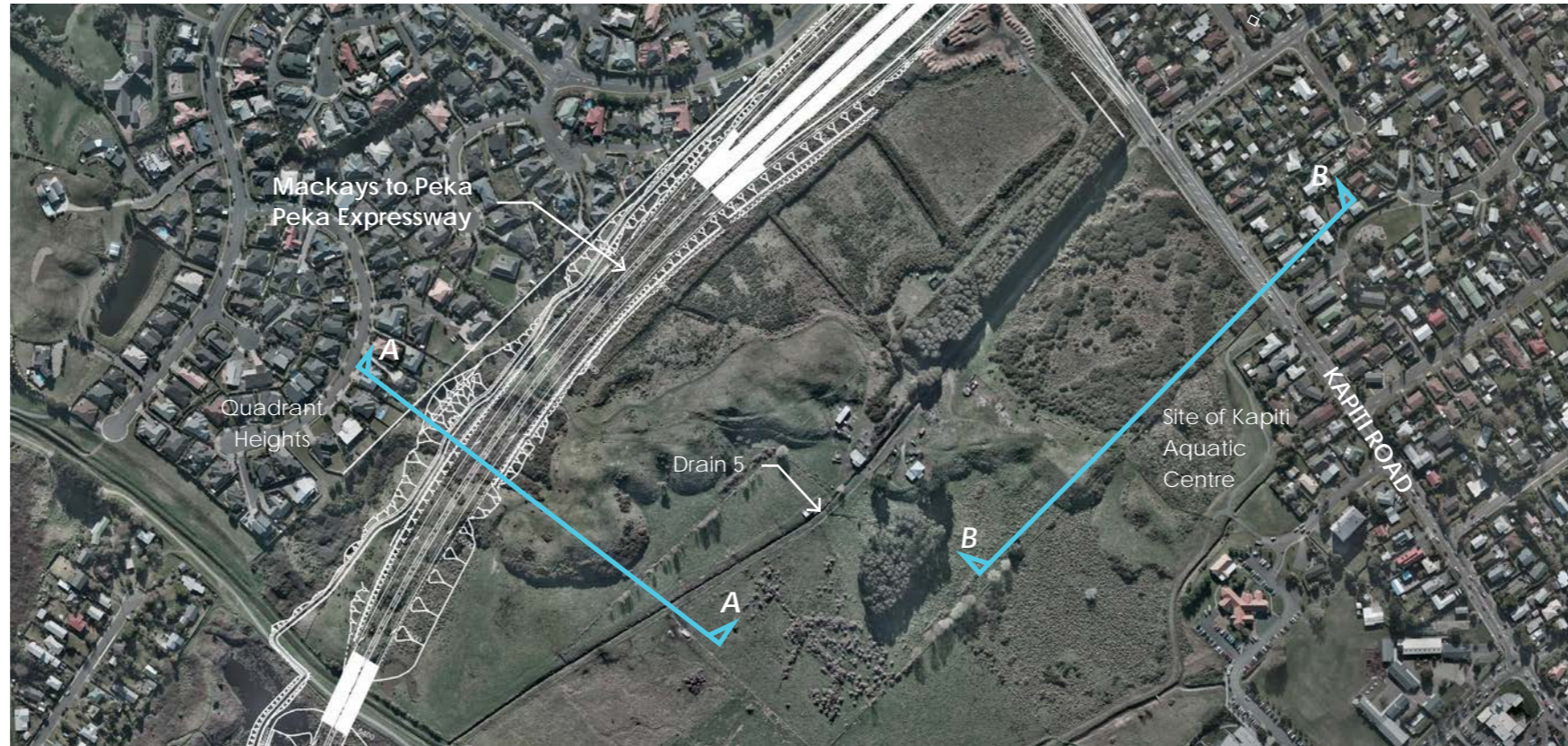


KEY

- THE SITE
- M2PP Expressway (under construction)
- > 25 m
- 24 - 25 m
- 23 - 24 m
- 22 - 23 m
- 21 - 22 m
- 20 - 21 m
- 19 - 20 m
- 18 - 19 m
- 17 - 18 m
- 16 - 17 m
- 15 - 16 m
- 14 - 15 m
- 13 - 14 m
- 12 - 13 m
- 11 - 12 m
- 10 - 11 m
- 9 - 10 m
- 8 - 9 m
- 7 - 8 m
- 6 - 7 m
- 5 - 6 m
- 4 - 5 m
- 3 - 4 m
- 2 - 3 m





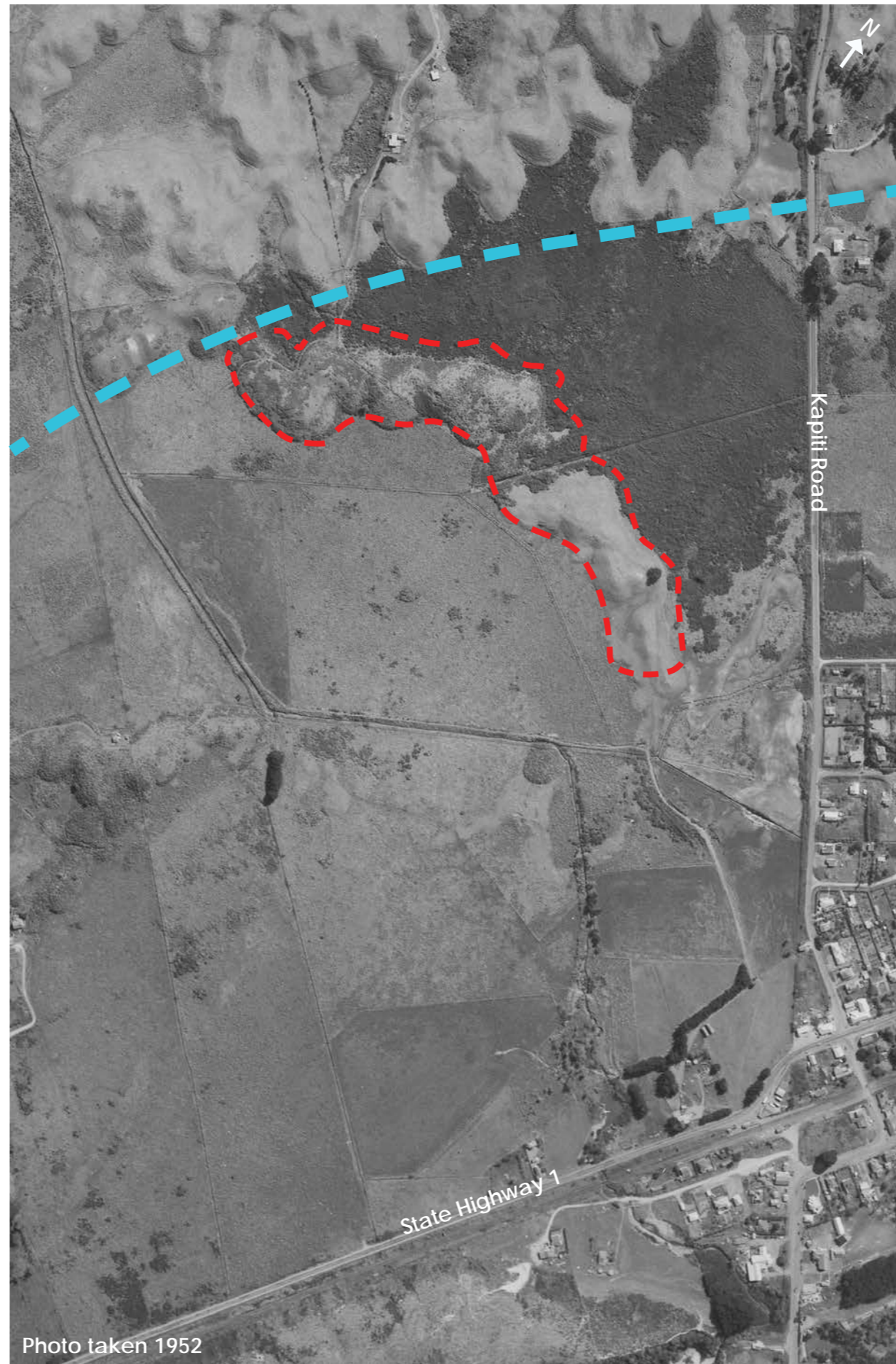


SECTION A-A (1:1250 @ A3)



SECTION B-B (1:1250 @ A3)

50m



KEY

-  THE SITE
-  MACKAYS TO PEKA PEKA EXPRESSWAY



Photograph 1. Midden recently exposed on western dune as a result of blackberry clearance for the M2PP Expressway. Based on the M2PP archaeological predictive model there is a high probability of the presence of other midden.



Photograph 2. Looking from the crest of the western dune towards eastern dune and the low 'saddle' between the dunes currently occupied by a group of farm buildings. In the mid-ground the stand of eucalypts and small groups of conifers located on and adjacent to the dune.



Photograph 3. Looking from the crest of the western dune towards Kapiti Town Centre and the eastern hills beyond. Drain 5 in the mid-ground.



Photograph 4. The dunes are grazed with various weed species present in places and the only native vegetation is a small group of three damaged mature cabbage trees on the western dune and a few scattered mahoe elsewhere on the site.



Photograph 5. The dunes are distinctive and prominent because of their height and lack of modification; they will also provide a buffer and separation between the proposed Town Centre and the Expressway.



