Variable	Elevation	Storm Wave Run-up*	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend‡	Short term Fluctn‡	CSI
Wellington									
Baring Head (Site 35)	3 6 m	5 6 m	4 3.2 degrees	3 3.05 m	5 gravels	5 gravel beach	2 0.4 m/yr	5 >30 m	32
Camp Bay (Site 32)	5 1.6 m	3 1.6 m	4 4.5 degrees	3 3.05 m	5 gravels	5 gravel beach	2 static	5 35 m pulses	32
Bluff Point (Site 33)	3 6 m	5 5–6 m	3 10 degrees	3 3.05 m	5 gravels	5 gravel beach	2 static	5 >30 m	31
Airport South, Lyall Bay (Site 45)	4 2 m	3 2.5 m	4 2.3 degrees	3 3.05 m	5 gravels	5 gravel beach	3 –0.2 m/yr	4 20 m	31
Barneys Hut (Site 36)	4 2.5 m	4 5 m	5 1.4 degrees	3 3.05 m	5 gravels	5 gravel beach	2 static	3 5–10 m	31
Fitzroy Bay (Site 34)	4 4 m	4 4.2 m	5 <1 degree	3 3.05 m	5 gravels	5 gravel beach	1 0.7 m/yr	4 11–30 m	31
Lyall Bay (Site 44)	4 4 m	3 2.5 m	2 12 degrees	3 3.05 m	5 sand	5 sand beach	3 –0.1 to –0.3	4 20 m	29
Turakirae Head (Site 37)	4 3.5 m	4 3.5 m	3 6 degrees	3 3.05 m	2 greywacke	2 rock platform	2 0.4 m/yr	1 <2 m	21
Eves Bay, Seatoun (Site 46)	4 3.5 m	4 3 m	1 25 degrees	3 3.05 m	5 gravel	5 gravel beach	2 static	3 5–10 m	27

* All storm wave run-up measurements based on field observations.

† Tsunami recorded after the 1855 Wairarapa Earthquake.

‡ Horizontal trend and short term fluctuation data courtesy of Wellington Regional Council.

Variable	Elevation	Storm Wave Run-up	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend	Short term Fluctn	CSI
Pauatahanui Inlet									
Management Reserve (Site 39)	5 0.4 m	2 1.2 m*	5 salt marsh	1 Unknown	5 sand/shells	4 saltmarsh	3 –0.03 to –0.49	1 <2 m	26
Motukaraka Point (Site 41)	5 0.4 m	2 1.2 m	5 1 degree	1 Unknown	5 shells/sand/alluv.	4 saltmarsh	2 static	1 <2 m	25
Ration Point (Site 40)	5 1.5 m	2 1.2 m	4 2.3 deg.	1 Unknown	5 shells/sand/alluv.	4 alluv. outwash fan	2 static	1 <2 m	24
Barton Marine, Paremata (Site 42)	5 1 m	1 0.75 m*	2 20 deg.	1 Unknown	5 dune sand	5 sand barrier	3 –0.03 to –0.49	1 <2 m	23

* Storm wave run-up recorded during field work in March 1992.

† No known tsunamis recorded in this location. Other West coast tsunamis have been <1 m (Manawatu, Wanganui Rivers).

Variable	Elevation	Storm Wave Run-up*	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend‡	Short term Fluctn	CSI
Manukau Harbour									
Grahams Beach Sth	5	3	5	1	5	5	3	3	30
(Site 51)	1.55 m	2.2 m	1 degree	0.3 m	sands	sand barrier	–0.3 m/yr	8 m	
Hudsons Beach	5	3	5	1	5	5	3	3	30
(Site 53)	1.2	2.2 m	1 degree	0.3 m	sands	sand barrier	–0.05 m/yr	8 m	
Sergeants Beach	5	3	4	1	4	5	3	3	28
(Site 50)	1.5 m	2.2 m	3 degrees	0.3 m	relict sands	sand barrier	–0.1 m/yr	6 m	
Wattle Bay	4	2	2	1	5	5	2	4	25
(Site 54)	2.1 m	1.5 m	16 degrees	0.3 m	sands	sand barrier	static	20 m	
Racecourse Rd, Waiuku	3	2	1	1	4	4	3	3	21
(Site 47)	8 m	1 m	69 degrees	0.3 m	mudstone	softrock cliffs	–0.26 m/yr	6 m slumps	
Te Toro Rd	4	2	1	1	4	4	3	2	21
(Site 49)	4 m	1.3 m	55 degrees	0.3 m	relict sands	softrock cliffs	–0.04 m/yr	2–5 m	
Waipipi Wharf Rd	3	2	1	1	4	4	2	2	19
(Site 48)	6 m	1.5 m	52 degrees	0.3 m	relict sands	softrock cliffs	–0.02 m/yr	<5 m	

* Storm wave run-up level from residents observations, and later from field observations along cliffs.

† Tsunami recorded as 0.3 m in 1960 in the Manukau Harbour.

‡ Horizontal trend data courtesy of Franklin District Council.

Variable	Elevation	Storm Wave Run-up*	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend‡	Short term Fluctn‡	CSI
Hawkes Bay									
Te Awanga Outfall (Site 60)	4 2.7 m	4 3.5 m	5 swale	3 3.0 m	5 gravels	5 gravel beach	5 –2.79 m/yr	4 20 m	35
Te Awanga (Site 59)	4 2.2 m	4 2.5–3.0 m	5 swale	3 3.0 m	5 gravels	5 gravel beach	4 –1.05 m/yr	4 20 m	34
Awatoto (Site 61)	4 2.7 m	4 3–3.5 m	5 swale	3 3.0 m	5 gravels	5 gravel beach	2 0.28 m/yr	4 11–30 m	32
Mangakuri Beach (Site 57)	4 2 m	4 2–4 m	4 3 degrees	3 3.0 m	5 sands	5 sand beach	2 static	4 11–30 m	31
Pourerere Bay Nth (Site 56)	4 2 m	3 2.5 m	4 3 degrees	3 3.0 m	5 sands	5 sand beach	2 static	4 11–30 m	30
Port of Napier (Site 62)	4 2.7 m	4 3.5 m	3 5–10 deg.	3 3.0 m	5 gravels	5 gravel beach	1 0.78 m/yr	4 11–30 m	29
Pourerere Bay Sth (Site 55)	1 >30 m	2 1.5 m	1 35 deg.	3 3.0 m	4 mudstones	4 softrock cliff	2 static	5 30–100 m	22

* Storm wave run-up estimates courtesy of Hawkes Bay Regional Council.

† Tsunami measured 22 May 1960 in Napier, no others recorded from Cape Kidnappers south to Castlepoint.

‡ Horizontal trend and short term fluctuation data supplied by Hawkes Bay Regional Council.

Variable	Elevation	Storm Wave Run-up	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend‡	Short term Fluctn‡	CSI
East Cape									
Te Araroa A	5	4	5	3	5	5	4	5	36
(Site 63)	1.5 m	2.2–3.3 m*	1 degree	3 m in 1868*	sands/gravels	sand/gravel beach	–1.57 m/yr	50 m	
Te Araroa B	5	4	5	3	5	5	4	5	36
(Site 64)	1.7 m	2.2–3.3 m	1 deg.	3 m in 1868	sands/gravels	sand/gravel beach	–0.93 m/yr	50 m	
Te Araroa C	5	4	5	3	5	5	2	5	34
(Site 65)	1.8 m	2.2–3.3 m	1 deg.	3 m in 1868	gravels	sand/gravel beach	static	50 m	
Hicks Bay South	5	4	5	3	5	5	1	5	33
(Site 68)	0.65 m	2.2–3.3 m	1 deg.	3 m in 1868	sand	sand beach	1.21 m/yr	> 100 m	
Hicks Bay North	5	4	5	3	5	5	1	5	33
(Site 69)	0.8 m	2.2–3.3 m	1 deg.	3 m in 1868	sand	sand beach	0.8 m/yr	> 100 m	
Onepoto Bay	5	4	5	3	5	5	2	4	33
(Site 67)	1.6 m	2.2–3.3 m	1 deg.	3 m in 1868	sand	sand beach	0.5 m/yr	11–30 m	
Torere Beach	3	5	5	3	5	5	2	4	32
(Site 74)	6 m	> 6 m*	1.5 deg.	3 m in 1868	gravels	gravel beach	0.2 m/yr	30 m	
Te Araroa D	4	4	5	3	5	5	1	5	32
(Site 66)	2.3 m	2.2–3.3 m	1 deg.	3 m in 1868	sands	sand beach	0.55 m/yr	50 m	
Hawai Beach West	3	5	3	3	5	5	2	5	31
(Site 73)	5–6 m	5–6 m	7 deg.	3 m in 1868	gravels	gravel beach	0.30 m/yr	> 30 m	
Whitianga Bay	1	3	1	3	2	2	2	1	15
(Site 72)	20–30 m	2–3 m	30 deg.	3 m in 1868	greywacke	hardrock platform	static	0 m	
Whanarua Bay	1	2	1	3	2	2	2	1	14
(Site 71)	20–30 m	1.5 m	50 deg.	3 m in 1868	greywacke	hardrock platform	static	0 m	
Lottin Point	1	3	1	3	1	1	2	1	13
(Site 70)	20–30 m	2.5 m*	50 deg.	3 m in 1868	basalts	v. hard rock platf.	static	0 m	

* Storm wave run-up level calculated in Gibb (1981).

† Tsunami recorded at Cape Runaway on 15 August 1868.

‡ Horizontal trend and short term fluctuation supplied by Gisborne District Council.

Variable	Elevation	Storm Wave Run-up*	Gradient	Tsunami†	Lithology	Landform	Horiz. Trend‡	Short term Fluctn‡	CSI
Bay of Plenty									
Ohiwa Spit (Site 75)	4 4.7 m	4 5 m*	5 intertidal flats	3 1.8 m in 1868	5 sands	5 sand spit	5 –3.15 m/yr	5 >100 m	36
Waihi North (Site 93)	4 2.5 m	4 3 m	5 swale	2 1.4 m in 1960	5 sand	5 sand beach	3 –0.2 m/yr	5 35 m	33
Ohiwa South (Site 76)	4 2.8 m	4 5 m	5 swale	3 1.8 m in 1868	5 sands	5 sand dunes	1 1.28 m/yr	5 >100 m	32
Ohope Spit (Site 79)	4 3.8 m	4 5 m	5 1 deg.	3 1.8 m in 1868	5 sand	5 sand beach	1 1.33 m/yr	5 >30 m	32
Mid Rangitaiki-Tarawera Rivers (Site 83)	4 4.7 m	4 5 m	5 swale	3 1.8 m in 1868	5 sand	5 sand beach	1 1.4 m/yr	5 >30 m	32
Thornton Lagoon (Site 84)	4 3.7 m	4 5 m	5 swale	3 1.8 m in 1868	5 sand	5 sand beach	1 2.17 m/yr	5 >30 m	32
Matata South (Site 82)	4 4 m	4 5 m	5 flat dunes	3 1.8 m in 1868	5 sand	5 sand beach	1 1.6 m/yr	5 >30 m	32
Ohope Spit, Ohope (Site 80)	4 3.7 m	4 5 m	4 2.3 deg.	3 1.8 m in 1868	5 sand	5 sand beach	1 1.33 m/yr	5 >30 m	31
Maketu Caravans (Site 89)	4 2.7 m	4 3 m	5 1 deg.	2 0.9 m in 1883	5 sands	5 sand beach	3 –0.1 m/yr est.	3 5–10 m	31
Bowentown tombolo (Site 92)	3 6 m	4 3–4 m	2 11 deg.	2 1.4 m in 1960	5 sands	5 sand beach	4 –1.57 m/yr	5 >30 m	30
Whakatane Spit (Site 86)	4 5 m	4 5 m	2 15–20 deg.	3 1.8 m in 1868	5 sands	5 sand beach/barrier	3 –0.2 m/yr	4 10–15 m	30
Mt. Maunganui Beach (Site 87)	3 6 m	4 5 m	3 5–10 deg.	3 1.8 m in 1877	5 sands	5 sand beach	2 static	5 35 m	30
Munro Subdivision (Site 78)	5 0.5 m	2 1.44 m*	5 <1 deg.	3 1.8 m in 1868	5 sands	5 sand spit	2 static	2 <5 m	29

Whangamata (Site 94)	4 4.5 m	4 3 m	4 2–5 deg.	2 1.4 m in 1960	5 sands	5 cuspate foreland	2 static	3 5–10 m	29
Golf Links Rd (Site 85)	3 5.5 m	4 5 m	3 5–10 deg.	3 1.8 m in 1868	5 sands	5 sand beach	1 1.78 m/yr	4 20 m	28
Whangamata Beach (Site 95)	3 5.7 m	4 4–5 m	4 2–5 deg.	2 1.4 m in 1960	5 sands	5 sand beach	2 static	3 5–10 m	28
Burke Rd, Ohiwa (Site 77)	5 2.0 m	3 2.1 m*	4 2 deg.	3 1.8 m in 1868	5 peat	4 salt marsh/mangrove	2 static	1 0	27
Matata Barrier (Site 81)	3 6.1 m	4 5 m	2 11 deg.	3 1.8 m in 1868	5 sands	5 sand barrier	1 1.33 m/yr	3 5–10 m	26
Bowentown Inner Harbour (Site 91)	4 3.5 m	2 1.5 m	2 16 deg.	3 1.8 m in 1877	4 relict sands	5 sand barrier	3 –0.2 m/yr estd.	2 <5 m	25
Omokoroa Headland (Site 90)	3 10 m	3 2 m	1 35 deg.	3 1.8 m in 1877	3 poor weld. ign.	4 softrock cliff	3 –0.2 m/yr estd.	3 5–10 m	23
Maketu Cliffs (Site 88)	2 20 m	3 2 m	1 >35 deg.	2 0.9 m in 1883	3 poor weld. ign.	4 softrock cliff	2 static	2 <5 m	19
Whangamata Harbour (Site 96)	1 >30 m	2 1 m	1 >35 deg.	2 1.4 m in 1960	1 volcanics	1 v. hard cliff	2 static	1 0	11

* Storm wave run-up recorded by Gibb (1977), rest from field estimations.

† Tsunamis recorded on 15 August 1868, 10 May 1877 (Tauranga), 27 August 1883 (Maketu), 22 May 1960 (Tairua).

‡ Horizontal trend and short term fluctuation data courtesy of Bay of Plenty Regional Council.

Variable	Elevation	Storm Wave Run-up	Gradient	Tsunami*	Lithology	Landform	Horiz. Trend	Short term Fluctn	CSI
Firth of Thames									
Te Puru (Site 97)	5 1.75 m	3 2.5 m	5 1 deg.	2 0.9 m	5 alluvial gravel	4 alluvial fan	2 static	4 11–30 m	30

* Tsunami recorded at Coromandel on 27 August 1883.

Variable	Elevation	Storm Wave Run-up	Gradient	Tsunami*	Lithology	Landform	Horiz. Trend‡	Short term Fluctn‡	CSI
Canterbury									
Washdyke (Site 104)	4 3.5 m	4 4 m	5 swale <2	3 1.8 m in 1868	5 sand/gravels	5 sand/gravel beach	5 –2.5 m/yr	4 20 m	35
Taumutu, Kaitorete (Site 108)	3 5.5 m	5 6 m	5 swale <2	3 1.8 m in 1868	5 sand/gravels	5 sand/gravel beach	3 –0.42 m/yr	5 50 m	34
Connellys Rd (Site 105)	4 4.49 m	4 5 m	5 swale <2	3 1.8 m in 1868	5 sand/gravels	5 sand/gravel beach	4 –1.27 m/yr	4 20 m	34
Wainono Lagoon (Site 100)	4 5 m	5 6.5 m	5 swale <2	3 3.3 m in 1960	5 gravels	5 gravel ridge	3 –0.42 m/yr	5 30 m	35
Orari River (Site 106)	4 5 m	5 6.1 m	5 swale <2	3 1.8 m in 1868	5 sand/gravels	5 sand/gravel beach	4 –1.0 m/yr	1 0 m	32
Amberley Beach (Site 113)	4 3.8 m	4 4 m	5 swale <2	3 3.3 m in 1960	5 gravels	5 sand/gravel beach	2 +0.32 m/yr	4 25 m	32
Caroline Bay (Site 103)	4 3.8 m	4 3 m	4 4.2 degrees	3 1.8 m in 1868	5 sands	5 sand beach	1 +5.91 m/yr	4 25 m	30
Tern St, Brighton (Site 110)	3 6 m	4 3.5 m	3 9 degrees	3 3.3 m in 1960	5 sands	5 sand beach	2 +0.24 m/yr	4 25 m	29
Birdlings Flat (Site 109)	3 10 m	5 6 m	2 12 degrees	3 1.8 m in 1868	5 gravels	5 gravel beach	1 +0.62 m/yr	4 25 m	28
Rickards Farm (Site 107)	2 20 m	5 6 m	1 ~vertical	3 1.8 m in 1868	5 alluvium	4 soft rock cliff	4 –0.56 m/yr	4 13 m	28
Otaio River South (Site 101)	3 9.87 m	5 6 m	1 ~vertical	3 1.8 m in 1868	4 loess	4 soft rock cliff	4 –0.5 m/yr	4 12 m	28
Morris Rd (Site 99)	3 11.9 m	5 6 m	1 ~vertical	3 1.8 m in 1868	5 alluvium	4 soft rock cliff	4 –0.79 m/yr	2 2–5 m	27
Waikuku Beach (Site 112)	3 10 m	4 3.5 m	2 11–20 deg.	3 3.3 m in 1960	5 sands	5 sandy beach	1 +0.84 m/yr	4 25 m	27
Waitaki Boys High (Site 98)	2 10–12 m	5 6 m	1 ~vertical	3 2.8 m in 1960	5 alluvium	4 soft rock cliff	4 –0.58 m/yr	2 5 m slumps	26
Motunau Cliffs (Desk test 4)	1 30–40 m	4 ~4 m	1 ~vertical	3 3.3 m in 1960	4 mudstones	4 soft rock cliff	4 –0.57 m/yr	4 14–20 m	25

* Tsunami recorded in Timaru on 13 August 1868, and in Lyttelton/Oamaru on 22 May 1960.

‡ Horizontal trend and short term fluctuation data courtesy of Canterbury Regional Council.

Variable	Elevation	Storm Wave Run-up	Gradient	Tsunami*	Lithology	Landform	Horiz. Trend†	Short term Fluctn†	CSI
Hokitika									
Tudor St	4	5	5	2	5	5	2	5	33
(Desk Test 2)	5 m	5–6 m	swale	1.5 m	sand/gravel	sand/gravel beach	–0.02 m/yr	70 m	
Camp St	4	5	5	2	5	5	1	5	32
(Desk Test 1)	4 m	5–6 m	swale	1.5 m	sand/gravel	sand/gravel beach	+ 1.34 m/yr	200 m	
Hampden St	3	5	5	2	5	5	2	5	32
(Desk Test 3)	5.3 m	5–6 m	swale	1.5 m	sand/gravel	sand/gravel beach	0.08 m/yr	60 m	

* Tsunami recorded in Westport on 13 August 1868. † Horizontal trend and short term fluctuation data from Gibb (1987).

Variable	Elevation	Storm Wave Run-up*	Gradient	Tsunami*	Lithology	Landform	Horiz. Trend	Short term Fluctn	CSI
Seawalls†									
Lyall Bay Surf Club	5	3	5	3	5	5	3	4	33
(Site 43)	1.5 m	2.5 m	1 degree	3.05 m in 1855	sand	sand beach	–0.2 m/yr	20 m	
Kairakau Beach, Hawkes	4	4	2	3	5	5	3	4	30
Bay (Site 58)	4 m	2–4 m	28 degrees	3 m	sands	sand beach	–.03 to –0.49	11–30 m	
Grahams Beach, Manukau	5	3	5	1	5	5	3	3	30
(Site 52)	1.2 m	2.2 m	1 degree	Unknown	sands	sand beach	–0.4 m/yr	8 m	
Pareora, Canterbury	3	5	5	3	5	5	3	1	30
(Site 102)	6 m wall	6 m	swale	1.8 m in 1868	gravels	gravel beach	–0.32 m/yr	4 m	
Browns Bay, Pauatahanui	5	2	5	2	5	4	2	2	26
(Site 38)	0.7 m	0.75	1.1 degree	Unknown	reclaimed area	alluvial outwash	static	<5 m	
Rosetta Rd, Raumati	2	4	1	2	5	5	3	4	26
(Site 28)	15 m	2.6 m in 1976	35 degrees	Unknown	sand	sand dunes/beach	–0.28 m/yr	20 m	

* Storm wave run-up and tsunami data is taken from original source areas. † All these sites have seawalls or structures affecting them, and this fact should be recorded on any surveys.

APPENDIX 8

List of various test areas in order of decreasing CSI

Site	CSI
Te Araroa B, Site 64	36
Te Araroa A, Site 63	36
Ohiwa Spit, Site 75	36
Kaiwhata Rivermouth, Site 15	36
Washdyke Lagoon, Site 104	35
Te Awanga outfall, Site 60	35
Riversdale beach, Site 11	35
Cuspate foreland, Flat Point, Site 17	35
Raumati South, Site 30	35
Wainono lagoon, Site 100	34
Te Awanga, Site 59	34
Te Araroa C, Site 65	34
Taumutu, Kaitorete Spit, Site 108	34
Orui Station Homestead, Site 18	34
Otaki Rivermouth, Site 21	34
Connellys Rd, Opihi, Site 105	34
Waihi beach, Site 93	33
Uruti beach north, Site 10	33
Sandy beach, Site 7	33
Otaki Rivermouth, Site 21	33
Horseshoe Bay, Site 67	33
Tudor St, Hokitika	33
Hicks Bay south, Site 68	33
Hicks Bay north, Site 69	33
Torere beach, Site 74	32
Thornton lagoon, Site 84	32
Te Araroa D, Site 66	32
Riversdale beach, Sunset road, Site 19	32
Orari River, Site 106	32
Ohope spit entrance, Site 79	32
Ohiwa south, Site 76	32
Mid Rangitaiki, Tarawera rivers, Site 83	32
Matata south, Site 82	32
Hampden St, Hokitika	32
Camp St, Hokitika	32
Boat ramp beach, Site 8	32
Baring Head, Site 35	32
Awatoto, Site 61	32
Amberley Beach, Site 113	32
Whareama Rivermouth, Site 1	31
Ohope spit, Site 80	31
Mangakuri beach, Site 57	31
Maketu caravans, Site 89	31
Hawai beach west, Site 73	31
Fitzroy Bay gravel beach, Site 34	31
Bluff Point, Site 33	31
Sims road, Site 22	31
Airport south, Site 45	31
Te Puru, Site 97	31
Barneys Whare, Site 36	31
Pourerere bay north, Site 56	30
Grahams/Hudsons beach, Site 53	30
Caroline Bay, Site 103	30
Camp Bay, Eastborne, Site 32	30
Bowentown tombolo, Site 92	30
Whakatane spit, Site 86	30

Site	CSI
Tern St, Brighton Site 110	29
Protected dunes, Lyall Bay, Site 44	29
Port of Napier, Site 62	29
Munro subdivision, Site 78	29
Mount Maunganui, Site 87	29
Pekapeka beach, Site 24	29
Whangamata cuspate foreland, Site 94	28
Uruti beach, Site 9	28
Sergeants beach, Site 50	28
Rickards Farm, Site 107	28
Queen Elizabeth Park, Raumati, Site 29	28
Otaio River, Site 101	28
Morris Rd, Sth Canterbury, Site 99	28
Gravel beach, Site 4	28
Golf links road, Site 85	28
Waikanae rivermouth, Site 25	28
Rua road south, Site 27	28
Fishermans Table, Paekakariki, Site 31	28
Birdlings Flat, Kaitorete Spit, Site 109	28
Whangamata main beach, Site 95	27
Waikuku Beach, Site 112	27
Riversdale beach, Site 20	27
Ohiwa harbour, Site 77	27
Management Reserve, Site 39	27
Low cliffs, Kaiwhata river north, Site 14	27
Homewood Station low cliffs, Site 12	27
Failed slope, Flat Point north, Site 16	27
Faceted dunes, Site 3	27
Paraparaumu cuspate foreland, Site 26	27
Waitaki Boys High, Oamaru, Site 98	26
Sims Rd south, Site 23	26
Platform headland with fence, Site 5	26
Motukaraka Pt, Site 41	26
Matata barrier, Site 81	26
High cliffs, Kaiwhata north, Site 13	26
Eves Bay, Seatoun, Site 46	26
Bowentown, Tauranga Harbour, Site 91	26
Whareama Homestead, Site 2	25
Wattle Bay, Site 54	25
Ration Point, Site 40	25
Motunau Cliffs, DT4	25
Barton Marine, Site 42	24
Omokoroa, Tauranga Harbour, Site 90	23
Pourerere beach, Site 55	22
Turakirae Head, Site 37	21
Waipipi wharf road, Site 48	20
Te Toro road, Site 49	20
Racecourse road, Waiuku, Site 47	20
Maketu ignimbrite, Site 88	19
Lazy surveyor rock, Site 6	18
Whitianga Bay, Site 72	15
Whanarua Bay, Site 71	14
Lottin Point, Site 70	13
Whangamata upper harbour, Site 96	11

APPENDIX 9
Worked example of the CSI technique using Te Araroa, East Cape

1. Record the date, time, location.	1 April 1992: 1500hrs Te Araroa A (Z14 839 826)
2. Bcome familiar with the test site, looking for (a) evidence of landslip, and (b) the presence of dune control or restoration works, and recording this.	
3. Measure the elevation of the first immediate feature	Elevation = 1.5m above MHWS, rating = 5
4. Assess the level of storm wave run-up from field and anecdotal evidence and reports.	Te Araroa (Site 63): a 2.2-3.3 m level has been Calculated for Onepoto Bay (5km NW of Te Araroa), accompanying evidence in the form of logs and flotsam, rating 4.
5. Is the first immediate feature exceeded by the storm wave run-up level? **Yes:** the gradient is determinedas that behind the first feature **No:** overtopping= zero so the gradient is determined as the slope face of the first feature.	Te Araroa inland slope of approximately 1^{o}, rating= 5.
*6. From de Lange and Healy (1986a) determine the largest tsunami on record	Te Araroa: 3m tsunami wave observed in March 1868 from Chilean earthquake, rating= 3.
7. Confirm the lithology and landform by field.	Unconsolidated sands (and gravels) forming a observation. Sand/gravel beach, ratings= 5.
*8. From the long-term horizontal trend data, for each field site (can be done while travelling).	Te Araroa A (Site 63) is retreating at an average of 1.5m/yr assess the rate of erosion or accretion rating= 4 Gibb 1981).
*9. From the long-term trend data and from field inspection make an assessment of the short term fluctuation variable.	50m from Gibb (1981), rating= 5.
10. Take a photograph.	
*11. Calculate an initial CSI.	CSI= 36 out of a possible total of 40, very high sensitivity.

APPENDIX 10
Sea-level rise case study results

Results for Te Awanga, Hawkes Bay (Site 59) illustrating change in CSI only at the extreme IPCC level rise prediction.

Site	Elevation	Storm Wave Run-up (m)	Gradient (degrees)	CSI
Te Awanga (Site 59)	2.70	3.5	swale	35 (v. high)
2050 A.D. N.Z. average	2.60	3.5	swale	35
2050 A.D. x 2	2.50	3.5	swale	35
2050 A.D. x 6	2.11	3.5	swale	35
2100 A.D. N.Z. average	2.52	3.5	swale	35
2100 A.D. x 2	2.33	3.5	swale	35
2100 A.D. x 6	1.60	3.5	swale	36 (v. high)

Results for the Port of Napier (Site 62) showing a change in CSI only at the highest IPCC prediction.

Site	Elevation	Storm Wave Run-up (m)	Gradient (degrees)	CSI
Port of Napier (Site 62)	2.70	3.5	10	29 (high)
2050 A.D. N.Z. average	2.60	3.5	10	29
2050 A.D. x 2	2.50	3.5	10	29
2050 A.D. x 6	2.11	3.5	10	29
2100 A.D. N.Z. average	2.52	3.5	10	29
2100 A.D. x 2	2.33	3.5	10	29
2100 A.D. x 6	1.60	3.5	10	30 (high)

Results for the Matata Barrier (Site 81) illustrating that a change in CSI only occurs for the highest sea-level rise prediction of the IPCC.

Site	Elevation	Storm Wave Run-up (m)	Gradient (degrees)	CSI
Matata Barrier (Site 81)	6.10	5	11	26 (med.)
2050 A.D. N.Z. average	6.00	5	11	26
2050 A.D. x 2	5.90	5	11	26
2050 A.D. x 6	5.50	5	11	26
2100 A.D. N.Z. average	5.92	5	11	26
2100 A.D. x 2	5.73	5	11	26
2100 A.D. x 6	5.00*	5	11	27 (med.)

* Change in elevation + change in class and change in CSI

Results for Whakatane Spit (Site 86) illustrating an initial change in CSI due to inundation caused by sea-level rise but no further change.

Site	Elevation	Storm Wave Run-up (m)	Gradient (degrees)	CSI
Whakatane Spit (Site 86)	5.00	5	15 -20	29 (high)
2050 A.D. N.Z. average	4.90	5	swale*	32 (high)
2050 A.D. x 2	4.80	5	swale	32
2050 A.D. x 6	4.40	5	swale	32
2100 A.D. N.Z. average	4.82	5	swale	32
2100 A.D. x 2	4.63	5	swale	32
2100 A.D. x 6	3.90	5	swale	32 (high)

* The site became overtopped so the gradient was taken of the area inland which would be inundated.

Results for Whangamata Beach (Site 95) illustrating a change in CSI occurring at the highest IPCC predictions.

Site	Elevation	Storm Wave Run-up (m)	Gradient (degrees)	CSI
Whangamata Beach (Site 95)	5.70	4 -5	5 -10	27 (medium)
2050 A.D. N.Z. average	5.60	4 -5	5 -10	27
2050 A.D. x 2	5.50	4 -5	5 -10	27
2050 A.D. x 6	5.10	4 5	5 -10	27
2100 A.D. N.Z. average	5.50	4 -5	5 -10	27
2100 A.D. x 2	5.30	4 -5	5 -10	27
2100 A.D. x 6	4.60	4 -5	5 -10	28 (high)