

Tauranga City Council
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Attention: Campbell Larking

Dear Campbell

Te Tumu Urban Growth Area Coastal erosion mapping update

1 Introduction

Over the last three years Tonkin + Taylor Ltd have completed three separate erosion hazard studies for Tauranga City Council (TCC). The study areas include:

- 1 Te Tumu (2017)¹
- 2 Tauranga Harbour (2019)²
- 3 Mauao to Papamoa (2020)³

Consistent probabilistic erosion methodology has been applied for all three studies. However, there is a difference in the erosion scenarios that have been selected by TCC for mapping. The maps produced for the Te Tumu study differ from the other two studies and therefore require updating so that TCC has a consistent approach to mapping coastal erosion in its GIS system.

2 Previous assessments

2.1 Te Tumu erosion assessment (2017)

The objective of the Te Tumu 2017 erosion assessment was to produce susceptibility maps in line with the Bay of Plenty Regional Council (BOPRC) Regional Policy Statement. Due to the Te Tumu Urban Growth Area being greenfield development, 100+ year timeframes (110 years and 130 years) were assessed. The sea level rise (SLR) values adopted in the Te Tumu 2017 assessment align directly with the RCP scenarios defined for wider New Zealand in the Ministry for the Environment Guidelines (2017). The previously mapped scenarios are outline in Table 2.1.

¹ Tonkin + Taylor Ltd. (2017). Te Tumu Natural Hazard Assessment – Coastal Hazard. Technical report prepared for Tauranga City Council.

² Tonkin + Taylor Ltd. (2019). Tauranga Harbour Coastal Hazards Study. Technical report prepared for Bay of Plenty Regional Council.

³ Tonkin + Taylor Ltd. (2020). Mount Maunganui to Papamoa Coastal Erosion Assessment. Technical report prepared for Tauranga City Council.

Table 2.1: Erosion scenarios previously mapped for the Te Tumu erosion assessment (2017)

Scenario	Timeframe in years	Likelihood of occurring over timeframe (Exceedance Probability)	SLR (m) ¹	Equivalent RCP Scenario ²
1	Present day (2017)	50%	n/a	n/a
2	Present day (2017)	5%	n/a	n/a
3	110 (2130)	50%	1.18	RCP8.5
4	110 (2130)	5%	1.18	RCP8.5
5	130 (2150)	50%	1.88	RCP8.5H+
6	130 (2150)	5%	1.88	RCP8.5 H+

¹Source: Stephens (2017) referencing IPCC (2013) Assessment Report 5

2.2 Tauranga Harbour and Mauao to Papamoa erosion assessments

Both the Tauranga Harbour and Mauao to Papamoa erosion studies assessed current (applicable to 2030), 50 year (2080) and 100 year (2130) timeframes. The SLR values adopted in both studies were provided by BOPRC and represent SLR relevant to the Tauranga region based on the RCP scenarios recommended by MfE (2017). The nine scenarios mapped for the Tauranga Harbour and Mauao to Papamoa assessments are outlined in Table 2.2.

Table 2.2: Erosion scenarios mapped for Tauranga Harbour and Mauao to Papamoa assessments

Scenario	Timeframe in years	Likelihood of occurring over timeframe (Exceedance Probability)	SLR (m)	Equivalent RCP Scenario ²
1	Current	66%	n/a	n/a
2	Current	5%	n/a	n/a
3	50 (2080)	66%	0.40	RCP4.5
4	50 (2080)	66%	0.60	RCP8.5
5	50 (2080)	5%	0.60	RCP8.5
6 ¹	100 (2130)	66%	0.80	RCP4.5
7 ¹	100 (2130)	66%	1.25	RCP8.5
8 ¹	100 (2130)	5%	1.25	RCP8.5
9 ¹	100 (2130)	5%	1.60	RCP8.5 H+

¹BOPRC Regional Policy Statement requirements

²Approximate RCP scenario

3 Te Tumu mapping update

The Te Tumu 2017 erosion assessment has been updated using the same component values as derived from the 2017 assessment but for timeframes and SLR scenarios consistent with the other

TCC coastal erosion assessments^{4,5} (Table 2.2). The adopted SLR values are generally consistent with the RCP scenarios recommended by MfE (2017).

For the two accretion dominated cells (cells A and B) the lower bound value for the long-term component has been adjusted down to zero. This slight adjustment allows for consistency with the Mauao to Papamoa study and accounts for a future scenario where there is no long-term accretion. Subsequently, the lower probability distances (i.e. P_{5%}) within cells A and B are now representative of future scenarios where there is no long-term accretion.

Results from the updated Monte-Carlo analysis are presented in Table 3.1. Updated maps, based on the nine scenarios outlined in Table 2.2, are presented in Appendix A.

In accretion dominated areas where the future CEHA is seaward of the current CEHA (i.e. Cell A), the future CEHA has been mapped equivalent to the current CEHA. This mapping approach is consistent with the other two erosion studies.

Table 3.1: Coastal erosion hazard area distances for Te Tumu

Cell	Timeframe	SLR	Probability of exceedance					
			Max	66%	50%	5%	1%	Min
A	2030	N/A	-6	-11	-13	-18	-20	-22
	2080	0.4	33	11	6	-14	-20	-29
		0.6	29	5	0	-20	-27	-37
	2130	0.8	66	27	19	-16	-27	-41
		1.25	59	15	6	-31	-45	-64
		1.6	54	5	-4	-44	-60	-83
B	2030	N/A	-2	-10	-11	-17	-19	-22
	2080	0.4	15	-3	-7	-19	-24	-34
		0.6	11	-9	-12	-26	-32	-44
	2130	0.8	33	3	-2	-25	-33	-47
		1.25	25	-8	-15	-42	-53	-72
		1.6	19	-17	-24	-55	-69	-91
C	2030	N/A	-4	-12	-14	-20	-22	-25
	2080	0.4	5	-14	-17	-30	-34	-43
		0.6	2	-19	-23	-37	-43	-53
	2130	0.8	15	-16	-22	-43	-51	-71
		1.25	8	-28	-34	-60	-71	-94
		1.6	3	-37	-44	-74	-87	-113
D	2030	N/A	-6	-13	-14	-18	-19	-22
	2080	0.4	-5	-21	-23	-33	-37	-45
		0.6	-9	-26	-28	-39	-43	-54

⁴ Tonkin + Taylor Ltd. (2019). Tauranga Harbour Coastal Hazards Study. Technical report prepared for Bay of Plenty Regional Council.

⁵ Tonkin + Taylor Ltd. (2020). Mount Maunganui to Papamoa Coastal Erosion Assessment. Technical report prepared for Tauranga City Council

Cell	Timeframe	SLR	Probability of exceedance					
			Max	66%	50%	5%	1%	Min
	2130	0.8	-3	-29	-34	-51	-57	-68
		1.25	-11	-40	-45	-65	-73	-88
		1.6	-17	-48	-54	-77	-87	-104
E	2030	N/A	-8	-15	-16	-19	-21	-23
	2080	0.4	-15	-27	-29	-37	-40	-43
		0.6	-19	-32	-34	-43	-47	-52
	2130	0.8	-19	-40	-43	-56	-61	-72
		1.25	-26	-51	-54	-71	-78	-92
		1.6	-32	-59	-63	-83	-92	-108
F	2030	N/A	-8	-14	-15	-19	-20	-22
	2080	0.4	-15	-25	-26	-32	-35	-40
		0.6	-18	-29	-31	-39	-43	-49
	2130	0.8	-20	-36	-38	-48	-52	-60
		1.25	-27	-46	-49	-64	-71	-80
		1.6	-33	-54	-57	-76	-85	-95
G	2030	N/A	-8	-14	-15	-18	-20	-21
	2080	0.4	-8	-21	-23	-30	-33	-38
		0.6	-11	-25	-27	-36	-40	-47
	2130	0.8	-8	-28	-31	-43	-48	-57
		1.25	-15	-38	-42	-58	-66	-76
		1.6	-21	-46	-50	-70	-80	-91
H	2030	N/A	-2	-4	-4	-6	-6	-6
	2080	0.4	-7	-8	-9	-10	-10	-11
		0.6	-10	-12	-12	-13	-14	-14
	2130	0.8	-12	-13	-14	-15	-15	-16
		1.25	-19	-21	-21	-22	-23	-23
		1.6	-25	-26	-27	-28	-28	-29

4 Summary

The Te Tumu coastal erosion hazard maps have been updated using SLR scenarios and timeframes consistent with the two other recently completed erosion hazard studies for TCC. The updated maps include scenarios for:

- 2080, 0.4 m SLR (P66%)
- 2080, 0.6 m SLR (P66%, P5%)
- 2130, 0.8 m SLR (P66%)
- 2130, 1.25 m SLR (P66%, P5%)
- 2130, 1.6 m SLR (P5%).

The 2130 1.6 m SLR P5% scenario is on average 8 m seaward from the 2150 RCP8.5H+ P5% which was previously mapped.

5 Applicability

This report has been prepared for the exclusive use of our client Tauranga City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

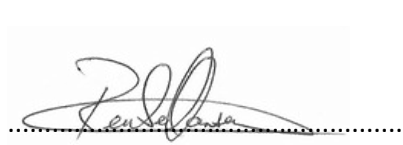
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RHAU

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Appendix A: Erosion hazard maps

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Notes: Aerial photograph sourced from LINZ Data Service 2017

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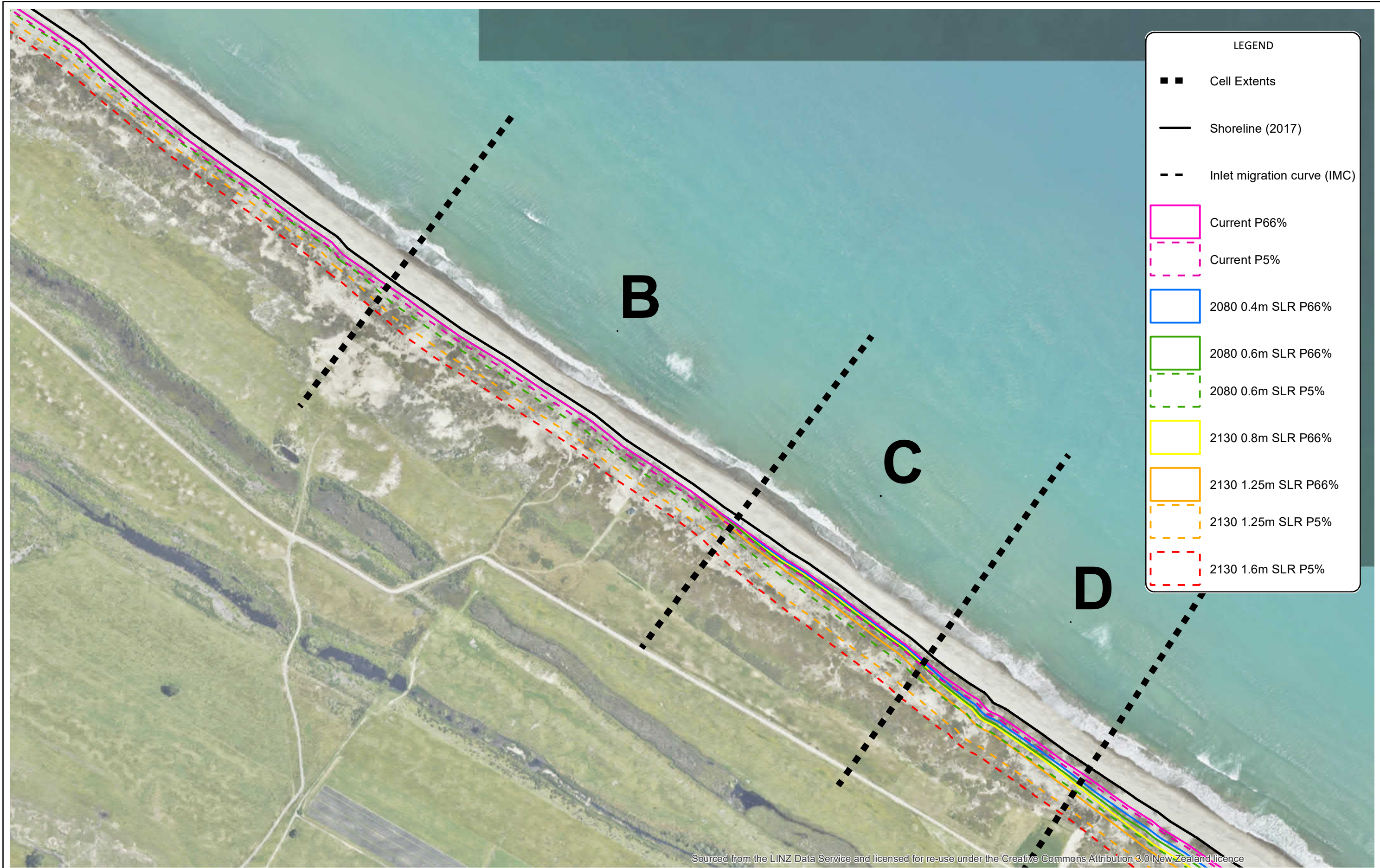
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Te Tumu Urban Development
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FIGURE No. **Figure 1.1**

Rev. **0**

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Notes: Aerial photograph sourced from LINZ Data Service 2017

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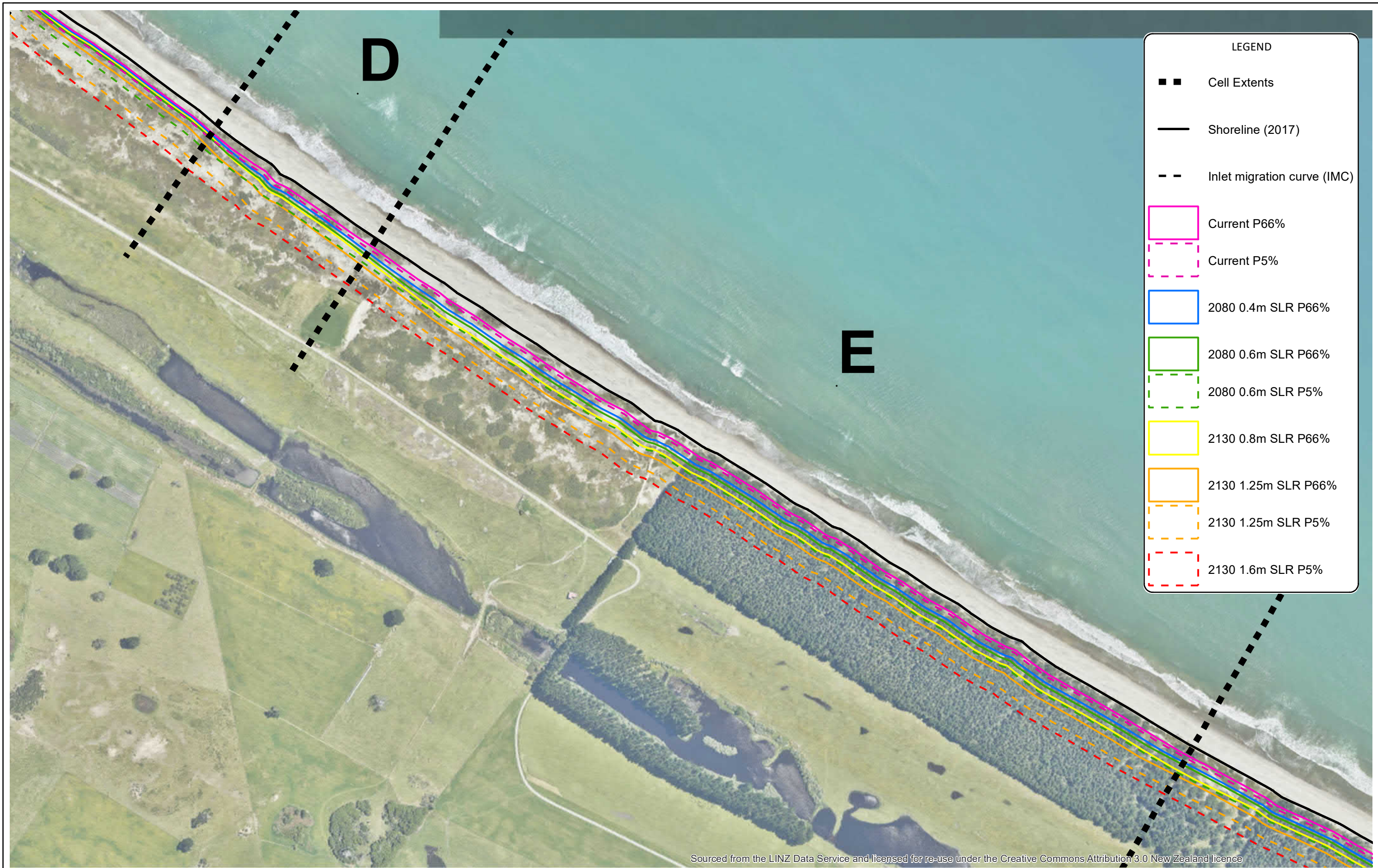


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FIGURE No.	Figure 1.2	Rev. 0

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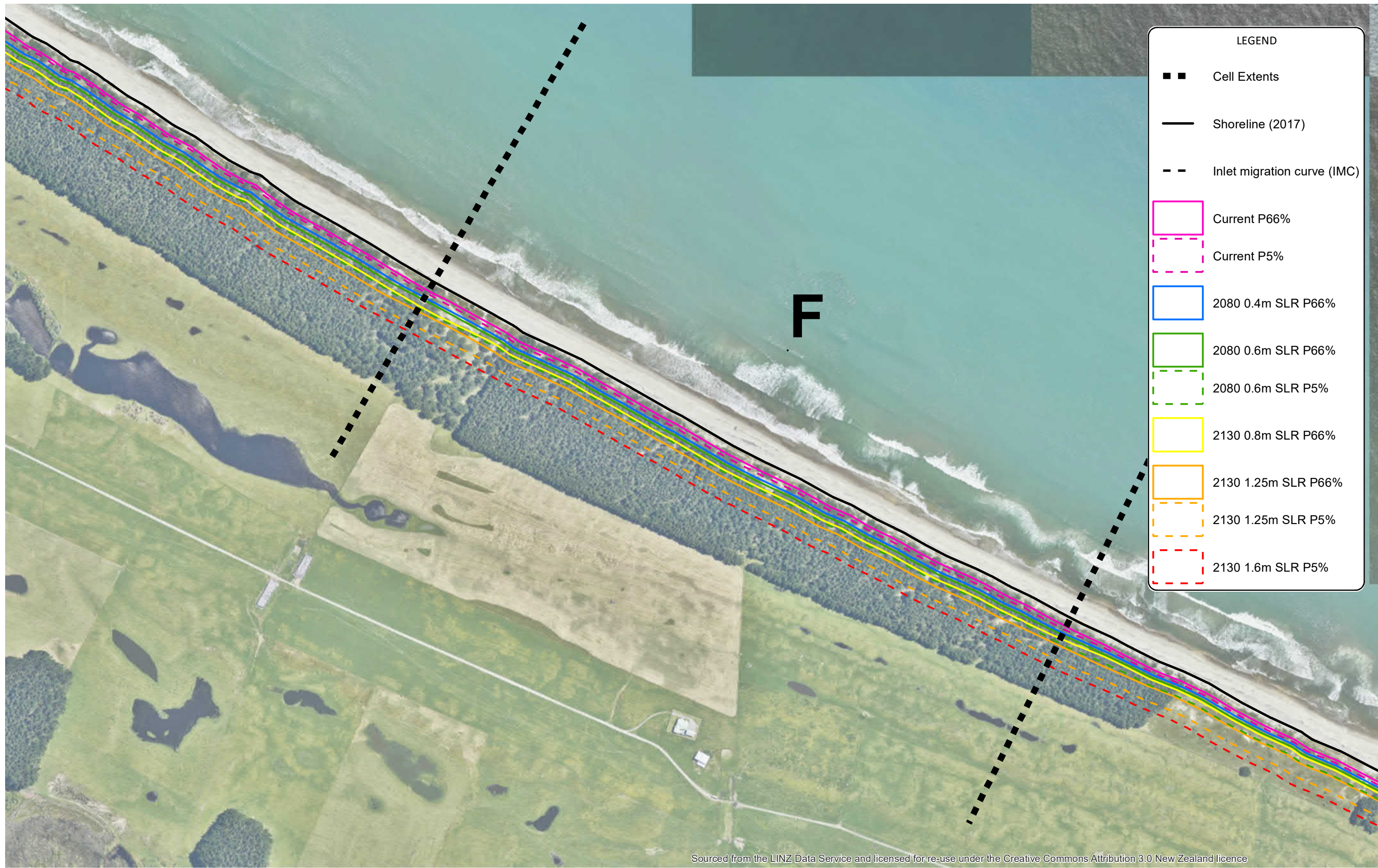


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Notes: Aerial photograph sourced from LINZ Data Service 2017

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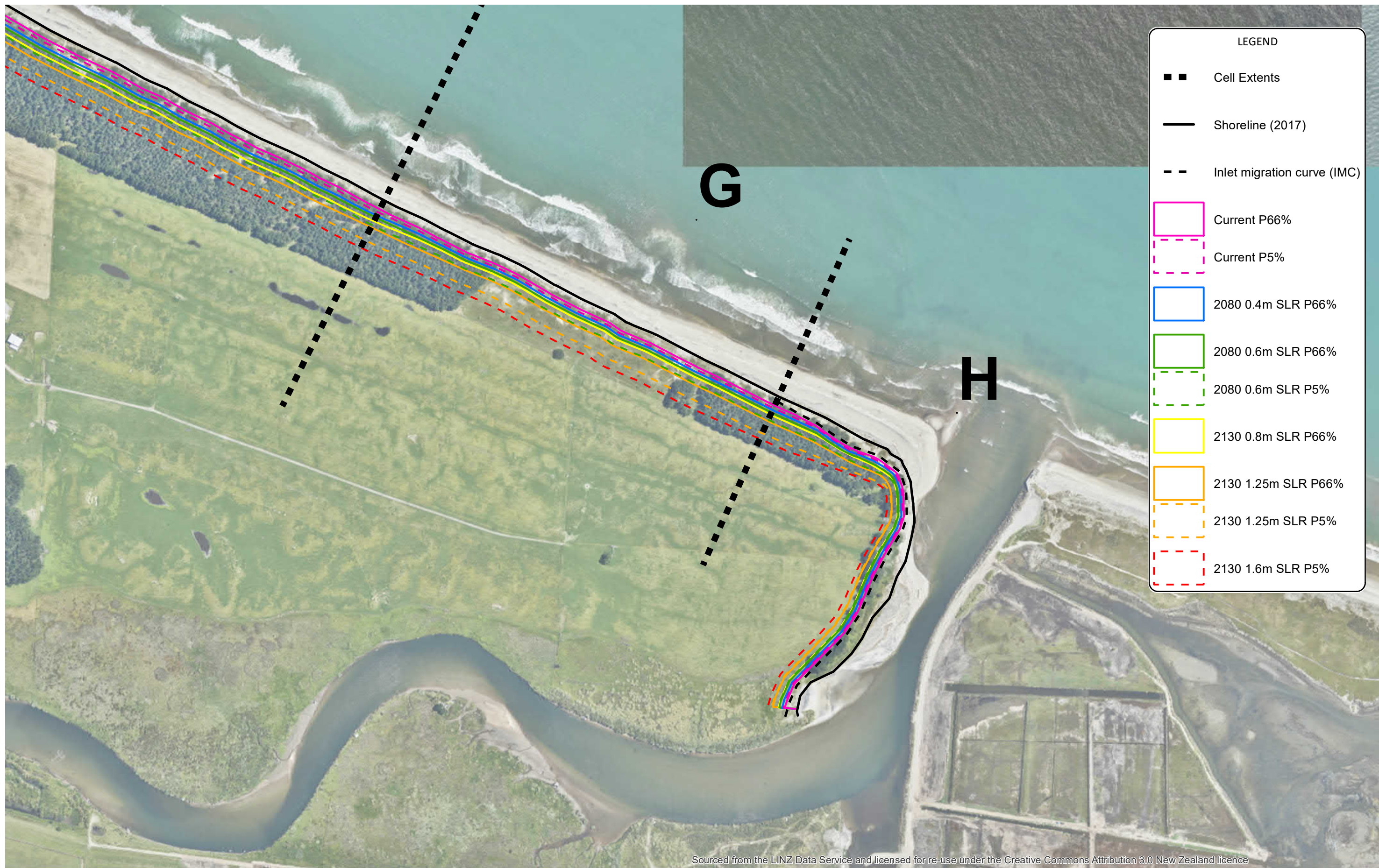
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FIGURE No. **Figure 1.4**

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Notes: Aerial photograph sourced from LINZ Data Service 2017

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