41 Glinks Gully

41.1 Description and geomorphology

Glinks Gully is located on the west coast of Northland 15 km southwest from Dargaville. Figure 41.1 shows the site and its division into four coastal cells for the purpose of assessing coastal erosion hazards. Site photos showing key features of the coast are presented in Figure 41.2.

The site extends for approximately 2 km and spans the township at Glinks Gully. The beach is a discrete section of an open coast system that spans 115 km from the Kaipara Harbour entrance to the Hokianga Harbour entrance. Landward of the beach, fluvial processes have carved out a valley in the weakly cemented sandstone deposits that formed as parabolic and transvers dunes in the Holocene. The valley connects the land to the beach and provides direct vehicle access from the road to the beach. Present day discharge to the valley is controlled by pipes and culverts.

The main road entering Glinks Gully continues onto the beach and is flanked by Late Pleistocene age sandstone cliffs that are weekly cemented remains of parabolic dunes. These sandstone cliffs span to the north and south of the main beach access and sit between a modern dune system (seaward) and historic Holocene deposits (landward). The modern beach is comprised of a dynamic beach face and a substantive dune system that extends landward for 50–100 m. The dune sequence is vegetated by spinifex and the modern foredune appears to be in state of short-term dynamic equilibrium with local residents commenting that waves regularly erode vegetation from the dune face.

The beach sediments at Glinks Gully are characterised by medium grain moderately sorted sand at the dune and backshore, with fine grain sand in the intertidal zone.

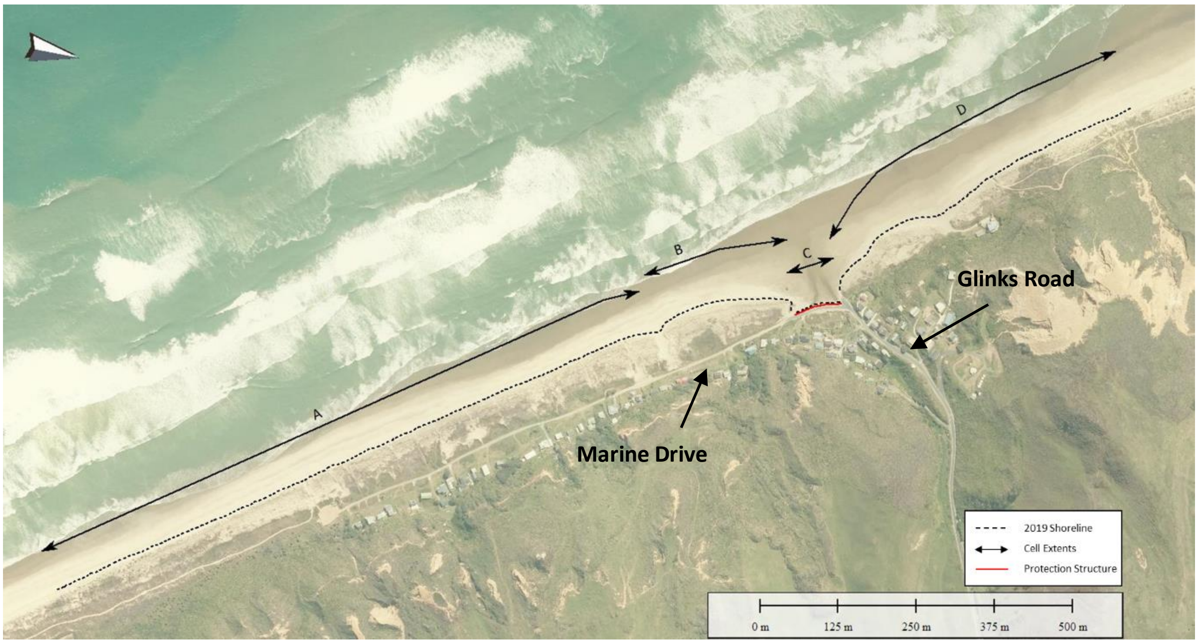


Figure 41.1: Map showing 2019 shoreline position and cell extents with background aerial imagery from 2014.

Figure 41.2: Photos from Glinks Gully site visit on 24/01/2020.

41.2 Local considerations

The main road into Glinks Gully (Glinks Road) provides vehicle access to the beach. Prior to the mid-2000s, access to Marine Drive was only possible by driving along the beach. A reclaimed road now connects Marine Drive and Glinks Road. This reclaimed road has a series of culverts and a seawall that defines the shoreline along the main beach access section. A single house north of Glinks Road is only accessed by four-wheel drive along the beach and a dune track.

41.3 Component values

The site is split into four cells based on discrete spatial differences in coastal geomorphology and historic shoreline changes. Cells A, B and D are characterised by prograding sand dunes and Cell C is influenced by beach access and a reclaimed road. Component values used to calculate coastal erosion hazard zones are presented in

Table 41.1 for the different cells and future sea level rise scenarios are presented in Table 41.2.

The same short-term erosion rate was adopted for each cell, based on Table 4.6 of the method in T+T (2020) and the same stable angle was applied based on unconsolidated sand. Dune height was assessed by calculating the difference between toe elevation and crest elevation at 10 m intervals along each cell using LiDAR data. A consistent closure slope was also applied to each site, based on the typical dune crest the depth of closure as calculated using the method in Section 4.6.5.2 of the main report (T+T, 2020).

Cells A and D are open coast beach systems at the northern and southern extents of the site and have similar rates of historic long-term change that average +0.5 m/yr of accretion. Cell B is a discrete section of dune between a blowout and the beach access and has a higher rate of accretion averaging +0.8 m/yr. The minimum long-term rate adopted for each cell was lower than indicated by shoreline change analysis to account for possible future changes in sediment supply or that the dune toe accretion may reach a seaward equilibrium with the hydrodynamic process regime.

Accurate analysis of long-term change at Cell C is complicated by construction of the reclaimed road that now defines the shoreline and a nominal rate of 0 ± 0.1 m/yr was adopted. The shoreline at Cell C is landward of other cells that represent more open-coast dune systems. The intertidal beach at Cell C also lower in elevation because of the valley influence and vehicle assess. Therefore, the same short-term erosion distance was adopted for Cell C.

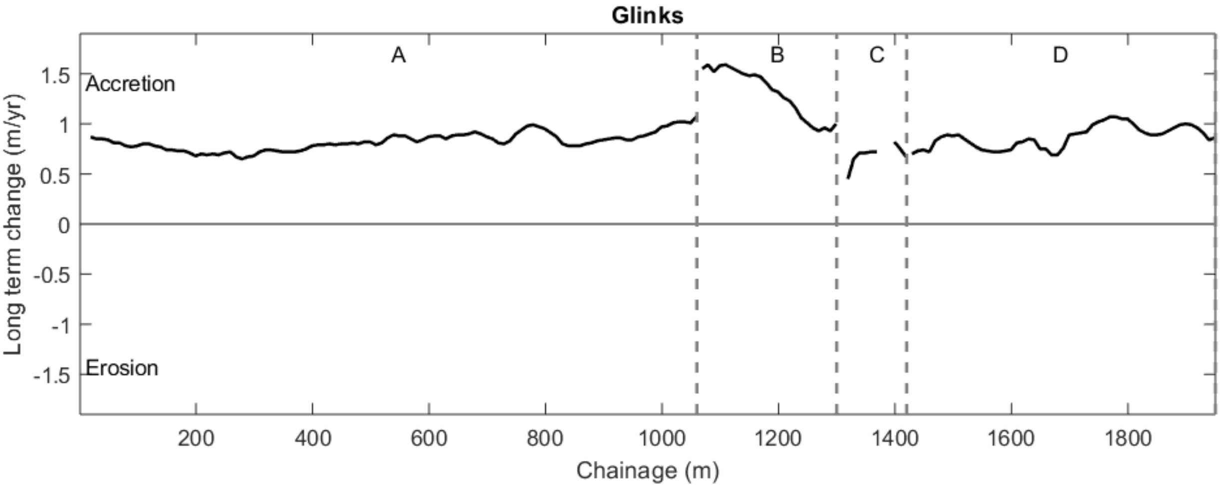


Figure 41.3: Rate of long-term shoreline change along the site showing each cell.

Table 41.1: Component values for Erosion Hazard Assessment

Site		2. Glinks Gully			
Cell		**41A**	**41B**	**41C**	**41D**
Cell centre (NZTM)	E	1677538	1677192	1677178	1676949
	N	6005963	6006493	6006641	6006837
Chainage, m (from S/E)		1-1,000	1,000-1,280	1,280-1,350	1,280-1,870
Morphology		Dune	Dune	Dune	Dune
Short-term (m)	Min	10	10	10	10
	Mode	15	15	15	15
	Max	20	20	20	20
Dune/Cliff elevation (m above toe or scarp)	Min	2.4	2.1	1.1	1.3
	Mode	5.4	4.5	1.8	4.7
	Max	8.3	5.5	2.6	7.3
Stable angle (deg)	Min	30	30	30	30
	Mode	32	32	32	32
	Max	34	34	34	34
Long-term (m) -ve erosion +ve accretion	Min	0.20	0.20	-0.10	0.20
	Mode	0.50	0.75	0.00	0.50
	Max	0.80	1.00	0.10	0.80
Closure slope (beaches) / Cliff response factor	Min	0.02	0.02	0.02	0.02
	Mode	0.03	0.03	0.03	0.03
	Max	0.04	0.04	0.04	0.04

+Shoreline armoured with engineered coastal protection structure

Table 41.2: Adopted sea level rise values (m) based on four scenarios included in MfE (2017) adjusted to 2019 baseline

Coastal type	Year	RCP2.6M	RCP4.5M	RCP8.5M	RCP8.5+
Unconsolidated beach[1]	2080	0.16	0.21	0.33	0.51
	2130	0.28	0.42	0.85	1.17

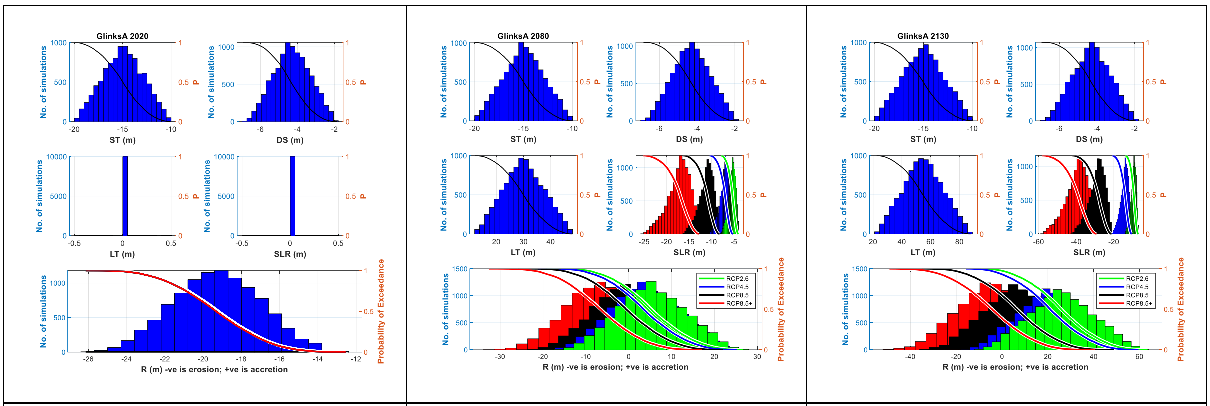
[1]Adjusted to remove the influence of historic SLR (2.2 mm/year) on long-term rates of shoreline change

41.4 Coastal erosion hazard assessment

Histograms of individual components and resultant CEHZ distances computed using a Monte Carlo technique are shown in Figure 41.4 to Figure 41.7. Coastal Erosion Hazard Zone are presented within Table 41.3 to Table 41.5 and mapped in Figure 41.8.

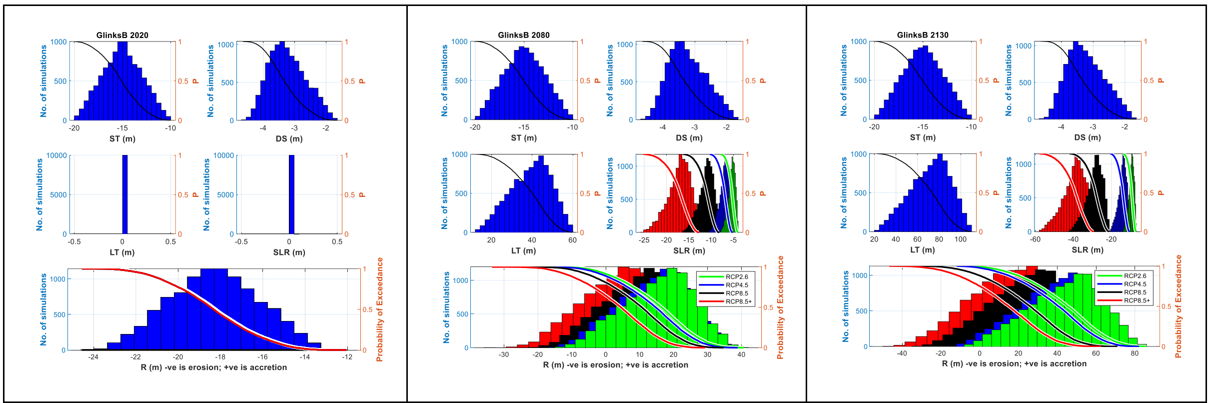
CEHZ1 values range from 15 to 26 m, noting that Cells A, B and D were rounded up to the minimum value of 15m as they produced positive distances due to the accreting long-term shoreline trends. CEHZ2 distances range from 35 to 56 m and CEHZ3 distances range from 35 to 69 m, with A,B and D rounded up to the minimum value of 35 m.

Figure 41.9 shows the available historic shorelines for Glinks Gully.



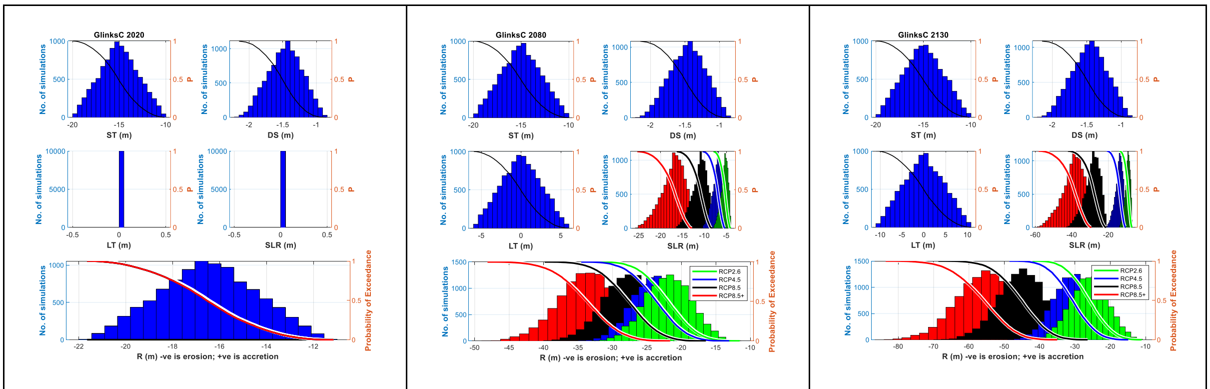
2020	2080	2130

Figure 41.4: Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 41A



2020	2080	2130

Figure 41.5: Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 42B



2020	2080	2130

Figure 41.6: Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 42C

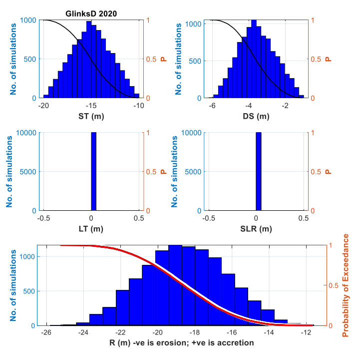
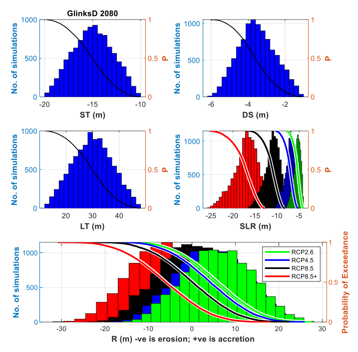
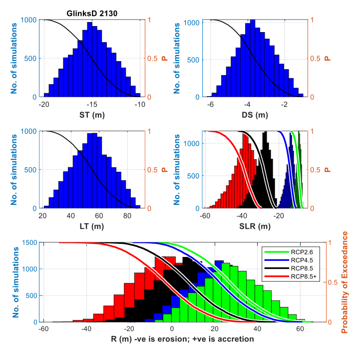
		
2020	*2080*	*2130*

Figure 41.7: Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 42D

Table 41.3: Coastal Erosion Hazard Zone Widths (m) Projected for 2020

Site		41. Glinks			
	Cell	**41A**	**41B**	**41C**	**41D**
Probability of CEHZ (m) Exceedance	**Min**	-13	-12	-11	-12
	99%	-14	-14	-12	-14
	95%	-16	-15	-13	-15
	90%	-16	-15	-14	-16
	80%	-17	-16	-15	-17
	70%	-18	-17	-15	-17
	66%	-18	-17	-16	-18
	60%	-19	-18	-16	-18
	50%	-19	-18	-17	-19
	40%	-20	-19	-17	-19
	33%	-20	-19	-17	-20
	30%	-21	-19	-18	-20
	20%	-21	-20	-18	-21
	10%	-22	-21	-19	-22
	5%	-23	-22	-20	-22
	1%	-24	-23	-21	-23
	Max	-26	-25	-22	-25

Table 41.4: Coastal Erosion Hazard Zone Widths (m) Projected for 2080

Site		41. Glinks															
Cell		41A				41B				41C				41D			
RCP scenario		2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	27	25	22	17	41	39	35	29	-12	-13	-16	-22	27	26	23	18
	99%	22	21	17	11	35	33	29	24	-15	-16	-20	-25	23	21	17	12
	95%	18	17	13	7	31	29	25	19	-16	-18	-22	-27	19	17	13	7
	90%	16	14	10	4	28	27	23	17	-18	-19	-23	-29	16	14	10	5
	80%	12	11	7	1	25	23	19	13	-19	-21	-25	-30	13	11	7	1
	70%	10	8	4	-2	22	20	16	10	-20	-22	-26	-32	10	9	5	-1
	66%	9	7	3	-3	21	19	15	9	-20	-22	-26	-32	9	8	4	-2
	60%	7	6	2	-4	19	17	13	7	-21	-23	-27	-33	8	6	2	-4
	50%	5	3	-1	-7	16	15	11	4	-22	-24	-28	-34	6	4	0	-6
	40%	3	2	-3	-9	13	12	8	1	-23	-24	-29	-35	4	2	-2	-8
	33%	2	0	-4	-10	11	9	5	-1	-23	-25	-29	-36	2	1	-3	-10
	30%	1	-1	-5	-11	10	8	4	-2	-24	-25	-30	-36	2	0	-4	-10
	20%	-1	-3	-7	-14	6	4	0	-6	-25	-27	-31	-37	-1	-3	-7	-13
	10%	-5	-7	-11	-17	1	-1	-5	-11	-26	-28	-32	-39	-4	-6	-10	-16
	5%	-8	-9	-14	-20	-3	-4	-8	-15	-27	-29	-34	-41	-7	-9	-13	-19
	1%	-11	-13	-18	-25	-8	-10	-14	-21	-29	-31	-36	-44	-10	-12	-16	-23
	Max	-19	-21	-26	-33	-17	-19	-25	-34	-33	-35	-40	-48	-16	-18	-23	-31
	CEHZ1	-15				-15				-26				-15			

Table 41.5: Coastal Erosion Hazard Zone Widths (m) Projected for 2130

Site		41. Glinks															
Cell		41A				41B				41C				41D			
RCP scenario		2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	63	60	49	41	86	82	71	63	-11	-15	-26	-35	65	61	48	39
	99%	55	51	37	27	78	74	60	51	-15	-19	-31	-41	57	52	39	29
	95%	49	44	30	20	71	67	53	42	-18	-22	-35	-44	50	46	32	21
	90%	45	40	26	15	67	62	48	37	-19	-24	-37	-47	46	41	27	17
	80%	38	34	19	9	60	55	41	30	-22	-26	-40	-50	40	35	20	10
	70%	33	29	14	4	55	50	36	25	-23	-28	-42	-52	35	30	16	5
	66%	32	27	13	2	53	48	34	23	-24	-28	-42	-53	33	28	14	3
	60%	29	25	10	-1	50	46	31	20	-25	-29	-44	-54	31	26	11	1
	50%	26	21	6	-4	45	41	26	15	-26	-31	-45	-56	27	22	8	-3
	40%	22	18	3	-8	40	35	20	9	-27	-32	-47	-58	23	19	4	-7
	33%	20	15	0	-11	36	31	16	5	-28	-33	-48	-59	21	16	1	-10
	30%	19	14	-1	-12	34	29	14	3	-29	-34	-49	-60	19	15	0	-11
	20%	14	9	-6	-17	27	22	7	-4	-31	-35	-51	-63	15	10	-5	-16
	10%	7	3	-13	-24	18	13	-2	-13	-33	-38	-54	-66	8	3	-12	-23
	5%	3	-2	-17	-29	11	6	-9	-20	-35	-40	-56	-69	4	-1	-16	-28
	1%	-3	-8	-24	-37	1	-4	-20	-32	-38	-43	-61	-75	-2	-7	-23	-37
	Max	-9	-16	-35	-49	-6	-12	-31	-47	-42	-49	-69	-84	-12	-18	-38	-53
	CEHZ2	-35				-35				-56				-35			
	CEHZ3	-35				-35				-69				-35			

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Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography.
Northland 0.4m Rural Aerial Photos (2014-2016).

A4 SCALE 1:7,500

0 0.1 0.2 0.3 0.4 (km)

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PROJECT No. 1012360		

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Coastal Erosion Hazard Assessment
Glinks Gully
Site: 41

FIGURE No. Figure 41-8

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Notes: Dashed CEHZ indicates greater uncertainty around stream mouths and backshore topography.
Northland 0.4m Rural Aerial Photos (2014-2016).

A4 SCALE 1:7,500

0 0.1 0.2 0.3 0.4 (km)

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SCALE (AT A4 SIZE) 1:7,500

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NORTHLAND REGIONAL COUNCIL

Historic Shorelines
Glinks Gully
Site: 41

FIGURE No. Figure 41-9

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