Appendix A: Figures

- **Figure 1: Settlement Locations and Large Landslides (1:50,000)**
- **Figure 2: Settlement Locations And Active Gullies (1:50,000)**
- **Figure 3: Wainui Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 4: Tikao Bay & French Farm Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 5: Barrys Bay Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 6: Duvauchelle Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 7: Robinsons Bay Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 8: Takamatua Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 9: Akaroa Slope Hazard Susceptibility Zoning (1:10,000)**
- **Figure 10: Wainui Liquefaction Potential(1:10,000)**
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- **Figure 13: Duvauchelle Liquefaction Potential(1:10,000)**
- **Figure 14: Robinsons Bay Liquefaction Potential(1:10,000)**
- **Figure 15: Takamatua Liquefaction Potential(1:10,000)**
- **Figure 16: Akaroa Liquefaction Potential(1:10,000)**

DUVAUCHELLE

BARRYS BAY

TIKAO & FRENCH FARM

WAINUI

ROBINSONS BAY

TAKAMATUA

AKAROA

Pipers Valley Road

Wainui Dump

Takamatua

La Clare

Lighthouse Road

LEGEND

1: 10,000 Map Limits

Settlement Boundary

Bedrock Landslide Outline

Large Loess Bedrock Landslide Outline

SCALE 1: 50,000

0 500 1000 1500 2000 2500(m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements

Settlement Locations and Large Landslides

FIG. No. Figure 1

REV. 1

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ROBINSONS BAY

TAKAMATUA

BARRYS BAY

TIKAO & FRENCH FARM

AKAROA

WAINUI

LEGEND

1: 10,000 Map Limits

Settlement Boundary

Active Gully

SCALE 1: 50,000

0 500 1000 1500 2000 2500(m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Settlement Locations and Active Gullies

FIG. No. Figure 2

REV. 1

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Wainui

N

Settlement boundry

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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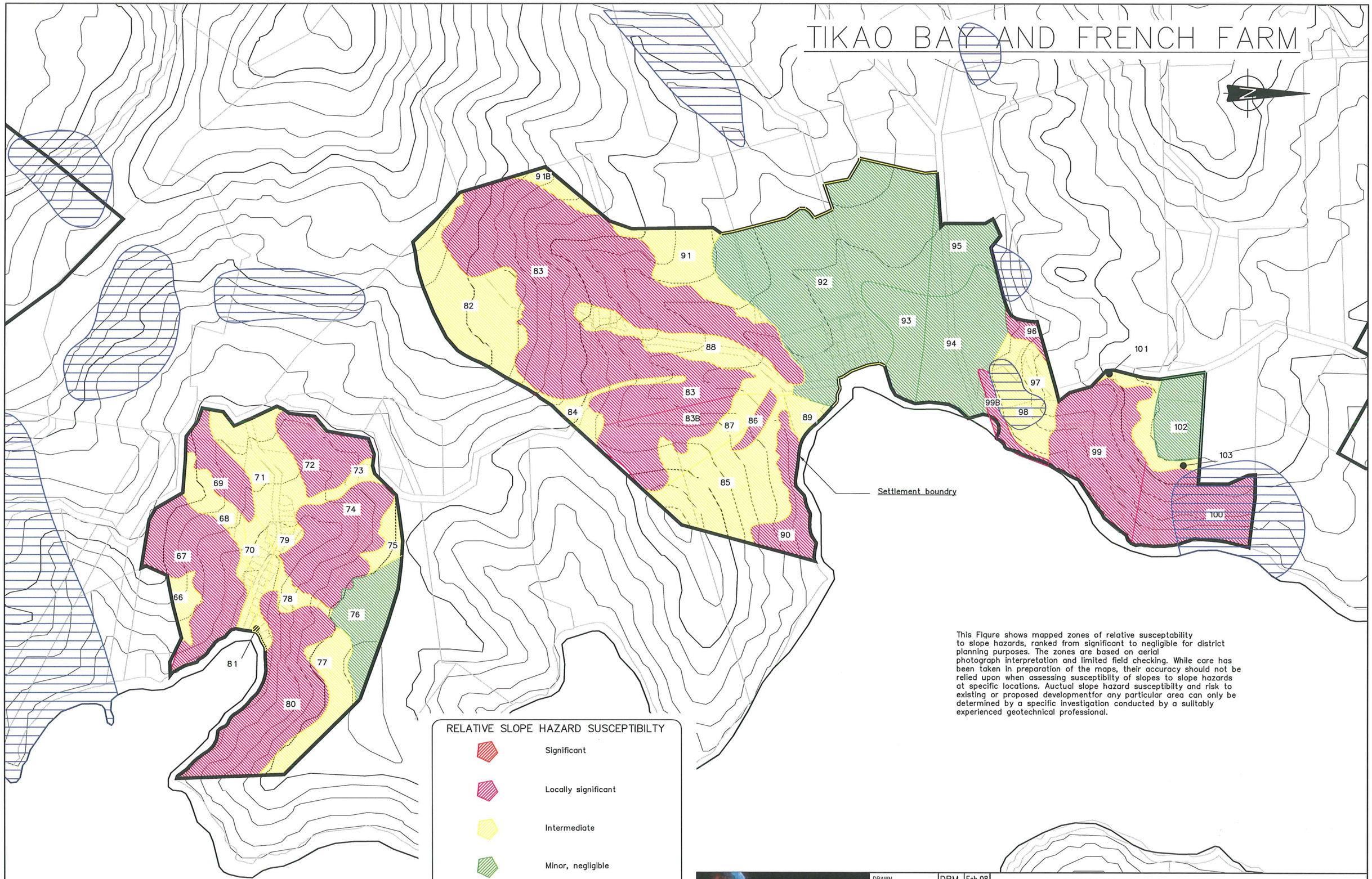
SLOPE HAZARD SUSCEPTIBILTY AKAROA HARBOUR SETTLEMENTS

Wainui

FIG. No. Figure 3

REV. 1

TIKAO BAY AND FRENCH FARM



This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

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SLOPE HAZARD SUSCEPTIBILTY AKAROA HARBOUR SETTLEMENTS

Tikao Bay and French Farm

FIG. No. Figure 4 REV. 1

BARRYS BAY

N

Settlement Boundary

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

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SLOPE HAZARD SUSCEPTIBILTY
AKAROA HARBOUR SETTLEMENTS
Barrys Bay

FIG. No. Figure 5 REV. 1

P:\51152\WorkingMaterial\CAD\erosion F03-09xr.dwg, FIGURE 5, 3/06/2008 11:10:21 a.m., 1:1

DUVAUCHELLE

Settlement Boundary

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

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SLOPE HAZARD SUSCEPTIBLITY
AKAROA HARBOUR SETTLEMENTS
Duvauchelle

FIG. No. Figure 6 REV. 1

ROBINSONS BAY

N

Settlement boundary

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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SLOPE HAZARD SUSCEPTIBLITY
AKAROA HARBOUR SETTLEMENTS
Robinsons Bay

FIG. No. Figure 7 REV. 1

P:\51152\WorkingMaterial\CAD\erosion F03-09xr.dwg, FIGURE 7, 3/06/2008 11:11:13 a.m., 1:1

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

TAKAMATUA

Settlement Boundary

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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SLOPE HAZARD SUSCEPTIBLITY
AKAROA HARBOUR SETTLEMENTS
Takamatua

FIG. No. Figure 8 REV. 1

P:\51152\WorkingMaterial\CAD\erosion F03-09xr.dwg, FIGURE 8, 3/06/2008 11:11:35 a.m., 1:1

This Figure shows mapped zones of relative susceptability to slope hazards, ranked from significant to negligible for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibilty of slopes to slope hazards at specific locations. Auctual slope hazard susceptibilty and risk to existing or proposed developmentfor any particular area can only be determined by a specific investigation conducted by a suiitably experienced geotechnical professional.

AKAROA

Settlement Boundary

RELATIVE SLOPE HAZARD SUSCEPTIBILTY

- Significant
- Locally significant
- Intermediate
- Minor, negligible
- Bedrock Landslide

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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SLOPE HAZARD SUSCEPTIBLITY
AKAROA HARBOUR SETTLEMENTS
Akaroa

FIG. No. Figure 9 REV. 1

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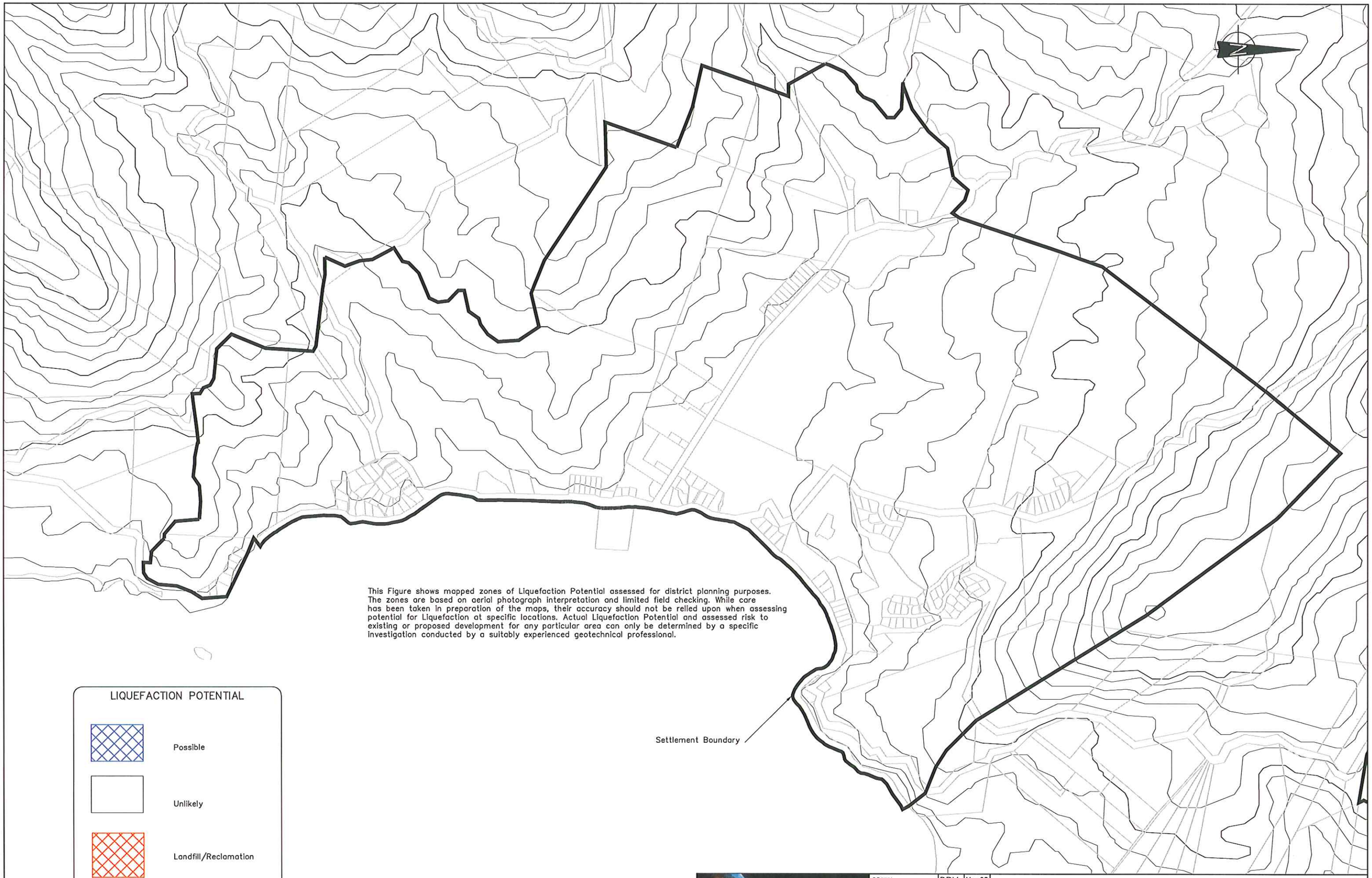

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SLOPE HAZARD SUSCEPTIBILTY
AKAROA HARBOUR SETTLEMENTS
Wainui Liquefaction Potential

FIG. No. Figure 10 REV. 1

This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

N

Settlement Boundary

Settlemer

LIQUEFACTION POTENTIAL

- Possible
- Unlikely
- Landfill/Reclamation

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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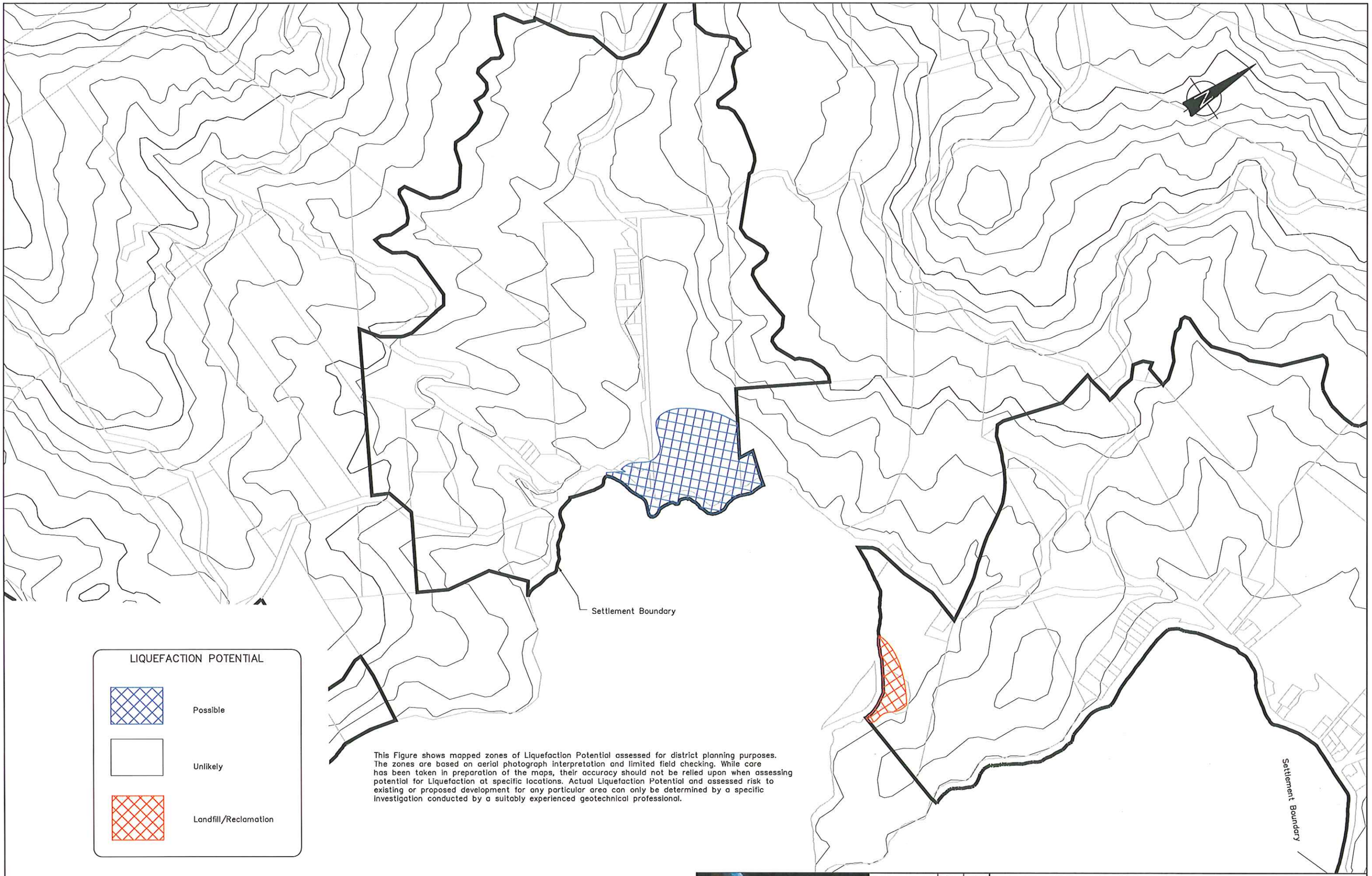
SLOPE HAZARD SUSCEPTIBILTY
AKAROA HARBOUR SETTLEMENTS
Tikao Bay & french farm Liquefaction Potential

FIG. No. Figure 11 REV. 1



LIQUEFACTION POTENTIAL

Possible

Unlikely

Landfill/Reclamation

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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SLOPE HAZARD SUSCEPTIBILTY AKAROA HARBOUR SETTLEMENTS
Barrys Bay Liquefaction Potential

FIG. No. Figure 12 REV. 1

Settlement Boundary

LIQUEFACTION POTENTIAL

Possible

Unlikely

Landfill/Reclamation

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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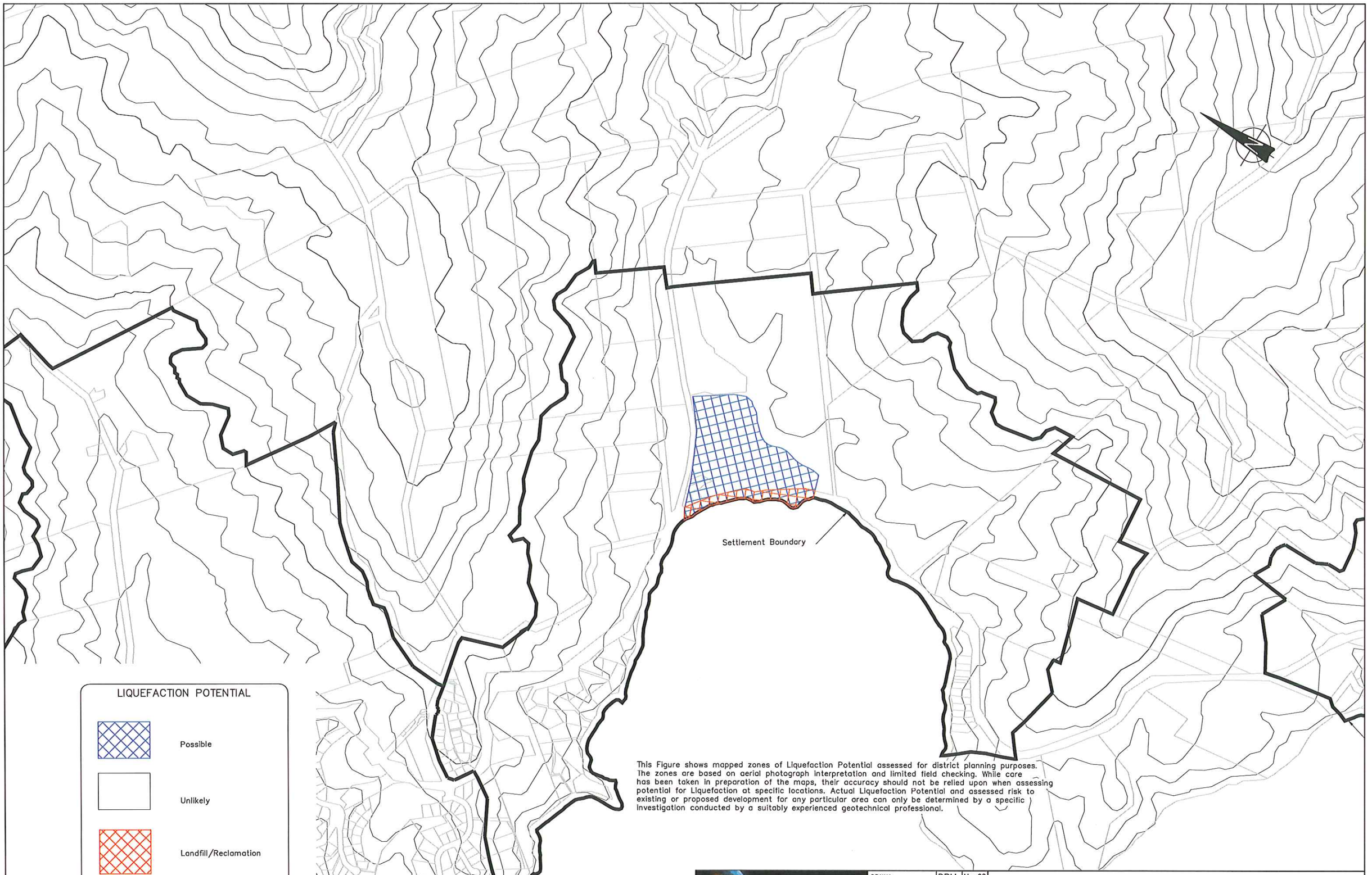
SLOPE HAZARD SUSCEPTIBILTY AKAROA HARBOUR SETTLEMENTS
Duvauchelle Liquefaction Potential

FIG. No. Figure 13 REV. 1



This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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CHRISTCHURCH CITY COUNCIL
SLOPE HAZARD SUSCEPTIBILTY
AKAROA HARBOUR SETTLEMENTS
Robinsons Bay Liquefaction Potential

FIG. No. Figure 14 REV. 1

Settlement Boundary

LIQUEFACTION POTENTIAL

Possible

Unlikely

Landfill/Reclamation

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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SLOPE HAZARD SUSCEPTIBILTY AKAROA HARBOUR SETTLEMENTS

Takamatua Liquefaction Potential

FIG. No. Figure 15

REV. 1

This Figure shows mapped zones of Liquefaction Potential assessed for district planning purposes. The zones are based on aerial photograph interpretation and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing potential for Liquefaction at specific locations. Actual Liquefaction Potential and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

Settlement Boundary

N

LIQUEFACTION POTENTIAL

- Possible
- Unlikely
- Landfill/Reclamation

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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SLOPE HAZARD SUSCEPTIBILTY
AKAROA HARBOUR SETTLEMENTS
Akaroa Liquefaction Potential

FIG. No. Figure 16 REV. 1

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Appendix B: Slope Hazard Susceptibility Tables

- **Basis for Zones**
- **Wainui Zones Scores**
- **Tikao French Farm Zones Scores**
- **Barrys Bay Zones Scores**
- **Duvauchelle Zones Scores**
- **Robinsons Bay Zones Scores**
- **Takamatua Zones Scores**
- **Akaroa Zones Scores**

Akaroa Slope Hazard Susceptibility
Basis for Zones

Existing Large landslide, Loess/bedrock

Yes	Significant (S)
No	Calculate score

Susceptibility Score

Active Gully Areas	50
Slope Angle	15
Slope Aspect	10
Geology	10
Debris Runout	10
Hydrology	5
Total	100

Susceptibility Rating

Locally Significant (LS)	70 to 100
Intermediate (I)	37 to 69
Minor (M)	25 to 36
Negligible (N)	17 to 24

17 lowest possible score
Presence of Bedrock Landslide is flagged but does not change the score
The susceptibility is not directly proportional to the actual numerical score

Active Gully Area	Yes	50
	No	10
Slope Angle	0 to10	2
	11 to 15	10
	16 to 25	15
	26 to 30	10
	>30	5
Slope Aspect	N	10
	W	6
	SW	6
	SW	5
	NE	5
	SE	3
	E	2
	NW	2
Geology	Loess/Colluvium	10
	Bedrock/volc soil	4
	Alluvium	0
Debris Runout (and rockfall)	Likley	10
	Possible	5
	Unlikley	0
Hydrology/ Upslope Length	100 to >300m	5
	<100m	3

Score Ranges

Highest Active Gully	50+15+10+10+10+5	100	Must be Locally Significant
Lowest Active Gully	50+2+2+10+5+3	72	Must be Locally Significant
Highest non Gully Slope	10+15+10+10+10+5	60	Must be Intermediate
Lowest Non Gully Slope (Loess)	10+2+2+10+0+3	27	Must be Minor
Lowest Non Gully Slope (Volc)	10+2+2+4+0+3	21	Negligible, OK
Highest Alluvium area	10+2+10+0+10+5	37	Must be Intermediate?
Mid Alluvium Area	10+2+2+0+10+3	27	Must be Minor
Lowest Alluvium Area	10+2+2+0+0+3	17	Must be Negligible
Highest score slope where Large Landslide can occur	50+10+10+10+10+5	95	Can be Locally Significant
Lowest score slope where Large Landslide can occur	10+2+2+10+0+3	25	Can be Minor

Akaroa Slope Hazard Susceptibility
Wainui Zones

	Scores						Total		Zone Rating
Number	Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water		Bedrock Landslide	
1	50	15	2	10	10	3	90		LS
2	10	10	2	10	0	3	35		M
3	10	15	2	10	5	3	45		I
4	50	15	5	10	10	5	95		LS
5	10	2	5	10	0	3	30		M
6	10	10	5	10	5	3	43		I
7	50	15	5	10	10	5	95		LS
8	10	15	5	10	5	3	48		I
9	10	2	5	10	0	3	30		M
10	10	15	5	10	5	3	48		I
11	10	10	5	10	0	3	38	Y	I
12	10	10	5	10	10	5	50	Y	I
13	10	2	5	10	5	3	35		M
14	10	10	3	10	5	5	43	Y	I
15	10	15	3	10	5	5	48	Y	I
16	50	15	3	10	10	5	93		LS
17	50	15	3	10	10	3	91		LS
18	10	10	3	10	5	3	41	Y	I
19	10	15	3	10	0	3	41	Y	I
20	10	15	3	10	0	3	41		I
21	10	10	3	10	0	3	36		M
22	10	15	3	10	0	3	41		I
23	50	15	3	10	10	5	93		LS
24	10	10	3	10	5	5	43		I
25	10	10	5	10	0	3	38		I
26	10	15	5	10	5	5	50		I
27	10	10	5	10	5	5	45		I
27B	10	15	5	10	5	5	50		I
28	50	15	5	10	10	5	95		LS
29	10	15	5	10	5	3	48		I
30	50	15	5	10	10	5	95		LS
31	10	10	5	10	5	3	43		I
32	10	15	5	10	5	5	50		I
33	10	10	5	10	5	5	45		I
34	10	15	5	10	5	5	50		I
35	50	10	5	10	5	3	83	Y	LS
36	10	10	5	10	5	5	45	Y	I
37	10	15	5	10	10	5	55	Y	I
38	10	15	5	10	5	3	48		I
39	10	2	5	10	5	5	37		I
40	10	10	5	10	5	3	43	Y	I
41	10	2	5	10	5	5	37	Y	I
42	10	2	5	0	5	5	27		M
43	10	2	5	10	5	5	37		I
44	10	15	5	10	5	5	50	Y	I
45	10	15	5	10	5	5	50		I
46	50	10	5	10	10	5	90		LS
47	50	10	5	10	10	5	90		LS
48	10	10	5	10	5	5	45		I
49	10	2	5	10	0	5	32		M
49B	10	2	5	0	5	5	27		M
49C	10	10	5	10	5	5	45		I
49D	10	2	5	10	0	5	32		M
50	10	10	5	10	5	5	45		I
51	10	15	5	10	5	5	50		I
52	Large landslide								S
53	50	10	5	10	10	5	90		LS
54	10	15	6	10	5	5	51		I
55	10	2	6	10	10	5	43		I
56	10	2	2	4	0	3	21		N
57	10	15	6	4	5	5	45		I
58	10	10	6	4	10	5	45		I
59	10	10	6	4	10	5	45	Y	I
60	10	10	6	4	10	5	45		I
61	50	10	6	4	10	5	85		LS
62	10	15	6	10	10	5	56		I
63	10	15	6	4	5	5	45		I
64	10	2	6	4	0	3	25		M
65	10	10	6	10	5	3	44	Y	I

Akaroa Slope Hazard Susceptibility
Taiko-French Farm Zones

	Scores						Total		Zone Rating
Number	Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water		Bedrock Landslide	
66	10	15	10	10	5	3	53		I
67	50	15	10	10	10	5	100		LS
68	10	15	10	10	0	3	48		I
69	50	15	10	10	10	5	100		LS
70	10	15	2	10	5	5	47		I
71	10	10	2	10	5	5	42		I
72	50	10	2	10	10	5	87		LS
73	10	15	5	10	5	5	50		I
74	50	15	5	10	10	5	95		LS
75	10	15	5	10	5	3	48		I
76	10	2	5	10	0	3	30		M
77	10	10	5	10	5	3	43		I
78	10	15	5	10	0	3	43		I
79	10	2	5	10	10	5	42		I
80	50	10	5	10	10	5	90		LS
81	10	15	5	10	10	5	55		I
82	10	2	10	10	5	5	42		I
83	50	15	10	10	10	5	100		LS
83B	50	15	6	10	10	5	96		LS
84	10	15	10	10	5	3	53		I
85	10	15	10	10	5	5	55		I
86	50	15	10	10	10	5	100		LS
87	10	15	6	10	5	5	51		I
88	10	10	10	10	10	5	55		I
89	10	2	10	10	5	5	42		I
90	50	15	10	10	10	5	100		LS
91	10	10	10	10	5	3	48		I
91B	10	15	10	10	0	3	48		I
92	10	2	6	10	0	5	33		M
93	10	2	10	0	0	5	27		M
94	10	2	5	0	0	5	22		N
95	10	2	5	10	0	5	32		M
96	50	15	5	10	5	5	90		LS
97	10	10	5	10	5	5	45		I
98	10	10	5	10	5	5	45	Y	I
99B	10	10	5	10	5	5	45	Y	I
99	50	10	5	10	10	5	90		LS
100	50	15	2	10	10	5	92		LS
101	10	15	5	10	5	3	48		I
102	10	2	2	10	0	3	27		M
103	10	15	2	10	5	3	45		I

Akaroa Slope Hazard Susceptibility
Barrys Bay Zones

	Scores						Total		Zone Rating
Number	Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water		Bedrock Landslide	
104	10	15	5	10	5	5	50		I
105	50	15	5	10	10	5	95		LS
106	10	10	5	10	5	5	45		I
107	50	10	5	10	10	5	90		LS
108	10	10	5	10	5	5	45		I
109	10	2	5	10	0	3	30		M
110	50	10	5	10	10	5	90		LS
111	10	2	5	10	0	5	32		M
112	50	15	5	10	10	5	95		LS
113	10	15	5	10	5	3	48		I
114	50	15	5	10	10	5	95		LS
115	10	10	5	10	5	5	45		I
116	50	10	5	10	10	5	90		LS
117	10	10	5	10	5	5	45		I
118	10	2	5	10	0	5	32		M
119	10	15	5	10	5	5	50		I
120	10	2	5	10	5	5	37		I
121	10	15	5	10	5	5	50		I
122	50	10	5	10	10	5	90		LS
123	10	2	5	10	0	5	32	Y	M
124	50	2	5	10	10	5	82		LS
125	10	2	5	10	0	5	32		M
126	10	2	6	10	5	5	38		I
127	50	2	6	10	10	5	83	Y	LS
128	Large Landslide								S
129	10	10	6	10	5	5	46	Y	I
130	10	2	6	10	5	5	38	Y	I
131	10	2	5	10	5	5	37	Y	I
132	10	2	5	10	0	5	32		M
133	10	2	6	0	5	5	28		M
134	10	2	6	10	5	5	38		I
135	10	10	6	10	5	5	46	Y	I
136	50	15	6	10	10	5	96	Y	LS
137	10	15	6	10	5	5	51	Y	I
138	50	15	6	10	10	5	96	Y	LS
139	50	15	6	10	10	5	96	Y	LS

Akaroa Slope Hazard Susceptibility
Duvauchelle Zones

Number	Scores Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water	Total	Bedrock Landslide	Zone Rating
140	10	2	3	0	0	5	20		N
141	10	2	6	0	0	5	23		N
142	50	10	6	10	10	3	89		LS
143	50	10	3	10	10	5	88		LS
144	10	2	3	10	5	5	35		M
145	10	10	3	10	5	5	43		I
146	10	10	3	10	5	5	43		I
147	50	15	3	10	10	5	93		LS
148	50	10	2	10	10	5	87		LS
149	10	10	2	10	5	3	40		I
150	10	10	2	10	5	3	40	Y	I
151	10	10	6	10	5	3	44		I
152	10	10	2	10	0	3	35		M
153	50	10	3	10	10	5	88		LS
154	10	2	3	10	0	5	30		M
154B	10	2	3	0	0	5	20		N
155	10	10	3	10	10	5	48		I
156	10	10	3	10	5	3	41	Y	I
157	50	10	3	10	10	5	88	Y	LS
157B	50	10	3	10	10	5	88	Y	LS
158	50	10	3	10	10	5	88	Y	LS
159	10	15	3	10	5	3	46	Y	I
160	10	10	3	10	5	5	43		I
161	10	2	3	10	0	5	30		M
162	10	2	6	10	5	5	38		I
163	10	15	6	10	5	3	49		I
164	50	10	6	10	10	5	91		LS
165	10	15	6	10	0	3	44		I
166	10	2	6	10	5	5	38		I
167	10	10	6	10	5	5	46		I
168	50	15	6	10	10	5	96		LS
169	50	15	6	10	10	5	96		LS
170	10	10	6	10	5	5	46		I
171	10	10	6	10	0	3	39		I
172	Large Landslide								S
173	50	15	6	10	10	5	96		LS
173B	50	15	6	10	10	5	96		LS
174	10	2	6	10	0	5	33		M
174B	10	2	6	0	0	5	23		N
175	10	15	6	10	5	5	51		I
176	50	15	6	10	10	5	96		LS
177	Large Landslide								S
178	Large Landslide								S
179	10	10	6	10	5	3	44		I
180	10	15	3	10	5	5	48		I
180B	10	10	3	4	10	5	42	Rock Quarry	I
181	50	15	3	10	10	5	93		LS
182	10	15	3	10	5	3	46		I
183	50	10	3	10	10	5	88		LS
183B	50	10	3	10	10	5	88		LS
184	Large Landslide								S
185	10	15	3	10	0	3	41		I
186	10	15	3	10	0	3	41		I
187	50	10	3	10	10	5	88		LS
188	10	2	3	10	5	5	35		M
189	10	15	3	10	5	5	48		I
190	10	2	3	10	5	5	35		M
191	10	2	3	0	0	5	20		N
192	10	2	2	0	0	5	19		N
193	10	2	2	10	5	5	34		M
194	10	2	2	10	5	5	34		M
195	10	10	2	10	5	5	42		I
196	50	15	2	10	10	5	92		LS
197	10	15	2	10	0	3	40		I
198	10	15	2	10	5	5	47		I
199	50	10	2	10	10	5	87		LS
200	10	10	2	10	5	5	42		I
201	10	15	2	10	5	5	47		I
202	50	10	2	10	10	5	87		LS
203	10	15	2	10	0	5	42		I
204	50	15	2	10	10	5	92		LS
204B	Large Landslide								S
204C	10	15	2	10	0	5	42		I
204D	50	15	2	10	10	5	92		LS
205	10	10	2	10	5	5	42		I
206	10	15	2	10	5	5	47		I
207	50	15	2	10	10	5	92		LS
208	10	15	2	10	0	3	40		I
209	10	10	2	10	5	5	42		I
210	50	10	2	10	10	5	87		LS
211	50	15	2	10	10	5	92		LS
212	10	10	2	10	10	5	47		I
213	10	10	2	10	5	5	42		I
214	50	10	2	10	10	5	87		LS
215	10	10	2	10	10	5	47		I
216	50	15	2	10	10	5	92		LS
217	10	15	2	10	5	5	47		I
218	50	10	2	10	10	5	87		LS
219	10	10	5	10	5	3	43		I
220	50	15	5	10	10	5	95		LS

Akaroa Slope Hazard Susceptibility
Robinsons Bay Zones

Number	Scores Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water	Total	Bedrock Landslide	Zone Rating
221	10	15	3	10	10	3	51		I
222	50	15	3	10	10	5	93		LS
223	10	10	3	10	5	5	43		I
224	10	2	3	10	0	3	28		M
224B	Large Landslide								S
225	10	10	3	10	5	5	43	Y	I
226	50	10	3	10	10	5	88	Y	LS
227	10	15	3	10	5	3	46	Y	I
228	50	10	3	10	10	5	88	Y	LS
229	50	15	3	10	10	5	93	Y	LS
230	10	10	3	10	5	5	43	Y	I
231	10	10	3	10	10	5	48	Y	I
232	50	10	3	10	10	5	88	Y	LS
233	10	10	3	10	10	3	46	Y	I
234	10	2	3	10	5	5	35	Y	M
235	10	10	3	10	5	5	43		I
236	10	2	3	10	5	5	35		M
237	10	15	3	10	5	3	46		I
238	10	10	3	10	5	5	43		I
239	10	15	2	10	5	5	47		I
240	50	10	2	10	10	5	87		LS
241	10	2	2	10	0	5	29		M
242	10	10	3	10	5	5	43		I
243	10	2	3	0	0	5	20		N
244	10	2	2	0	5	5	24		N
245	10	2	2	10	5	5	34		M
246	10	2	2	10	5	5	34		M
247	50	10	2	10	10	5	87		LS
248	10	10	2	10	5	5	42		I
249	50	10	2	10	10	5	87		LS
249B	50	10	2	10	10	5	87		LS
250	10	10	2	10	5	5	42		I
251	10	2	2	10	0	5	29		M
252	50	2	2	10	10	5	79		LS
253	50	10	2	10	10	5	87		LS
254	10	10	2	10	5	5	42		I
255	10	10	2	10	5	5	42		I
255B	10	10	2	10	5	5	42		I
256	50	15	2	10	10	5	92		LS
257	50	10	10	10	10	5	95		LS
258	10	10	10	10	0	3	43		I
259	10	10	10	10	5	5	50		I
260	10	10	10	10	5	5	50		I
261	50	10	10	10	5	5	90		LS
262	50	15	10	10	10	5	100		LS
263	10	15	10	10	5	5	55		I
264	50	15	10	10	10	5	100		LS
265	10	15	10	10	5	5	55		I
266	50	10	10	10	10	5	95		LS

Akaroa Slope Hazard Susceptibility
Takamatua Zones

	Scores						Total		Zone Rating
Number	Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water		Bedrock Landslide	
267	50	10	3	10	10	3	86		LS
268	10	2	3	10	0	5	30		M
269	10	10	3	10	5	5	43		I
270	50	15	3	10	10	5	93		LS
271	10	2	3	10	5	5	35		M
272	10	10	3	10	5	5	43		I
273	10	10	3	10	5	5	43	Y	I
274	10	2	3	10	5	5	35	Y	M
275	50	15	3	10	10	5	93	Y	LS
276	50	10	3	10	5	5	83	Y	LS
277	10	15	5	10	5	5	50		I
278	50	15	5	10	10	5	95		LS
279	50	15	6	10	10	5	96		LS
280	50	15	6	10	10	5	96	Y	LS
281	10	10	6	10	5	5	46		I
282	50	15	6	10	10	5	96		LS
283	10	10	3	10	5	3	41		I
284	50	15	3	10	10	5	93		LS
285	10	10	3	10	5	5	43		I
286	50	10	3	10	10	5	88		LS
287	50	15	3	10	10	5	93		LS
288	10	2	3	10	0	5	30		M
289	50	10	3	10	10	5	88		LS
290	10	10	3	10	5	5	43		I
291	50	10	2	10	10	5	87		LS
292	50	10	2	10	10	5	87		LS
293	50	10	2	10	10	5	87		LS
294	50	10	2	10	10	5	87		LS
295	50	10	2	10	10	5	87		LS
296	10	10	2	10	5	5	42		I
297	10	2	2	10	5	5	34		M
298	10	2	6	10	0	5	33		M
299	10	2	5	10	0	5	32		M
300	10	2	3	0	0	5	20		N
300B	10	2	3	0	0	5	20		N
301	10	2	10	0	0	5	27		M
302	Large Landslide								S
303	10	2	10	10	0	5	37		I
304	10	10	10	10	0	5	45		I
305	50	10	10	10	10	5	95		LS
306	10	10	10	10	5	5	50		I
307	50	10	10	10	10	5	95		LS
308	10	10	10	10	5	5	50		I
309	50	10	10	10	10	5	95		LS
310	10	10	10	10	5	5	50		I
311	50	10	10	10	10	5	95		LS
312	50	10	10	10	10	5	95		LS
313	10	2	10	10	0	3	35		M
314	10	10	10	10	5	5	50		I
315	50	10	10	10	10	5	95		LS
316	50	10	10	10	10	5	95		LS
317	50	10	10	10	10	5	95		LS
318	10	2	10	10	0	3	35		M
319	50	10	10	10	10	5	95		LS
320	Large Landslide								S
321	10	10	10	10	0	3	43		I
322	50	10	10	10	10	5	95		LS
323	10	10	10	10	5	5	50		I
324	Large Landslide								S
325	50	10	10	10	10	5	95		LS
326	50	10	10	10	10	5	95		LS
327	50	10	10	10	10	5	95		LS
328	10	2	10	10	5	5	42		I
329	50	10	10	10	10	3	93		LS
330	10	15	10	10	5	5	55		I
331	50	15	10	10	10	5	100		LS
332	50	15	10	10	10	5	100		LS
333	50	10	10	10	10	5	95		LS
334	10	10	10	10	5	5	50		I
335	50	10	10	10	10	5	95		LS

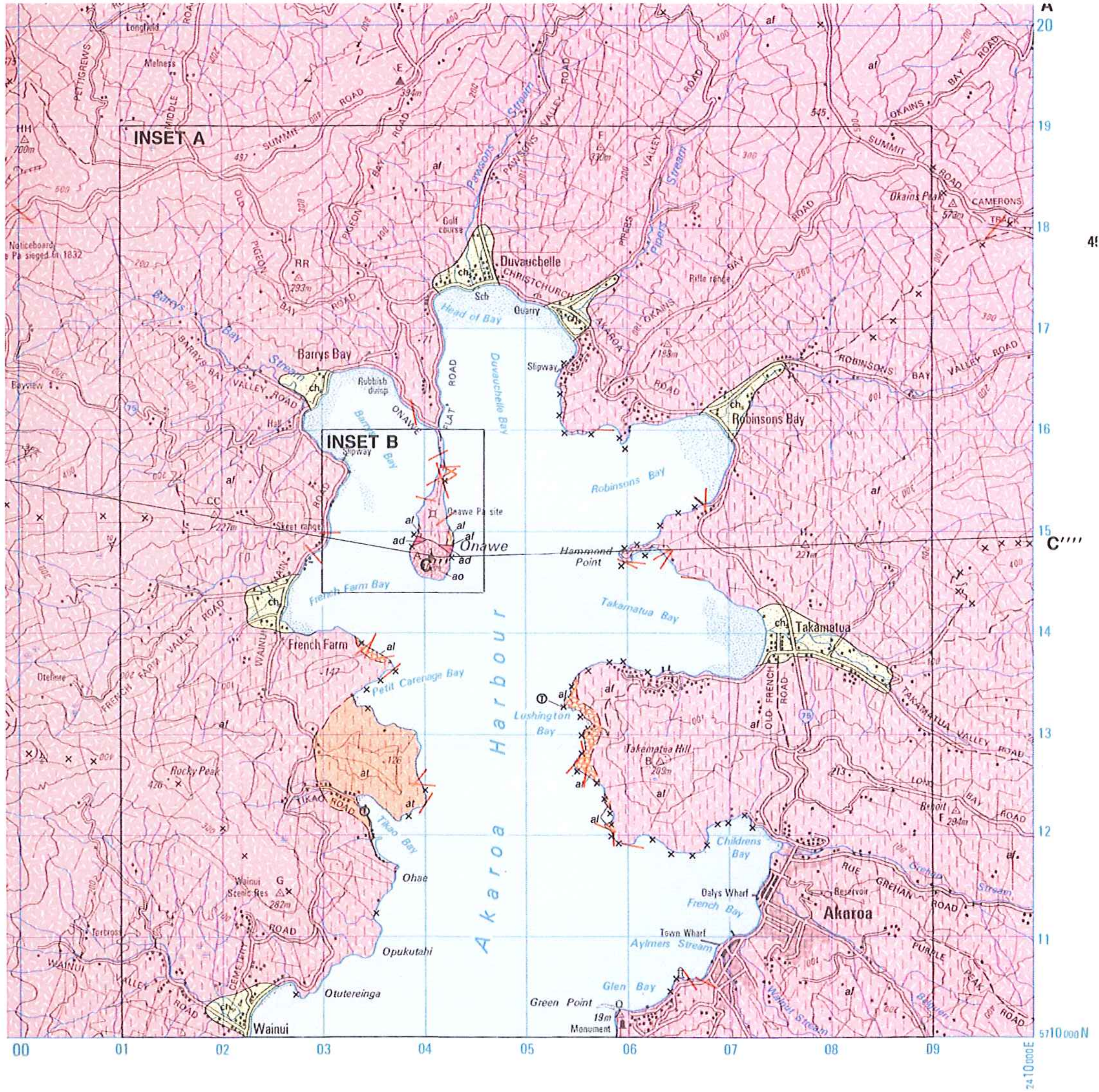
Akaroa Slope Hazard Susceptibility
Akaroa Zones

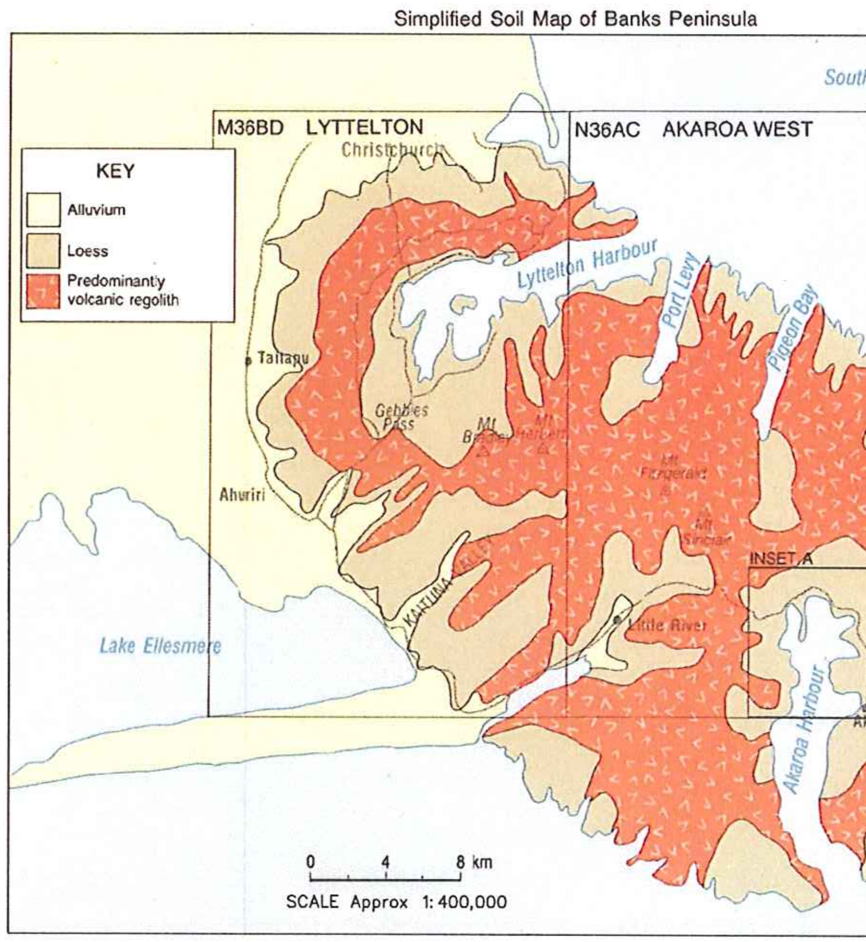
	Scores						Total		Zone Rating
Number	Active Gully	Slope Angle	Slope Aspect	Geology	Debris Runout	Water		Bedrock Landslide	
336	50	15	3	10	10	5	93	Y	LS
337	10	10	3	10	5	5	43	Y	I
338	50	10	3	10	10	5	88	Y	LS
339	10	10	3	10	0	5	38		I
340	50	10	3	10	10	5	88	Y	LS
341	10	10	3	10	5	5	43	Y	I
342	50	10	6	10	10	5	91		LS
342B	10	10	3	10	5	5	43	Y	I
343	10	10	6	10	5	5	46		I
344	10	10	6	10	5	5	46		I
345	50	10	6	10	10	5	91		LS
346	10	10	6	10	5	5	46		I
347	10	15	6	10	5	5	51		I
348	10	10	6	10	5	5	46		I
349	10	2	6	10	0	5	33		M
350	10	15	6	10	5	5	51		I
351	10	2	6	10	5	5	38		I
352	50	15	6	10	10	5	96		LS
353	50	10	6	10	10	5	91	Y	LS
354	10	2	6	10	0	5	33	Y	M
355	10	15	6	10	5	5	51	Y	I
356	10	10	6	10	5	5	46	Y	I
357	50	15	6	10	10	5	96	Y	LS
358	10	10	6	10	5	5	46	Y	I
359	50	10	6	10	10	5	91		LS
360	50	10	6	10	10	5	91		LS
361	10	2	6	10	0	5	33		M
362	10	2	6	0	0	5	23		N
363	10	2	6	0	0	5	23		N
364	10	2	10	10	0	3	35		M
365	10	2	10	10	0	3	35		M
366	50	10	10	10	10	5	95		LS
367	10	10	10	10	5	5	50		I
368	50	15	10	10	10	5	100		LS
369	10	10	10	10	5	5	50		I
370	10	10	10	10	5	3	48	Y	I
371	10	2	6	10	0	5	33		M
372	10	2	6	10	5	5	38		I
373	50	10	6	10	10	5	91		LS
374	10	10	6	10	5	5	46	Y	I
374B	10	10	6	10	5	5	46	Y	I
375	50	10	6	10	10	5	91	Y	LS
375B	50	10	6	10	10	5	91	Y	LS
376	50	10	6	10	10	5	91	Y	LS
377	10	10	6	10	5	5	46	Y	I
378	50	10	6	10	10	5	91	Y	LS
379	10	10	10	10	5	5	50		I
380	50	10	10	10	10	5	95	Y	LS
381	50	15	10	10	10	5	100		LS
382	10	10	10	10	0	5	45		I
383	10	2	10	10	0	3	35		M
384	10	10	10	10	5	5	50		I
385	50	10	10	10	10	5	95		LS
386	50	10	6	10	10	5	91		LS
387	10	10	6	10	5	5	46		I
388	10	10	6	10	5	5	46		I
389	50	15	6	10	10	5	96		LS
390	50	15	6	10	10	5	96	Y	LS
391	10	10	6	10	5	5	46	Y	I
392	50	10	6	10	10	5	91	Y	LS
393	10	10	6	10	5	5	46		I
394	10	2	5	10	0	5	32		M
395	50	10	5	10	10	5	90		LS
396	10	2	6	10	0	5	33		M
397	10	10	6	10	5	5	46		I
398	50	10	6	10	10	5	91		LS
399	10	2	6	10	0	3	31		M
400	10	10	6	10	5	5	46		I
401	50	15	6	10	10	5	96	Y	LS
402	10	10	6	10	5	5	46	Y	I
403	50	10	6	10	10	5	91	Y	LS
404	10	15	6	10	5	5	51	Y	I
405	10	2	10	10	0	3	35		M
406	10	10	10	10	5	5	50		I
407	10	10	10	10	5	5	50		I
407B	50	10	10	10	10	5	95		LS
408	10	15	10	10	5	5	55		I
409	50	10	10	10	10	5	95		LS
410	50	10	10	10	10	5	95		LS
411	Large Landslide*								I
412	10	10	10	4	5	5	44		I
413	10	10	10	10	5	3	48		I
414	10	10	6	10	5	5	46		I
415	50	15	6	10	10	5	96		LS
416	10	10	6	10	5	5	46		I
417	50	10	6	10	10	5	91		LS
418	10	15	10	10	5	5	55		I
418A	50	10	10	10	10	5	95		LS
419	Large Landslide								S
420	50	15	10	10	10	5	100		LS
421	10	10	6	10	5	5	46		I
422	10	15	10	10	0	3	48		I

* Lighthouse Road Landslide has been remediated by slope unloading and drainage.

Appendix C: Supporting Figures

- **Figure C1: Geology**
- **Figure C2: Slope Aspect Divisions**
- **Figure C3: Wainui Air Photo Interpretation (1:10,000)**
- **Figure C4: Tikao French Farm Air Photo Interpretation (1:10,000)**
- **Figure C5: Barrys Bay Air Photo Interpretation (1:10,000)**
- **Figure C6: Duvauchelle Air Photo Interpretation (1:10,000)**
- **Figure C7: Robinsons Bay Air Photo Interpretation (1:10,000)**
- **Figure C8: Takmatua Air Photo Interpretation (1:10,000)**
- **Figure C9: Akaroa Air Photo Interpretation (1:10,000)**
- **Figure C10: Wainui Slope Angles (20m Contours)**
- **Figure C11: Tikao French Farm Slope Angles (20m Contours)**
- **Figure C12: Barrys Bay Slope Angles (20m Contours)**
- **Figure C13: Duvauchelle Slope Angles (20m Contours)**
- **Figure C14: Robinsons Bay Slope Angles (20m Contours)**
- **Figure C15: Takmatua Slope Angles (20m Contours)**
- **Figure C16: Akaroa Slope Angles (20m Contours)**
- **Figure C17: location of 2m contour data (1:50,000)**





LEGEND

Christchurch Formation (ch)

Dominantly fixed dune sand and beach deposits chs — ch_s | ch_p — Dominantly saline silt and beach deposits chp.

Description	Formation
Flow-banded, blue-grey to black, fine grained, aphyric basalt *(ae)*	Te Oka Formation *(ae)*
Columnar-jointed, blue-black, medium grained, plagioclase-pyroxene-olivine phyric and aphyric basalt *(am)*	Mt Sinclair Formation *(am)*
Massive, dark grey to black, olivine gabbro *(ad)*	Duvauchelle Gabbro *(ad)*
Light brown to yellow, open-textured syenite *(ao)*	Onawe Syenite *(ao)*
Blue-black, medium to fine grained, clinopyroxene-olivine-plagioclase phyric and aphyric basalt *(af)*	French Hill Formation *(af)*
Cream to light grey, weakly stratified, matrix-to clast-supported, angular to subrounded, trachytic breccia *(al)*	Lushington Breccia *(al)*
Dark green to grey, coarse and fine grained, sparsely feldspar phyric trachyte *(at)*	Tikao Trachyte *(at)*

Dike (>3 m thick)

SCALE 1: 50,000
0 500 1000 1500 2000 2500(m)

Part of Geology of Akaroa West, Sheet N36AC
N.Z. Geological Survey. 1990

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CHRISTCHURCH CITY COUNCIL
Slope Hazard Susceptability
Akaroa Harbour Settlements
Geology

FIG. No. Figure C. 1 REV. 0

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DUVAUCHELLE

BARRYS BAY

TIKAO & FRENCH FARM

WAINUI

ROBINSONS BAY

TAKAMATUA

AKAROA

LEGEND

1: 10,000 Map Limits

Settlement Boundary

Slope Aspect Outline

SCALE 1: 50,000

0 500 1000 1500 2000 2500(m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Slope Aspect Divisions

FIG. No. Figure C2 REV. 0

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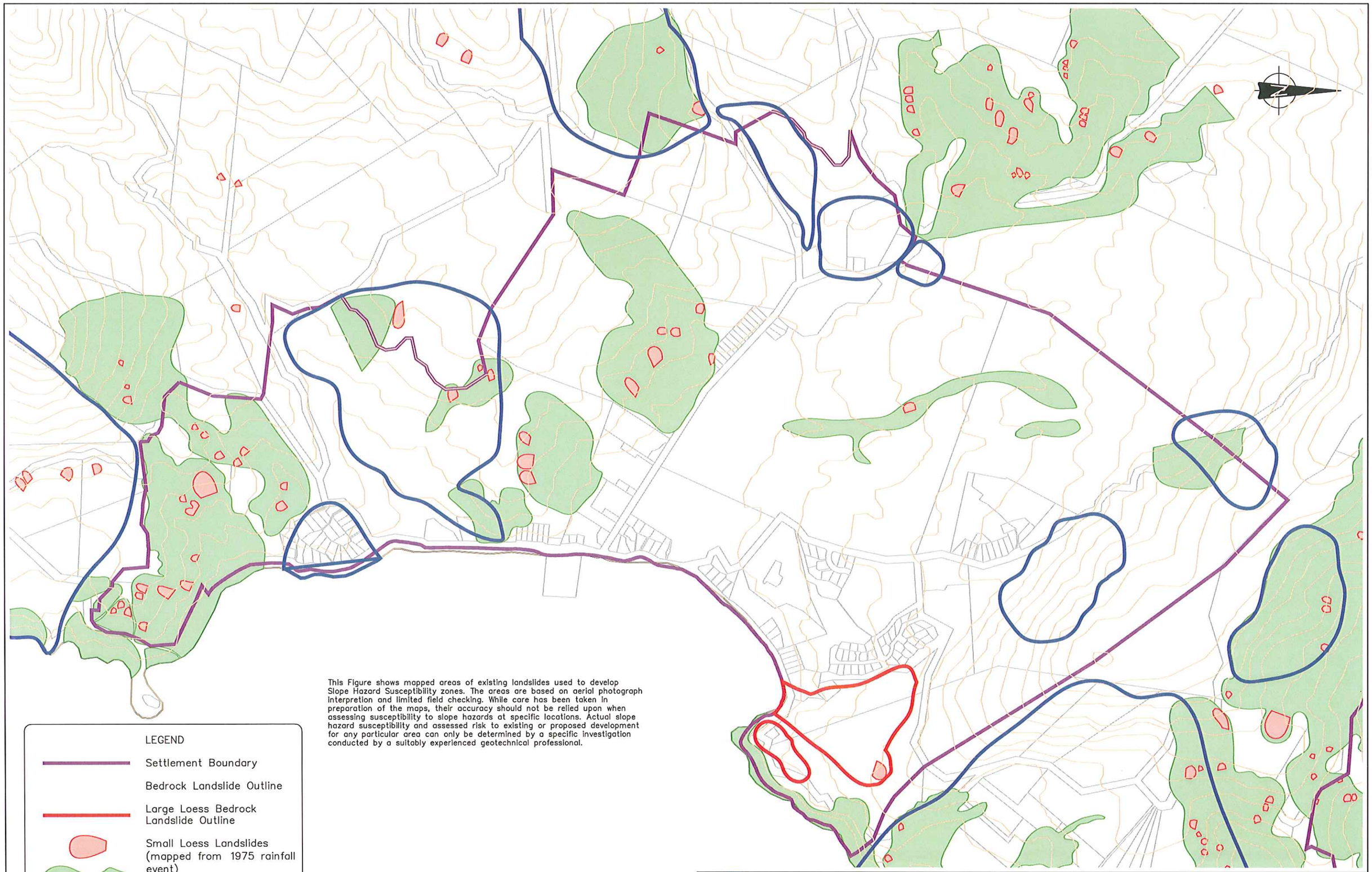

LEGEND

- Settlement Boundary
- Bedrock Landslide Outline
- Large Loess Bedrock Landslide Outline
- Small Loess Landslides (mapped from 1975 rainfall event)
- Active Gully

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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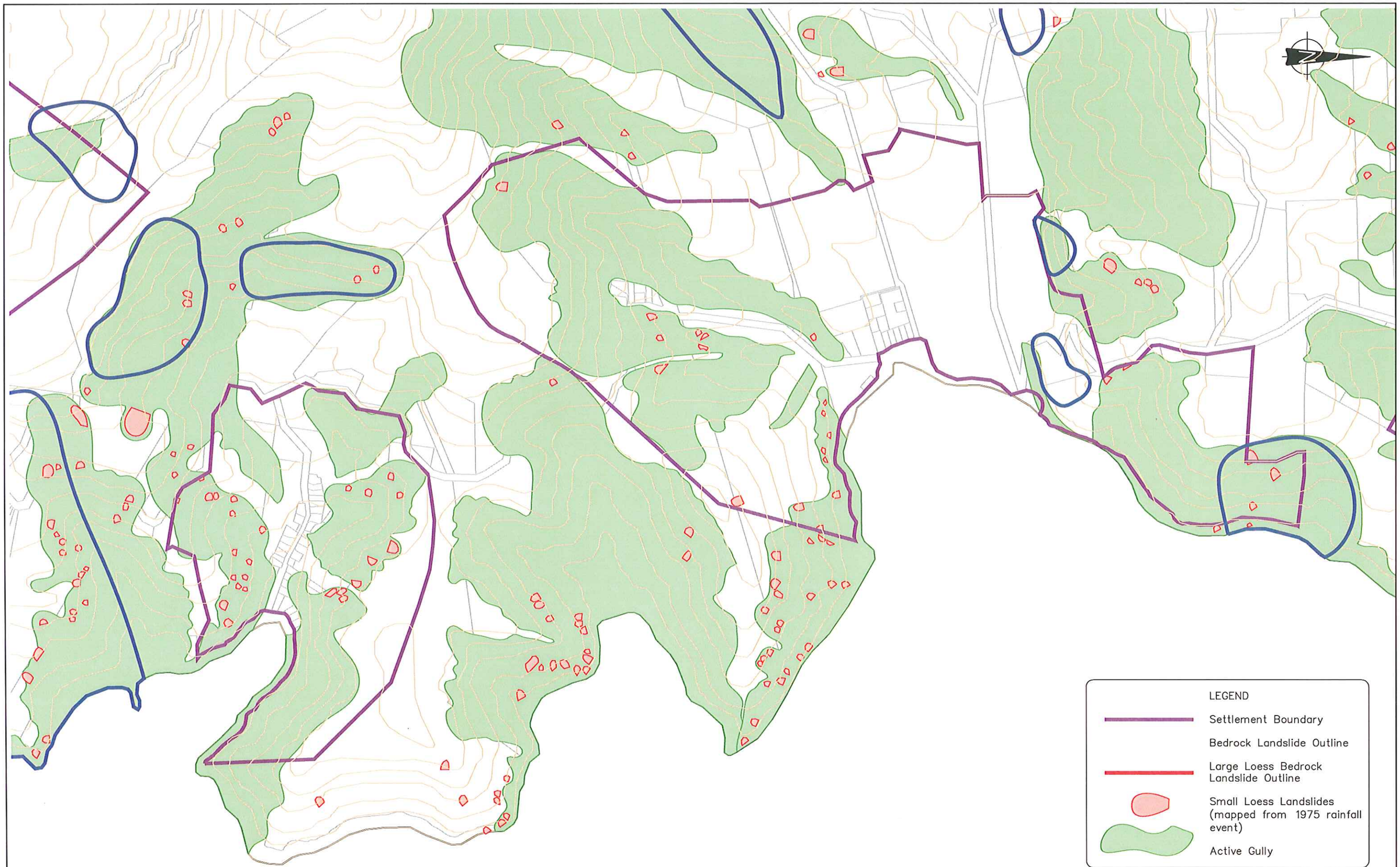
Slope Hazard Susceptability
Akaroa Harbour Settlements
Wainui Air Photo Interpretation

FIG. No. Figure C3 REV. 1



SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Tikao French Farm Air Photo Interpretation

FIG. No. Figure C4 REV. 1

LEGEND

- Settlement Boundary
- Bedrock Landslide Outline
- Large Loess Bedrock Landslide Outline
- Small Loess Landslides (mapped from 1975 rainfall event)
- Active Gully

SCALE 1: 10,000

0 100 200 300 400 500 (m)

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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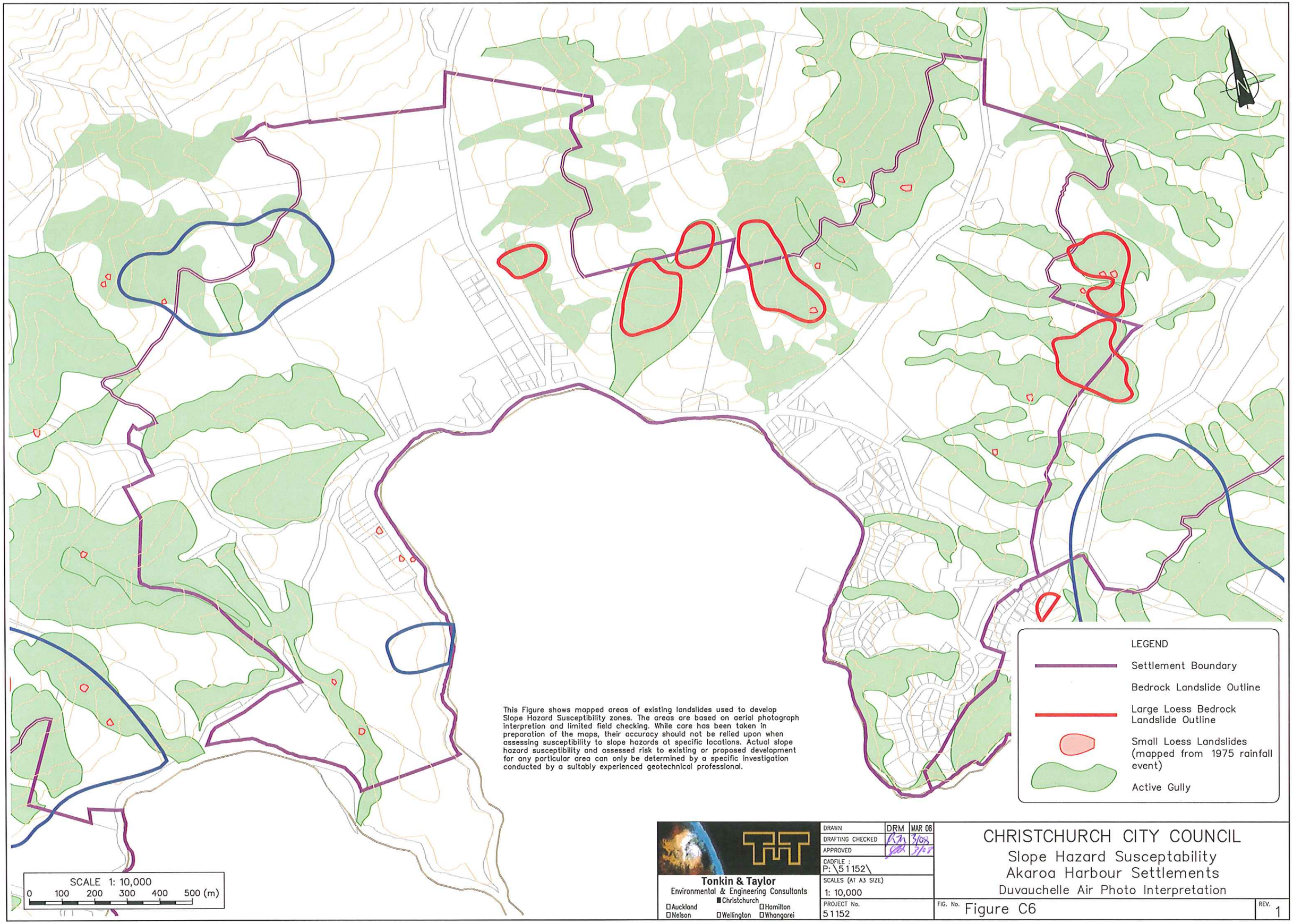
Slope Hazard Susceptability
Akaroa Harbour Settlements
Barrys Bay Air Photo Interpretation

FIG. No. Figure C5 REV. 1



This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Duvauchelle Air Photo Interpretation

FIG. No. Figure C6 REV. 1

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

LEGEND

- Settlement Boundary
- Bedrock Landslide Outline
- Large Loess Bedrock Landslide Outline
- Small Loess Landslides (mapped from 1975 rainfall event)
- Active Gully

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Robinsons Bay Air Photo Interpretation

FIG. No. Figure C7 REV. 1

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LEGEND

- Settlement Boundary
- Bedrock Landslide Outline
- Large Loess Bedrock Landslide Outline
- Small Loess Landslides (mapped from 1975 rainfall event)
- Active Gully

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Takamatua Air Photo Interpretation

FIG. No. Figure C8

REV. 1

This Figure shows mapped areas of existing landslides used to develop Slope Hazard Susceptibility zones. The areas are based on aerial photograph interpretion and limited field checking. While care has been taken in preparation of the maps, their accuracy should not be relied upon when assessing susceptibility to slope hazards at specific locations. Actual slope hazard susceptibility and assessed risk to existing or proposed development for any particular area can only be determined by a specific investigation conducted by a suitably experienced geotechnical professional.

LEGEND

- Settlement Boundary
- Bedrock Landslide Outline
- Large Loess Bedrock Landslide Outline
- Small Loess Landslides (mapped from 1975 rainfall event)
- Active Gully

SCALE 1: 10,000
0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Akaroa Air Photo Interpretation

FIG. No. Figure C9 REV. 1

NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Wainui Slope Angles (20m Contours)

FIG. No. Figure C 10

REV. 0

NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements

Tikao French Farm Slope Angles (20m Contours)

FIG. No. Figure C11 REV. 0

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NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Barrys Bay Slope Angles (20m Contours)

FIG. No. Figure C12 REV. 0

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NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Duvauchelle Slope Angles (20m Contours)

FIG. No. Figure C13 REV. 0

NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements

Robinsons Bay Slope Angles (20m Contours)

FIG. No. Figure C 14 REV. 0

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NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Takamatua Slope Angles (20m Contours)

FIG. No. Figure C 15

REV. 0

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NOTE: White areas where triangulation failed. Interpolated from neighbouring triangles.

Legend

Settlement Boundary

Slope Angles:

- 0– 10°
- 10– 15°
- 15–25°
- 25–30°
- > 30°

SCALE 1: 10,000

0 100 200 300 400 500 (m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Akaroa Slope Angles (20m Contours)

FIG. No. Figure C 16

REV. 0

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DUVAUCHELLE

ROBINSONS BAY

TAKAMATUA

BARRYS BAY

TIKAO & FRENCH FARM

WAINUI

AKAROA

LEGEND

1: 10,000 Map Limits

Settlement Boundary

Extent of 2m Contour Data

SCALE 1: 50,000

0 500 1000 1500 2000 2500(m)

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Slope Hazard Susceptability
Akaroa Harbour Settlements
Location of 2m Contour Data

FIG. No. Figure C17

REV. 0

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Appendix D: Supporting Tables

- **Large Loess/Bedrock Landslide Summary**
- **1975 Event Small Landslide Assessment**
- **Active Gully Summary of Areas**
- **% small landslides by slope angle**
- **Comparison of small landslide slope angles 20m and 2m contour data**

Large to Medium Scale Loess/Colluvium Landslides

Landslide	Settlement Area	History	Surface Dimensions L x W	Size	Slope Angle	Headscarp Slope Aspect	Elevation	Slope Location	Slope location	Comments
Wainui Tip	Wainui	Mackwell Thesis 1986 and air photos	175 x 50	8750	10	SW	40	40/110	0.36	Part of Mackwell 1986 Thesis study. Episodic Movement since this time.
Otutereinga	Wainui	Mackwell Thesis 1986 and air photos	300 x 75	22500	10	SW	84	84/110	0.76	West of Wainui Tip, toe is on steepening coastal slope
Barry's Bay West	Barrys Bay	air photo 1995	225 x 175	39375	13	SW	110	110/300	0.37	On margin of very large bedrock landslide
Barry's Bay East	Outside Barrys bay	air photo 1995	325 x 300	97500	11	SW	170	170/300	0.57	On margin of very large bedrock landslide
Parsons Valley Road	Duvauchelle	air photo 1995	130 x 80	10400	18	W	70	70/150	0.47	Within head of active gully area
Duvauchelle West	Duvauchelle	air photo 1995	210 x 160	33600	23	SW	130	130/240	0.54	Within head of active gully area
Duvauchelle Middle	Duvauchelle	air photo 1995	150 x 85	12750	17	SW	160	160/240	0.67	Within head of active gully area
Duvauchelle East	Duvauchelle	air photo 1995	370 x 120	44400	16	SE	145	145/240	0.60	Within head of active gully area
Pipers Valley Road	Outside Duvauchelle	recent scarps developed in 1994	200 x 130	26000	14	W	160	160/220	0.73	Within head of active gully area. Probably active before 1994
Okains Bay Road	Duvauchelle	air photo 1995	275 x 200	55000	14	W	190	190/220	0.86	Within head of active gully area. Next to Pipers Valley landslide and cutting across Okains Valley Rc
Robinsons Bay East	Outside Robinsons Bay	air photo 1975	200 x 150	30000	11	NW	120	120/260	0.46	Within head of active gully area
Ngaio Point	Robinsons Bay	active 1990s	50 x 80	4000	20	SE	100	100/110	0.91	Within head of active gully area
Takamatua Valley Road	Takamatua	scarps seen 2007, air photo 1975	160 x 70	11200	6	W	26	26/140	0.19	At toe of valley slope, no other activity nearby
Old French Road West	Takamatua	air photo 1995	230 x 120	27600	11	N	92	92/110	0.84	Within head of active gully area
Takamatua Peninsula N	Takamatua	air photo 1996	210 x 80	16800	12	N	70	70/220	0.32	Within head of active gully area
Takamatua Peninsula	Outside Akaroa	Ecan report 2004, scarps noted 1994	350 x 150	52500	13	S	100	100/210	0.48	On margin of very large bedrock landslide, toe on steepening coastal slope/cliff
La Clare Subdivision	Akaroa	active 1975 to 1977. On going?	50 x 50	2500	16	W	60	60/220	0.27	Occurred below Hempleman Drive, after subdivision development. Within active gully?
Lighthouse Road	Akaroa	active 1994. On going?	100 x 70	7000	11	NE	120	120/220	0.55	Upslope of Lighthouse Road. 10-15m deep, sliding to volc ash layers at top of bedrock

AVERAGE	27882	14	N	4	108	AVERAGE	0.55
MEDIAN	24250	13	NE	1	105	MEDIAN	0.54
MODE		11	E	0	70	MODE	#N/A
SD	23782	4	SE	2	46	SD	0.21
MAX	97500	23	S	1	190	MAX	0.91
MIN	2500	6	SW	6	26	MIN	0.19
			W	5			
			NW	1			
			total	20			

Blus highlight landslides known to be active following 1994 rainfall events and Arthurs Pass earthquake

brown highlight 2 m contour data
black 20 m contour data

COUNTS	Slope Angle		%	Elevation		%	Slope Location		%
	0 - 5	0		0 - 50	2	10	0 - 0.24	1	5
	6 - 10	4	20	51 - 100	8	40	0.25 - 0.49	8	40
	11 - 15	10	50	101 - 150	6	30	0.5 - 0.74	7	35
	16 - 20	5	25	>150	4	20	0.75 - 1.0	4	20
	21 - 25	1	5	total	20		total	20	
	26 - 30	0							
	31 - 35	0							
	36 - 40	0							
	41 - 45	0							
	46 - 50	0							
	>50	0							
	total	20							

Small Landslide Assessment, 1975 Event

numbers per aspect division of compass	Plan area: Wainui	Tikao Bay and French Farm	Barrys Bay	Duvauchelles Bay	Robinsons Bay	Takamatua	Akaroa	Total
N	8	74	0	0	23	28	46	179
NE	95	31	0	34	0	0	30	95
E	74	48	22	1	3	0	0	74
SE	26	7	3	4	7	0	5	26
S	24	0	17	7	0	0	0	24
SW	17	1	0	0	0	11	4	17
W	52	0	1	0	2	14	30	52
NW	5	0	0	0	5	0	0	5
Total	472	95	117	46	17	48	67	82	472

numbers per slope location	Wainui	Tikao Bay and French Farm	Barrys Bay	Duvauchelles Bay	Robinsons Bay	Takamatua	Akaroa	
1 - 0.75	18	10	0	0	8	13	9	58
0.74 - 0.5	37	31	1	4	12	28	26	139
0.49 - 0.25	38	50	31	10	20	18	34	201
0.24 - 0	2	26	14	3	8	8	13	74
Total	95	117	46	17	48	67	82	472
1 - 0.66	27	18	0	0	10	21	16	92
0.65 - 0.33	54	48	23	8	18	28	42	221
0.32 - 0	14	51	23	9	20	18	24	159
Total	95	117	46	17	48	67	82	472

numbers per elevation	Wainui	Tikao Bay and French Farm	Barrys Bay	Duvauchelles Bay	Robinsons Bay	Takamatua	Akaroa	
0 - 50	8	54	4	6	24	24	8	128
51 - 100	37	46	17	4	14	20	23	161
101 - 150	33	7	20	7	7	17	23	114
>151	17	10	5	0	3	6	28	69
Total	95	117	46	17	48	67	82	472

Assume Wainui, Tikao Bay, French Farm, Barrys Bay and Duvauchelles in West, others in east

number of landslips per slope aspect	WESTERN HARBOUR	EASTERN HARBOUR	TOTAL HARBOUR	
N	82	97	179	N
NE	65	30	95	NE
E	74	0	74	E
SE	21	5	26	SE
S	24	0	24	S
SW	1	16	17	SW
W	3	49	52	W
NW	5	0	5	NW
Total	275	197	472	

% Slope aspect	number of landslips expected	difference	difference factor
27	127	52	1.4
14	66	29	1.4
4	19	55	3.9
9	42	-16	0.6
14	66	-42	0.4
15	71	-54	0.2
12	57	-5	0.9
5	24	-19	0.2
100	472		

assumes each aspect = 12.5%

slope aspect factor	no. of landslips expected	difference	% difference	
2.16	83	96	116	N
1.12	85	10	12	NE
0.32	231	-157	-68	E
0.72	36	-10	-28	SE
1.12	21	3	12	S
1.2	14	3	20	SW
0.96	54	-2	-4	W
0.4	13	-8	-60	NW
	537	-65		

numbers per slope location	WESTERN HARBOUR	EASTERN HARBOUR	TOTAL HARBOUR
1 - 0.75	28	30	58
0.74 - 0.5	73	66	139
0.49 - 0.25	129	72	201
0.24 - 0	45	29	74
Total	275	197	472
1 - 0.66	45	47	92
0.65 - 0.33	133	88	221
0.32 - 0	97	62	159
Total	275	197	472

numbers per elevation	WESTERN HARBOUR	EASTERN HARBOUR	TOTAL HARBOUR
0 - 50	72	56	128
51 - 100	104	57	161
101 - 150	67	47	114
>151	32	37	69
Total	275	197	472

Total 0 - 100 m elevation 289

Slope angle 20 m contours			
median		22	
mode		22	
average		23	
standard dev.		9	
max		63	
min		5	
		%	
count/degrees	0 - 5	0	0
	6 - 10	19	4
	11 - 15	61	13
	16 - 20	122	26
	21 - 25	112	24
	26 - 30	83	18
	31 - 35	48	10
	36 - 40	8	2
	41 - 45	16	3
	46 - 50	0	0
	>50	3	1
	Total	472	100

Slope angle 2 m contours			
median		23	
mode		27	
average		23	
standard dev.		7	
max		51	
min		5	
		%	
count/degrees	0 - 5	1	0.9
	6 - 10	3	2.8
	11 - 15	5	4.6
	16 - 20	23	21.3
	21 - 25	38	35.2
	26 - 30	28	25.9
	31 - 35	4	3.7
	36 - 40	2	1.9
	41 - 45	3	2.8
	46 - 50	0	0.0
	>50	1	0.9
	Total	108	

Slope angle in 2 m contour			
median		22	
mode		22	
average		22	
standard dev.		10	
max		63	
min		7	
		%	
count/degrees	0 - 5	0	0
	6 - 10	4	4
	11 - 15	20	19
	16 - 20	28	26
	21 - 25	28	26
	26 - 30	8	7
	31 - 35	13	12
	36 - 40	1	1
	41 - 45	3	3
	>50	3	3
	Total	108	100

upslope length 20 m contours				% Slope length 20 m contours		
median		267		median		42
mode		267		mode		50
average		345		average		45
standard dev.		288		standard dev.		21
max		1708		max		100
min		0		min		4
			%			
count/length upslope	0-100	67	14%			
	101-200	88	19%			
	201-300	102	22%			
	301-400	64	14%			
	401-500	55	12%			
	501-1000	81	17%			
	1001-1500	8	2%			
	1501-2000	7	1%			
	Total	472	100%			

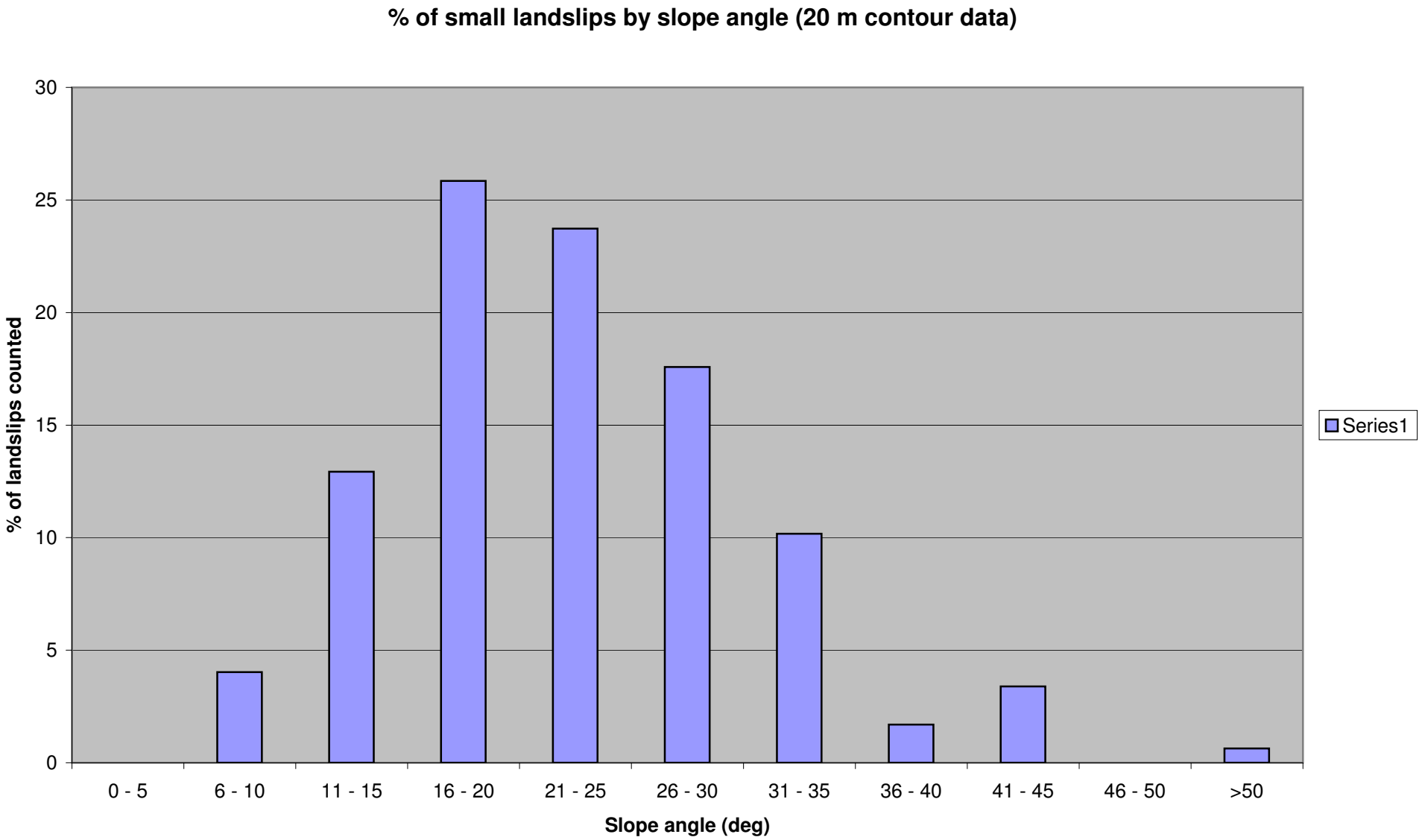
Upslope length is distance of landslide from toe of slope
% slope length is (upslope length /total slope length)*100

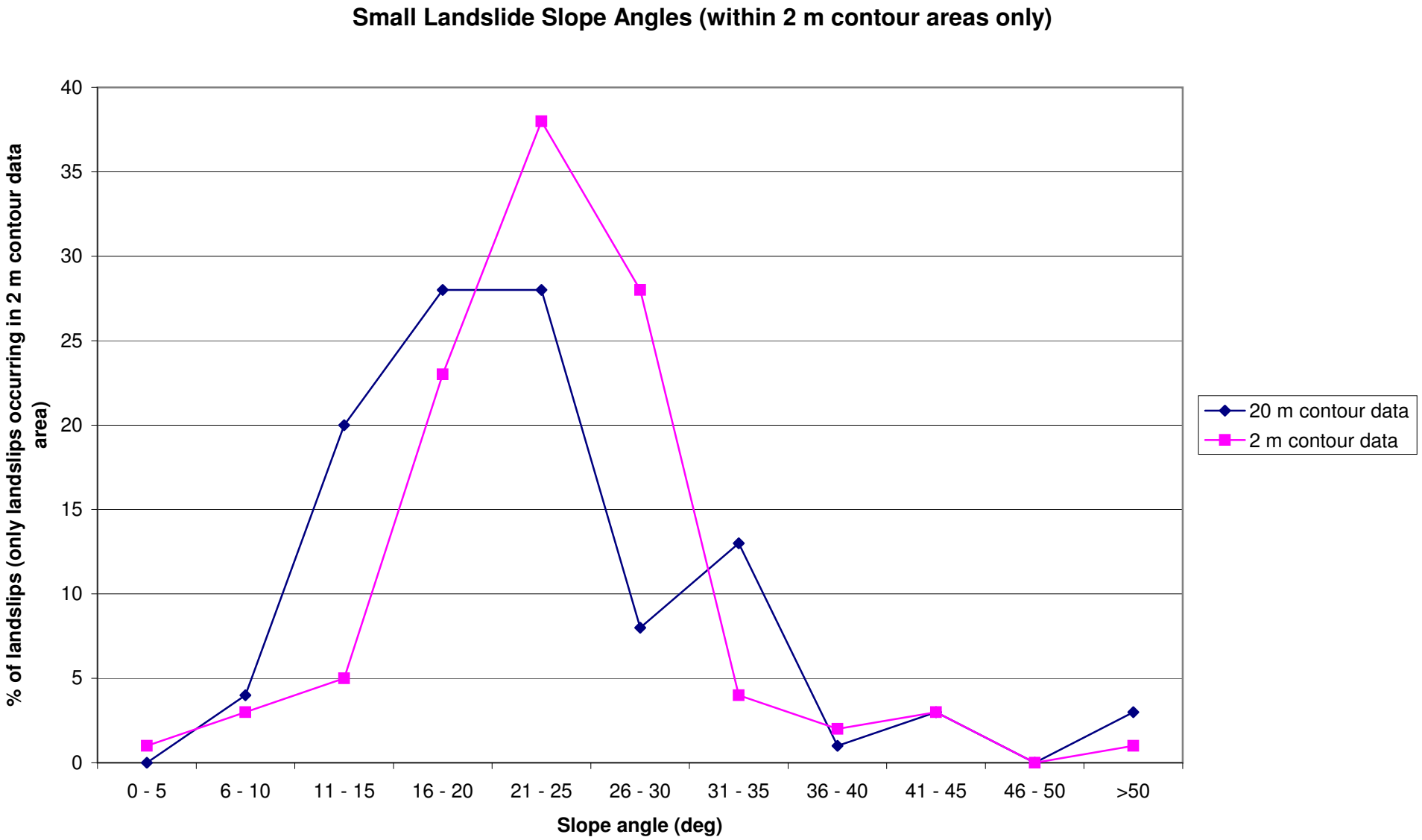
Settlement	Area
Wainui	3262550.9
Tikao Bay	529605.8
French Farm	1388262.2
Barrys Bay	1413264.4
Duvauchelles	3466768.5
Robinsons Bay	1598995.4
Takamatua	3190309.6
Akaroa	4362218.8

Active Gully Areas within Settlement

Wainui	Tikao Bay	French Far	Barrys Bay	Duvauchelle	Robinsons	Takamatua	Akaroa
70590.3	78031.1	375770.3	59268.6	104564.4	2326	54095.8	13429.9
127044.5	26346.1	31319.5	23800.6	156785	46454	9088.3	14038
7190.7	39134	7356.6	47482.3	19584.1	42058.1	21790.4	92395
3670.1	70910.4	8729.3	81143.8	8357.1	6102	41651.1	12610.7
12829	97289.6	151678	48735.9	44162.8	17492	41538.9	47637.3
18393.7	78031.1	313.5	53289.8	21200.8	190281.4	2689.2	81087.5
61171.7		7170.5	63211	42993.6	13478.3	9333.3	21586.7
25210.4			31319.9	55786.4	66589.4	21239.5	56546.3
149025.4			9759.1	92475.8	31870.7	24354.4	7056.4
8064			29787.6	76150.4	128264.6	3016.1	7781.3
42072			65664.3	18242.1	55187.2	42757.8	14339.3
7015.4				12472.2	4893.8	373.3	112923
25986				21839.6	9589	871.5	5883.2
25304.1				82105.7	13582.3	5809.9	16438.1
				16977.5		7561.7	30973.8
				13083.6		10312.4	62949.3
				19572.1		20019.7	23499.1
				45176.4		19530.6	7860.5
				33999.3		58132.2	4696.3
				96202.3		51799.4	2405.5
				49600.8		10632	142126.4
						58956.1	89176.1
						121195.8	22223.5
						62084.2	7317.9
						130093	26349
						26528.8	21249
						37758.2	154763.3
						64182.2	34770
						20114	21332.3
						24556.1	2245.1
						10760	148842.6
						15867.6	30875.6
							68605.9
							16007.6
							170004.6

	Erosion Area inside settlement areas							
	Wainui	Tikao Bay	French Far	Barrys Bay	Duvauchelle	Robinsons	Takamatua	Akaroa
Total	583567.3	389742.3	582337.7	513462.9	1031332	628168.8	1028693.5	1592026.1
% of settlement area	**18**	**74**	**42**	**36**	**30**	**39**	**32**	**36**
average %		**38**						


% of small landslips by slope angle (20 m contour data)
% of landslips counted
30
25
20
15
10
5
0
0 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
>50
Slope angle (deg)
Series1


Small Landslide Slope Angles (within 2 m contour areas only)
% of landslips (only landslips occurring in 2 m contour data area)
40
35
30
25
20
15
10
5
0
0 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
>50
Slope angle (deg)
20 m contour data
2 m contour data