12 Sandy Bay

Description and geomorphology

Sandy Bay is a located on Northland east coast approximately 24 km north of Whangarei.

The site is a pocket beach embayment situated between two headlands. The shoreline is approximately 700 m long. The beach comprises medium sand.

The southern 250 m of the site is a cliff shoreline which comprises Greywacke material (cell 12D). The central 150 m of the site is an eroding shoreline with a minimal dune system. The backshore elevation ranges from RL 3 to 5 m in this area (cell 12C). A stormwater outlet enters the site near the centre of the site, which has caused local retreat of the dune toe.

Two streams enter the shoreline at the northern end of the site, with the main stream located approximately 200 m south of the northern extent of the site. The main stream flows north for approximately 100 m causing beach lowering and fluctuations in this area over time.

Note that erosion repair works have been undertaken through the second half of 2017 which may affect local geometry and extents of erosion hazard zones.

Local considerations

There is a gabion basket erosion protection structure located along approximately 50 m of the cliff shoreline. The streams and stormwater outlets are causing bank erosion and shoreline fluctuations.

There are three streams that enter the site and influence the shoreline position. There is a greater level of uncertainty in these areas because fluvial processes also effect shoreline movement. The resulting hazard zones are dashed in these areas to reflect this uncertainty.

Cells 12B and 12C also contain some additional uncertainty due to the backshore topography. Although the shoreline morphology comprises weakly consolidated Holocene sand dunes, the backshore has hill slope topography and slope instability is a factor. The resulting hazard zones are dashed in these areas to reflect this uncertainty.

Coastal Erosion Hazard Assessment

The site is split into five cells based on differences in geomorphology, dune height and shoreline movement trends.

Site Photograph A (central area and stormwater outfall)

Site Photograph B (stream looking south)

Site Photograph C (southern cliff area

Adopted component values are presented within Table 12-1. The beaches are relatively exposed to storm waves from the E to NE and short-term erosion rates range from 15 to 25 m. Long-term shoreline trends are generally variable at the north end of the beach and erosional at the south. They Greywacke cliff at the southern end of the bay is approximately 20 m high with a stable angle of repose of between 18 and 27°.

Histograms of individual components and resultant CEHZ distances using a Monte Carlo technique are shown in Figure 12-1 to Figure 12-5.

Coastal Erosion Hazard Zone widths are presented within Table 12- 2 to 12-4 and Figure 12-6. CEHZ1 values range from 36 to 52 m, CEHZ2 values from 72 to 117 m and CEHZ3 values from 74 to 142 m. These larger values are attributed to the erosional trends of the southern beach and cliff and the relatively flat offshore slopes which result in large sea level rise response.

Note that cell 12A has experienced accretion over approximately 100 m, with CEHZs offset from the accreted most recent shoreline.

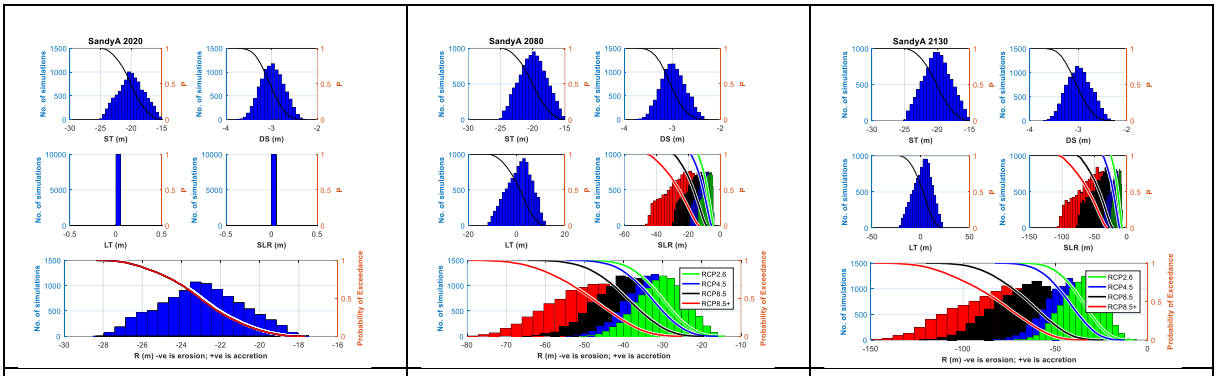
CEHZs have been mapped in agreement with the calculated values. Except around the streams where fluvial effects increase uncertainty and where the backshore morphology transitions from sand dunes to hill slope. In both these cases lines are dashed to reflect the uncertainty and should be considered on a site-specific basis.

Figure 12-7 shows the available historic shorelines for Sandy Bay.

Table 12-1 Component values for Erosion Hazard Assessment

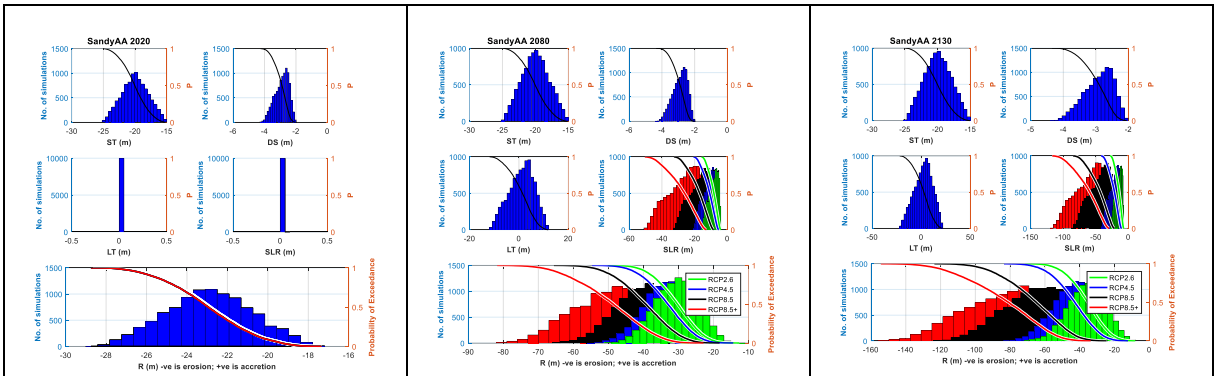
Site		**12. Sandy Bay**				
Cell		12A	12AA	12B	12C	12D
Cell centre (NZTM)	E	1733573	0	1733673	1733721	1733877
	N	6064320	0	6064264	6064210	6064140
Chainage, m (from N/W)		0-240	240-275	275-335	335-440	440-700
Morphology		Dune	Inlet	Dune	Dune	Greywacke
Short-term (m)	Min	15	15	15	15	0
	Mode	20	20	20	20	0
	Max	25	25	25	25	0
Dune/Cliff elevation (m above toe or scarp)	Min	3.0	2.6	4.1	2.9	19.9
	Mode	3.8	3.2	5.5	3.7	20.0
	Max	4.4	5.1	6.6	4.8	20.1
Stable angle (deg)	Min	30	30	30	30	18.4
	Mode	32	32	32	32	22.5
	Max	34	34	34	34	26.6
Long-term (m) -ve erosion +ve accretion	Min	0.2	0.2	-0.1	-0.1	-0.02
	Mode	0.05	0.05	-0.2	-0.2	-0.05
	Max	-0.2	-0.2	-0.3	-0.3	-0.15
Closure slope (beaches)	Min	0.04	0.04	0.04	0.04	0.5
	Mode	0.012	0.012	0.012	0.012	0.25
	Max	0.011	0.01	0.011	0.011	0
	RCP 2.6	0.16	0.16	0.16	0.16	0.16

Site		12. Sandy Bay				
Cell		12A	12AA	12B	12C	12D
SLR 2080 (m)	RCP 4.5	0.21	0.21	0.21	0.21	0.21
	RCP 8.5M	0.33	0.33	0.33	0.33	0.33
	RCP 8.5H+	0.51	0.51	0.51	0.51	0.51
SLR 2130 (m)	RCP 2.6	0.28	0.28	0.28	0.28	0.28
	RCP 4.5	0.42	0.42	0.42	0.42	0.42
	RCP 8.5M	0.85	0.85	0.85	0.85	0.85
	RCP 8.5H+	1.17	1.17	1.17	1.17	1.17



2020	2080	2130

Figure 12-1 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 12A



2020	2080	2130

Figure 12-2 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 12AA

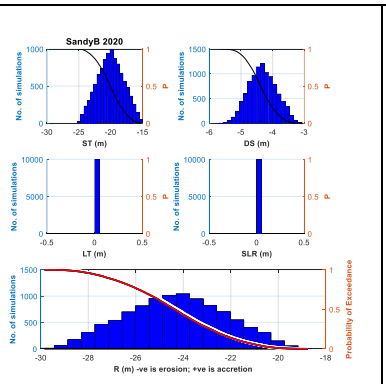
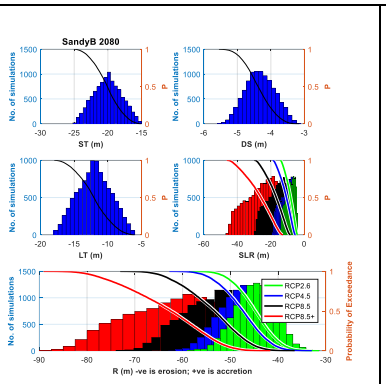
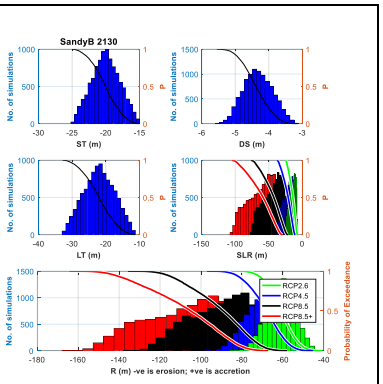
		
2020	*2080*	*2130*

Figure 12-3 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 12B

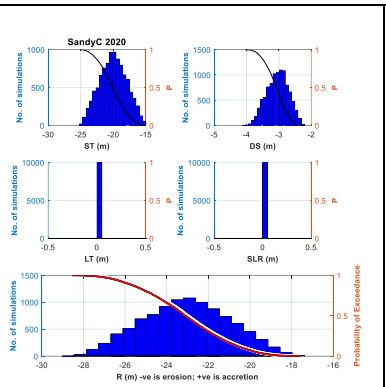
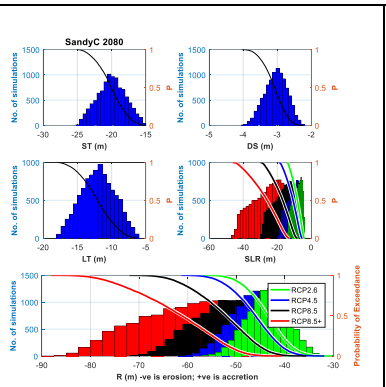
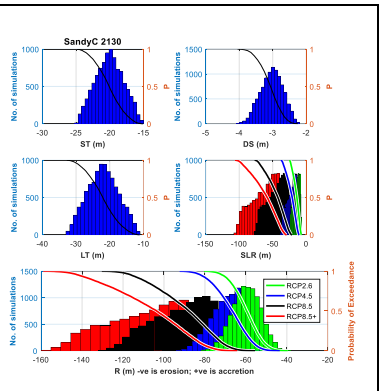
		
2020	*2080*	*2130*

Figure 12-4 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 12C

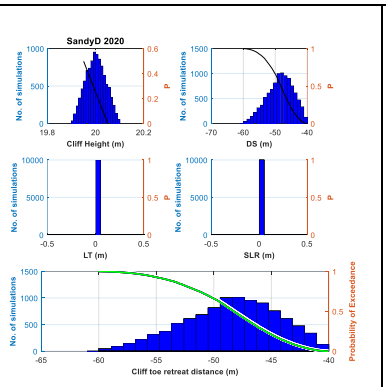
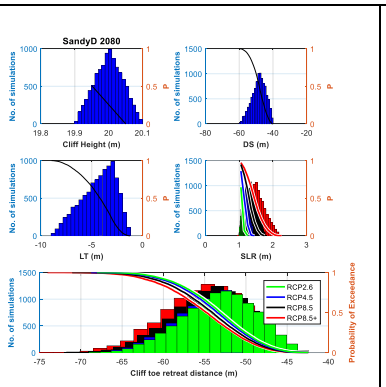
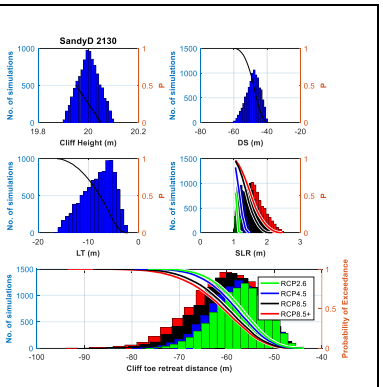
		
2020	*2080*	*2130*

Figure 12-5 Histograms of parameter samples and the resultant shoreline distances for 2020, 2080 and 2130 timeframes for cell 12D

Table 12-2 Coastal Erosion Hazard Zone Widths for 2020

Site		12. Sandy Bay				
Probability of CEHZ (m) Exceedance		A	AA	B	C	D
	Min	-18	-17	-19	-18	-40
	99%	-19	-18	-20	-19	-41
	95%	-20	-19	-21	-20	-42
	90%	-20	-20	-22	-20	-43
	80%	-21	-21	-22	-21	-45
	70%	-22	-22	-23	-22	-46
	66%	-22	-22	-23	-22	-47
	60%	-22	-22	-24	-23	-47
	50%	-23	-23	-24	-23	-48
	40%	-24	-23	-25	-24	-49
	33%	-24	-24	-25	-24	-50
	30%	-24	-24	-25	-24	-50
	20%	-25	-25	-26	-25	-52
	10%	-26	-26	-27	-26	-54
	5%	-26	-26	-28	-26	-56
	1%	-27	-27	-29	-27	-58
	Max	-28	-29	-30	-28	-60

Table 12-3 Coastal Erosion Hazard Zone Widths Projected for 2080

Site		12. Sandy																			
Cell		12A				12AA				12B				12C				12D			
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+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	-14	-16	-19	-25	-13	-14	-18	-23	-31	-33	-37	-42	-30	-32	-36	-41	-42	-42	-42	-42
	99%	-18	-20	-24	-29	-18	-20	-24	-30	-36	-38	-42	-47	-34	-36	-40	-45	-44	-45	-45	-45
	95%	-21	-23	-27	-34	-21	-23	-27	-34	-38	-40	-44	-50	-37	-39	-43	-49	-46	-47	-47	-47
	90%	-23	-25	-30	-36	-23	-25	-30	-36	-40	-41	-46	-52	-38	-40	-45	-51	-48	-48	-48	-49
	80%	-25	-27	-32	-40	-25	-27	-33	-40	-41	-43	-48	-55	-40	-42	-47	-54	-49	-50	-50	-51
	70%	-27	-29	-35	-43	-27	-29	-35	-43	-43	-45	-50	-57	-41	-43	-49	-56	-51	-51	-52	-52
	66%	-28	-30	-36	-44	-28	-30	-36	-44	-43	-45	-51	-58	-42	-44	-49	-57	-51	-52	-52	-53
	60%	-29	-31	-37	-46	-29	-31	-37	-46	-44	-46	-52	-60	-42	-45	-50	-59	-52	-52	-53	-53
	50%	-30	-33	-39	-48	-30	-33	-39	-49	-45	-47	-53	-62	-43	-46	-52	-61	-53	-53	-54	-55
	40%	-32	-34	-41	-51	-32	-35	-42	-52	-46	-49	-55	-65	-45	-47	-54	-64	-54	-55	-55	-56
	33%	-33	-36	-43	-53	-33	-36	-43	-54	-47	-50	-57	-67	-45	-48	-55	-66	-55	-56	-56	-57
	30%	-34	-36	-43	-54	-34	-37	-44	-55	-47	-50	-57	-68	-46	-49	-56	-67	-56	-56	-57	-57
	20%	-36	-39	-46	-58	-36	-39	-46	-59	-48	-52	-59	-72	-47	-50	-58	-71	-57	-58	-58	-59
	10%	-38	-42	-50	-63	-39	-42	-50	-64	-50	-54	-63	-76	-49	-53	-61	-75	-59	-60	-61	-62
	5%	-41	-44	-53	-66	-41	-44	-53	-67	-52	-55	-64	-79	-51	-54	-63	-78	-61	-62	-62	-63
	1%	-45	-48	-58	-72	-44	-48	-58	-74	-54	-58	-68	-83	-53	-57	-67	-82	-64	-65	-66	-67
	Max	-50	-55	-64	-80	-50	-55	-66	-82	-59	-63	-73	-89	-57	-61	-72	-88	-68	-69	-71	-74
	CEHZ1	-36				-36				-51				-49				-52			

Table 12-4 Coastal Erosion Hazard Zone Widths Projected for 2130

Site		12. Sandy																			
Cell		12A				12AA				12B				12C				12D			
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+	2.6	4.6	8.5	8.5+
Probability of CEHZ (m) Exceedance	Min	-8	-13	-24	-32	-8	-12	-25	-34	-41	-45	-58	-67	-40	-43	-56	-64	-44	-44	-45	-45
	99%	-15	-19	-33	-43	-14	-19	-33	-43	-47	-51	-64	-74	-45	-50	-63	-73	-47	-47	-48	-49
	95%	-20	-25	-40	-51	-19	-25	-41	-51	-50	-55	-69	-80	-49	-54	-68	-78	-49	-50	-51	-51
	90%	-23	-28	-44	-56	-23	-28	-45	-56	-52	-58	-73	-84	-51	-56	-72	-82	-51	-51	-52	-53
	80%	-27	-33	-50	-63	-27	-33	-50	-63	-55	-61	-77	-89	-54	-60	-76	-88	-53	-53	-55	-55
	70%	-30	-36	-56	-69	-30	-36	-55	-69	-57	-63	-81	-94	-56	-62	-80	-93	-54	-55	-56	-57
	66%	-31	-38	-57	-71	-31	-38	-57	-71	-58	-64	-83	-96	-57	-63	-81	-95	-55	-56	-57	-58
	60%	-33	-40	-60	-75	-33	-40	-60	-75	-59	-66	-85	-99	-58	-64	-84	-98	-56	-57	-58	-59
	50%	-35	-43	-65	-80	-35	-43	-65	-81	-61	-68	-89	-105	-60	-67	-88	-104	-57	-58	-60	-61
	40%	-38	-46	-69	-87	-38	-46	-70	-88	-63	-70	-94	-111	-61	-69	-93	-110	-58	-59	-61	-62
	33%	-40	-48	-73	-92	-40	-48	-74	-93	-64	-72	-97	-117	-63	-71	-96	-115	-60	-61	-63	-64
	30%	-41	-49	-75	-94	-41	-50	-76	-95	-65	-73	-99	-119	-63	-72	-98	-118	-60	-61	-63	-65
	20%	-45	-53	-81	-103	-45	-54	-82	-105	-67	-76	-105	-127	-66	-75	-104	-126	-62	-63	-66	-67
	10%	-50	-59	-89	-113	-50	-59	-91	-116	-70	-80	-112	-136	-69	-79	-111	-136	-64	-66	-69	-71
	5%	-54	-63	-95	-120	-54	-64	-97	-123	-72	-83	-116	-142	-71	-82	-116	-142	-67	-68	-72	-74
	1%	-61	-71	-106	-133	-61	-73	-109	-137	-77	-88	-123	-150	-76	-87	-122	-149	-70	-72	-77	-80
	Max	-71	-83	-120	-148	-71	-84	-124	-154	-85	-97	-136	-164	-80	-92	-130	-159	-77	-79	-88	-93
	CEHZ2	-95				-97				-116				-116				-72			
	CEHZ3	-120				-123				-142				-142				-74			

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

A4 SCALE 1:4,000

0 0.1 0.2 (km)

Tonkin+Taylor
105 Carlton Gore Rd, Newmarket, Auckland
www.tonkintaylor.co.nz

DRAWN	JJOU	May.20
CHECKED		
APPROVED		
ARCFILE	1012360_CEHZ001_v2.mxd	
SCALE (AT A4 SIZE)	1:4,000	
PROJECT No.	1012360	

NORTHLAND REGIONAL COUNCIL

Coastal Erosion Hazard Assessment
Sandy Bay
Site: 12

FIGURE No. Figure 12-6

Rev. 1

Path: P:\1012360\WorkingMaterial\GIS\CEHZ maps\1012360_CEHZ001_v2.mxd Date: 29/05/2020 Time: 6:08:13 am

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

A4 SCALE 1:4,000

0 0.1 0.2 (km)

Tonkin+Taylor
105 Carlton Gore Rd, Newmarket, Auckland
www.tonkintaylor.co.nz

DRAWN	JJOU	Jun.20
CHECKED		
APPROVED		
ARCFILE	1012360_Historicv2.mxd	
SCALE (AT A4 SIZE)	1:4,000	
PROJECT No.	1012360	

NORTHLAND REGIONAL COUNCIL

Historic Shorelines
Sandy Bay
Site: 12

FIGURE No. Figure 12-7

Rev. 1

Path: P:\1012360\WorkingMaterial\GIS\CEHZ maps\1012360_Historicv2.mxd Date: 9/06/2020 Time: 9:25:59 AM