

Appendix C: Stream Classification Data

Appendix C Table 1: Stream classifications and lengths (km) across the site and within each block

Block	Data source ¹	Artificial	Unclassified ²	Ephemeral ³	Intermittent	Permanent	Total
Eastern Block	Modelled	0	0.00	4.86	5.48	4.07	14.41
	Predicted	0	15.24	4.87	3.05	8.70	31.86
	Block total	0	15.24	9.73	8.53	12.77	46.27
Southern Block	Walked	0	0	0.01	0.36	0.49	0.85
	Modelled	0	0	0.40	1.60	2.46	4.47
	Predicted	0	2.10	0.97	0.41	0.84	4.32
	Block total	0	2.10	1.37	2.37	3.79	9.63
Western Block	Walked	0.22	0	0.61	4.19	7.39	12.40
	Modelled	0	0	0.02	0.29	0.30	0.60
	Predicted	0	10.94	3.26	2.18	7.82	24.19
	Block total	0.22	10.94	3.89	6.65	15.51	37.20
Rest of WMNZ landholdings	Predicted	0	21.10	5.99	3.42	10.27	40.78
	Modelled	0	0	0.33	0.79	0.19	1.31
	Block total	0	21.10	6.32	4.21	10.45	42.09
Total (km)		0.22	49.38	21.31	21.76	42.51	135.18

Notes:

1. Lengths based on the combined values obtained from walked, modelled and predicted stream layers following the methods outlined in Section 5.1.1. NB: rounded to two decimal places.
2. Auckland Council modelling shows a 'No channel', which based on our on-site observations is likely to be representative of ephemeral or intermittent stream. We have not been able to assign a ground-truthed approach to classify these streams (as described in Section 4.1.1), as we have not walked or modelled the entire WMNZ landholdings. For the purpose of our assessment, we have included it in the total length of stream on site and within each Block.
3. Based on our assessment (as described in section 4.1.1.2) we expect that some of the ephemeral stream length in the 'Predicted' rows, may be intermittent.

Appendix D: Macroinvertebrate Species List

Appendix D Table 1: Macroinvertebrate Species List

1005069.1115			SEV1	SEV2	SEV3	SEV4	SEV5	SE6	SEV7	SEV8	SEV9	SEV10	SEV11	SEV12*	SEV13	SEV14	SEV15	SEV16	SEV17	SEV18	SEV19	SEV20
			SB	HB	HB	SB	SB	SB	SB	SB	SB	SB	SB	HB	SB	SB	SB	SB	SB	SB	SB	SB
Rare taxa	MCI Score	MCI-sb Score	12-Jul-18	12-Jul-18	13-Jul-18	2-Aug-18	8-Aug-18	9-Aug-18	23-Aug-18	2-Aug-18	2-Aug-18	2-Aug-18	1-Aug-18	30-Jul-18	2-Aug-18	1-Aug-18	1-Aug-18	9-Aug-18	7-Aug-18	7-Aug-18	7-Aug-18	23-Aug-18
Mayflies																						
<i>Acanthophlebia</i>	7	9.6	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Ameletopsis</i>	10	10.0	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Arachnocolus</i>	8	8.1	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-
<i>Austroclima</i>	9	6.5	-	6	5	12	4	3	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Austronella</i>	7	4.7	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Coloburiscus</i>	9	8.1	-	68	4	16	6	36	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Deleatidium</i>	8	5.6	-	8	1	2	4	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Ichthybotus</i>	8	9.2	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Neozephlebia</i>	7	7.6	-	1	-	-	10	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Nesameletus</i>	9	8.6	-	-	-	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Tepakia</i>	8	7.6	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-
<i>Zephlebia</i>	7	8.8	18	47	10	94	195	106	52	36	1	9	77	1	17	-	1	41	-	-	-	22
Stoneflies																						
<i>Acroperla</i>	5	5.1	-	-	7	5	2	4	1	1	-	-	-	1	1	-	-	1	1	-	1	-
<i>Austroperla</i>	9	8.4	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Spaniocerca</i>	8	8.8	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Spaniocercoides</i>	8	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
<i>Zelandobius</i>	5	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Zelandoperla</i>	10	8.9	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Dobsonflies																						
<i>Archichauliodes</i>	7	7.3	-	1	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Beetles																						
Elmidae	6	7.2	-	-	-	-	-	-	4	-	-	-	-	1	-	-	-	-	-	-	-	2
<i>Enochrus</i>	5	2.6	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	5	4	2	-
Hydraenidae	8	6.7	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	1	-
Hydrophilidae	5	8.0	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Liodessus</i>	5	4.9	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-
Ptilodactylidae	8	7.1	-	6	8	1	6	1	3	-	-	-	-	1	-	-	-	-	-	-	-	2
Staphylinidae	5	6.2	-	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Water Bugs																						
<i>Microvelia</i>	5	4.6	4	3	1	3	1	1	2	13	2	1	7	1	2	-	1	9	1	9	1	2

1005069.1115			SEV1	SEV2	SEV3	SEV4	SEV5	SE6	SEV7	SEV8	SEV9	SEV10	SEV11	SEV12*	SEV13	SEV14	SEV15	SEV16	SEV17	SEV18	SEV19	SEV20
			SB	HB	HB	SB	SB	SB	SB	SB	SB	SB	SB	HB	SB	SB	SB	SB	SB	SB	SB	SB
<i>Hydropsyche - Aoteapsyche</i>	4	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
<i>Hydropsyche - Orthopsyche</i>	9	7.5	2	19	3	3	1	7	1	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Olinga</i>	9	7.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Oxyethira</i>	2	1.2	-	-	-	-	-	-	-	2	4	-	1	-	-	-	-	-	21	105	135	-
<i>Polypsectopus</i>	8	8.1	-	-	-	-	-	-	1	5	2	1	2	-	-	1	2	-	2	-	-	-
<i>Pseudoeconesus</i>	9	6.4	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-
<i>Psilochorema</i>	8	7.8	-	1	-	-	1	1	1	1	1	-	-	1	-	1	-	-	4	-	1	-
<i>Pycnocentria</i>	7	6.8	-	7	-	-	-	5	-	-	-	-	-	1	-	-	-	-	-	-	-	-
<i>Pycnocentrodes</i>	5	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Triplectides</i>	5	5.7	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Zelandoptila</i>	8	7.0	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Zelolessica</i>	10	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Crustacea																						
Copepoda	5	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
<i>Paracalliope</i>	5	5.5	-	-	-	20	8	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-
<i>Paraleptamphopus</i>	5	5.5	2	4	6	1	2	2	51	-	-	-	-	-	-	-	-	30	-	1	-	13
Ostracoda	3	1.9	-	-	-	-	-	-	-	8	5	74	1	-	1	-	-	-	8	12	1	-
<i>Paranephrops</i>	5	8.4	-	-	-	-	-	-	2	-	-	-	2	1	-	-	-	-	-	-	-	-
Talitridae	5	5.5	5	2	2	-	3	5	8	-	-	-	2	1	3	4	-	3	-	-	-	5
Tanaidacea	4	6.8	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Mites	5	5.2	12	-	11	6	2	4	18	119	23	21	16	1	105	71	25	7	-	11	-	22
Worms	1	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	3	1	-	5	1	1	-
Flatworms	3	0.9	-	-	-	-	-	-	-	-	1	18	-	-	-	-	-	-	4	14	4	-
Springtails	6	5.3	-	-	3	2	2	1	5	1	2	5	1	-	9	26	5	-	1	4	2	10
Leeches																						
<i>Alboglossiphonia</i>	3	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Placobdelloides</i>	3	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Snails																						
<i>Ferrissia</i>	3	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Gyraulus</i>	3	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Latia</i>	3	6.1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lymnaeidae	3	1.2	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	7	-	9	-
<i>Physa</i>	3	0.1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	14	5	2	-
<i>Potamopyrgus</i>	4	2.1	3	72	2	24	21	22	48	36	162	-	-	1	-	2	51	1	26	12	17	27
Sphaeriidae	3	2.9	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Gordian worms	3	4.3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
Proboscis worms	3	1.8	-	-	-	-	-	-	1	4	2	-	-	-	-	-	-	-	1	35	-	-

1005069.1115			SEV1	SEV2	SEV3	SEV4	SEV5	SE6	SEV7	SEV8	SEV9	SEV10	SEV11	SEV12*	SEV13	SEV14	SEV15	SEV16	SEV17	SEV18	SEV19	SEV20
			SB	HB	HB	SB	SB	SB	SB	SB	SB	SB	SB	HB	SB	SB	SB	SB	SB	SB	SB	SB
Round worms	3	3.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	-	-
Coelenterates																						
<i>Hydra</i>	3	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
Percentage Counted			100.0	50.0	100.0	30.0	75.0	100.0	60.0	30.0	20.0	40.0	60.0	N/A	100.0	90.0	100.0	100.0	16.7	20.0	12.5	100.0
Number of taxa			12	24	20	25	24	18	25	16	21	15	20	37	13	18	12	10	22	22	20	17
Number of rare taxa			0	3	0	6	2	0	2	7	9	2	1	18	0	1	0	0	0	2	3	0
Number of individuals			61	265	80	215	278	204	214	231	216	176	155	696	154	219	112	96	227	250	238	121
MCI			95	122	133	112	131	127	113	98	87	100	91	130	98	92	87	110	80	78	75	99
MCI-sb			124	122	124	110	126	118	129	89	80	113	116	N/A	117	122	122	121	72	67	73	118
QMCI			5.21	6.86	6.68	6.34	6.73	6.93	5.37	5.10	4.12	4.20	6.30	8.03	5.19	4.59	4.38	5.94	3.04	2.86	2.65	5.16
QMCI-sb			6.79	6.17	6.35	6.78	7.77	7.36	5.70	5.08	2.63	4.04	7.60	N/A	5.83	5.70	4.29	6.87	2.92	2.04	1.93	5.31
%EPT richness (excl. Hydroptilidae)			16.67	41.67	45.00	40.00	54.17	44.44	11.67	25.00	14.29	20.00	20.00	52.38	15.38	16.67	16.67	30.00	13.64	0.00	10.00	17.65
%EPT abundance (excl. Hydroptilidae)			32.79	62.64	48.75	68.84	82.37	79.90	27.10	18.61	1.85	11.36	65.81	86.09	11.69	1.83	2.68	45.83	3.08	0.00	0.84	19.83

Notes: SEV 12 macroinvertebrate results are a combination of three replicates for baseline sampling from Site MC2 and so the results are reported as presence (1) absence (-) rather than actual count of individuals and the statistics/indices are higher than most other SEV macroinvertebrate samples.

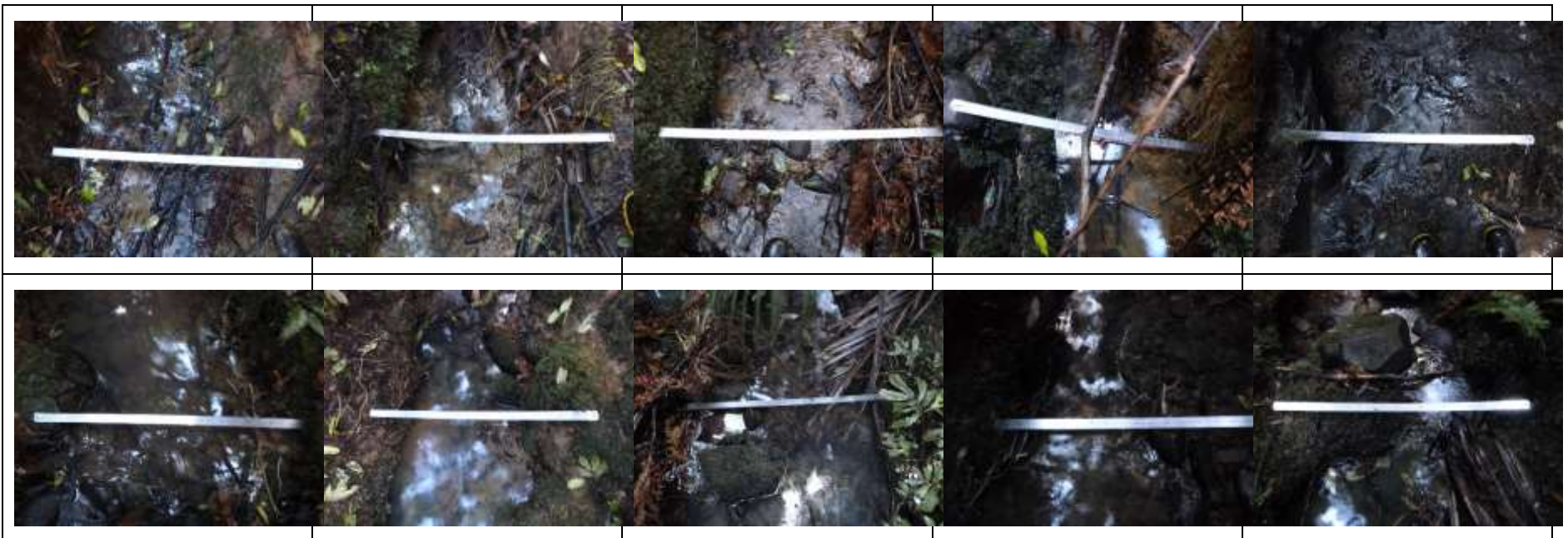
Yellow cells are 'rare' taxa.

Appendix E: Stream Ecological Valuation Cross Section Photos and Descriptions

SEV 1 - Southern Block tributary



SEV 2 - Southern Block main channel upstream of culvert



SEV 3 - Forestry tributary south



SEV 4 - Forestry main tributary downstream



SEV 5 - Forestry main channel mid-reach



SEV 6 - Forestry main stem upstream



SEV 7 - Forestry tributary north east



SEV 8 - Western Block tributary on the north side



SEV 9 - Farm main channel of stockpile



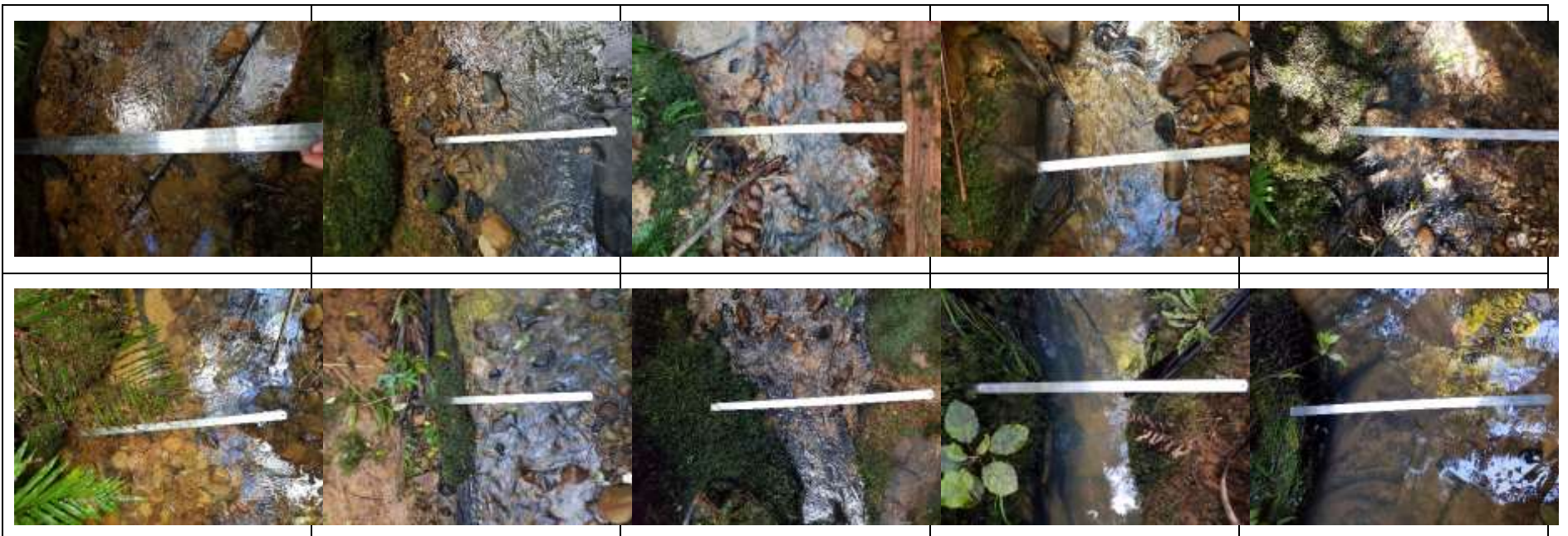
SEV 10 - Access road to stockpile



SEV 11 - Southern Block tributary 1 off main channel



SEV 12 - Southern Block main channel



SEV 13 - Forestry tributary 2 south west side



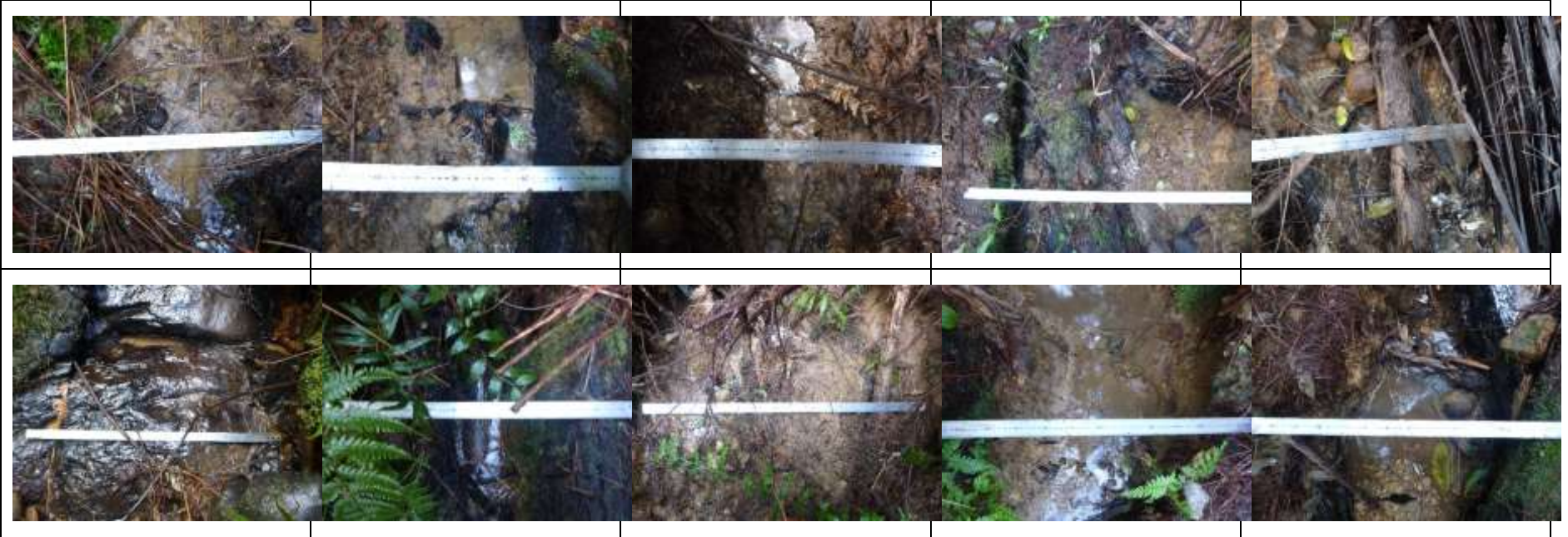
SEV 14 - Southern Block tributary 2 south side of access track



SEV 15- Southern Block tributary 3 permanent stream



SEV 16 - Forestry tributary 3 on the north side



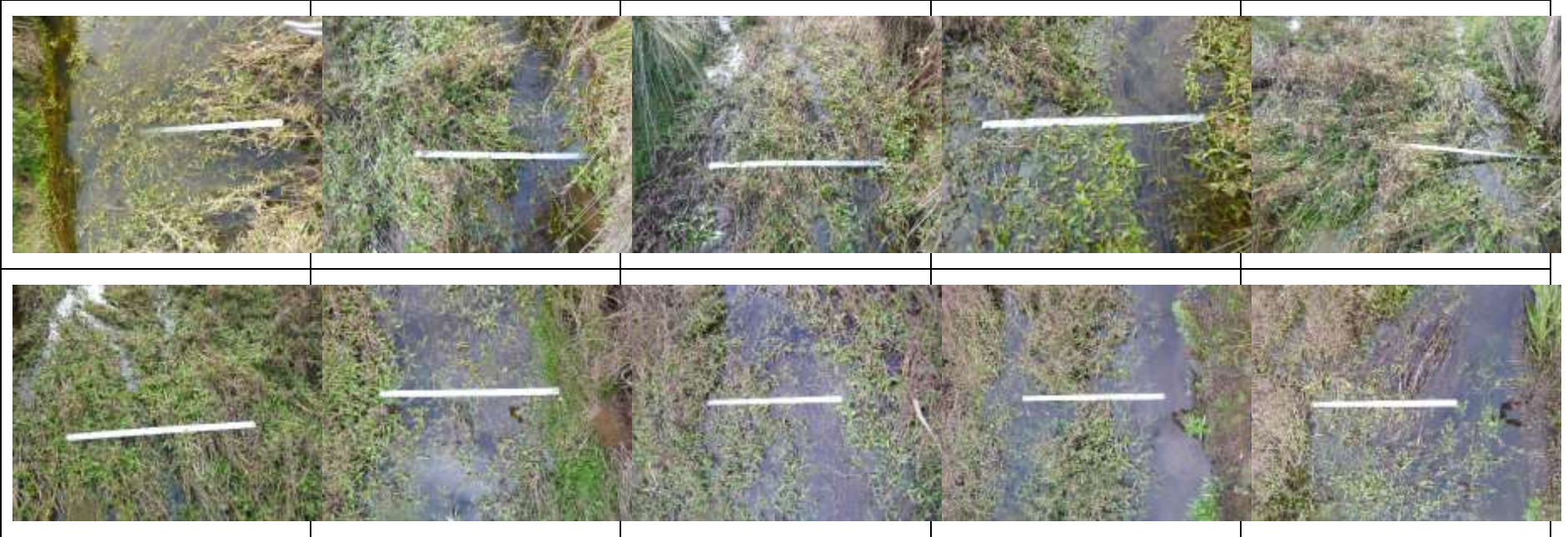
SEV 17 - Farm main channel downstream



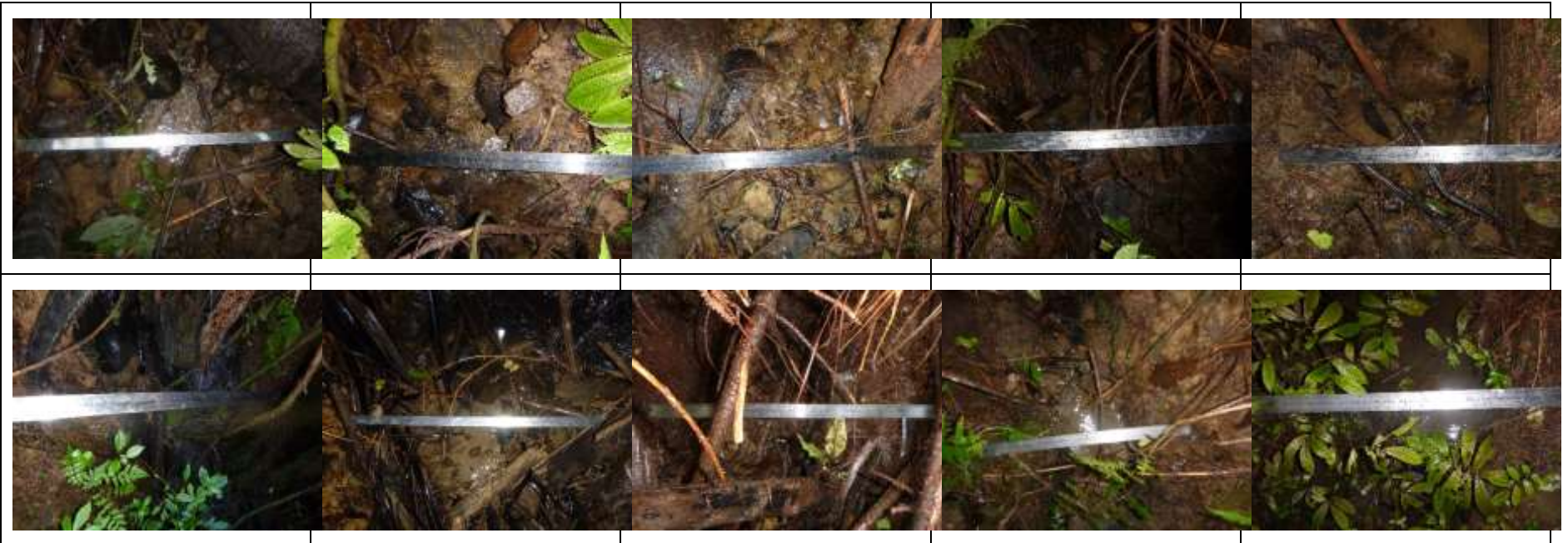
SEV 18 - Middle of farm, east of woolshed



SEV 19 - Western Block south of airstrip



SEV 20 - Waiteraire Tributary Block (Stockpile 2) headwaters



Appendix F: Stream Ecological Valuation Results

Appendix F Table 1: Summary SEV Sheets

Variable (code)	SEV1	SEV2	SEV3	SEV4	SEV5	SEV6	SEV7	SEV8	SEV9	SEV10	SEV11	SEV12	SEV13	SEV14	SEV15	SEV16	SEV17	SEV18	SEV19	SEV20
Vchann	0.90	0.85	0.58	0.91	0.79	0.42	0.43	0.65	0.77	1.00	0.80	0.98	0.74	0.80	0.90	0.73	0.30	0.34	0.37	0.79
Vlining	1.00	1.00	0.90	0.82	0.84	0.88	0.90	0.82	0.84	1.00	0.96	1.00	0.94	0.98	0.98	0.98	0.82	0.80	0.80	0.88
Vpipe	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Natural flow regime	0.93	0.90	0.69	0.88	0.81	0.57	0.59	0.71	0.79	1.00	0.85	0.98	0.81	0.86	0.93	0.81	0.47	0.49	0.51	0.82
Vbank	0.84	0.76	0.36	1.00	0.84	0.52	0.52	0.76	0.60	0.92	0.68	0.92	0.36	0.68	0.84	0.84	0.20	0.20	1.00	0.92
Vrough	0.97	1.00	0.71	0.74	0.74	0.69	0.71	0.23	0.27	0.98	0.88	1.00	0.74	0.75	0.85	0.71	0.20	0.20	0.23	0.70
Floodplain effectiveness	0.81	0.76	0.26	0.74	0.62	0.36	0.37	0.17	0.16	0.90	0.60	0.92	0.27	0.51	0.71	0.60	0.04	0.04	0.23	0.64
Vbarr	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Connectivity for natural species migration	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vchanshape	0.92	0.88	0.74	0.99	0.87	0.84	0.81	0.50	0.64	1.00	0.84	0.98	0.83	0.84	0.92	0.86	0.38	0.76	0.90	0.87
Vlining	1.00	1.00	0.90	0.82	0.84	0.88	0.90	0.82	0.84	1.00	0.96	1.00	0.94	0.98	0.98	0.98	0.82	0.80	0.80	0.88
Natural connectivity to groundwater	0.97	0.96	0.85	0.88	0.85	0.87	0.87	0.71	0.77	1.00	0.92	0.99	0.90	0.93	0.96	0.94	0.67	0.79	0.83	0.88
Hydraulic function mean score	0.93	0.91	0.70	0.87	0.82	0.70	0.71	0.65	0.68	0.97	0.84	0.97	0.74	0.83	0.90	0.84	0.55	0.58	0.64	0.84
Vshade	0.76	0.80	0.54	0.64	0.80	0.84	0.88	0.28	0.42	1.00	0.96	0.94	0.92	0.98	0.66	0.80	0.00	0.04	0.00	0.92
Water temperature control	0.76	0.80	0.54	0.64	0.80	0.84	0.88	0.28	0.42	1.00	0.96	0.94	0.92	0.98	0.66	0.80	0.00	0.04	0.00	0.92
Vdod	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.45	0.60	0.40	1.00
Dissolved oxygen levels	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.45	0.60	0.40	1.00
Vripar	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.10	1.00
Vdecid	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00
Organic matter input	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	0.10	1.00
Vmacro	1.00	1.00	1.00	1.00	0.98	1.00	1.00	0.85	0.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.34	0.28	0.10	1.00
Vretain	0.96	0.94	0.72	0.88	0.86	0.32	0.38	0.70	0.78	1.00	0.92	0.99	0.84	0.92	0.96	0.78	0.28	0.20	0.20	0.86

Variable (code)	SEV1	SEV2	SEV3	SEV4	SEV5	SEV6	SEV7	SEV8	SEV9	SEV10	SEV11	SEV12	SEV13	SEV14	SEV15	SEV16	SEV17	SEV18	SEV19	SEV20
Instream particle retention	0.96	0.94	0.72	0.88	0.86	0.32	0.38	0.70	0.66	1.00	0.92	0.99	0.84	0.92	0.96	0.78	0.28	0.20	0.10	0.86
Vsurf	0.64	0.72	0.65	0.69	0.75	0.66	0.81	0.70	0.59	1.00	0.99	0.70	0.76	0.87	0.38	0.66	0.77	0.79	0.79	0.72
Vripfilt	1.00	1.00	0.60	1.00	1.00	1.00	1.00	0.20	0.28	0.94	1.00	1.00	1.00	1.00	1.00	1.00	0.20	0.20	0.20	0.95
Decontamination of pollutants	0.82	0.86	0.63	0.85	0.88	0.83	0.91	0.45	0.44	0.97	1.00	0.85	0.88	0.94	0.69	0.83	0.48	0.50	0.49	0.83
Biogeochemical function mean score	0.91	0.92	0.78	0.87	0.91	0.80	0.83	0.49	0.46	0.99	0.98	0.96	0.93	0.97	0.86	0.88	0.24	0.27	0.22	0.92
Vgalspwn	0.67	0.40	0.36	0.94	0.70	0.58	0.57	1.00	1.00	0.94	0.73	1.00	0.34	1.00	0.55	0.39	0.00	0.00	0.85	0.53
Vgalqual	0.75	0.75	0.25	0.75	0.75	0.75	0.75	0.25	0.25	1.00	0.75	0.75	1.00	0.75	0.75	1.00	0.00	0.00	0.25	0.75
Vgobspwn	0.10	0.80	0.80	0.80	1.00	0.80	0.10	0.10	0.10	0.10	0.10	1.00	0.80	0.10	0.10	0.80	0.10	0.10	0.10	1.00
Fish spawning habitat	0.30	0.55	0.45	0.75	0.76	0.62	0.26	0.18	0.18	0.52	0.32	0.88	0.57	0.43	0.26	0.59	0.05	0.05	0.16	0.70
Vphyshab	0.88	1.00	0.80	0.81	0.88	0.84	0.88	0.47	0.67	0.99	0.95	1.00	0.89	0.70	0.68	0.87	0.41	0.38	0.36	0.90
Vwatqual	0.88	0.90	0.77	0.82	0.90	0.92	0.94	0.24	0.21	1.00	0.98	0.97	0.96	0.99	0.83	0.90	0.11	0.07	0.04	0.96
Vimperv	1.00	0.70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.70	0.70	1.00
Habitat for aquatic fauna	0.91	0.90	0.84	0.86	0.92	0.90	0.92	0.54	0.64	1.00	0.97	0.99	0.93	0.85	0.80	0.91	0.48	0.38	0.37	0.94
Habitat provision function mean score	0.61	0.73	0.64	0.81	0.84	0.76	0.59	0.36	0.41	0.76	0.65	0.93	0.75	0.64	0.53	0.75	0.27	0.22	0.26	0.82
Vfish	0.00	0.00	0.80	0.73	0.80	0.80	1.00	0.67	0.53	0.58	0.96	0.77	0.92	0.96	0.77	0.80	0.53	0.47	0.47	0.96
Fish fauna intact	0.00	0.00	0.80	0.73	0.80	0.80	1.00	0.67	0.53	0.58	0.96	0.77	0.92	0.96	0.77	0.80	0.53	0.47	0.47	0.96
Vmci	0.92	0.91	1.00	0.81	0.91	0.85	1.00	0.57	0.44	0.81	0.85	1.00	0.86	0.90	0.91	0.89	0.41	0.35	0.43	0.86
Vept	0.33	0.56	0.50	1.00	1.00	1.00	1.00	1.00	0.67	0.68	1.00	1.00	0.45	0.68	0.33	0.50	0.67	0.17	0.50	0.68
Vinvert	0.82	0.71	0.49	0.58	0.47	0.47	0.92	0.51	0.47	0.82	1.00	1.00	0.71	1.00	0.70	0.70	0.47	0.23	0.23	0.92
Invertebrate fauna intact	0.69	0.73	0.66	0.80	0.79	0.77	0.97	0.69	0.52	0.77	0.95	1.00	0.68	0.86	0.65	0.70	0.51	0.25	0.39	0.82
Vripcond	0.79	0.80	0.69	0.66	0.66	0.66	0.69	0.13	0.19	0.79	0.71	0.82	0.66	0.65	0.69	0.69	0.18	0.11	0.11	0.63
Vripconn	0.80	0.90	0.80	1.00	0.80	0.60	0.70	0.90	1.00	1.00	0.80	0.90	0.90	0.60	0.90	1.00	1.00	1.00	1.00	0.90
Riparian vegetation intact	0.63	0.72	0.55	0.66	0.53	0.40	0.48	0.12	0.19	0.79	0.57	0.74	0.59	0.39	0.62	0.69	0.18	0.11	0.11	0.57
Biodiversity function mean score	0.44	0.48	0.67	0.73	0.71	0.66	0.82	0.49	0.42	0.71	0.83	0.83	0.73	0.74	0.68	0.73	0.41	0.28	0.32	0.78
Total SEV score	0.77	0.79	0.71	0.83	0.83	0.73	0.76	0.52	0.51	0.89	0.86	0.93	0.81	0.83	0.79	0.82	0.37	0.35	0.37	0.85

Appendix G: Stream Ecological Compensation Calculations

In order to determine where no net loss has been achieved, we have calculated ecological compensation ratios (ECR) for specific impacts areas and offset sites within the WMNZ landholdings.

The ECR is a tool used to quantify the amount of stream bed area that is required to be restored, depending on the extent and type of enhancement works proposed, relative to the amount lost to maintain a 'no net loss' in ecological function as a result of the activities. The ECR calculation formula requires a SEV score to be calculated for both the impact and proposed mitigation (or offset, if applicable) sites. This provides a basis from which to quantify and scale the likely loss in values and functions at an impact site and the increase in stream value and functions at a compensation or mitigation site.

$$ECR = [(SEVi-P - SEVi-I) / (SEVm-P - SEVm-C)] \times 1.5$$

Where:

SEVi-P is the potential SEV value for the site to be impacted.

SEVi-I is the predicted SEV value of the stream to be impacted after impact.

SEVm-C is the current SEV value for the site where environmental compensation is applied.

SEVm-P is the potential SEV value for the site where environmental compensation is applied.

$$\text{Restoration length required} = (\text{impact area} \times \text{ECR}) / \text{restoration channel width}$$

Representative impact and mitigation SEV have been used and are shown against each impact area in Appendix G Table 1, **Note:** IFI = invertebrate fauna intact and FFI = fish fauna intact are functions of the SEV method which are excluded from modelling calculations as required by the SEV methodology.

Appendix G Table 2 and Appendix G Table 3 below.

Stream width data has been extrapolated from the SEV data collected and stream length available has been estimated based on GIS and the areas that are available to be enhanced. We note that these widths are based on representative SEV only and expect there to be unders and overs when averaged across the impact footprints.

Assumptions for SEVm-P are briefly summarised against each SEVm-P score, and further detail can be provided upon request.

SEVi-P were not calculated for streams within the Southern and Waiteraire Tributary Blocks as the SEVi-C values were so high that it is considered that potential values would be very similar if modelled as many of these values are similar to reference conditions (as shown in the SEV guide).

Modelling is required to be undertaken to determine what the likely ecological function of a stream might be following enhancement actions being implemented.

SEVm-P scores have been calculated for stream reaches within the Western Block which are available for enhancement. SEV17 and SEV19 are representative of modified stream channels which would benefit from riparian enhancement, fencing and in some cases, instream habitat enhancement. There are some restrictions on the height of trees that can be planted in proximity to the airstrip, however this affects a small section of the stream length and low growing plants which provide maximum channel shade would be selected.

Refer to Section 4.3.3.3 for discussion regarding the way the ECR has been applied to each of the impact areas.

Appendix G Table 1: Impact site SEV scores, length and width data.

Representative SEV	SEVi-C (excl IFI, FFI)	SEV-I	SEVi-P (same as SEVi-C)	Median width (m)	Length impacted (m)	Comments
Southern Block						
SEV2	0.87		0.87	0.675	105	Culvert length 105 m.
SEV11	0.84		0.84	0.3	2025	Total stream lost 2,130 m within Southern Block, minus culvert length above.
Waiteraire Tributary Block						
SEV20	0.85	0	0.85	0.46	1365	One SEV within Stockpile 2. Used as representative for whole area. Note conservative as intermittent streams likely to be narrower.

Note: IFI = invertebrate fauna intact and FFI = fish fauna intact are functions of the SEV method which are excluded from modelling calculations as required by the SEV methodology.

Appendix G Table 2: Offset site SEV scores, length available and width data.

Representative SEV	SEVm-C (excl IFI, FFI)	SEVm-P (excl FFI and IFI)	Median width (m)	Length available (m)	Comments
SEV19	0.36	0.77	2.55	1150	SEV representative of stream between SEA wetland and Hôteo River and along stream bordering the eastern boundary of the airstrip, identified as Site 2b. Potential scores based on planting to 20 m, with shade providing plants and removal of all stock access.
SEV19_2a	0.43	0.77	1.4	600	SEV19 has been modified to account for the existing riparian margin on the true left side, to be representative of the length of stream between the airstrip and existing planting, identified as Site 2a. Potential scores based on planting to 20 m, with shade providing plants and removal of all stock access.
SEV17	0.34	0.75	1.2	600	SEV representative of stream along eastern boundary of clay borrow area, identified as Site 2d. Potential scores based on planting to 20 m, with shade providing plants and removal of all stock access.

Note: IFI = invertebrate fauna intact and FFI = fish fauna intact are functions of the SEV method which are excluded from modelling calculations as required by the SEV methodology.

Appendix G Table 3: ECR calculations to quantify offset proposal for Southern Block and Waiteraire Tributary Block stream loss.

Impact Site SEV	SEVi-C	SEVi-I	Enhancement site	Enhancement Area Available	SEVm-C	SEVm-P	ECR	Streambed Area Impacted (m ²)	Enhancement Area Required	Proportion Streambed Area Addressed	Length addressed (m)	Residual Streambed Area Available for Enhancement (m ²)
SEV20	0.85	0	SEV19	2932.5	0.36	0.77	3.101	627.90	1946.83	100% covered	763.46	985.67
SEV2	0.87	0.2	SEV19	985.67	0.36	0.77	2.444	70.88	173.21	100% covered	67.93	812.46
SEV11	0.84	0	SEV19	812.46	0.36	0.77	3.064	607.50	1861.41	0.44	729.97	0.00
			SEV17	720	0.34	0.75	3.056	342.34	1046.30	0.69	600.00	0.00
			SEV19 (2a)	840	0.43	0.77	3.677	106.76	392.54	2.14	280.38	

Appendix H: Plant Species List

Appendix H Table 1: Species list of all vascular plants observed on site and their associated threat status. Includes exotic species. Exotic species underlined.

Species name	Common name	Threat status
<i>Acaena novae-zelandiae</i>	Bidibid	
<u><i>Acacia</i> spp.</u>	<u>Black wattle</u>	
<i>Acianthus sinclairii</i>	Pixie cap	
<i>Adiantum cunninghamii</i>	Common maidenhair	
<i>Adiantum cunninghamii</i>	Maidenhair	
<i>Agathis australis</i>	Kauri	Threatened – nationally vulnerable
<i>Alectryon excelsus</i>	Titoki	
<i>Aristotelia serrata</i>	Wineberry	
<i>Asplenium bulbiferum</i>	Hen and chicken fern	
<i>Asplenium flaccidum</i>	Hanging spleenwort	
<i>Asplenium oblongifolium</i>	Shining spleenwort	
<i>Asplenium polyodon</i>	Sickle spleenwort	
<i>Astelia hastata</i>	Tank lily	
<i>Beilschmiedia tarairi</i>	Taraire	
<u><i>Callitriche stagnalis</i></u>	<u>Water starwort</u>	
<i>Carex</i> spp.	Carex	
<i>Carpodetus serratus</i>	Marbleleaf	
<u><i>Cenchrus landestinus</i></u>	<u>Kikuyu grass</u>	
<i>Centella uniflora</i>	Centella	
<i>Clematis</i> spp.	Clematis	
<i>Coprosma arboreus</i>	Tree coprosma	
<i>Coprosma gradnifolia</i>	Kanona	
<i>Coprosma rhamnoides</i>	Twiggy coprosma	
<i>Coprosma robusta</i>	Karamu	
<i>Coprosma rotundifolia</i>	Round-leaved coprosma	
<i>Coprosma tenuicaulis</i>	Swamp coprosma	
<i>Cordyline australis</i>	Cabbage tree	
<i>Cordyline banksii</i>	Forest cabbage tree	
<u><i>Cortaderia selloana</i></u>	<u>Pampas</u>	
<i>Corynocarpus laevigatus</i>	Karaka	
<i>Cyathea dealbata</i>	Silver fern	
<i>Cyathea medularis</i>	Mamaku	
<i>Dacrycarpus dacrydioides</i>	Kahikatea	
<i>Dacrydium cupressinum</i>	Rimu	
<u><i>Delairea odorata</i></u>	<u>German ivy</u>	

Species name	Common name	Threat status
<i>Dianella nigra</i>	Blueberry	
<i>Dicksonia squarrosa</i>	Wheki ponga	
<u><i>Digitalis</i> spp.</u>	<u>Foxglove</u>	
<i>Doodia australis</i>	Rasp fern	
<i>Dysoxylum spectabile</i>	Kohekohe	
<i>Elatostema rugosum</i>	Parataniwha	
<i>Fragaria</i> spp.	Strawberry	
<i>Freycinetia banksii</i>	Kiekie	
<i>Fuscospora truncata</i>	Hard beech	
<i>Gahnia lacera</i>	Cutty grass	
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	Hangehange	
<i>Haloragis erecta</i> subsp. <i>erecta</i>	Toatoa	
<i>Hedycarya arborea</i>	Pigeonwood	
<i>Hedychium gardnerianum</i>	Wild ginger	
<i>Hydrocotyle moschata</i> var. <i>parvifolia</i>	Hydrocotyle	
<i>Hymenophyllum</i> spp.	Filmy fern	
<i>Icarus filiformis</i>	Thread fern	
<i>Juncus edgariae</i>	Wiwi	
<i>Knightia excelsa</i>	Rewarewa	
<i>Kunzea robusta</i>	Kānuka	At Risk - declining
<i>Laurelia novae-zelandiae</i>	Pukatea	
<i>Leptopteris</i> <i>hymenophylloides</i>	Crape fern	
<i>Leptospermum scoparium</i>	Mānuka	Threatened – nationally vulnerable
<i>Leucopogon fasciculatus</i>	Mingimingi	
<u><i>Leycesteria formosa</i></u>	<u>Himalayan honeysuckle</u>	
<i>Libocedrus plumosa</i>	Kawaka	Locally rare
<u><i>Ligustrum lucidum</i></u>	<u>Tree privet</u>	
<i>Lygodium articulatum</i>	Bushman's mattress	
<i>Melicope simplex</i>	Poataniwha	
<i>Melicytus macrophyllus</i>	Large-leaved māhoe	
<i>Melicytus micranthus</i>	Swamp māhoe	
<i>Melicytus ramiflorus</i>	Māhoe	
<i>Metrosideros diffusa</i>	White rātā	Threatened – nationally vulnerable
<i>Metrosideros excelsa</i>	Pōhutukawa	Threatened – nationally vulnerable
<i>Metrosideros fulgens</i>	Rātā	Threatened – nationally vulnerable
<i>Metrosideros perforata</i>	White rātā	Threatened – nationally vulnerable
<i>Microsorium pustulatum</i>	Hound's tongue	

Species name	Common name	Threat status
<i>Microsorium scandens</i>	Fragrant fern	
<i>Muehlenbeckia australis</i>	Pohuehue	
<i>Myrsine australis</i>	Red matipo	
<i>Nertera dichondifolia</i>	Nertera	
<i>Nestegis cunninghamii</i>	Black maire	Locally rare
<i>Nestegis lanceolata</i>	White maire	
<i>Olearia rani</i>	Heketara	
<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	Basket grass	
<i>Paesia scaberula</i>	Ring fern	
<i>Parablechnum novae-zelandiae</i>	Kiokio	
<i>Passiflora 'Tacsonia'</i> subgroup	<u>Banana passionfruit</u>	
<i>Passiflora tendrata</i>	New Zealand passionfruit	
<i>Pellaea rotundifolia</i>	Button fern	
<i>Pennantia corymbosa</i>	Kaikomako	Locally rare
<i>Phormium tenax</i>	Harakeke	
<i>Phyllocladus trichomanoides</i>	Tanekaha	
<i>Pinus radiata</i>	<u>Radiata pine</u>	
<i>Pittosporum eugenioides</i>	Lemonwood	
<i>Pittosporum tenuifolium</i>	Black matipo	
<i>Plagianthus regius</i>	Ribbonwood	
<i>Pneumatopteris pennigera</i>	Gully fern	
<i>Podocarpus totara</i>	Tōtara	
<i>Pomaderris kumarahou</i>	Kumarahou	
<i>Prumnopitys taxifolia</i>	Matai	
<i>Pseudopanax arboreus</i>	Five finger	
<i>Pseudopanax crassifolius</i>	Lancewood	
<i>Pyrrosia elaeagnifolia</i>	Leather-leaf fern	
<i>Ranunculus reflexus</i>	Hairy buttercup	
<i>Ranunculus spp.</i>	<u>Buttercup</u>	
<i>Rhopalostylis sapida</i>	Nīkau	
<i>Ripogonum scandens</i>	Supplejack	
<i>Rubus australis</i>	Swamp lawyer	
<i>Rubus fruticosus</i> agg.	Blackberry	
<i>Rubus schmiellioides</i>	Bush lawyer	
<i>Schefflera digitata</i>	Pate	
<i>Selaginella kraussiana</i>	<u>African clubmoss</u>	
<i>Solanum nigrum</i>	Black nightshade	

Species name	Common name	Threat status
<i>Streblus heterophyllus</i>	Small-leaved milk tree	
<i>Syzigium maire</i>	Swamp maire	Threatened - nationally critical
<i>Thypha orientalis</i>	Raupō	
<i>Tmesipteris spp.</i>	Fork fern	
<i>Tradescantia fluminensis</i>	<u>Tradescantia</u>	
<i>Coriaria arborea</i>	Tutu	
<i>Typha orientalis</i>	Raupō	
<i>Ulex europa</i>	<u>Gorse</u>	
<i>Vitex lucens</i>	Pūriri	
<i>Weinmannia silvicola</i>	Towai	

