BEFORE AN INDEPENDENT HEARING PANEL FOR

APPOINTED BY KAIPARA DISTRICT COUNCIL

Under	**Resource Management Act 1991**
And	
In the matter of	**Proposed Plan Change 85 to the Operative Kaipara District Plan**
By	Kaipara District Council

STATEMENT OF EVIDENCE OF ANDREW JAMES TOWNSEND

(ECOLOGY)

ON BEHALF OF THE DIRECTOR-GENERAL OF CONSERVATION

Submitter No. 81

Dated 30 January 2026

Counsel for the Director-General of Conservation

Lisa Sutherland
Senior Solicitor
Department of Conservation
P O Box 842
Raumaunga
Whangarei 0140

Phone: 027 275 0826
Email: lsutherland@doc.govt.nz

Executive summary

1. In my opinion, the provisions proposed in the planning evidence for the applicant, dated 18 December 2025, largely address concerns for indigenous vegetation and flora over the area of the proposed Private Plan Change 85 (PPC85) – Mangawhai East.

2. However, it is important that these provisions also consider the hydrological connections between the Significant Natural Areas (SNA) and the sea, in relation to the placement or repair of any infrastructure. Loss of the connection to the harbour for the northern SNA (e.g., by repairing the stop-bank on the southern shoreline of Mangawhai Harbour) will have significant negative effects on the ecological values present.

3. The Saltmarsh SNA[1] appears to be already covered by a Reserves Act 1977 conservation covenant that is larger than the proposed SNA area. It is not clear whether this covenant is intended to remain in place or the new SNA is going to replace it. For completeness, I consider the ecological benefits of the covenant, if it were fully exercised. This potential benefit would be lost if substituted for a SNA that is smaller.

4. Placement of any infrastructure (fences, walking tracks) also requires careful consideration. The remaining areas of indigenous vegetation are relatively small and cannot afford further loss by placing infrastructure within them.

[1] Referred to as the northern SNA by some other parties, but because it occurs on the southern shoreline of the Mangawhai Harbour, and I also refer to ecological values along the southern shoreline, I have avoided using “northern” and “southern” in my naming.

Introduction

5. My full name is Andrew James Townsend.

6. I have been asked to provide expert ecological evidence on PPC85, on the southern side of Mangawhai Harbour.

Qualifications and experience

7. I hold bachelor's degree in Horticulture and a Post-graduate Diploma in Plant Science from Massey University. I am a member of the New Zealand Botanical Society and the New Zealand Plant Conservation Network.

8. I am currently employed by Te Papa Atawhai/Department of Conservation (DOC) as a senior technical advisor for ecology, in the Terrestrial Ecosystems Unit of the Biodiversity Heritage and Visitor Group. I have worked for DOC as a terrestrial ecologist since 1997, first based in Wellington (10 years) and then Northland (18 years). Prior to 1997, I held fixed-term contracts with DOC and worked as an ecological consultant (Wildland Consultants Ltd.); this work required ecological survey across much of the North Island, using and refining ecological assessment criteria for the Protected Natural Areas (PNA) Programme and writing PNA survey reports.

9. I was involved in the preparation of DOC's Guidelines for assessing Ecological Significance[2] and have experience in providing advice on ecological significance assessments into internal and external organisational statutory processes such as council hearings and the Environment Court.

10. I was involved with developing ecological significance criteria for the Northland Regional Council Regional Policy Statement 2016 (RPS), and processes to identify SNAs for the Far North, Kaipara, Whangarei, Thames-Coromandel, and Waitomo Districts.

11. I also provided evidence on behalf of the Director-General of Conservation for *Mangawhai Harbour Restoration Society Inc v Northland Regional Council* [2012] NZEnvC 232. This focused on the possible effects of mangrove (*Avicennia australasica* subsp. *maritima*) removal from Mangawhai Harbour. Developing that evidence involved assessing and mapping the natural values of the harbour at that time.

[2] Davis, M.; Head, N.J.; Myers, S.C.; Moore, S.H. 2016: Department of Conservation guidelines for assessing significant ecological values. *DOC. Wellington*.

12. My current role requires me to provide ecological advice nationally, and I am specifically involved with projects across much of the North Island, including providing advice on managing threatened plants in Wairarapa, Hawke's Bay, Manawatū-Rangitikei, Waikato, Auckland and Northland regions. I have over 30 years of experience mapping vegetation using aerial photographs and satellite imagery.

Code of Conduct

13. I confirm that I have read the code of conduct for expert witnesses as contained in the Environment Court Practice Note 2023 (the Code). I have complied with the Code when preparing my written statement of evidence and will do so when I give evidence before the hearing.

14. For the avoidance of doubt, in providing this evidence as an expert witness in accordance with the Code, I acknowledge that I have an overriding duty to impartially assist the Panel on matters within my area of expertise. The views expressed are my own expert views, and I do not speak on the behalf of the Director-General of Conservation (DG).

15. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence. The reasons for the opinions expressed are also set out, and includes, where relevant:

    a. why other alternative interpretations of data are not supported;

    b. any qualification if my evidence may be incomplete or inaccurate without such qualification;

    c. any knowledge gaps and the potential implication of the knowledge gap;

    d. if my opinion is not firm or concluded because of insufficient research or data or for any other reason; and

    e. an assessment of the level of confidence and the likelihood of any outcomes specified in my conclusion.

16. Unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

17. My evidence focuses on the provisions relating to effects on the ecological values of the indigenous vegetation and flora present within the proposed plan change area.

18. I also make some suggested amendments to the provisions that will improve the prospects of the SNAs persistence, and ecological value.

Material considered

19. I have read and considered the following:

    a. the Mangawhai East Planning Report - section 32 report May 2025;

    b. the Ecological Impact Assessment – Northern Area, prepared by Viridis Environmental Consultants, dated June 2025;

    c. the Ecological Impact Assessment – Southern Area, prepared by Rural Design, dated November 2024;

    d. the section 42A report prepared by Mr Clease, circulated on 1 December 2025, appended amendments to proposed provisions, and relevant evidence from other experts appended to this report, including:

        i. the evidence of Mr Smith in relation to ecology, dated 1 December 2025;

    e. evidence of the applicant's witnesses, including:

        i. the evidence of Mr Delaney in relation to ecology, dated 16 December 2025;

        ii. the evidence of Ms O'Connor in relation to planning, dated 18 December 2025;

    f. the DG's submission and further submission; and

    g. my assessment of the ecological values of Mangawhai Harbour (including Black Swamp SNA[3] and the southern shoreline, attached as Appendix 1).

20. Over the last 15 years I have made numerous visits to Mangawhai Sand Spit; and visited Black Swamp and the southern shoreline multiple times in 2012 when mapping the vegetation there.

Methodology

21. As part of preparing this evidence (2026), I used recent satellite imagery in a geographic information system (GIS) to confirm that the vegetation I mapped in 2012 still aligns closely with what is there now.

[3] Referred to as the southern SNA by some other parties, but because the project area is on the southern shoreline of the Mangawhai Harbour, and I refer to the ecological values along that harbour edge, there is potential for confusion. Therefore, I refer to the two SNAs by names that avoid the use of "northern" and "southern".

22. Dr Beauchamp and I visited the southern shoreline on 19 January 2026. During this visit, I confirmed that the vegetation analysis I undertook in 2012 is still relevant. During this visit, I also investigated the hydrology, to better understand the connections between the saltmarsh and the harbour.

23. I also used LiDAR (2018) in a GIS application (ArcMap 10.7) to better understand the topography and hydrology of the SNAs.

Results

24. Vegetation along the southern shoreline of Mangawhai Harbour has not changed significantly since my assessment in 2012 (Figure 1), so the assessment I undertook then is still useful context today. The full analysis is attached to this body of evidence as Appendix 1.

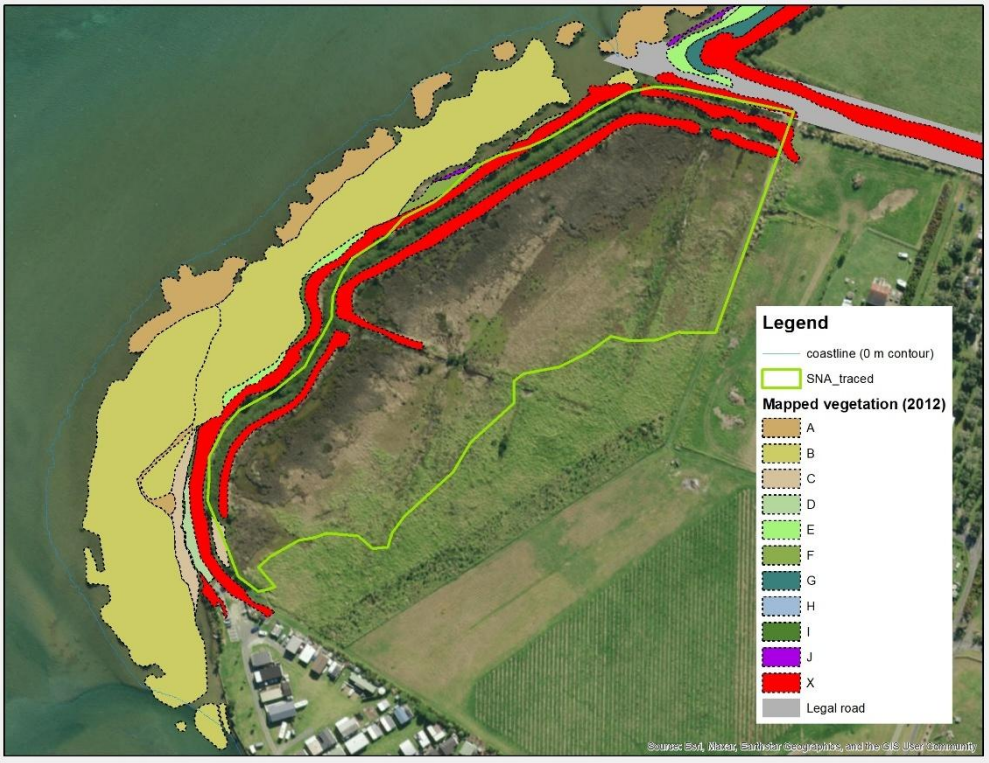

Figure 1. Vegetation predominantly on the seaward side of the saltmarsh SNA.[4]

25. Photographs I took during the January 2026 visit are attached as Appendix 2.2, and show that the eastern end of the Saltmarsh SNA is a mosaic of sea rush (*Juncus kraussii* subsp. *australiensis*) reedland, and sedgeland of Cyperaceous

[4] Key: A = scattered mangrove over open water; B = mangrove shrubland; C oioi (*Apodasmia similis*)–sea rush (*Juncus kraussii* subsp. *australiensis*)–scattered mangrove reedland; D = oioi reedland; E = oioi-sea rush reedland; F = oioi–*Machaerina juncea*–*Austrostipa stipoides* reedland; G = oioi–*M. juncea*–*Machaerina articulata* reedland; H = *M. juncea* reedland; I = *Schoenoplectus tabernaemontani* reedland; J = sea primrose (*Samolus repens*)–remuremu (*Goodenia radicans*) herbfield coastal turf; X = dense pampas grass tussockland on stop-bank (red).

species[5]; interspersed with a herbfield comprising bachelor's button (*Cotula coronopifolia*), remuremu (*Goodenia radicans*), and sea primrose (*Samolus repens*); and a backdrop of pampas grass (*Cortaderia selloana*) with occasional emergent, planted pōhutukawa (*Metrosideros excelsa*)[6] on higher elevations, such as on the stop-bank. Mangrove treeland appears to be present along drains. The western end of the Saltmarsh SNA has taller vegetation, grading from a highly saline wetland of mangrove shrubland in the drain and sea rush reedland, to sedgeland of Cyperaceous species, through to brackish wetland comprising *Schoenoplectus tabernaemontani* reedland. Beyond this is rank paddock comprising tall fescue (*Lolium arundanaceum* subsp. *arundanaceum*) and kikuyu (*Cenchrus clandestinus*) grassland.[7]

26. I developed a 10 cm contour interval for the Saltmarsh SNA and used this to plot flow paths (Figure 2) within the wetland. This, in conjunction with confirmation of those flow paths in the field undertaken during the 19 January visit, identified importance of the break in the stop-bank at the western end of Raymond Bull Road for maintaining the saltmarsh.

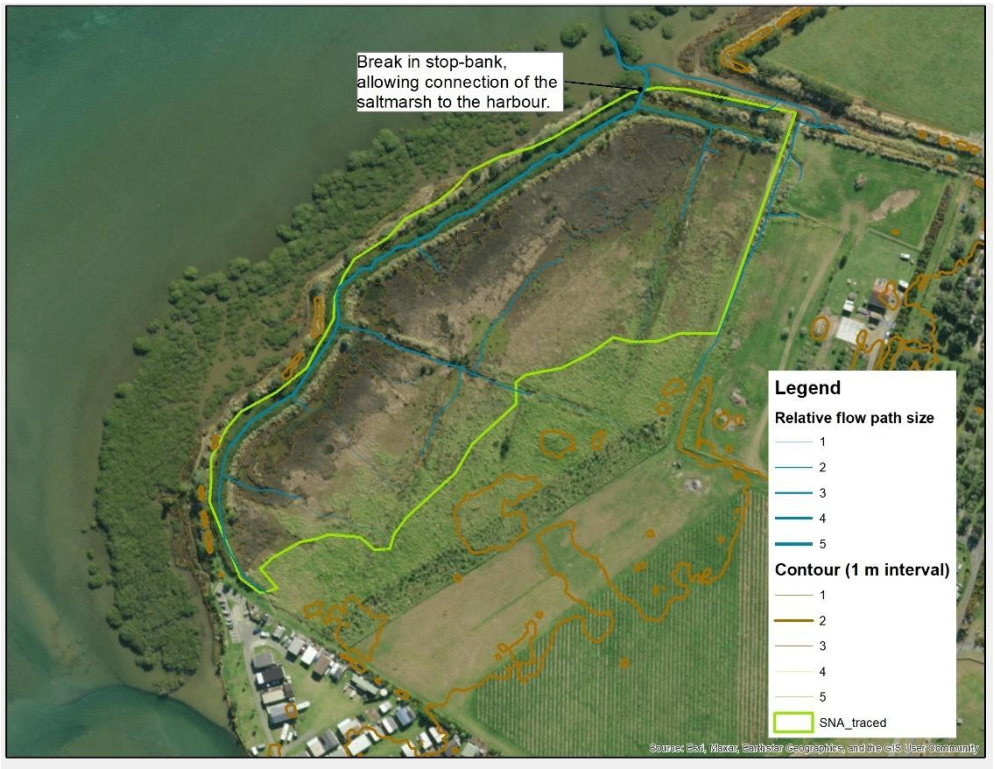

Figure 2. Hydrological connections and flow-paths between the saltmarsh and the harbour.

[5] Unable to determine further, due to access restrictions.
[6] And Kermadec pōhutukawa (*Metrosideros kermadecensis*).
[7] This area was not visited, due to access restrictions, and so may contain additional species.

27. The 2012 assessment indicates that the area of mangrove treeland in the Black Swamp SNA has been reduced in size (Figure 3), with two areas of mangroves on the seaward side of Black Swamp Road having been removed (Figure 4).

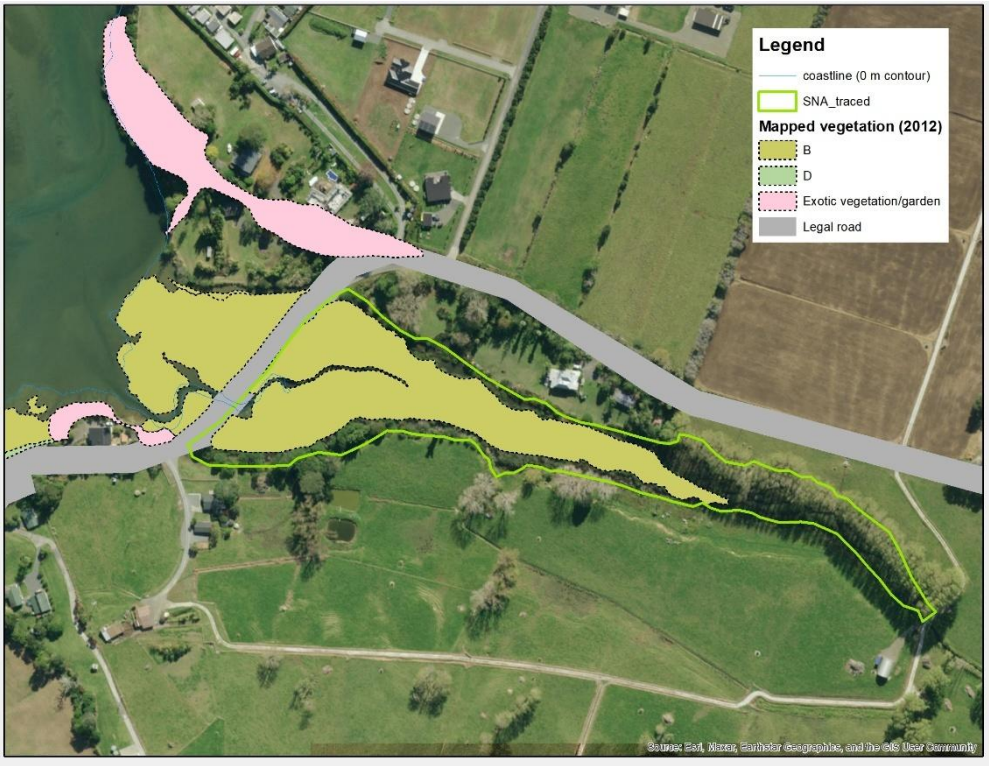

Figure 3. Extent of mangrove shrubland in Black Swamp SNA in 2012, showing mangroves on the seaward side of Black Swamp Road[8].

[8] Key: B = mangrove shrubland; D = oioi reedland.

Figure 4. Current-day extent of mangrove shrubland in Black Swamp SNA.

28. In 2012, I recorded the presence of a Threatened–Nationally Vulnerable (de Lange et al. 2018)[9] lichen – *Ramalina pacifica* – on the mangroves in Black Swamp SNA. Although the lichen's habitat is now much reduced, it may still be present there. (I did see two examples of this lichen on mangroves on the southern shoreline on 19 January 2026, so it is still present in the wider area).

Effects on indigenous vegetation and flora

29. Although an induced wetland,[10] the vegetation types present on the Saltmarsh SNA meet the criteria for ecological significance provided in Appendix 5 of the Northland RPS.[11] It is representative of vegetation types that would have been present in *c.* 1840; it contains wetland vegetation elements (saltmarsh) >0.5 ha in area; and it contributes to important linkages or networks between marine and terrestrial ecosystems.

[9] de Lange, P.; Blanchon, D.; Knight, A.; Elix, J.; Lücking, R.; Frogley, K.; Harris, A.; Cooper, J.; Rolfe, J. 2018: Conservation status of New Zealand indigenous lichens and lichenicolous fungi, 2018. *New Zealand Threat Classification Series 27*. Department of Conservation, Wellington. 64 p. https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs27entire.pdf.

[10] Induced wetlands are considered to be natural, and are not included in manmade wetlands.

[11] I have used Appendix 5 of the Northland RPS as my reference document because the operative and the proposed Kaipara District plans also reference this document. These criteria are sufficiently similar to the National Policy Statement on Indigenous Biodiversity (NPS-IB) as to be interchangeable for the purposes of this assessment.

30. The Black Swamp SNA would also meet Appendix 5 ecological significance criteria, in that mangrove shrubland is largely indigenous vegetation that is typical of vegetation that existed in *c.* 1840; it possibly supports threatened or at risk species;[12] and it contributes to important linkages or networks between terrestrial and marine ecosystems.

31. In my opinion, recognising the two SNAs (and including them in current planning maps) improves their prospects for protection by giving them the status that they deserve.

32. Furthermore, the changes proposed in Ms O'Connor's [13] positively address concerns around the indigenous vegetation clearance rule (DEV-X-G-R2) as it was proposed in the original document.

33. Clearance of indigenous vegetation in an SNA should only be allowed for very specific circumstances, such as where it may cause harm to people or infrastructure. Therefore, removing the exemption for allowing indigenous vegetation clearance where the area of vegetation is <50 m² and height is <3 m is appropriate because saltmarsh vegetation (and any turfs associated with it) is typically low-statured, and often occurs in small parches. The approximate area of the Saltmarsh SNA is 4 ha, which is well in excess of 50 m².

34. The reduction of the permitted width of vegetation clearance for fences (including new fences) around SNAs from 3.5 m to 1 m, is also appropriate because of the low stature of saltmarsh vegetation. Even better, would be to place any fences or walking tracks outside the SNA because this would provide buffering, rather than causing further loss.

35. In my opinion, the two SNAs are currently undervalued. My understanding is that the Saltmarsh SNA is part of a larger conservation covenant[14] that overlies the northeastern part of the property, and abuts (and in some parts, overlaps) the esplanade reserve on the southern side of Mangawhai Harbour. The fact that the proposed SNA is smaller than the conservation covenant, and there is no reference to the covenant being larger than the SNA suggests that it is under-recognised.

36. It is not clear whether the conservation covenant is intended to be replaced by the SNA. If the covenant area were to be reduced to the proposed SNA area, there

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[12] *Ramalina pacifica* – Threatened–Nationally Vulnerable; and banded rail [*Gallirallus philippensis assimilis*; At Risk–Declining (Robertson et al 2021)] (EIC of Dr Beauchamp).
[13] Refer paragraph 19.e.ii above.
[14] Area "E" on DP 565865.

would be a potential loss in ecological value because of the loss of buffering currently offered by the tall fescue grassland (although as I mention in paragraph 46, tall fescue has its own negative effects).

37. If the covenant conditions were to be fully enacted, restoration planting would be undertaken over the *c.* 1.5 ha area outside the SNA (but still within the covenant boundary), and to be effective, this would require control of tall fescue and other weeds. This would in turn result in a better buffered SNA, with ecological gradients forming between indigenous saline, freshwater (and possibly terrestrial) ecosystems, over time.

38. Approximately 35% of Black Swamp SNA (0.784 ha of 2.227 ha) has been cleared, and rubbish is sometimes dumped into it too, which again attributes to the perception of under-recognition of the ecological value of these areas.

Suggested amendments to provisions

39. The following paragraphs provide suggested amendments to the provisions, to better protect the ecological values and attributes of the saltmarsh and Black Swamp SNAs.

40. In addition to the proposed provisions, maintaining hydrological connection to the sea is highly important for the longevity of the SNA's ecological values. The Saltmarsh SNA is an induced wetland resulting from the failure of the stop-bank at the western end of Raymond Bull Road, allowing saltwater to intrude during high tide. It is therefore important to ensure that this 'leakage' continues. If this break in the stop-bank were repaired or filled in, it is likely that this SNA would transition towards either a swamp wetland type or rank pasture, and its ecological value as a saltmarsh would be lost.

41. In my opinion, the rationale for the placement of the Saltmarsh SNA boundaries where they are is defined by the assessment of satellite imagery of vegetation present but requires further clarification. The whole area is uniformly low-lying (Figure 5) and would likely be defined as a wetland if Wetland Delineation[15] were undertaken.

42. Furthermore, the lower floodplain (approximately below the 2 m contour, Figure 4), on which the Saltmarsh SNA sits, is presumably unsuitable for safe housing

[15] Wetland Delineation (Clarkson 2013) is a methodology that uses vegetation type, soil type and hydrology to determine wetland extent: Clarkson, B.R. 2013: A vegetation tool for wetland delineation in New Zealand. *Landcare Research Manaaki Whenua contract report LC1793*. 70 pp.

development without compromising the ecological value of the SNA by repairing the stop-bank.

Figure 5. The saltmarsh SNA with 1-metre interval contours.

43. In my opinion, a more logical extent for the boundary from a reserve design point of view, would be to include all land seaward of the 2 m contour (the dashed yellow line, Figure 6), because this would be a reasonably defendable ecological boundary between wetland and terrestrial environments.[16] (However, it would mean the inclusion of approximately 3 hectares of vegetation that would not meet Appendix 5 criteria as a buffer, i.e., the area of tall fescue grassland, the restoration planting, and some of the cropping land outside Area "E").

44. From a practical point of view, it may make more sense to define the boundary as running from the fenceline at the end of Raymond Bull Road to Riverside Holiday Park, including the area of restoration planting, i.e., the area of the conservation covenant vested with the Kaipara District Council, (Area "E", inside the solid yellow line, Figure 6). This would mean the inclusion of an additional approximately 1.5 ha (of tall fescue and restoration planting, which would not meet Appendix 5 criteria), but would be a buffer that could be restored over time.

[16] I note that the Council flood hazard maps are even more conservative and approximately follow the 4 metre contour.

Figure 6. Alternative boundaries that would improve the ecological integrity of the SNA. (Dashed yellow line = approximate 2 metre contour, and solid yellow line = fenceline outside the existing restoration planting.) (Note that polygons have been drawn as they were shown in the underlying documents, i.e. overlaps and slices are deliberate).

45. Inclusion of an additional walking track may have minor negative effects on saltmarsh vegetation, in that increased foot traffic will cause some increased disturbance to the saltmarsh. There is rudimentary walking access outside the esplanade reserve (on the southern shoreline of the harbour), and it is unclear whether an additional walking track through this area would add any benefit. If one were to be included, it would be best placed on the landward side of the SNA, below the 2 m contour, as this would have minimal impact.

46. Several exotic species are present throughout the Saltmarsh SNA, including pampas grass, saltwater paspalum (*Paspalum urvillei*), casuarina (*Casuarina cunninghamiana*) and tall fescue (*Lolium arundanaceum* subsp. *arundanaceum*), and carefully considered on-going weed control that does not impinge on the natural values present should be introduced to improve its naturalness. The presence of tall fescue is a concern because it is a vigorous grass that is tolerant of wide range of conditions (including wet, dry and brackish conditions), and it out competes native species, meaning that natural regeneration will be very slow or absent.

47. The area of indigenous vegetation (mangrove shrubland) in Black Swamp SNA is now relatively small and bounded by roading infrastructure and development. Therefore, it is desirable that walking tracks and fences be placed outside the SNA

boundary to preserve the amount of indigenous vegetation remaining and provide some form of buffering (by providing some distance between it and any new infrastructure).

Conclusion

48. Overall, the amended provisions being sought through the PPC85 and subsequent documents are likely to provide marginally better protection for the areas of indigenous flora and vegetation than the current situation, because it raises their status by bringing them into contemporary plans. However, the Saltmarsh SNA appears to already be covered by a Reserves Act 1977 conservation covenant that is larger than the proposed SNA area. If the area of protected land were to be reduced to match the proposed SNA area, opportunities for restoration and a loss in ecological buffering would result.

49. It is important that any planning provisions consider the hydrological connections between the SNAs and the sea and placement of any infrastructure on the inland side of the SNA. Loss of the connection to the harbour (e.g., by repairing the stop-bank on the southern shoreline of Mangawhai Harbour) will have significant negative effects on the ecological values present.

50. Placement of any infrastructure (fences, walking tracks) also requires careful consideration. The areas of indigenous vegetation are relatively small and cannot afford further loss by placing infrastructure within them.

Andrew James Townsend

DATED 30 January 2026

Appendix 1: Ecological assessment of areas proposed for mangrove removal in Mangawhai Harbour

Andrew Townsend, February 2012

Note: mangroves produce false annual growth rings and so do not provide an accurate estimate of tree age. However, their trunk diameter still provides a general estimate of age in that larger diameter trees have required more time to reach their size.

Summary

Throughout January and February 2012, I carried out an ecological investigation of the vegetation in Mangawhai Harbour, specifically the areas below the causeways, which are proposed for mangrove clearance. These are: Lincoln Street Reserve (A); Hideaway/Moir Street to Molesworth Drive causeway (B); Sand/Mangrove Island (C); Insley Street causeway (D) and Black Swamp Creek (D); Back Bay Jetty to Molesworth Drive Causeway (E); Southern Shoreline/"Riverside Holiday Park – Tern Point" (F); and Kainui Street Arm (G), and the order in which they are presented in this report, is in that visited. Location of sites and GPS waypoints are presented in DOCDM-916188 (Appendix 1.2) and attached below.

The assessment comprised describing the vegetation types present at each of these localities, identifying any "At Risk" or "Threatened" species (as defined in Townsend et al 2008) present, and assessing the likely effects of clearing mangroves from the site.

Scientific names used in the text follow the convention used by the New Zealand Plant Conservation Network (www.nzpcn.org.nz), which is the currently accepted standard. Vegetation structural form is adapted from Atkinson (1991) in that their terminology is largely used; however scrub has other vernacular meanings to New Zealanders and so is referred to in this text as shrubland. Mangroves form three distinct vegetation structures:

- Treeland: "Vegetation in which the cover of trees in the canopy is 20-80%, with tree cover exceeding that of any other growth form, and in which the trees form a discontinuous upper canopy above either a lower canopy of predominantly non-woody vegetation or bare ground.
- Shrubland: "Vegetation in which the cover of shrubs in the canopy is 20-80% and in which the shrub cover exceeds that of any other

growth form or bare ground." Scrub is defined as "where woody vegetation in which the cover of shrubs and trees in the canopy is >80% and in which shrub cover exceeds that of trees (c.f. forest). Shrubs are woody plants <10 cm d.b.h.".

- Rather than a true forest (where trees have a d.b.h. in excess of 10 cm), mangroves tend to form a tree-shrubland, defined as: vegetation in which the cover of trees in the canopy is >80%, with tree or cover exceeding that of any other growth form, and in which the trees form a discontinuous upper canopy above a lower canopy of shrubs.

Lincoln Street Reserve (A)
16 January 2012

Salt-marsh sedgeland, dominated by oioi, sea rush (*Juncus kraussii* subsp. *australiensis*) and *Machaerina juncea* occurs at Lincoln Street Reserve. This salt-marsh sedgeland is relatively diverse with *Austrostipa stipoides*, *Machaerina arthrophylla* and patches of sea primrose (*Samolus repens*) and glasswort (*Sarcocornia quinqueflora* subsp. *quinqueflora*) herbfield and young mangrove (*Avicennia marina* subsp. *australasica*) being locally common. Salt-marsh ribbonwood (*Plagianthus divaricatus*), harakeke (*Phormium tenax*), pohuehue (*Muehlenbeckia complexa*) and *Olearia solandri* are scattered throughout, although the latter two usually at the rear of the salt-marsh where salt inundation is experienced least often (photo 9348). *Olearia solandri* is considered to be regionally significant in Northland Conservancy because it has a very localised distribution in Northland and occupies a threatened (dune) habitat. Weeds such as pampas grass (*Cortaderia selloana*), gorse (*Ulex europaeus*), Sydney golden wattle (*Acacia longifolia*), boneseed (*Chrysanthemoides monilifera* subsp. *monilifera*), *Banksia integrifolia* and South African iceplant (*Carpobrotus edulis*) are also locally common. This area is bisected by a track, which has had vehicles driving along it in the past, and also by several drains, and it appears to be along these, that mangroves appear to be advancing.

On the outer edge of the salt-marsh, a mangrove tree-shrubland mosaic with oioi (*Apodasmia similis*) salt-marsh sedgeland (photo 9349) exists, which has been modified through human activity. Some large trees are present, although others have been cut down (photo 9354) and tracks cleared. One tree measured at 10 cm diameter had an estimated age of at least 46 years old (photo 9355) and other stumps with a 5 cm diameter were 30 years old. Scattered pockets of oioi sedgeland also occur on the outer edge and amongst this vegetation type (photo 9337).

To the north of the salt-marsh sedgeland is a sandfield with scattered pingao (*Ficinia spiralis*), spinifex (*Spinifex sericeus*), shore bindweed (*Calystegia soldanella*), hare's tail (*Lagurus ovatus*) and buffalo grass (*Stenotaphrum secundatum*). Pingao is listed by de Lange et al. (2009) as

“At Risk/Relict”. A scattered mangrove treeland and a small sea primrose herbfield occurs on the outer edge of this vegetation type (photo 9339).

At the southern end of the salt-marsh, the mangrove fringe appears to have been removed, and there is erosion of the peaty base on which the salt-marsh has formed (photo 9631). A small turf of *Selleria radicans*, with *A. stipoides* and buffalo grass has colonised the upper surface of this erosion, but this appears to be insufficient to halt the erosion. In other places, where the beach profile is lower, mangroves are re-colonising the oioi salt-marsh sedgeland.

The advance of mangroves at Lincoln Street Reserve appears to be the result of human-induced disturbance. Where drains have been dug, or tracks put in, mangroves are able to colonise during high tides that allow the relatively large mangrove seed to float up these cleared areas and establish (photo 9345) in the salt-marsh. Furthermore, the removal of mangroves appears to be accelerating the demise of the salt-marsh as it allowing wave action to erode this habitat.

Photo 9348: Lincoln Street salt-marsh with *Austrostipa stipoides* (in the foreground), oioi and sea rush amongst scattered mangroves (middle) and a margin of *Olearia solandri*, pohuehue, harakeke and ?*Coprosma propinqua* on the landward edge.

Photo 9349: Lincoln Street salt-marsh and fringing mangrove tree-shrubland. Oioi sedgeland is on the left, with small mangroves in the centre. The area in the middle has been artificially cleared of mangroves, and propagules are dispersing along this and the track from which the photo was taken and re-colonising these areas.

Photo 9354: Seaward edge of the mangrove tree-shrubland, where some trees have been removed.

Photo 9355: Cut mangrove stump, showing *c.*46 growth rings.

Photo 9337: Seaward side of the mangrove tree-shrubland with scattered patches of oioi sedgeland.

Photo 9339: Pingao, shore bindweed and spinifex sandfield (foreground); sea primrose herbfield (left) and mangrove tree land at the northern side of Lincoln Road Reserve site.

Photo 9631: Erosion of the peaty base on which the salt-marsh has formed (lower left and middle). The small turf (middle left) is dominated by *Selleria radicans*, with *Austrostipa stipoides* and buffalo grass.

Photo 9345: Young mangroves colonising a recently cleared drain through the salt-marsh (centre), with older mangroves along the margins. Mangrove advance appears to be accelerated by disturbance which creates an access point into the salt-marsh. A few, older mangroves are also scattered throughout the salt-marsh.

Back Bay Jetty to Molesworth Road causeway (E&G)[17]
8 February2012

Back Bay comprises a low, wave-cut bank at the back of a built-up area between Molesworth Drive and the true right, lower reaches of Tara Creek, on Mangawhai Estuary.

The bank at the rear of salt-marsh has areas of reasonable indigenous cover but is also quite weedy in places. Vegetation comprises a shrubland of manuka (*Leptospermum scoparium*) and gorse (*Ulex europaeus*) with locally common pampas grass, Sydney golden wattle, tangle fern (*Gleichenia dicarpa*), rarahu (*Pteridium esculentum*) and tree ferns (*Cyathea dealbata* and *C. medullaris*). Where this adjoins the flats, several small fresh-water wetland flushes occur which are dominated by *M. juncea*, tangle fern, harakeke, rarahu, and locally common raupo (*Typha orientalis*). Several plants of swamp blueberry (*Dianella haematica*), ranked as "At Risk/Declining $_{DP}$" (de Lange et al. 2009) were seen in this vegetation type. Swamp blueberry and tangle fern are typical of acidic, peat based ecosystems rather than saline systems, and indicate that a full range of vegetation assemblages from saline to fresh-water wetland are present at this site. Between the bank and the salt-marsh, is a shrub-sedgeland where manuka, *Coprosma propinqua*, harakeke, ti kouka (*Cordyline australis*) and raupo are locally common amongst the sedges *Machaerina articulata* and *M. juncea*. The salt-marsh itself is a sedgeland mosaic of sea rush, *M. juncea* and oioi. Salt-marsh ribbonwood is scattered throughout but usually on areas of slightly higher elevation. On the outer edge, scattered mangrove shrubs occur amongst the salt-marsh, and beyond this is a fringing mangrove tree-shrubland which is dense in places (photo 0545). This appears to be forming a protective barrier between the salt-marsh and the tidal flats on their seaward side.

There has been a long history of human intervention at this site, which is evident through the presence of tracks cut through the salt-marsh and mangrove tree-shrubland (photo 0540) and more recently the shrubland (GPS 750; photo 0546); there is evidence of mangrove removal (photo

[17] This assessment includes salt-marsh and mangrove vegetation south of the jetty, which in the statement of evidence, are deal with as part of Kainui Street Arm.

0542); and drainage ditches dug at several localities (photo 0537). One mangrove on a cut track (GPS 746) with a diameter of approx. 11 cm had *c.*46 complete growth rings present and was estimated to be more than 30 years old. Where drains have been cut through the salt-marsh (GPS 744 & 751), small mangrove plants have established in the salt-marsh.

Photo 0545: Mangrove tree shrubland (left) on the outer edge of the salt-marsh ecotone, with *Plagianthus divaricatus* (foreground and centre) and epiphytic *Usnea rubicunda* and *Usnea* sp., and manuka on a small ridge and more salt-marsh on the inner edge (right). (This location is part of Kainui Street Arm in the Statement of evidence.)

Photo 0540: An old track cleared through the mangrove tree-shrubland.

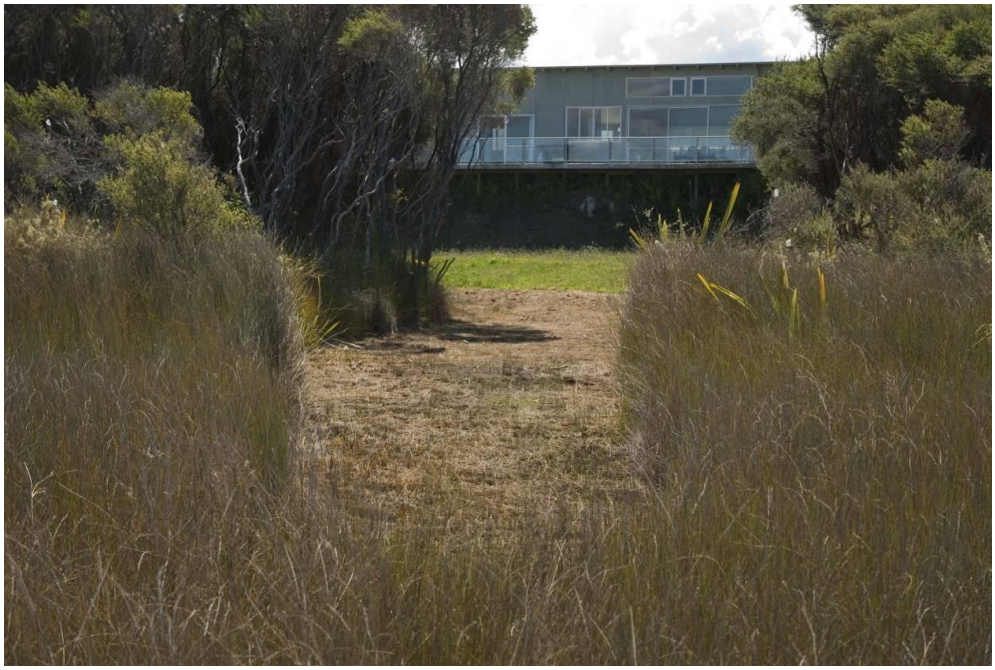

Photo 0546: A track recently cleared through the manuka shrubland and salt-marsh sedgeland. (This location is part of Kainui Street Arm in the Statement of evidence).

Photo 0542: Evidence of long-term human intervention at this site: mangrove stumps in an area where mangroves have been removed from near the jetty.

Photo 0537: Drainage ditch cut through the salt-marsh sedgeland.

Kainui Street Arm (G)
13 February 2012 and 17 February 2012

Kainui Street Arm comprises areas of tall mangrove tree-shrubland (GPS/photo 800/0672); treeland interspersed with colonising saplings (GPS/photo 799, 803/0669, 805/0674); and shrubland (GPS 807) on sand- and mud-flats; and a small bank of pōhutukawa (*Metrosideros excelsa*) treeland with a very weedy understory (GPS 779). A relatively diverse lichen flora was also present.

A narrow band of salt-marsh plants are present along the western boundary of the site (GPS 806). These include oioi, sea primrose, salt-marsh ribbonwood and *S. repens*. On the whole there was not a lot of available habitat for these species, as beyond them was scrubby forest of maritime pine, Sydney golden wattle and maritime pine with some mamaku, harakeke, tangle fern, *M. juncea* and kiokio (*Blechnum novaezelandiae*) present. These latter species indicate that although it is quite weedy, a full sequence of vegetation from saline to fresh-water is present. On the south-eastern margin of the site, scattered examples of salt-marsh were present along the high tide line between the pōhutukawa treeland and the mangrove tree-shrubland.

A discussion was entered into with a local resident on 13 February, who said that he does not like mangroves and admitted to cutting larger trees and pulling out smaller seedlings and saplings. On 17 February., consistent with this, several areas of mangrove stumps were observed (GPS/photo 803, 807/0675, 808/0676, 809/0677). Along the frontage to this person's home (and several others), a boulder retaining wall had been built to minimise the effects of tidal erosion. Where this did not exist and mangroves were absent, erosion was evident.

Photo 0672: Tall mangrove tree-shrubland in Kainui Street Arm where some lichens and bryophytes are present.

Photo 0669: Mangrove treeland interspersed with colonising mangrove saplings in Kainui Street Arm.

Photo 0674: Mangrove treeland interspersed with colonising mangrove saplings in Kainui Street Arm.

Photo 0675: Mangrove treeland and cut mangrove stumps in Kainui Street Arm.

Photo 0676: Mangrove stumps in Kainui Street Arm.

Photo 0677: Recently cut mangroves and stumps in Kainui Street Arm.

Mangrove covered intertidal bank (Sand Island) (C)
17 February 2012

Sand Island was visited for several minutes on an incoming tide and therefore has had only a brief exploration. It comprises areas of mud; colonising, sapling mangrove shrubland (with plants generally under 75 cm tall); established mangrove shrubland (with plants generally over 1 m tall); tall mangrove tree-shrubland; and mangrove treeland; (photo 0648). Some of the larger trees seen had a diameter of at least 30 cm. Lichen diversity was relatively high (photos 0641, 0643 & 0645), and included *Xanthoria parietina*, *Parmotrema reticulatum*, *Usnea rubicunda*, *Usnea* sp., *Ramalina peruviana*, *Physcia* sp. and several species in the family Parmeliaceae (as determined by Dr. P.J. de Lange, pers. comm. 2012, from photographs sent to him). Peter also determined two bryophytes: *Fissidens* sp. and *Siphonolejeunea nudipes*.

Photo 0648: Colonising sapling mangrove shrubland (foreground), and mangrove tree-shrubland and mangrove treeland (background) on Sand Island.

Photo 641: *Xanthoria parietina* (yellow) and a species of lichen in the family Parmeliaceae at Sand Island mangrove tree-shrubland.

Photo 0643: More species of lichen including *Parmotrema reticulatum*, *Usnea* sp., *Ramalina peruviana* and *Physcia* sp. at Sand Island mangrove tree-shrubland.

Photo 0645: Several species of lichen in the family Parmeliaceae, *Usnea rubicunda*, *Usnea* sp. and *Ramalina* sp. on Sand Island.

Insley Street Causeway (D1)
8 February 2012 and 13 February 2012

Insley Street Causeway site comprises several sparse-to-dense mangrove tree-shrublands on sand- and mud-flats on the downstream side of the causeway. Mangrove tree-shrubland occurs on both sides of the causeway, and mangrove was the only substantial native component in the landscape, i.e., of the 36 plant species recorded 29 were exotic and most of these were along the roadside.

A channel of Bob's Creek runs between the causeway and two of the mangrove tree-shrublands (GPS 792-796). These 'islands' are vegetated by a mangrove tree-shrubland, and have a reasonable lichen diversity (photos 0635 & 0636). At the northern end of these islands (GPS 794 & 795), mangrove shrubland and mangrove treeland occur, and intervening spaces are occupied by mud and Pacific oyster beds (photo 0634). Around the margin of these islands, dense mangrove tree-shrubland occurs – especially on the inner side – and some of these have been cut down. One had a diameter of 10 cm and was therefore estimated to be around 30 years old, but as its centre had rotted out, this could not be confirmed through ring counts.

Several small sedgelands abutting Insley Street Causeway site: Several small pockets of oioi sedgeland occur along the true left bank of Bob Creek, north of Insley Street Causeway. One of these (GPS 752) has several mangroves establishing on the seaward edge of the salt-marsh (photo 0548). The presence of the mangrove plants has caused sand and silt build-up (to approx. 10-20 cm above the surrounding substrate) amongst the pneumatophores. Less than 20 metres to the north (GPS 753), mangroves have been removed, and the salt-marsh is retreating and degraded (photo 0551 & 0552). Further down-stream (GPS 754) is a small pocket of oioi sedgeland, which is showing signs of eroding. Young mangroves are establishing into the open root-mass (photo 0558) amongst this. No evidence of mangroves having been removed (stumps) from this vegetation could be found.

These pockets of salt-marsh sedgeland occur on an outer bend of the creek, and are therefore subject to faster tidal flows than they would be if

they were on an inside bend. The evident erosion may be linked to this but where mangroves are present amongst the salt-marsh, the substrate was accreting rather than eroding. By contrast, where mangroves had been removed (or were absent), the salt-marsh to appears to be retreating.

Photo 0636: An assemblage of several lichen species including Usnea spp. and Ramalina spp. epiphytic on mangrove on one of the ‘islands’ at Insley Street causeway.

Photo 0635:Lichens seen on mangrove ‘island’ at Isnley Street causeway: *Ramalina celastri* (upright in centre of photo), *Xanthoria parietina* (yellow) and *Usnea* spp.

Photo 0634: Mangrove shrubland and Pacific oyster beds on one of the mangrove ‘islands’ at Insley Street causeway.

Photo 0548: Healthy salt-marsh with protective mangroves present. Note sand build-up amongst pneumatophores (right).

Photo 05558: Young mangroves establishing amongst eroded oioi salt-marsh sedgeland.

Photo 0551: Mangrove stumps (upper right) where mangroves have been removed and degraded, dead oioi salt-marsh sedgeland.

Photo 0552: Dead oioi in-front of an area where mangroves have been removed.

Molesworth Drive to Moir Point (B)
13 February 2012

Between Moir Point and Molesworth Drive Causeway are several areas of mangrove tree-shrubland, salt-marsh sedgeland and zostera herbfield.

At the far eastern end of Moir Point (GPS 755), a narrow band of pōhutukawa forest with an understory primarily of houpara (*Pseudopanax lessonii*) on a low sandstone bluff over a wave-cut sandstone pavement exists. This runs around the headland and is contiguous with a band of zonated salt-marsh sedgeland and fresh-water wetland which runs along the beach towards the Holiday Park. On the beach is a sedgeland of oioi and *M. juncea* with occasional mangrove (GPS 756), and behind this is a shrub-sedgeland of salt-marsh ribbonwood, oioi and *M. juncea* with occasional wiwi (*Ficinia nodosa*), pohuehue, rarahu and harakeke, where seawater inundation is less frequent (photo 0559). Behind this is a small area of raupo wetland, *Cyperus ustulatus* sedgeland and pink bindweed (*Calystegia sepium* subsp. *roseata*) herbfield on a terrace tread, which is unfortunately degraded by gorse, Sydney golden wattle and buffalo grass.

Further west, these assemblages on the terrace tread become increasingly weedy, with the appearance of brush wattle (*Paraserianthes lophantha*), Dally pine (*Psoralea pinnata*), pampas grass, Japanese honeysuckle (*Lonicera japonica*), gorse, maritime pine, giant reed (*Arundo donax*) and montbretia (*Crocosmia* ×*crocosmiiflora*) (GPS 757). A narrow and intermittent band of oioi and *M. juncea* salt-marsh sedgeland, with occasional mangroves still exists along the shoreline. Where mangroves are present this appears to be healthy (GPS/photo 757/0563) but where they are absent it appears to be eroding (GPS/photo 757/0562. Both these photos were taken from the same point, but at 90° to each other.)

East of Hideaway Holiday Park is a small area of scrub with some native plants present, which indicate that the terrace was once an acidic peat wetland as a few plants of swamp blueberry and *Lepidosperma laterale* – both characteristic of low-fertility soils – are present (photo 0568). In front of the Holiday Park (GPS 759, 760) and the adjacent properties to the west (GPS 761), mangroves have been essentially completely removed – bar one adult (photo 0569) and the terrace developed. This section comprises

a steep bank, eroded to the root zones of the radiata pines (*Pinus radiata*) and macrocarpas (*Cupressus macrocarpa*) growing along the top of it. This area is highly modified and mostly mown grass. A few plants were seen along the bank at the water's edge, including karo (*Pittosporum crassifolium*), swamp blueberry (GPS 761), mingimingi (*Leucopogon fasciculatus*), wiwi and glasswort. Also the exotic plants peppermint geranium (*Pelargonium tomentosum*), cape honeysuckle (*Tecomaria capensis*), brush wattle and kikuyu grass (*Pennisetum clandestinum*) are present.

At GPS point 762, very sparsely scattered mangroves are colonising the mud-flat but there is no salt-marsh along the shoreline. Further north (GPS 763), larger sapling mangroves to approx. 50 cm tall are scattered over the mud-flat east of a small drain and appear to be re-colonising, as there are several mangrove stumps present. There is a small zostera herbfield between the scattered mangrove shrubland and a narrow band of oioi salt-marsh sedgeland and saltwater paspalum (*Paspalum vaginatum*) grassland, with a few sapling mangroves amongst them (photos 0571 & 0573). Behind this is a radiata pine, pōhutukawa and manuka shrubland. From this point (GPS 763) back to Molesworth Drive, the vegetation becomes increasingly natural with small copses of mangrove tree-shrubland (GPS 766, 767, 769, 774, 775 & 776), sea rush (*Juncus kraussii* var. *australiensis*) tussockland and oioi salt-marsh sedgeland (765, 771, 774 & 775; photo 0581), *Bolboschoenus fluviatilis* sedgeland, and saltwater paspalum grassland. Between GPS 774 and 775, small mangroves are re-colonising the mud-flat and have intact, relatively natural vegetation sequences behind them. These comprise sea primrose and *S. radicans* herbfield between the mangroves and the beach, thence salt-marsh sedgeland of oioi, sea rush, salt-marsh ribbonwood, pampas grass, and *M. juncea* to about the high tide mark, and a manuka shrubland over an understory of predominately of *M. juncea* and tangle fern with pampas grass, narrow-leaved kanuka, *M. arthrophylla* and *M. articulata* present. Oioi sedgeland and mangroves are also present on the edges of a watercourse that runs along the back of the beach. Within the area of interest in Mangawhai Harbour, this area has the most intact vegetation sequences from saline to fresh-water, peat wetland (photo 0595).

Erosion appears to be a problem for residents along this coastline as structures have been erected to attempt to minimise its effects (GPS/photo 772/0582). At GPS 773, eroding peat is evident (photo 0585) where waves are eroding not only the top-most layer, but also a second, underlying (and therefore older) horizon. This indicates that the current shoreline has been relatively stable, with peat-forming vegetation present here for a relatively long period. No attempt was made to age these soil layers but it is possible that they relate to the last several hundred years.

Along the side of the causeway, the in-coming tidal current was relatively swift. The presence of mangroves here is assisting with protecting the causeway from erosion (GPS 776). Above the shoreline near the causeway, is a weedy wasteland.

Photo 0559: Mangrove shrubs amongst healthy sedgeland at the eastern end of Moir Point site. Also visible in the photograph is oioi, wiwi, slat-marsh ribbonwood, and harakeke.

Photo 0563: Healthy salt-marsh with mangroves present.

Photo 0562: Eroding salt-marsh at the same location as 0563, without any mangroves present.

Photo 0568: Swamp blueberry (*Dianella haematica*) on a bank that has eroded back to a line of established trees. Also present is scrambling asparagus (*Asparagus scandens*), coral tree (*Erythrina ×sykesii*), Sydney golden wattle, pampas grass and red mapou (*Myrsine australis*).

Photo 0569: Single mangrove tree near the Holiday Park. The tidal margin comprises a steep, eroded bank art the base of the pine trees.

Photo 0573: Mangrove stump, eroding saltwater paspalum grassland with oioi and *Bolboschoenus fluviatilis* sedgelands behind.

Photo 0571: Colonising sapling mangroves with a small zostera herbfield on mud-flat, oioi sedgeland on the margin and a shrubland with pohutukawa, manuka and narrow-leaved kanuka and radiata pine behind. Both these photos are in close proximity to each other.

Photo 0581: Natural vegetation Between Moir Point and Molesworth Drive cauesway. Scattered mangrove copses with salt-marsh vegetation comprising sea rush tussockland and oioi sedgeland on the tidal margin and *Machaerina juncea* behind. Beyond this is a manuka shrubland with an understory predominantly of *M. juncea* in a largely fresh-water environment.

Photo 0582: Retaining walls erected to minimise effects of tidal erosion, which is evident on the edges of the small bank in beyond the wall. Note salt-marsh and largely indigenous shrubland in the background.

Photo 0585: Layers of eroding peat, that indicate that this shoreline has been stable for a relatively long period.

Photo 0595: Relatively natural vegetation near Molesworth Drive causeway, where sequences from mangrove (removed but re-colonising) to salt-marsh, to indigenous shrubland occur.

Black Swamp (D2)
13 February 2012

Black Swamp site is a dense mangrove tree-shrubland on sand- and mud-flats in the mouth of Black Swamp Creek. The site extends up as far as the causeway but mangrove tree-shrubland extends further up the catchment than this. The mangrove tree-shrubland in the site is relatively open (GPS/photo 783/0613) and supports a wide range of epiphytic lichen species (e.g. photos 0609, 0615 & 0623). These include *Usnea rubicunda*, *Usnea* sp., *Teleoschistes chrysophthalmus*, *Pseudocyphellaria aurata*, *Dirinaria* sp., several species of Parmeliaceae and *Ramalina peruviana*, *Ramalina celastri*, *Ramalina pacifica*, (as determined by Dr. P.J. de Lange, pers. comm., 2012). *R. pacifica* has a listing of "Threatened/Nationally Endangered" and *T. chrysophthalmus* is "Not Threatened" in New Zealand but is threatened overseas (de Lange *et al.*, in sub., 2012). Peter commented that *R. pacifica* has declined rapidly from the northern part of New Zealand and was commonly found on mangroves but has declined markedly from much of the Auckland Region since 1993 (Dr. P.J. de Lange, pers. comm. 2012). It was relatively common in Black Swamp mangrove tree-shrubland. Along the northern margin, is a very narrow, intermittent band of salt-marsh. Vegetation is dominated by buffalo grass, but occasional salt-marsh ribbonwood, wiwi, sea rush and oioi (GPS 783) also occur. Glasswort, sea primrose and oioi form an understory under the mangrove tree-shrubland at GPS 784 (photo 0617). This was also the only area seen where an understory of species other than mangrove has developed under a mangrove tree-shrubland on Mangawhai Harbour.

On the seaward side of the tree shrubland, young mangroves have colonised an area of mud-flat (GPS 781), and south of this, where Black Swamp Creek disgorges onto the mud-flat, is an area of deep, sludgy mud, where mangroves have been removed but are re-colonising. Saplings to about 70 cm tall were seen here. To the east of this (at GPS 787) is an area of wave-cut sandstone pavement overlain and in-filled in cracks by squashy mud where mangroves are colonising (photo 0624). This extends to Insley Street causeway, where there are also patches of mangrove tree-shrubland (GPS 789) and evidence of mangroves having been pulled up (GPS 789; photo 0628) and cut (GPS 790; photo 0629).

A narrow band of oioi salt-marsh sedgeland with occasional mangroves and saltwater paspalum extends between the road and the mud-flat (GPS 777). This area is quite weedy, with pampas grass, agapanthus (*Agapanthus praecox*), Dally pine, Japanese honeysuckle, monkeyapple (*Acmena smithii*), canna lily (*Canna ×generalis*) and orache (*Atriplex prostrata*) present.

On the outer edge of the pavement, is a small area of mangrove tree-shrubland (GPS 791) with trees up to 6 m tall.

Photo 0613: Black Swamp mangrove tree-shrubland.

Photo 0617: Black Swamp mangrove tree-shrubland, where an understory of glasswort and oioi has developed.

Photo 0609: Black Swamp lichens: *Usnea rubicunda*, *Usnea* sp, and several species of Parmeliaceae.

Photo 0615: *Ramalina pacifica* – a Nationally Endangered lichen seen in Black Swamp.

Photo 0623: BGlack Swamp lichens: *Pseudocyplellaria aurata* (green-yellow), *Ramalina peruviana* (small, spiky) and a species of Parmeliaceae.

Photo 0624: Mangrove shrubland over sandstone pavement between Black Swamp and Insley Street Causeway.

Photo 0628: Pulled up mangrove between Black Swamp and Insley Street Causeway.

Photo 0629: Cut mangroves between Black Swamp and Insley Street Causeway.

Southern Shoreline (F)
21 February 2012

The site comprises a 2 km long band of mangrove and salt-marsh vegetation up to 100 m wide along the southern side of Mangawhai Harbour from Riverside Holiday Park. The landward side of the site is bounded by a stop-bank along most of its length.

Several drains with tide gates on them have been installed through the stop-bank and the top has been planted with pōhutukawa . On the landward side of this is an area of reclaimed land which has been varyingly re-colonised by salt-marsh and mangroves or is in production. These areas were not investigated.

At the upper end of the site (GPS 810) scattered mangrove seedlings appear to be colonising a sand-flat amongst a Pacific oyster bed, and closer to the shoreline (GPS 811) a mangrove treeland occurs, which extends up to the shoreline. This area has a good lichen diversity with *R. pacifica*, *R. celastrii*, *U. rubicunda*, *U.* sp., *T. chrysophthalmus*, *X. parietina*, *P. aurata* and several species of Parmeliaceae seen. Slightly further toward the harbour mouth (GPS 816), the mangroves have been thinned, creating an artificial mangrove shrubland, but not being removed completely.

Along the shoreline, a track which extends throughout most of the site has been cleared between the mangroves and salt-marsh. On parts of this (GPS 813) a sea primrose, glasswort and *S. radicans* herbfield is locally common amongst a band of oioi and *M. juncea* sedgeland with occasional salt-marsh ribbonwood, sea rush and wiwi which extends back to the stop-bank. Variations on this theme run along the shoreline and track; sometimes becoming weedy (e.g., at GPS 816, where South African iceplant (*Carpobrotus edulis*) and saltwater paspalum are competing with oioi sedgeland), and sometimes having high naturalness (e.g., at GPS 821 where oioi, sea rush and M. *arthrophylla* with occasional glasswort and salt-marsh ribbonwood are the dominant types) (and GPS 817/9792.)

Further toward the harbour mouth, a shrub-tussockland of salt-marsh ribbonwood and sea rush has developed (GPS/photo 822/9797) and becomes a sea rush tussockland beyond GPS 823. Within this

assemblage, glasswort is common, *A. stipoides* is locally common and mangroves are local. The seaward side of the salt-marsh vegetation is bare mud, and mangrove treeland and shrubland.

From around GPS 823, a sand-bank has formed between the mangrove treeland and shrubland on mud-flat and the salt-marsh vegetation (GPS/photo: 824/9798). Vegetation on the sand-bank is dominated in places by glasswort herbfield (GPS/photo 828/9799); South African iceplant herbfield (GPS/photo: 826/9804; 831/9816) with rare pingao; *A. stipoides* tussockland (GPS/photo: 837/9824); sea rush tussockland; oioi sedgeland and mangrove shrubland. Pingao is listed by de Lange et al. (2009) as "At Risk/Relict." The salt-marsh vegetation behind contains similar vegetation types, but more usually sea rush tussockland, oioi sedgeland and mangrove shrubland. The mangrove tree-shrubland on mud-flat, sand-bank and salt-marsh all petre out near where Raymond Bull Road ends. At this point vegetation becomes a wiwi sedgeland, saltwater paspalum grassland on the shoreline and slatwater paspalum grassland with colonising mangrove seedlings (GPS/photo: 838/9829). Beyond this point, scattered seedling mangroves exist on the sand-flat (GPS 840) but these are not likely to establish (GPS/photo 841/9830); salt-marsh vegetation is absent.

Vegetation on the stop-bank comprises planted pōhutukawa over pampas grass, buffalo grass and *M. juncea* (GPS 815) and becomes a more dense pampas grass tussockland with occasional emergent pōhutukawa (GPS 820) in places. Further along, it is dominated by Sydney golden wattle (e.g., GPS 836).

Photo 9792: Track running between mangrove tree-shrubland and salt-marsh vegetation, in this case, sea rush, Austrostipa stipoides and sat-marsh ribbonwood. The stop-bank with planted pohutukawa and pampas grass is visible in the background.

Photo 9797: Sea rush and salt-marsh ribbonwood shrub-tussockland. The vehicle track is on the right and mangrove tree-shrubland is in the background.

Photo 9798: Sand-bank separating Mangrove tree-sharbland (right) and salt-marsh of sea rush tussockland and oioi sedgeland. *Austrostipa stipoides*, wiwi, glasswort and South African iceplant with salt-marsh ribbonwood, are main plants on the sand-bank.

Photo 9799: Glasswort herbfield on the sand bank, with occasional mangroves. The tussock is *A. stipoides* and the tree is sheoak (*Casuarina cuninghamiana*).

Photo 9816: South African iceplant herbfield on the sand bank, with pingao (*Ficina spiralis*) and glasswort. Salt marsh at this point comprises an *Austrostipa stipoides* tussockland interspersed by a glasswort herbfield.

Photo 9824: *Austrostipa stipoides* tussockland with *Selleria radicans* herbfield on sand-bank. The salt-marsh at this point is a mixture of salt-marsh ribbonwood, oioi and *A. stipoides*. Sydney golden wattle is beginning to become common on the stop-bank, behind.

Photo 9829: At the point where the mangrove tree-shrubland ends, the salt-marsh also ends (note rock wall on right). At this point it is dominated by wiwi sedgeland and saltwater paspalum grassland. In the foreground saltwater paspalum grassland also contains seedling mangroves, which may be able to establish.

Photo 9830: Young mangroves attempting to germinate in consolidated sand caused by a vehicle.

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Appendix 1.1. Full list of vascular plants species seen in or near the sites at Mangawhai Harbour in 2012

Footnotes: † denotes adventive species; § denotes regionally significant, At Risk or Threatened species.

Scientific Name			Common Name	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank
Gymnosperms											
	†	*Cupressus macrocarpa*	macrocarpa							1	
	†	*Pinus pinaster*	maritime pine		1			1	1	1	
	†	*Pinus radiata*	radiata pine					1		1	
Lycophytes											
		Lycopodiella cernua							1		
Ferns											
		Adiantum hispidulum							1	1	
		Asplenium flaccidum								1	
		Blechnum novaezelandiae	kiokio					1	1		
		Cyathea dealbata	ponga, silver fern						1		
		Cyathea medullaris	mamaku, black treefern					1	1		
		Dicksonia squarrosa	whekiponga						1		
		Doodia australis							1		
		Gleichenia dicarpa	tangle fern					1	1	1	
		Histiopteris incisa	mata, water fern						1		
	†	*Nephrolepis cordifolia*	tuber sword fern					1			
		Pteridium esculentum	rarahu, brachen				1		1	1	
		Pteris tremula	shaking brake						1		

Scientific Name			Common Name	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank
		Pyrrosia eleagnifolia								1	
Dicot. trees & shrubs											
	†	*Acacia dealbata*	silver wattle							1	
	†	*Acacia longifolia*	Sydney golden wattle	1	1	1	1	1	1	1	
	†	*Acacia mearnsii*	black wattle				1				
	†	*Acmena smithii*								1	
		Avicennia marina subsp. *australasica*	mangrove, manawa	1	1	1		1	1	1	1
	†	*Banksia integrifolia*	banksia	1							
	†	*Senecio angulatus*	German ivy					1			
	†	*Casuarina cunninghamiana*	sheoak		1	1				1	
	†	*Chrysanthemoides monilifera* subsp. *monilifera*	boneseed	1							
		Coprosma propinqua × *C. robusta*							1		
		Coprosma propinqua var. *propinqua*							1		
		Coprosma robusta	karamu							1	
	†	*Cotoneaster lacteus*	cotoneaster					1			
	†	*Erica baccans*	berry heath	1							
	†	*Erythrina* × *sykesii*	coral tree		1					1	
		Geniostoma ligustrifolium var. *ligustrifolium*	hangehange						1	1	

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	§	*Kunzea ericoides* var. *linearis*	narrow-leaved kanuka							1	
	†	*Lantana camara* var. *aculeata*	lantana					1			
		Leptospermum scoparium var. *scoparium*	manuka						1	1	
		Leucopogon fasciculatus	mingimingi						1	1	
		Macropiper excelsum	kawakawa							1	
		Metrosideros excelsa	pōhutukawa	1		1	1	1		1	
		Myrsine australis	red mapou							1	
	§	*Olearia solandri*		1							
	†	*Paraserianthes lophantha*	brush wattle				1			1	
		Pittosporum crassifolium	karo	1					1	1	
	§	*Plagianthus divaricatus*	salt-marsh ribbonwood	1	1	1	1	1	1	1	
	†	*Polygala myrtifolia*	sweet pea shrub					1			
		Pomaderris kumeraho	kumeraho						1		
		Pseudopanax lessonii	houpara							1	
	†	*Psoralea pinnata*	Dally pine		1					1	
	†	*Solanum mauritianum*	wooly nightshade				1				
	†	*Ulex europaeus*	gorse	1	1	1	1	1	1	1	
Dicot. lianes											

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		Calystegia sepium subsp. *roseata*	pink bindweed						1	1	
		Calystegia soldanella	shore bindweed	1						1	
	†	*Hedera helix*	ivy					1			
	†	*Lonicera japonica*	Japanese honeysuckle				1		1	1	
		Muehlenbeckia complexa	small-leaved pohuehue	1						1	
	†	*Passiflora tripartita* var. *mollissima*	banana passionflower						1		
	†	*Rosa multiflora*	rose				1				
	†	*Rubus fruticosus* agg.	blackberry				1		1		
	†	*Solanum ?dulcamara*	bittersweet						1		
	†	*Tecomaria capensis*	tecomaria							1	
Dicot. herbs											
	†	*Achillea millefolium*	yarrow				1				
	†	*Anagallis arvensis subsp. arvensis var. arvensis*	scarlet pimpernell				1		1		
	†	*Aster subulatus*	sea aster		1		1		1	1	
	†	*Atriplex prostrata*	orache		1	1	1			1	
	†	*Carpobrotus edulis*	South African iceplant	1	1						
		Centella uniflora	Mercury Bay weed						1		
	†	*Conyza sumatrensis*	fleabane	1		1	1			1	
		Cotula coronopifolia	batchelor's buttons						1	1	
	†	*Euphorbia peplus*	milkweed							1	

Scientific Name			Common Name	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank
	†	*Foeniculum vulgare*	fennel				1				
	†	*Galium aparine*	cleavers							1	
		Haloragis erecta subsp. *erecta*					1		1	1	
	†	*Helminthotheca echioides*	oxtongue							1	
	†	*Leontodon taraxacoides*	hawkbit		1				1		
	§	*Lilaeopsis novae-zelandiae*			1				1		
		Lobelia anceps							1	1	
	†	*Lotus angustissimus*	hairy lotus						1		
	†	*Lotus pedunculatus*	lotus major	1	1		1		1		
	†	*Oenanthe pimpinelloides*	parsley dropwort			1	1				
	†	*Pelargonium ?tomentosum*	peppermint geranium							1	
		Peperomia urvilleana	peperomia							1	
	†	*Plantago coronopus*	buck's horn plantain		1						
	†	*Plantago lanceolata*	narrow-leaded plantain				1				
	†	*Prunella vulgaris*	selfheal						1		
	†	*Rumex* sp.	dock				1				
		Samolus repens var. *repens*	shore primrose	1	1	1		1	1	1	
		Sarcocornia quinqueflora subsp. *quinqueflora*	glasswort	1	1	1	1			1	
		Selliera radicans		1	1	1		1	1	1	

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	†	*Senecio diaschides*								1	
	†	*Sonchus asper*	prickly sow thistle							1	
	†	*Taraxacum officinale*	dandelion	1			1				
	†	*Trifolium pratens*	red clover				1	1			
	†	*Tropaeolum majus*	nasturtium					1			
	†	*Vellereophyton dealbatum*				1			1	1	
	†	*Verbascum thapsus*	wooly mullein						1		
	†	*Verbena bonariensis*	purpletop				1				
Monocot. trees & shrubs											
	†	*Arundo donax*	arundo					1		1	
	†	*Bambusa* sp.	bamboo							1	
		Cordyline australis	cabbage tree, ti kouka	1					1		
	†	*Furcraea foetida*							1		
	†	*Hedychium gardnerianum*	wild ginger						1	1	
	†	*Phoenix canariensis*	Phoenix palm							1	
		Phormium tenax	harakeke, NZ flax	1	1		1	1	1	1	
Monocot. lianes											
	†	*Asparagus scandens*	climbing asparagus						1	1	
Rushes											
	†	*Juncus articulatus*							1		
		Juncus edgariae							1		
	†	*Juncus effusus*							1		

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	†	*Juncus microcephalus*							1		
		Juncus kraussii subsp. *australiensis*	sea rush		1	1				1	
		Juncus sp.						1			
Sedges											
		Apodasmia similis	oioi	1	1	1		1	1		
		Bolboschoenus fluviatilis								1	
		Carex pumila	sand sedge		1						
		Carex sp.							1		
		Carex virgata	swamp sedge						1		
	†	*Cyperus eragrostis*	umbrella sedge						1	1	
	†	*Cyperus sanguinolentus*	umbrella sedge		1		1				
		Cyperus ustulatus	umbrella sedge							1	
	§	*Eleocharis gracilis*	slender spike sedge						1		
		Ficinia nodosa	wiwi, knobby clubrush	1	1	1				1	
	§	*Ficinia spiralis*	pingao	1	1						
		Isolepis cernua			1				1	1	
		Lepidosperma laterale								1	
		Machaerina arthrophylla		1	1				1	1	
		Machaerina articulata							1		
		Machaerina juncea		1	1			1	1	1	
		Machaerina ?rubiginosa							1		

Scientific Name			Common Name	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank
		Schoenoplectus tabernaemontani			1					1	
Orchids											
	†	*Epidendrum ibaguense*	Crucifix orchid							1	
Grasses											
	†	*Agrostis capillaris*	browntop				1				
		Austrostipa stipoides		1	1					1	
	†	*Briza minor*	shivery grass	1							
	†	*Cortaderia selloana*	pampas grass	1	1	1	1	1	1	1	
	†	*Dactylis glomerata*	cock's foot				1				
		Isachne globosa	swamp millet						1		
	§	*Lachnagrostis billardierei*	coastal windgrass	1	1						
	†	*Lagurus ovatus*	hares-tail	1	1						
	†	*Paspalum dilatatum*	paspalum	1			1		1		
	†	*Paspalum urvillei*	saltwater paspalum						1		
	†	*Paspalum vaginatum*	Vasey grass	1	1	1	1		1	1	
	†	*Pennisetum clandestinum*	kikuyu grass				1	1	1	1	
	†	*Schedonorus arundinaceus*	tall fescue	1						1	
		Spinifex sericeus	spinifex	1	1					1	
	†	*Stenotaphrum secundatum*	buffalo grass	1	1	1			1	1	
Other Monocot. herbs											
	†	*Agapanthus praecox*	agapanthus					1	1	1	

Scientific Name			Common Name	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank
		Astelia banksii								1	
	†	*Canna ×generalis*	canna lily							1	
		Collospermum hastatum								1	
	†	*Crocosmia ×crocosmiiflora*	montbretia				1			1	
	§	*Dianella haematica*	swamp blueberry						1	1	
		Triglochin striata							1		
		Typha orientalis	raupo							1	
	†	*Watsonia meriana* var. *bulbillifera*	watsonia				1	1	1		
	†	*Zantedeschia aethiopica*	zantedeschia						1		
		Zostera muelleri subsp. *novozelandica*	zostera							1	

TOTALS:	Lincoln Street	Southern Shoreline	Black Swamp Creek	Insley Road Causeway	Kainui Street to Back Bay Jetty	Back Bay Jetty to Molesworth Road causeway	Molesworth Drive to Moir Point	Mangrove covered intertidal bank	Total
Total number of Regionally Significant, At Risk or Threatened species recorded:	4	4	1	1	1	4	3	0	8

Number of weeds recorded:	16	17	10	30	17	32	37	0	83
Number of native vascular plant species:	20	19	9	6	12	42	45	1	72
Total number of vascular plant species recorded:	**36**	**36**	**19**	**36**	**29**	**74**	**82**	**1**	**155**

Appendix 1.2. Location of GPS points and sites at Mangawhai Harbour, from 2012

1. Lincoln Street Reserve (GPS waypoints 510-513).

2. Eastern proportion of Moir Point-Molesworth Drive (GPS waypoints 755-761).

3. Western proportion of Moir Point-Molesworth Drive (GPS waypoints 762-776).

4. Back Bay Jetty to Molesworth Drive (GPS waypoints 742-748).

5. Kainui Street Arm to Back Bay Jetty (GPS waypoints 749-750, 778-780 & 799-809) and Mangrove Covered Intertidal Bank (GPS waypoints 797-798).

6. Insley Street causeway (GPS waypoints 787-796 and 752-754) and Black Swamp (GPS waypoints 781-786).

7. Eastern proportion of Southern Shoreline (GPS waypoints 810-832).

8. Western proportion of Southern Shoreline (GPS waypoints 833-842).

Appendix 2.1. Dr Beauchamp's photos of the Saltmarsh SNA, 9 January 2026

1. Eastern end.

2. Middle, looking west.

3. Bull Road end.

Appendix 2.2. Photos of various parts of the Saltmarsh SNA and southern side of Mangawhai Harbour, 19 January 2026

1. Raymond Bull Road end of the Saltmarsh SNA, showing herbfield of remuremu and sea primrose, and various reed- and sedgelands of largely indigenous vegetation.

2. Drain between the Saltmarsh SNA and the end of Raymond Bull Road, showing mangrove shrubland, sea rush reedland and emergent pōhutukawa trees over pampas grass on the stop-banks.

3. Vegetation on the southern shoreline of Mangawhai Harbour, looking very similar to how it looked in 2012.

4. Cut in the stop bank that maintains the saltmarsh wetland at the end of Raymond Bull Road.

5. View of the eastern end of the saltmarsh SNA, showing mangroves in the drain, sea rush and other rush and sedge reedlands and sedgelands, with a few emergent casuarina (*Casuarina cunninghamiana*) trees and pampas grass clumps towards the motor camp. Raupo (*Typha orientalis*) and *Machaerina articulata* reedland are visible on the far left of the photo, indicating freshwater wetland.

6. The Threatened–Nationally Vulnerable lichen *Ramalina pacifica*, seen growing on a mangrove stem on the southern shoreline of Mangawhai Harbour in 2026.