APPENDIX D: DESCRIPTIONS OF SURVEY TRANSECTS

Sampling Unit Number	Start Easting	Start Northing	Grid Reference Source	End Easting	End Northing	Grid Reference Source	Sampling Unit Length (m)	Sampling Unit Width (m)	Area (sq m)
vt001	343000	6378040	AMG	343030	6377800	AMG	250	60	15000
vt002	343060	6378050	AMG	343070	6377840	AMG	215	60	12900
vt003	343095	6378030	AMG	343120	6377880	AMG	175	60	10500
vt004	343020	6377790	AMG	343080	6377440	AMG	300	60	18000
vt005	343070	6377830	AMG	343125	6377540	AMG	290	60	17400
vt006	343110	6377880	AMG	343160	6377580	AMG	290	60	17400
vt007	343155	6377910	AMG	343210	6377620	AMG	290	60	17400
vt008	343200	6377950	AMG	343250	6377650	AMG	300	60	18000
vt009	343235	6377980	AMG	343290	6377700	AMG	290	60	17400
vt010	344480	6377350	AMG	344250	6377450	AMG	220	60	13200
vt011	344340	6377500	AMG	344420	6377440	AMG	160	60	9600
vt012	344740	6377320	AMG	344490	6377370	AMG	235	60	14100
vt013	344760	6377250	AMG	344460	6377310	AMG	310	60	18600
vt014	343900	6376535	AMG	343444	6777170	GPS	1255	60	75300
vt015	344950	6377150	AMG	344560	6377225	AMG	380	60	22800
vt016	344550	6377180	AMG	344890	6377095	AMG	340	60	20400
vt017	344810	6377000	AMG	344540	6377100	AMG	290	60	17400
vt018	344520	6376990	AMG	344810	6376980	AMG	290	60	17400
vt019	344810	6376930	AMG	344420	6376865	AMG	390	60	23400
vt020	344420	6376865	AMG	344868	6376845	GPS	450	60	27000
vt021	344820	6376905	AMG	344700	6376700	AMG	230	60	13800
wt001	342960	6378040	AMG	343020	6377760	AMG	275	20	5500
wt002	343020	6377760	AMG	343230	6377990	AMG	300	20	6000
wt003	343200	6378000	AMG	343200	6378050	AMG	44	6	264
wt004	343200	6378050	AMG	343170	6378050	AMG	30	6	180
wt005	343170	6378050	AMG	343120	6378100	AMG	80	6	480
wt006	343000	6378220	AMG				121	6	726
wt007	343252	6378054	GPS				131	6	786
wt008	343100	6377400	AMG	343745	6377830	AMG	1087	10	10870
wt009	343100	6377420	AMG	343725	6377880	AMG	1087	10	10870
wt010	343750	6377790	AMG	344150	6377450	AMG	798	10	7980
wt011	344150	6377440	AMG	344340	6376830	AMG	885	6	5310
wt012	344160	6377480	AMG	344380	6376840	AMG	885	6	5310
wt013	344480	6377223	GPS				195	6	1170
wt014	344200	6376860	AMG	344355	6376900	AMG	151	1	151
wt015	344210	6377860	AMG	344470	6377490	AMG	527	6	3162
wt016	344380	6376827	GPS				122	6	732
wt017	344380	6376520	AMG	343810	6376520	AMG	590	10	5900
wt018	343300	6377500	AMG				93	6	558
wt019	343511	6377681	GPS				83	30	2490
wt020	344820	6376910	AMG	345050	6377220	AMG	304	10	3040
wt021	343750	6376540	AMG				220	6	1320
wt022	342950	6378050	AMG	343180	6377960	AMG	266	5	1330
wt023	343220	6377950	AMG	343110	6378020	AMG	138	15	2070
wt024	343130	6378040	AMG	343232	6377989	GPS	125	15	1875
wt025	343810	6377210	AMG	343780	6377210	AMG	30	20	600
wt026	343800	6377190	AMG	343810	6377200	AMG	30	20	600
wt027	344400	6377810	AMG	344520	6377510	AMG	370	6	2220
wt030	343232	6377989	GPS	342900	6378320	AMG	400	15	6000
wt031	342900	6378320	AMG	343725	6377880		1205	15	18075

Table D.1: Summary of Sampling Units

Sampling Unit Number	Start Easting	Start Northing	Grid Reference Source	End Easting	End Northing	Grid Reference Source	Sampling Unit Length (m)	Sampling Unit Width (m)	Area (sq m)
wt032	343725	6377880	AMG	343550	6377660	AMG	230	15	3450
wt033	343832	6377220	GPS				30	30	900
wt034	343850	6377210	AMG	344050	6377150	AMG	212	10	2120
wt035	343810	6377200	AMG	343790	6376550	AMG	682	15	10230
wt036	343720	6376530	AMG	343460	6376580	AMG	256	10	2560
wt037	343540	6376250	AMG	343010	6377780	AMG	1587	10	15870
						TOTAL AREA SURVEYED			557,699

N.B. Those transects without end grid references were walked around dam overburdens.

Table D.1: Summary of Sampling Units

Sampling Unit Number	Sampling Sub Unit Number	Sampling Sub Unit Length (m)	Sampling Sub Unit Width (m)	Location	Artefacts Present
VT001	0-250	250	60	Off track - Across field	
VT002	0-215	215	60	Off track - Across field	
VT003	0-175	175	60	Off track - Across field	
VT004	0-300	300	60	Off track - Across field	
VT005	0-290	290	60	Off track - Across field	
VT006	0-290	290	60	Off track - Across field	
VT007	0-290	290	60	Off track - Across field	
VT008	0-300	300	60	Off track - Across field	
VT009	0-290	290	60	Off track - Across field	
VT010	0-160	160	60	Off track - Across field	
VT010	160-220	60	60	Off track - Across field	
VT011	0-105	105	60	Off track - Across field	
VT011	105-160	55	60	Off track - Across field	
VT012	0-190	190	60	Off track - Across field	
VT012	190-235	45	60	Off track - Across field	
VT013	0-105	105	60	Off track - Across field	
VT013	105-310	205	60	Off track - Across field	
VT014	0-840	840	60	Off track - Across field	
VT014	840-1255	415	60	Off track - Across field	
VT015	0-380	380	60	Off track - Across field	
VT016	0-340	340	60	Off track - Across field	
VT017	0-290	290	60	Off track - Across field	
VT018	0-290	290	60	Off track - Across field	
VT019	0-390	390	60	Off track - Across field	
VT020	0-425	425	60	Off track - Across field	
VT020	425-450	25	60	Off track - Across field	
VT021	0-230	230	60	Off track - Across field	*
WT001	0-275	275	20	Off track - Fenceline	
WT002	0-300	300	20	Off track - Fenceline	*
WT003	0-44	44	6	Off track - Fenceline	
WT004	0-30	30	6	Off track - Fenceline	
WT005	0-80	80	6	Off track - Across field	
WT006	0-121	121	6	Off track - dam overburden	*
WT007	0-131	131	6	Off track - dam overburden	*
WT008	0-67	67	10	Off track - Watercourse	
WT008	067-392	325	10	Off track - Watercourse	*
WT008	392-664	272	10	Off track - Watercourse	*
WT008	664-887	223	10	Off track - Watercourse	
WT008	887-1087	200	10	Off track - Watercourse	
WT009	0-67	67	10	Off track - Watercourse	
WT009	067-392	325	10	Off track - Watercourse	
WT009	392-664	272	10	Off track - Watercourse	
WT009	664-887	223	10	Off track - Watercourse	
WT009	887-1087	200	10	Off track - Watercourse	
WT010	0-79	79	10	Off track - Watercourse	
WT010	079-170	91	10	Off track - Watercourse	
WT010	170-310	140	10	Off track - Watercourse	
WT010	310-655	345	10	Off track - Watercourse	*
WT010	655-798	143	10	Off track - Watercourse	
WT011	0-125	125	6	Off track - Watercourse	

Table D.2: Summary of sampling sub unit per location

Sampling Unit Number	Sampling Sub Unit Number	Sampling Sub Unit Length (m)	Sampling Sub Unit Width (m)	Location	Artefacts Present
WT011	125-795	670	6	Off track - Watercourse	
WT011	795-885	90	6	Off track - Watercourse	
WT012	0-330	330	6	Off track - Watercourse	
WT012	330-775	445	6	Off track - Watercourse	
WT012	775-885	110	6	Off track - Watercourse	
WT013	0-195	195	6	Off track - dam overburden	*
WT014	0-151	151	1	Off track - contour bank	*
WT015	0-227	227	6	Off track - Watercourse	
WT015	227-527	300	6	Off track - Watercourse	
WT016	0-122	122	6	Off track - dam overburden	*
WT017	0-590	590	10	Off track - Across field	
WT018	0-93	93	6	Off track - dam overburden	
WT019	0-83	83	30	Off track - dam overburden	*
WT020	0-304	304	10	Off track - Fenceline	*
WT021	0-220	220	6	Off track - dam overburden	*
WT022	0-266	266	5	Off track - Fenceline	
WT023	0-138	138	15	Off track - Across field	*
WT024	0-125	125	15	Off track - Across field	*
WT025	0-30	30	20	Off track - Across field	
WT026	0-30	30	20	Off track - Across field	
WT027	0-120	120	6	Off track - Watercourse	
WT027	120-370	250	6	Off track - Watercourse	
WT030	0-135	135	15	Off track - Across field	
WT030	135-400	265	15	Off track - Across field	
WT031	0-1205	1205	15	Off track - Watercourse	*
WT032	0-230	230	15	Off track - Across field	
WT033	0-30	30	30	Off track - dam overburden	*
WT034	0-55	55	10	Off track - drainage ditch	
WT034	55-212	157	10	Off track - drainage ditch	
WT035	0-682	682	15	Off track - Across field	*
WT036	0-256	256	10	Off track - Across field	
WT037	0-890	890	10	Off track - Across field	*
WT037	890-1050	160	10	Off track - Across field	*
WT037	890-1587	537	10	Off track - Across field	

Table D.2: Summary of sampling sub unit per location

Sampling Unit Number	Sampling Sub Unit Number	Sampling Sub Unit Length (m)	Sampling Sub Unit Width (m)	Land Unit	Area (sq m)
WT036	0-256	256	10	simple slope	2560
WT037	0-890	890	10	simple slope	8900
VT010	0-160	160	60	primary terrace	9600
VT011	105-160	55	60	primary terrace	3300
VT012	0-190	190	60	primary terrace	11400
VT012	190-235	45	60	primary terrace	2700
VT013	0-105	105	60	primary terrace	6300
VT013	105-310	205	60	primary terrace	12300
VT015	0-380	380	60	primary terrace	22800
VT016	0-340	340	60	primary terrace	20400
VT017	0-290	290	60	primary terrace	17400
VT018	0-290	290	60	primary terrace	17400
VT019	0-390	390	60	primary terrace	23400
VT020	0-425	425	60	primary terrace	25500
VT021	0-230	230	60	primary terrace	13800
WT006	0-121	121	6	primary terrace	726
WT010	0-79	79	10	primary terrace	790
WT010	079-170	91	10	primary terrace	910
WT010	310-655	345	10	primary terrace	3450
WT011	0-125	125	6	primary terrace	750
WT011	795-885	90	6	primary terrace	540
WT012	0-330	330	6	primary terrace	1980
WT012	775-885	110	6	primary terrace	660
WT013	0-195	195	6	primary terrace	1170
WT015	0-227	227	6	primary terrace	1362
WT016	0-122	122	6	primary terrace	732
WT020	0-304	304	10	primary terrace	3040
WT027	0-120	120	6	primary terrace	720
WT030	135-400	265	15	primary terrace	3975
WT031	0-1205	1205	15	primary terrace	18075
WT032	0-230	230	15	primary terrace	3450
VT001	0-250	250	60	secondary terrace	15000
VT002	0-215	215	60	secondary terrace	12900
VT003	0-175	175	60	secondary terrace	10500
VT004	0-300	300	60	secondary terrace	18000
VT005	0-290	290	60	secondary terrace	17400
VT006	0-290	290	60	secondary terrace	17400
VT007	0-290	290	60	secondary terrace	17400
VT008	0-300	300	60	secondary terrace	18000
VT009	0-290	290	60	secondary terrace	17400
VT010	160-220	60	60	secondary terrace	3600
VT011	0-105	105	60	secondary terrace	6300
VT014	840-1255	415	60	secondary terrace	24900
VT020	425-450	25	60	secondary terrace	1500
WT001	0-275	275	20	secondary terrace	5500
WT002	0-300	300	20	secondary terrace	6000
WT003	0-44	44	6	secondary terrace	264
WT004	0-30	30	6	secondary terrace	180
WT005	0-80	80	6	secondary terrace	480
WT007	0-131	131	6	secondary terrace	786

Table D.3: Summary of sampling sub units per land unit

Sampling Unit Number	Sampling Sub Unit Number	Sampling Sub Unit Length (m)	Sampling Sub Unit Width (m)	Land Unit	Area (sq m)
WT008	0-67	67	10	secondary terrace	670
WT008	067-392	325	10	secondary terrace	3250
WT008	392-664	272	10	secondary terrace	2720
WT009	0-67	67	10	secondary terrace	670
WT009	067-392	325	10	secondary terrace	3250
WT009	392-664	272	10	secondary terrace	2720
WT010	170-310	140	10	secondary terrace	1400
WT010	655-798	143	10	secondary terrace	1430
WT011	125-795	670	6	secondary terrace	4020
WT012	330-775	445	6	secondary terrace	2670
WT014	0-151	151	1	secondary terrace	151
WT015	227-527	300	6	secondary terrace	1800
WT018	0-93	93	6	secondary terrace	558
WT019	0-83	83	30	secondary terrace	2490
WT022	0-266	266	5	secondary terrace	1330
WT023	0-138	138	15	secondary terrace	2070
WT024	0-125	125	15	secondary terrace	1875
WT027	120-370	250	6	secondary terrace	1500
WT030	0-135	135	15	secondary terrace	2025
WT034	55-212	157	10	secondary terrace	1570
WT037	890-1587	537	10	secondary terrace	5370
WT008	664-887	223	10	indeterminate/1st or 2nd terrace	2230
WT008	887-1087	200	10	indeterminate/1st or 2nd terrace	2000
WT009	664-887	223	10	indeterminate/1st or 2nd terrace	2230
WT009	887-1087	200	10	indeterminate/1st or 2nd terrace	2000
VT014	0-840	840	60	tertiary terrace	50400
WT017	0-590	590	10	tertiary terrace	5900
WT021	0-220	220	6	tertiary terrace	1320
WT025	0-30	30	20	tertiary terrace	600
WT026	0-30	30	20	tertiary terrace	600
WT033	0-30	30	30	tertiary terrace	900
WT034	0-55	55	10	tertiary terrace	550
WT035	0-682	682	15	tertiary terrace	10230
WT037	890-1050	160	10	tertiary terrace	1600
					555139

Table D.3: Summary of sampling sub units per land unit

Sampling Unit Number	Sampling Sub Unit Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	%Groundcover	Groundcover Type
vt001	0-250	0%	none			80	grass
vt002	0-215	0%	none			85	grass
vt003	0-175	0%	none			85	grass
vt004	0-300	0%	none			95	grass
vt005	0-290	0%	none			95	grass
vt006	0-290	0%	none			95	grass
vt007	0-290	0%	none			95	grass
vt008	0-300	0%	none			95	grass
vt009	0-290	0%	none			95	grass
vt010	0-160	0%	none			95	grass
vt010	160-220	0%	none			95	grass
vt011	0-105	0%	none			95	grass
vt011	105-160	0%	none			95	grass
vt012	0-190	0%	none			100	grass
vt012	190-235	0%	none			100	grass
vt013	0-105	0%	none			100	weeds
vt013	0-105	0%	none			100	grass
vt013	105-310	0%	none			100	grass, thistles
vt014	0-840	0%	none			95	grass
vt014	840-1255	0%	none			95	grass
vt015	0-380	0%	none			95	grass
vt016	0-340	0%	none			95	grass
vt017	0-290	0%	none			95	grass
vt018	0-290	0%	none			95	grass
vt019	0-390	0%	none			100	grass
vt020	0-425	0%	none			95	grass
vt020	425-450	0%	none			95	grass
vt021	0-230	0%	none			95	grass

Table D.4: Summary of detection limiting factors per sampling sub unit

Sampling Unit Number	Sampling Sub Unit Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	%Groundcover	Groundcover Type
wt001	0-275	<10%	few	2-6mm	small pebbles or fine gravel	70	grass
wt001	0-275			6-20mm	medium pebbles or gravel		
wt001	0-275			20-60mm	large pebbles or coarse gravel		
wt002	0-300	0%	none			80	grass
wt003	0-44	0%	none			60	grass
wt004	0-30	0%	none			90	grass
wt005	0-80	0%	none			90	grass
wt006	0-121	<10%	few	2-6mm	small pebbles or fine gravel	50	grass, redeposited sediments
wt007	0-131	11-20%	common	2-6mm	small pebbles or fine gravel	20	grass, redeposited sediments
wt007	0-131			6-20mm	medium pebbles or gravel		
wt007	0-131			20-60mm	large pebbles or coarse gravel		
wt008	0-67	0%	none			80	grass
wt008	067-392	0%	none			90	grass
wt008	392-664	0%	none			90	grass
wt008	664-887	0%	none			90	grass
wt008	887-1087	0%	none			100	grass
wt009	0-67	0%	none			80	grass
wt009	067-392	0%	none			90	grass
wt009	392-664	0%	none			90	grass
wt009	664-887	0%	none			90	grass
wt009	887-1087	0%	none			100	grass
wt010	0-79	<10%	few	20-60mm	large pebbles or coarse gravel	60	grass
wt010	079-170	11-20%	common	2-6mm	small pebbles or fine gravel	95	grass
wt010	079-170			6-20mm	medium pebbles or gravel		
wt010	170-310	11-20%	common	2-6mm	small pebbles or fine gravel	95	grass
wt010	170-310			6-20mm	medium pebbles or gravel		
wt010	310-655	11-20%	common	2-6mm	small pebbles or fine gravel	95	grass
wt010	310-655			6-20mm	medium pebbles or gravel		
wt010	655-798	11-20%	common	2-6mm	small pebbles or fine gravel	95	grass
wt010	655-798			6-20mm	medium pebbles or gravel		
wt011	0-125	0%	none			95	grass
wt011	125-795	0%	none			95	grass
wt011	795-885	0%	none			95	grass

Table D.4: Summary of detection limiting factors per sampling sub unit

Sampling Unit Number	Sampling Sub Unit Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	%Groundcover	Groundcover Type
wt012	0-330	0%	none			95	grass
wt012	330-775	0%	none			95	grass
wt012	775-885	0%	none			95	grass
wt013	0-195	11-20%	common	2-6mm	small pebbles or fine gravel	10	grass, redeposited sediments
wt013	0-195		common	6-20mm	medium pebbles or gravel		
wt014	0-151	11-20%	common	2-6mm	small pebbles or fine gravel	20	grass, redeposited sediments
wt014	0-151			6-20mm	medium pebbles or gravel		
wt015	0-227	0%	none			99	grass
wt015	227-527	0%	none			99	grass
wt016	0-122	<10%	few	2-6mm	small pebbles or fine gravel	10	grass, redeposited sediments
wt016	0-122			6-20mm	medium pebbles or gravel		
wt017	0-590	0%	none			90	grass
wt018	0-93	0%	none			10	grass, redeposited sediments
wt019	0-83	11-20%	common	2-6mm	small pebbles or fine gravel	50	grass, redeposited sediments
wt019	0-83			6-20mm	medium pebbles or gravel		
wt019	0-83			60-200mm	cobbles		
wt019	0-83			20-60mm	large pebbles or coarse gravel		
wt020	0-304	0%	none			90	grass
wt021	0-220	21-50%	many	2-6mm	small pebbles or fine gravel	5	grass, redeposited sediments
wt021	0-220			6-20mm	medium pebbles or gravel		
wt022	0-266	<10%	few	2-6mm	small pebbles or fine gravel	90	grass
wt023	0-138	0%	none			90	grass
wt024	0-125	0%	none			85	grass
wt025	0-30	0%	none			65	grass
wt026	0-30	0%	none			65	grass
wt027	0-120	0%	none			99	grass
wt027	120-370	0%	none			99	grass
wt030	0-135	0%	none			90	grass
wt030	135-400	0%	none			90	grass
wt031	0-1205	0%	none			85	grass
wt032	0-230	0%	none			100	grass
wt033	0-30	11-20%	common	2-6mm	small pebbles or fine gravel	65	grass

Table D.4: Summary of detection limiting factors per sampling sub unit

Sampling Unit Number	Sampling Sub Unit Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	%Groundcover	Groundcover Type
wt033	0-30			6-20mm	medium pebbles or gravel		
wt034	0-55	0%	none			90	grass
wt034	55-212	0%	none			90	grass
wt035	0-682	0%	none			90	grass
wt036	0-256	0%	none			100	grass
wt037	0-890	0%	none			85	grass
wt037	0890-1050	0%	none			85	grass
wt037	1050-1587	0%	none			85	grass

Table D.4: Summary of detection limiting factors per sampling sub unit

		Tallest Stratum			Understorey			Groundlayer		
Sampling Unit Number	Sampling Sub Unit Number	Growth Form	Height	Crown Separation	Growth Form	Height	Crown Separation	Growth Form	Height	Foliage Cover
VT001	0-250							Tussock grass	<0.25m	>70%
VT002	0-215							Tussock grass	<0.25m	>70%
VT003	0-175							Tussock grass	<0.25m	>70%
VT004	0-300							Tussock grass	<0.25m	>70%
VT005	0-290							Tussock grass	<0.25m	>70%
VT006	0-290							Tussock grass	<0.25m	>70%
VT007	0-290							Tussock grass	<0.25m	>70%
VT008	0-300							Tussock grass	<0.25m	>70%
VT009	0-290							Tussock grass	<0.25m	>70%
VT010	0-160							Tussock grass	<0.25m	>70%
VT010	160-220							Tussock grass	<0.25m	>70%
VT011	0-105							Tussock grass	<0.25m	>70%
VT011	105-160							Tussock grass	<0.25m	>70%
VT012	0-190							Tussock grass	<0.25m	>70%
VT012	190-235							Tussock grass	0.25-0.5m	>70%
VT013	0-105							Tussock grass	<0.25m	>70%
VT013	105-310							Tussock grass	0.25-0.5m	>70%
VT014	0-840	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
VT014	840-1255							Tussock grass	<0.25m	>70%
VT015	0-380							Tussock grass	<0.25m	>70%
VT016	0-340							Tussock grass	<0.25m	>70%
VT017	0-290							Tussock grass	<0.25m	>70%
VT018	0-290							Tussock grass	<0.25m	>70%
VT019	0-390							Tussock grass	<0.25m	>70%
VT020	0-425							Tussock grass	<0.25m	>70%
VT020	425-450							Tussock grass	<0.25m	>70%
VT021	0-230							Tussock grass	<0.25m	>70%
WT001	0-275							Tussock grass	<0.25m	30-70%
WT002	0-300							Tussock grass	<0.25m	>70%
WT003	0-44							Tussock grass	<0.25m	30-70%

Table D.5: Summary of vegetation per sampling sub unit

		Tallest Stratum			Understorey			Groundlayer		
Sampling Unit Number	Sampling Sub Unit Number	Growth Form	Height	Crown Separation	Growth Form	Height	Crown Separation	Growth Form	Height	Foliage Cover
WT004	0-30							Tussock grass	<0.25m	>70%
WT005	0-80							Tussock grass	<0.25m	>70%
WT006	0-121							Tussock grass	<0.25m	30-70%
WT007	0-131							Tussock grass	<0.25m	10-30%
WT008	0-67	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT008	067-392							Tussock grass	<0.25m	>70%
WT008	392-664							Tussock grass	<0.25m	>70%
WT008	664-887	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT008	887-1087							Tussock grass	<0.25m	>70%
WT009	0-67	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT009	067-392							Tussock grass	<0.25m	>70%
WT009	392-664							Tussock grass	<0.25m	>70%
WT009	664-887	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT009	887-1087							Tussock grass	<0.25m	>70%
WT010	0-79							Tussock grass	<0.25m	30-70%
WT010	079-170	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT010	170-310	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT010	310-655	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT010	655-798	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT011	0-125							Tussock grass	<0.25m	>70%
WT011	125-795							Tussock grass	<0.25m	>70%
WT011	795-885							Tussock grass	<0.25m	>70%
WT012	0-330							Tussock grass	<0.25m	>70%

Table D.5: Summary of vegetation per sampling sub unit

		Tallest Stratum			Understorey			Groundlayer		
Sampling Unit Number	Sampling Sub Unit Number	Growth Form	Height	Crown Separation	Growth Form	Height	Crown Separation	Growth Form	Height	Foliage Cover
WT012	330-775							Tussock grass	<0.25m	>70%
WT012	775-885							Tussock grass	<0.25m	>70%
WT013	0-195							Tussock grass	<0.25m	<10%
WT014	0-151							Tussock grass	<0.25m	10-30%
WT015	0-227	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	0.25-0.5m	>70%
WT015	227-527	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	0.25-0.5m	>70%
WT016	0-122							Tussock grass	<0.25m	10-30%
WT017	0-590	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT018	0-93							Tussock grass	<0.25m	10-30%
WT019	0-83							Tussock grass	<0.25m	30-70%
WT020	0-304							Tussock grass	<0.25m	>70%
WT021	0-220							Tussock grass	<0.25m	<10%
WT022	0-266							Tussock grass	<0.25m	>70%
WT023	0-138							Tussock grass	<0.25m	>70%
WT024	0-125	Tree	7-12m	Crowns clearly separated				Tussock grass	<0.25m	>70%
WT025	0-30							Tussock grass	<0.25m	>70%
WT026	0-30							Tussock grass	<0.25m	>70%
WT027	0-120	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	0.25-0.5m	>70%
WT027	120-370	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	0.25-0.5m	>70%
WT030	0-135							Tussock grass	<0.25m	>70%
WT030	135-400							Tussock grass	<0.25m	>70%
WT031	0-1205	Tree	4-6m	Crowns touching or slightly separated				Tussock grass	<0.25m	>70%
WT032	0-230							Tussock grass	<0.25m	>70%
WT033	0-30							Tussock grass	<0.25m	30-70%

Table D.5: Summary of vegetation per sampling sub unit

		Tallest Stratum			Understorey			Groundlayer		
Sampling Unit Number	Sampling Sub Unit Number	Growth Form	Height	Crown Separation	Growth Form	Height	Crown Separation	Growth Form	Height	Foliage Cover
WT034	0-55							Tussock grass	<0.25m	>70%
WT034	55-212							Tussock grass	<0.25m	>70%
WT035	0-682	Tree	7-12m	Crowns clearly separated	Mallee	4-6m	Clumps of 2-5 trees/shrubs 200+m apart	Tussock grass	<0.25m	>70%
WT036	0-256							Tussock grass	<0.25m	>70%
WT037	0-890							Tussock grass	<0.25m	>70%
WT037	0890-1050							Tussock grass	<0.25m	>70%
WT037	1050-1587							Tussock grass	<0.25m	>70%

Table D.5: Summary of vegetation per sampling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
VT010	0-160	Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - streambank	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT010	160-220	Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT011	0-105	Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT011	105-160	Geomorphological Damage - Aggradation - alluvial	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT012	0-190	Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT012	190-235	Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT013	0-105	Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT013	105-310	Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT014	0-840	Animal Damage - Cattle - urine/droppings	minor
		Pastoral Damage - Farm constructions	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	minor
VT015	0-380	Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT016	0-340	Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT017	0-290	Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT018	0-290	Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
VT019	0-390	Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT020	0-425	Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT020	425-450	Animal Damage - Cattle - urine/droppings	moderate
		Insect Damage - Ants - nests	moderate
		Insect Damage - Ants - trails	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
VT021	0-230	Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT001	0-275	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - nesting/rooting	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Human Damage - Infrastructure Development	severe
		Human Damage - Surveyors Marks	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT002	0-300	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - nesting/rooting	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Human Damage - Surveyors Marks	minor
		Pastoral Damage - Farm constructions	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT003	0-44	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - nesting/rooting	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT004	0-30	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - nesting/rooting	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT005	0-80	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT006	0-121	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT007	0-131	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT008	0-67	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT008	067-392	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT008	392-664	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT008	664-887	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT008	887-1087	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT009	0-67	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT009	067-392	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT009	392-664	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT009	664-887	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT009	887-1087	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Roads/tracks	severe
WT010	0-79	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Aggradation - colluvial	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT010	079-170	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Aggradation - colluvial	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT010	170-310	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT010	310-655	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Aggradation - colluvial	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT010	655-798	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT011	0-125	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT011	125-795	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT011	795-885	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT012	0-330	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT012	330-775	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT012	775-885	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT013	0-195	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT014	0-151	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Insect Damage - Ants - mounds	moderate
		Insect Damage - Ants - trails	moderate
		Pastoral Damage - Water management	severe
WT015	0-227	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT015	227-527	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT016	0-122	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT017	0-590	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Insect Damage - Ants - nests	minor
		Insect Damage - Ants - trails	minor

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT018	0-93	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT019	0-83	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT020	0-304	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - nesting/rooting	severe
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Aggradation - aeolian	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT021	0-220	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT022	0-266	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT023	0-138	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	severe
		Animal Damage - Rabbits - nesting/rooting	severe
		Animal Damage - Rabbits - urine/droppings	severe
		Pastoral Damage - Farm constructions	severe
		Pastoral Damage - Roads/tracks	severe
WT024	0-125	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - nesting/rooting	moderate
		Animal Damage - Rabbits - urine/droppings	moderate
		Pastoral Damage - Farm constructions	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT025	0-30	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT027	0-120	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Aggradation - alluvial	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT027	120-370	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Geomorphological Damage - Erosion - gullying	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT030	0-135	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - sheetwash	moderate
		Pastoral Damage - Farm constructions	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT030	135-400	Animal Damage - Cattle - hoof damage	minor
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Erosion - sheetwash	moderate
		Pastoral Damage - Farm constructions	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT031	0-1205	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Geomorphological Damage - Aggradation - colluvial	severe
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
WT032	0-230	Animal Damage - Cattle - hoof damage	severe
		Animal Damage - Cattle - urine/droppings	moderate
		Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Disturbance Factors	Severity
WT033	0-30	Animal Damage - Cattle - artefact displacement/trampling	moderate
		Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	moderate
		Geomorphological Damage - Erosion - sheetwash	minor
		Pastoral Damage - Water management	severe
WT034	0-55	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Insect Damage - Ants - nests	minor
		Insect Damage - Ants - trails	minor
		Pastoral Damage - Water management	moderate
WT034	55-212	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Insect Damage - Ants - nests	minor
		Insect Damage - Ants - trails	minor
		Pastoral Damage - Water management	moderate
WT035	0-682	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Geomorphological Damage - Erosion - gullying	moderate
		Insect Damage - Ants - nests	minor
		Insect Damage - Ants - trails	minor
WT036	0-256	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	minor
		Animal Damage - Rabbits - urine/droppings	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate
		Pastoral Damage - Water management	severe
WT037	0-890	Animal Damage - Cattle - hoof damage	moderate
		Animal Damage - Cattle - urine/droppings	moderate
		Human Damage - Infrastructure Development	severe
		Human Damage - Surveyors Marks	minor
		Pastoral Damage - Land clearing	moderate
		Pastoral Damage - Ploughing	moderate

Table D.6: Summary of disturbance factors per smapling sub unit

Sampling Unit Number	Sampling Sub Unit Number	Exposure Number	Exposure Length (m)	Exposure Width (m)	Exposure Type	Groundcover (%)	Groundcover Type
Land Unit: Secondary Terrace							
vt003	0-175	170	5	5	erosion patch	0	
vt009	0-290	269	18	8	erosion patch	65	grass
vt020	425-450	450	2	1	anthill	5	grass
wt001	0-275	0	1.95	4.2	cattle trampled patch	50	grass
wt001	0-275	0-275	275	1	optical fibre trench overburden	10	grass
wt001	0-275	29.9	1	2	erosion patch	20	grass
wt001	0-275	4	10.56	2	erosion patch	10	grass
wt001	0-275	42.8	3	1	cattle trampled patch	10	grass
wt003	0-44	0	44	6	dam overburden	60	grass
wt007	0-131	0	131	6	dam overburden	20	grass
wt008	0-67	20	10	10	erosion patch	10	grass
wt008	067-392	200	2	2	erosion patch	10	grass
wt008	392-664	485	2	2	erosion patch	10	grass
wt009	0-67	30	15	8	erosion patch	10	grass
wt010	170-310	260	20	2	erosion patch	10	grass
wt014	0-151	0	151	1	water management contour bank	20	grass and redeposited sediments
wt018	0-93	0	93	6	dam overburden	10	grass
wt019	0-83	0	83	6	dam overburden	50	grass and redeposited sediments
wt022	0-266	1	4.5	0.5	creek bank/drainage ditch	40	grass
wt022	0-266	224	6	5.5	erosion patch	25	grass
wt023	0-138	114	3	2	erosion patch	5	grass
wt023	0-138	117	6	16	erosion patch	8	estuarine mud)
wt023	0-138	50	8.5	18	floor of shed	8	scattered building materials
wt024	0-125	25	0.5	3	erosion patch	50	grass
wt024	0-125	29	5	7	erosion patch	40	grass
wt024	0-125	30	13	15	erosion patch	30	grass
wt024	0-125	5	0.5	20	cow pad	45	grass
wt024	0-125	61	10	15	erosion patch	40	grass
wt027	120-370	300	50	10	creek bank/drainage ditch	10	grass
wt030	0-135	0	53	0.5	cow pad	50	grass

Table E.1: Summary of groundcover per exposure type

Sampling Unit Number	Sampling Sub Unit Number	Exposure Number	Exposure Length (m)	Exposure Width (m)	Exposure Type	Groundcover (%)	Groundcover Type
wt030	0-135	75	5	5	erosion patch	50	grass
wt034	55-212	55	157	2	creek bank/drainage ditch	90	grass
wt037	1050-1587	1050	537	1	erosion patch	75	grass
Land Unit: Tertiary Terrace							
wt017	0-590	200	2	10	erosion patch	20	grass
wt021	0-220	0	220	6	dam overburden	5	grass and redeposited sediments
wt025	0-30	30	30	20	creek bank/drainage ditch	65	grass
wt026	0-30	30	30	20	creek bank/drainage ditch	65	grass
wt033	0-30	0	30	30	dam overburden	65	grass
wt034	0-55	24	31	2	creek bank/drainage ditch	90	grass
wt035	0-682	177	3.3	3.1	ant mound	0	
wt035	0-682	323	27	17.5	erosion patch	20	grass
wt035	0-682	37	4.2	4.2	erosion patch	5	grass
wt035	0-682	630	15.3	3.8	ant mound	45	grass
wt037	0890-1050	1005	2	1	erosion patch	75	grass
wt037	0890-1050	890	160	1	erosion patch	75	grass

Table E.1: Summary of groundcover per exposure type

Sampling Unit Number	Sampling Sub Unit Number	Exposure Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	Other Detection Limiting Factors
Land Unit: Simple Slope							
wt037	0-890	0	<10%	Few	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt037	0-890	382	0%	none			
wt037	0-890	556	0%	none			
wt037	0-890	795	0%	none			
wt037	0-890	845	0%	none			
Land Unit: Primary Terrace							
wt006	0-121	0	<10%	Few	2-6mm	small pebbles or fine gravel	animal scats, vegetation
wt010	0-79	0	<10%	Few	2-6mm	small pebbles or fine gravel	
wt010	310-655	515	11-20%	common	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt013	0-195	0	11-20%	common	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt016	0-122	0	<10%	Few	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt020	0-304	0	0%	none			
wt020	0-304	110	0%	none			
wt030	135-400	340	0%	none			
wt031	0-1205	1072	<10%	Few	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt031	0-1205	127	0%	none			
wt031	0-1205	16	0%	none			vegetation
wt031	0-1205	164	0%	none			
wt031	0-1205	233	0%	none			leaf litter/bark having colour/sheen/shape of artefacts
wt031	0-1205	435	0%	none			
wt031	0-1205	561	0%	none			
wt031	0-1205	667	0%	none			
wt031	0-1205	77	0%	none			
wt031	0-1205	802	0%	none			
wt031	0-1205	808	0%	none			

Table E.2: Summary of detection limiting factors in exposures

Sampling Unit Number	Sampling Sub Unit Number	Exposure Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	Other Detection Limiting Factors
wt031	0-1205	852	21-50%	many	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
					20-60mm	large pebbles or coarse gravel	
					60-200mm	cobbles	
wt031	0-1205	897	0%	none			
wt031	0-1205	931	0%	none			
wt031	0-1205	988	0%	none			
Land Unit: Secondary Terrace							
vt003	0-175	170	0%	none			
vt009	0-290	269	0%	none			
vt020	425-450	450	0%	none			severe compaction from cattle trampling of deposits
wt001	0-275	0	0%	none			
wt001	0-275	0-275	<10%	Few	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt001	0-275	29.9	0%	none			
wt001	0-275	4	0%	none			
wt001	0-275	42.8	0%	none			
wt003	0-44	0	0%	none			animal scats
wt007	0-131	0	11-20%	common	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	
					20-60mm	large pebbles or coarse gravel	
wt008	0-67	20	0%	none			
wt008	067-392	200	0%	none			
wt008	392-664	485	0%	none			
wt009	0-67	30	0%	none			
wt010	170-310	260	<10%	Few	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	
wt014	0-151	0	11-20%	common	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	
wt018	0-93	0	0%	none			pebbles/rocks same colour or material as artefacts

Table E.2: Summary of detection limiting factors in exposures

Sampling Unit Number	Sampling sub Unit Number	Exposure Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	Other Detection Limiting Factors
wt019	0-83	0	11-20%	common	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	vegetation
					20-60mm	large pebbles or coarse gravel	
					60-200mm	cobbles	
wt022	0-266	1	<10%	Few	2-6mm	small pebbles or fine gravel	
wt022	0-266	224	0%	none			logs from cattle loading ramp
wt023	0-138	114	0%	none			animal scats, scattered building materials
wt023	0-138	117	0%	none			
wt023	0-138	50	0%	none			animal scats
wt024	0-125	25	11-20%	common	2-6mm	small pebbles or fine gravel	animal scats
					6-20mm	medium pebbles or gravel	
wt024	0-125	29	0%	none			animal scats
wt024	0-125	30	11-20%	common	2-6mm	small pebbles or fine gravel	animal scats
					6-20mm	medium pebbles or gravel	
					20-60mm	large pebbles or coarse gravel	
wt024	0-125	5	<10%	Few	2-6mm	small pebbles or fine gravel	animal scats
					6-20mm	medium pebbles or gravel	
					20-60mm	large pebbles or coarse gravel	
wt024	0-125	61	<10%	Few	2-6mm	small pebbles or fine gravel	animal scats
					6-20mm	medium pebbles or gravel	
					20-60mm	large pebbles or coarse gravel	
wt027	120-370	300	0%	none			
wt030	0-135	0	0%	none			
wt030	0-135	75	0%	none			
wt034	55-212	55	0%	none			
wt037	1050-1587	1050	0%	none			
Land Unit: Tertiary Terrace							
wt017	0-590	200	0%	none			
wt021	0-220	0	21-50%	many	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	

Table E.2: Summary of detection limiting factors in exposures

Sampling Unit Number	Sampling Sub Unit Number	Exposure Number	%Coarse Fragments	Coarse Fragment Frequency	Coarse Fragment Size	Coarse Fragment Description	Other Detection Limiting Factors
wt025	0-30	30	11-20%	common	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	
wt026	0-30	30	11-20%	common	2-6mm	small pebbles or fine gravel	pebbles/rocks same colour or material as artefacts
					6-20mm	medium pebbles or gravel	
wt033	0-30	0	11-20%	common	2-6mm	small pebbles or fine gravel	
					6-20mm	medium pebbles or gravel	
wt034	0-55	24	0%	none			
wt035	0-682	177	0%	none			
wt035	0-682	323	0%	none			
wt035	0-682	37	0%	none			logs, vegetation
wt035	0-682	630	0%	none			
wt037	0890-1050	1005	0%	none			
wt037	0890-1050	890	0%	none			

Table E.2: Summary of detection limiting factors in exposures

Exposure Type	Exposure Length (m)	Exposure Width (m)	Exposure Area (sq m)	Visibility (%)	Area Available for Detection (sq m)	%Land Unit Available for Site Detection	Artefacts Present
Simple Slope							
surficial disturbance							
creek bank/drainage ditch	70	3	210	80	168.00		
erosion patch	20	2	40	80	32.00		
erosion patch	1	1	1	25	0.25		*
erosion patch	2	2	4	25	1.00		*
Totals			255.00		201.25	0.09%	
extensive disturbance							
optical fibre trench	890	1	890	90	801.00		*
Totals			890.00		801.00	0.35%	
Simple Slope Total					1002.25	0.44%	
Primary Terrace							
surficial disturbance							
cow pad	45	2	90	80	72.00		*
cow pad	14	0.5	7	50	3.50		
cow pad	14	1	14	30	4.20		
cow pad	2	7	14	40	5.60		
cow pad	43	0.5	21.5	45	9.68		
cow pad	81	0.5	40.5	50	20.25		
cow pad	79	0.5	39.5	90	35.55		
cow pad	38	10	380	75	285.00		
creek bank/drainage ditch	3	23	69	30	20.70		
creek bank/drainage ditch	11	22	242	30	72.60		
creek bank/drainage ditch	304	10	3040	10	304.00		
erosion patch	15	2	30	95	28.50		*
erosion patch	20	10	200	70	140.00		*
erosion patch	2.5	1	2.5	50	1.25		
erosion patch	3	3	9	70	6.30		
erosion patch	13	4	52	90	46.80		
erosion patch	9	15	135	60	81.00		
erosion patch	18	20	360	45	162.00		
erosion patch	20	20	400	55	220.00		
erosion patch	30	20	600	80	480.00		
Totals			5746.00		1998.93	0.32%	
extensive disturbance							
dam overburden	195	6	1170	90	1053.00		*
dam overburden	122	6	732	90	658.80		*
dam overburden	121	6	726	50	363.00		*
Totals			2628.00		2074.80	0.33%	
Primary Terrace Total					4073.73	0.65%	
Secondary Terrace							
surficial disturbance							
anthill	2	1	2	95	1.90		*
cattle trampled patch	1.95	4.2	8.19	50	4.10		*
cattle trampled patch	3	1	3	90	2.70		
cow pad	0.5	20	10	55	5.50		
cow pad	53	0.5	26.5	50	13.25		
creek bank/drainage ditch	4.5	0.5	2.25	60	1.35		
creek bank/drainage ditch	157	2	314	10	31.40		
creek bank/drainage ditch	50	10	500	90	450.00		
erosion patch	0.5	3	1.5	50	0.75		*
erosion patch	2	2	4	90	3.60		*
erosion patch	2	2	4	90	3.60		*
erosion patch	10.56	2	21.12	90	19.01		*
erosion patch	5	5	25	100	25.00		*
erosion patch	20	2	40	90	36.00		*
erosion patch	18	8	144	35	50.40		*

Table E.3: Summary of effective survey coverage per exposure per land unit

Exposure Type	Exposure Length (m)	Exposure Width (m)	Exposure Area (sq m)	Visibility (%)	Area Available for Detection (sq m)	%Land Unit Available for Site Detection	Artefacts Present
erosion patch	6	16	96	92	88.32		*
erosion patch	13	15	195	70	136.50		*
erosion patch	1	2	2	80	1.60		
erosion patch	3	2	6	95	5.70		
erosion patch	5	5	25	50	12.50		
erosion patch	5	7	35	60	21.00		
erosion patch	6	5.5	33	75	24.75		
erosion patch	10	15	150	60	90.00		
erosion patch	10	10	100	90	90.00		
erosion patch	15	8	120	90	108.00		
erosion patch	537	1	537	25	134.25		
floor of shed	8.5	18	153	92	140.76		*
Totals			2557.56		1501.93	0.16%	
extensive disturbance							
dam overburden	83	6	498	50	249.00		*
dam overburden	131	6	786	80	628.80		*
dam overburden	44	6	264	40	105.60		
dam overburden	93	6	558	90	502.20		
optical fibre trench	275	1	275	90	247.50		*
water management contour	151	1	151	80	120.80		*
Totals			2532.00		1853.90	0.19%	
Secondary Terrace Total					3355.83	0.35%	
Tertiary Terrace							
surficial disturbance							
ant mound	3.3	3.1	10.23	100	10.23		
ant mound	15.3	3.8	58.14	55	31.98		
creek bank/drainage ditch	31	2	62	10	6.20		
creek bank/drainage ditch	30	20	600	35	210.00		
creek bank/drainage ditch	30	20	600	35	210.00		
erosion patch	2	1	2	25	0.50		*
erosion patch	2	10	20	80	16.00		
erosion patch	4.2	4.2	17.64	95	16.76		
erosion patch	160	1	160	25	40.00		
erosion patch	27	17.5	472.5	80	378.00		*
Totals			2002.51		919.67	0.17%	
extensive disturbance							
dam overburden	220	6	1320	95	1254.00		*
dam overburden	30	30	900	35	315.00		*
Totals			2220.00		1569.00	0.29%	
Tertiary Terrace Total					2488.67	0.46%	

Table E.3: Summary of effective survey coverage per exposure per land unit

APPENDIX F: DESCRIPTIONS OF FIND LOCATIONS AND ARTEFACTS

Site Identification	Site Length (m)	Site Width (m)	Site Area (sq m)	Number of Artefacts	Artefact Density	Site Boundary Criteria	Groundcover (%)	Site Condition	Land Unit
OFT2	1	1	1	1	1.00	visibility	85	poor	simple slope
OFT3	1	1	1	1	1.00	visibility	15	fair	simple slope
OFT4	1	1	1	1	1.00	visibility	15	fair	simple slope
BC2	1	1	1	1	1.00	visibility	5	poor	primary terrace
BC3	20	10	200	7	0.04	visibility	30	poor	primary terrace
DAM1	60	5	300	17	0.06	visibility	50	poor	primary terrace
DAM4	1	1	1	2	2.00	visibility	0	poor	primary terrace
DAM5	1	1	1	4	4.00	visibility	0	poor	primary terrace
WT1	15	2	30	3	0.10	visibility	5	poor	primary terrace
AN1	2	1	2	5	2.50	visibility	0	poor	secondary terrace
BC1	51	10	510	800	1.57	decline in artefacts	10	fair	secondary terrace
CB1	15	1	15	3	0.20	decline in artefacts	20	poor	secondary terrace
DAM2	16.5	1	16.5	3	0.18	decline in artefacts	0	poor	secondary terrace
DAM3	83	30	2490	52	0.02	visibility	50	poor	secondary terrace
GSG1	1	1	1	1	1.00	visibility	90	poor	secondary terrace
GSG2	1	1	1	1	1.00	visibility	90	poor	secondary terrace
HS1	65	52	3380	11	0.00	visibility	8	poor	secondary terrace
OFT1	23.5	6.3	148.05	12	0.08	visibility	50	poor	secondary terrace
DAM6	220	6	1320	11	0.01	visibility	5	poor	tertiary terrace
DAM8	30	30	900	6	0.01	visibility	65	poor	tertiary terrace
MD1	1	1	1	1	1.00	visibility	90	poor	tertiary terrace
OFT5	1	1	1	1	1.00	visibility	75	fair	tertiary terrace

Table F.1: Summary of sites

		Cores		Flakes		Broken Flakes		Retouched Flakes		Flaked Pieces		Other			
Site Id	Raw Material	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Total	Notes
AN1	100			2	40.0%	3	60.0%							5	
BC1	100	1	0.8%											1	
	101	8	6.3%	30	23.6%	46	36.2%	4	3.1%	22	17.3%			110	**blade cores, backed blades and tranchet retouch
	107	1	0.8%	3	2.4%	3	2.4%			3	2.4%			10	**sample only for BC1 (~10%)
	108	1	0.8%	1	0.8%					3	2.4%			5	**
	110			1	0.8%									1	**
BC2	101			1	100.0%									1	
BC3	101	1	14.3%	3	42.9%	1	14.3%			2	28.6%			7	
CB1	101			2	66.7%			1	33.3%					3	tranchet retouch
DAM1	101	3	17.6%	3	17.6%	6	35.3%			3	17.6%			15	
	102							1	5.9%					1	tranchet retouch
	105			1	5.9%									1	
DAM2	100									1	33.3%			1	
	101			1	33.3%									1	
	104			1	33.3%									1	
DAM3	100	1	1.9%			1	1.9%			2	3.8%			4	cobble core
	101	20	38.5%	10	19.2%	4	7.7%	2	3.8%	4	7.7%	1	1.9%	41	backed blades, 3 blade cores,also flakes used as blade cores, split cobble
	105											1	1.9%	1	broken bottom grindstone
	106	2	3.8%	1	1.9%	1	1.9%							4	
	109	1	1.9%	1	1.9%									2	blade core
DAM4	101	1	50.0%			1	50.0%							2	
DAM5	101					2	50.0%							2	
	107			2	50.0%									2	
DAM6	101	3	27.3%	2	18.2%	2	18.2%			3	27.3%	1	9.1%	11	hammerstone
DAM8	101			2	33.3%	4	66.7%							6	
GSG1	105			1	100.0%									1	
GSG2	101			1	100.0%									1	
HS1	101			7	63.6%					4	36.4%			11	
MD1	102									1	100.0%			1	
OFT1	101			5		3		3		1	8.3%			12	broken including one split cone, backed blades

Table F.2: Summary of artefacts in artefact type per raw material groupings

		Cores		Flakes		Broken Flakes		Retouched Flakes		Flaked Pieces		Other			
Site Id	Raw Material	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Total	Notes
OFT2	106	1	100.0%											1	
OFT3	101			1	100.0%									1	
OFT4	106			1	100.0%									1	
OFT5	101			1	100.0%									1	
WT1	101					1	100.0%							1	
	107	1	50.0%			1	50.0%							2	
													Total	271	

Code	Raw Material Type
100	chert
101	silcrete
102	brown hard siliceous material
103	cream hard silliceous material
104	quartz sandstone
105	white hard silliceous material
106	quartzite
107	mudstone
108	indurated mudstone
109	crystalline quartz
110	quartz

Table F.2: Summary of artefacts in artefact type per raw material groupings

APPENDIX G: GLOSSARY

Anvil: Object, usually a piece of stone, that supports another stone being struck with a hammer.

Archaeology: The study of the material evidence of the human past.

Archaeological deposit: Sediments that contain artefacts or other evidence of past human occupation of a place.

Artefact: An object made or modified by human agency. Objects were only called artefacts if they possessed one or more of the following characteristics:

- Positive or negative ringcrack
- Distinct positive or negative bulb of applied force
- Definite erraillure scar in position beneath a platform
- Definite remnants of flake scars (ie dorsal scars and ridges)
- Fracture-surface markings such as Wallner lines, concentric undulations, and lances on flake scars or the ventral surfaces of flakes.

These traits were chosen because they indicate the application of an external force to a core, and are characteristic of the spalls removed by humans using direct percussion.

Assemblage: A group of stone artefacts from a site or the same region.

Backed blade: A flake or piece of flake with the margin opposite the sharp edge deliberately blunted by flaking (called backing or retouch). In some instances, the knapper took advantage of natural backing, such as cortex or inclusions, to serve as the same blunting medium.

BP: Before the Present ("Present" being 1950 when radiocarbon dating began).

Broken flake: Piece of stone that is identifiable as a segment of a flake.

Conjoin: Artefacts that can be joined back together.

Contact sites: See Historic Period Features.

Core: A lump of stone from which flakes have been removed by striking it with another stone.

Cortex: The outer skin on a piece of rock formed as a result of surface weathering.

Ethnography/Ethnographic: Historical writings about local indigenous people.

Faceting: Faceted or abraded platforms have a series of small scars that result from the removal of very small flakes. This serves to roughen the platform surface thereby increasing friction with the hammer and often isolating the platform or removing overhangs to improve the platform angle.

Flake: A piece of stone detached by striking a core with another rock. For analytical purposes, this artefact category doe not include retouched flakes or flaked pieces.

Flaked piece: Chipped stone artefacts that cannot be classified as flakes, cores or retouched flakes. Often very weathered or fire shattered artefacts are difficult to accurately categorise even though they may be recognisable as humanly produced; these types of artefacts are placed in this "miscellaneous" category of flaked piece.

Geomorphology: The study of present day landscapes to explain how they have formed.

Hammerstone: A rock or piece of rock, often a river pebble, which is used by a knapper to strike a core to remove flakes.

Grinding grooves: Depressions in rock surfaces where axes, spears or other implements, ochre, or seeds or other foodstuffs were ground. Water was often used to create a slurry to assist the grinding process, so grooves tend to be found near water, usually in creek beds, around rock pools or on rock surfaces that catch drips.

Hearth: The site of a campfire, represented by ash, charcoal, soil discolouration, and possibly hearth stones around it.

Historic Period Features: Locations associated with early contact between Aboriginal people and non-Aboriginal people or historical sites that have special significance for Aboriginal people. (Also called contact sites.)

Holocene period: The last 10,000 years.

In situ: Undisturbed, in its original place.

Knapper: Person who flakes stone.

Knapping floor: Place with the debris left from removing stone flakes from one or more cores.

Manuport: An artefact produced from non-local raw material that was transported into the area.

Open sites: Any place in the open with evidence of Aboriginal use/occupation or symbolic meaning.

Overhang Removal: The lip or overhang left on the core from removal of a previous flake is knocked off, leaving a series of stacked step fractures on the dorsal face of the flake. This is indicated by the presence of small scars on the proximal end of the dorsal face. Overhang removal is one method of preparing a platform so that it will not shatter and cause a step termination when struck. This removal of mass from the platform strengthens it and improves the predictability with which the stone will fracture.

PAD: See Potential archaeological deposit.

Platform: The surface to which force is applied by a hammer during knapping.

Platform preparation: Alteration of the platform edge or surface by flake removal, grinding, or chipping.

Pleistocene: The period from 10,000 years ago to about 2,000,000 years ago.

Potential archaeological deposit: Open areas or rockshelters, sometimes without visible, surface evidence of Aboriginal occupation or use, which are large enough to rest or camp in and have level floors with sandy deposits with a high likelihood of containing archaeological material. (Called PAD for short.)

Potlid: a small piece of rock that spalls off sometimes when stone is heated.

Quarry: Places where raw materials, such as stone or ochre, have been obtained.

Reduction strategy: The process of removing flakes from a core.

Retouch: Resharpening or shape modification by the removal of small flakes from the margins of an artefact.

Retouch/use wear/edge damage: Evidence on the margins of artefacts that indicates retouch, use or accidental damage.

Retouched Flakes: Flakes that have been "shaped" into a recognised formal tool type.

Scarred trees: Trees with scars from bark removal by Aboriginal people for use as roofing material or for manufacturing canoes or utensils such as shields and containers, or as notched footholds for climbing trees to catch possums or obtain honey.

Site: Any location with evidence of past Aboriginal activity.

Stone artefact scatters: Places where artefacts made from stone, the waste produced from their manufacture, or those which are broken or worn out are found.

Stone artefact scatters: Places where artefacts made from stone, the waste produced from their manufacture, or those which have been 'used up' are found. Often stone artefact scatters have been buried by sediment or covered by vegetation. Artefact scatters found in the open are often called open sites or open campsites, although they may not actually be places where people camped. They may represent evidence left from hunting or plant food processing or have been discarded as people travelled through an area.

Stratified: Having successive layers of occupational debris and/or sediments.

Taphonomic: Natural and cultural processes that operate before material is covered by sediment (if it is), after burial with sand or soil, and then after deposition, often by subsequent erosion, or cycles of erosion and reburial, and that affect the dispersal or preservation of archaeological material.

Tranchet retouch: Removal of a thin flake parallel to the long axis and/or transversely or obliquely—a combination of what are referred to as a burin technique and a tranchet blow. Most often, these flakes are removed from the proximal end of a flake along the lateral margin, and less frequently from the lateral or distal margin.

PART II

Report on Geomorphology

Report on the land units of proposed Rothbury Country Resort development, near Cessnock, as background for the Archaeological Survey.

A report to Burramoko Archaeological Service
Grace Hill, 108 Narrowneck Road,
Katoomba NSW 2780

Prepared by Dr Robert Haworth

April 1998

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Executive summary

The majority of the landforms that make up the proposed Rothbury Country Resort development area are products of a long history of floodplain deposition on this section of Black Creek. As these deposits are made up largely of or semi-consolidated silts and gravels, any development must be aware of the special effects this will have on the drainage system. When dealing with sedimentary deposits it is usually better to spread rather than concentrate excess waters created by development. Failure to do this in the past on the property has led to the development of extensive gully erosion, probably triggered by a fluctuating water table interacting with fossil drainage lines. Much of the property is therefore presently undergoing net erosion and loss of sediment. This erosion has in places exposed a rich archaeological record, but the same processes also may threaten the preservation of the record in the long term. If the proposed development takes the proper corrective measures and follows best practice there is no reason why it cannot be compatible with a preservation of the natural and archaeological heritage of the site, and perhaps repair some of the damage caused by earlier land uses.

Introduction

The Rothbury Country Resort development site (hereafter called the Rothbury Estate) is located on the floodplain of Black Creek, 12 km north of Cessnock and 18 km north of the creek's source in the Broken Back Range in the Hunter Valley region of New South Wales (see Plates C.1 and C.2). Black Creek is a north-flowing tributary of the Hunter River, and joins this stream 12 km north of the development area.

The outstanding geomorphic feature of the development area is that 85% of the total site area lies on the Quaternary sediments of the floodplain of Black Creek. The present landscape mostly derives from the evolution by erosion and reworking of the different levels of fluvial terraces and associated landforms. The only parts of the development area that do not originate from past or present fluvial deposition are the narrow segment of bedrock slope (see Plate C.22) in the central/southwest sector, adjacent to Allandale Road (Branxton-Cessnock), and occasional bedrock residuals such as that underlying the former homestead site of "Rose Mount" in the central/north sector of the development area.

The landscape of the development area must therefore be analysed principally in terms of its floodplain geomorphic units. These comprise a typical fluvial depositional assemblage of:

- stream bed
- stream bank
- levee
- primary (lower), secondary (middle) and tertiary (upper) alluvial terraces (see Plates C.13 and C.14)
- oxbow lakes ("billabongs")
- backswamps
- fossil relics of some of these forms (see Plates C.15-C.18)

There is also some possible aeolian modification of sand deposits on the floodplain in the southeastern sector of the development site (see Plates C.5 and C.6).

From the point of view of drainage modification and hydrology, it is important to emphasise that all these forms consist of sedimentary deposits that may be characterised generally as semi-consolidated, though they comprise a complicated series of facies, lenses and truncated strata that range in consistency from uncompacted silt to near-lithified laterites, with greater or lesser degrees of differentiation into soil horizons.

Overview of upper Black Creek floodplain

Upper Black Creek floodplain is contained within a long narrow south-north trending depression over 12 km long and from one to two km wide (see Plate C.2), beginning just south of the town of Cessnock and terminating where Black Creek passes through a narrow defile just north of the development site (see Plate C.17), after which the creek continues on its northward course to the Hunter River. This defile is the key to understanding the unusual concentration of sediments on the development area. It consists of two relatively gentle bedrock slopes (a low point in

the Molly Morgan Ridge: see Plate C.17) just north of the bridge over Allandale Road on the northern border of the property, and just below the confluence of Black Creek with a major tributary (Rothbury Creek) coming in from the southwest.

The valley of upper Black Creek is surrounded on the south, west and northeast by steeply scarped ranges between 200 and 580 m in altitude above sea level (ASL) (see Plates C.1, C.2 and C6). As the bed of Black Creek ranges in ASL from between 40 and 80 m, this represents considerable local relief. The result has been an exceptional build-up of sediment on the floodplain for a stream of this size. Much of the floodplain of Black Creek from Cessnock to the development area is now cultivated and covered by extensive vineyards. Valley sediment appears to be thickest at the northern end of the 12 km long floodplain, and especially on the development area. This is because sediment carried by floodwaters falls out of suspension as these waters bank up and slow after being checked by the narrowness of the defile and the incoming tributary stream (Rothbury Creek). In particular, bedload in the form of rounded cobbles and pebbles have formed extensive but now largely buried deposits (see Plate C.3), presumably during past higher velocity fluvial regimes. It is these cobble deposits, formed from a wide variety of rock types from all over the catchment, that provided an attractive resource to stone tool technologists, and also left an extensive record of stone artefacts.

Nature of the floodplain in development area

The floodplain along the Rothbury Estate reach of Black Creek is up to 2 km in width (see Plates C.2 and C.17), with sediments ranging in thickness from over five metres deep in the primary and secondary terraces to less than a metre in the backswamps. There are various deposits of different sediment grain sizes, from fine silts and clays, sands, and extensive gravel and cobble beds. Laterisation and pedogenesis have taken place in much of the older depositional facies (for example, see Plates C.18 and C.19), and some of the very oldest depositional remnants high up on the distal edge of the flood plain have developed ironstone nodule beds.

Downstream of the property the floodplain narrows as the river cuts its way between two parallel ridges in its flow towards the Hunter River 12 km to the north. The floodplain on the right bank, which is not part of the proposed development site, has the simplest structure, of bank, levee and lower (primary) terrace less than 0.5 km wide and sharply demarcated on its outer edge by the escarpment of a branch of the Molly Morgan Range (see Plate C.6). The right bank of the river cuts into the bedrock of this escarpment in the last bend on the northernmost part of the development area. On the left bank, which is the development site, the floodplain consists of the numerous relic forms which are often 1 to 2 m higher than the opposite bank.

Streambed and banks

Black Creek presently flows in a deeply incised, narrow (~ 20 m wide) and relatively straight U-shaped channel cut at least four metres into its own alluvial deposits. At only one point does it cut into bedrock, on the bend 600 m above the road-bridge at the northwestern boundary of the development area. The stream appears to have reached equilibrium with its present discharge, exhibiting a stable pool and riffle sequence (see Plate C.7), with pools dominant. These pools extend for 60 to 80 m in

length and are up to two metres deep, while riffles are much shorter, rarely exceeding five metres in length. The stream at average flow (November 1997) ranges between five and ten metres in width of wetted perimeter, and usually fills the whole base of the incised channel (see Plate C.7). The top of the U-shaped channel averages between 20 and 25 m in width; thus the slopes of the incised channel are extremely steep, having a gradient of between 50 and 25%.

Temporal sequence of floodplain sedimentary units from the present to the past

The present fluvial regime is one of a straight, single thread, deeply incised stream where bankfull discharge would not be common. There is little sign of extensive recent deposition on the flood plain except for the levees on either side of the stream which are probably still receiving sediment during overbank discharge events. Beyond the presently aggrading levees, the floodplain appears to have entered a degrading, erosional phase.

There is ample evidence that this present phase has replaced a previous regime of a meandering and possibly multi-thread stream (see Plates C.14-C.17) that overtopped its much lower banks more frequently and was actively cutting a flood plain out of the higher level terraces. Beyond the higher or middle (secondary) terrace there are remnants a third and presumably much older terrace formed at a higher level than the two lower terraces. This third (or tertiary) terrace also extends for up to 500 m in width.

Apart from the present regime, there is therefore sedimentary evidence for three depositional phases building and reworking to produce a complex flood plain, probably over many thousand of years. Erskine (1986) has demonstrated that the Hunter drainage system has changed even within the short time span of European settlement, so the present regime may be quite recent. There may have been other erosional phases similar to the present, but of course erosional evidence is less apparent than depositional. However, an extensive lag deposit of large rounded gravels (which will be discussed later because of their rich archaeological attributes) underlying the second terrace may represent the residue of several cycles of erosion. The three depositional phases will be designated phases 1, 2 and 3, from the river outwards, or from the younger to the older, and their relic forms discussed in order to allow them to be fitted into the context of the archaeological finds.

Proper management of any floodplain demands that landforms be ordered spatially and temporally so as to understand the consequences of disturbing or altering any of these units. This report is based on the premise that surface and groundwater drainage systems should not be compromised, both for general sustainable management purposes but also particularly so that heritage and archaeological values can be preserved and enhanced. The development area's landscape will therefore be broken into these various floodplain regimes, moving from the streambed outwards.

Phase 1: primary (lowest) terrace and other landforms produced by the meandering stream phase

The banks and the associated levees topping them represent the present fluvial regime (see Plates C.12-C.14). However, these banks have cut through two earlier phases. The lower terrace has been designated the primary terrace. This is because, although it is the youngest of the three terrace levels, it has extensively reworked prior landforms and dominates the present floodplain landscape on both sides of the Black creek: the survival of the older terrace levels is largely limited to Rothbury Estate and some of the adjoining properties to the south. This lowest terrace is traversed by relic infilled billabongs (oxbow lakes), which are now moist grassy depressions (eg Plate C.18), though they are filled with water during one in 100 year floods. These billabong remnants are usually within 50 m of the present stream, which cuts through their original arcuate form leaving remnants on either side of the stream, although far more of these relics are preserved on the left bank (the Rothbury Estate side) than on the right bank. Associated with this phase are sandy deposits on that part of the floodplain contained within the southeastern sector of the property (see Plate C.6). These deposits appear to have been reworked by the wind to form a low, broad west-east trending dune, covered with scanty grass and infested with large rabbit warrens (see Plate C.5). The primary terrace is at its widest at the northwestern and southeastern ends of the development area, where it forms extensive lower levels several hundred metres wide. In the middle parts of the stream as it borders Rothbury Estate the primary terrace has made less substantial inroads into the second, middle level terrace, and is often less than 50 m wide, and diminishes to nothing at one point where the higher middle terrace forms the left bank of the present stream (see Plates C.14 and C.24).

Phase 2: higher, second terrace covering lag gravels

The higher and therefore probably older feature on the floodplain is the second terrace (see Plates C.12, C.13, C.17, C.19 and C.20), on remnant sections of which both the present house and silos ("Rothdale") and the now abandoned site of "Rose Mount" are situated (see Plate C.21). This mid-level terrace represents the culmination of an earlier phase of river development, during most of which time the river must have flowed at a considerably higher level than at the present. The base of this terrace, so far as can be ascertained from dam extraction material and riverbank and erosion profiles, consists (at least in part) of rounded gravels (mostly in the cobble range) of varied lithologies, and occasional even larger angular sandstone slabs. This large fluvial cobble assemblage is set approximately 3 m above the present base of the Black Creek incision, and the evidence from other point exposures suggests that it has a wide extension underneath the second terrace.

The edge of the second terrace is sharply demarcated and rises one to two metres above the primary terrace (see Plates C.12-C.14). Both the primary and second terrace are highest at their front, and slope gently to their distal edge to lateral backswamp depressions (Plate C. 14 shows both the primary and middle terrace sloping back to their distal edges). Sedimentation in river terraces are usually deepest at the front edge, declining to the back swamp which, unless it also functions as a an overflow billabong, may have the thinnest and finest sediment stratum. This was the case with

the backswamp of the second terrace, where a dam excavations (see Plate C. 29) showed that bedrock was not far below the surface at this geomorphic location.

In places in the middle section of the valley the demarcating bank of the second terrace forms the banks of the present stream (see Plate C.24). However, it is mostly situated further inland from Black Creek where it has been cut back to form the primary terrace. The second terrace is generally much wider than the primary terrace, extending as much as 500 m inland. On its distal side it gently declines into a long lateral depression that represents a former backswamp, and the limit of the influence of the depositional regime that produced this sedimentary unit (see Plates C.14 and C.24).

Exposed in places underneath the second terrace by recent erosion and dam building are deposits of lag gravels, containing many large rounded cobbles as well as some smaller fluvial gravels and occasional boulders.

Phase 3: truncated and eroded uppermost (tertiary) terrace

Between the termination of the second terrace and the bedrock slopes (see Plate C.22) in the central/southwest sector of the development area is what is interpreted as a third, older terrace, with many of its features obscured by a gentle slope development of its deep alluvium. On its distal edge in the far south west of the development area, however, there is an exposed lag deposit of fluvial gravels at a height of eight metres above the present streambed, and at least two above the lag depsoits of the middle, second terrace. The lag deposit is associated with an extensive lens of ironstone gravels, which may have formed at a time when the terrace was intact and iron could move up and down with the water table, or the iron may have moved laterally and downslope from the adjacent bedrock rise.

The central/southwest portion of the development area, adjacent to Allandale Road, has colluvial-derived soils formed on a bedrock slope (see Plate C.22), which have probably developed on a different and much longer timescale to the floodplain deposits. However, the changing base level of the river must have influenced the development of the slope in its later stages, that is, probably during Quaternary time.

However, remnant pockets of fluvial gravels are found at high levels on the present slope, suggesting that the topography represents a very long period of fluvial downcutting, infilling, and erosional exhumation.

Possible age of present regime and the earlier phases

Rapid change since European settlement in the Hunter drainage system, often from meandering forms to straighter, steeper channels, has been well documented (Erskine 1986; Erskine and Warner 1988; Warner 1995). This has been explained as a result of increased sediment load from human disturbance and an increase in summer rain due to a slight climatic change in the region during the 20th century. Black Creek had the added disturbance of an increase in discharge from the towns of Cessnock, Bellbird and other forms of urban and industrial drainage. As well, Eyles (1977) has described the widespread change in river planform in southeast Australia following European settlement, from chains of ponds to incised flow.

It is therefore probable that the present river form is very recent, and may post-date the beginning of European settlement. This is also suggested by the good preservation of the remnant billabongs (eg Plates C.15 and C.16), and is consistent with the development of the lateral erosion gullies initiated along the course of former billabongs (eg see Plates C.8, C.12 and C.13). Another indicator of a relatively recent age of the sediment of the primary terrace is that profile exposures show no sign of pedogenesis, or soil formation into an A and B horizon profile, which is widespread in the middle terrace (compare Plates C.12 and C.13 with Plates C.19 and C.20). The lines of evidence point to the primary terrace being actively formed until the last few hundred years and deposition probably still occurs in extreme floods.

More problematic is the age of the fine silts and sediments of which the upper portion of the second terrace is composed (see Plate C.20), and more importantly, from the point of view of dating the extensive archaeological remains in the lag fluvial cobbles, the age at which these gravels were covered by the fine upper layers of sediment. The sheer extent of the second terrace compared to the much narrower lower terrace suggests that either it was deposited over a much longer timeframe or it was the product of a series of extreme climatic and environmental events. Either possibility suggests the mid or the early Holocene (5000 and 10 000 years ago), two dates when the climate was changing rapidly and the landscape probably adjusted to the change with more intense erosion and deposition. However, the fineness of the upper sediments of the secondary terrace implies a long and stable regime of high discharge, which suggests the climatic optimum of the full 5000 years of the early Holocene, when conditions were warmer and wetter on the Barrington Tops (Dodson *et al.* 1986) on the opposite side of the Hunter Valley, where conditions would be roughly analogous to the peaks of the Broken Back Range.

More problematic still are the lag deposits themselves. What conceivable climatic conditions could have produced such extensive clastic lenses, containing such a large proportion of cobbles and even boulders? Most material is well rounded, suggesting that it had travelled some distance, at least as far as from the Broken Back Range, which is sufficiently distant (~ 12 km) to allow for the rounding of the rock material in transport (see Plate C.23). This would still require much higher discharge and velocity, and therefore a considerably higher rainfall than today, as well as, perhaps, a steeper gradient in Black Creek. The lag beds are about 3 m above the present streambed base, which today only has the competency to carry and deposit silt and limited amounts of small gravel.

The cobble material underlying parts of the middle as well as the uppermost terraces is indicative of a very different stream regime and a very different climate and stream gradient to now: only a steeply graded, high velocity stream could possibly rework rock from the ranges a mere 12 km away to such smooth and rounded forms. There is less small pebble material than larger clasts, which is consistent with the short distance available for reworking.

Steeper gradient would suggest a time of lower sea level, which at the last glacial maximum (18 000 years ago) was 130 m lower, and the present limit of tidal influence at Maitland is less than 40 m below the present ASL of the bed of Black Creek . But this was also generally believed to be a time of lower rainfall, though possibly the lower temperatures (- 5 ^{0}C from present) provided a better water balance and a higher effective precipitation in the Black Creek catchment. Snow may have fallen on

the higher peaks (~ 500 m) of the Broken Back Range, and the spring thaw may have induced mass wasting and the transport of large rocks.

Another factor which may be added to past climatic affects is a geomorphic one: the defile to the immediate north of the development area, as well as the large incoming tributary, would have slowed down floodwaters and forced deposition, particularly of the heavier, larger bedload. This may have occurred over a very long period of time through several cycles of deposition and erosion, and where all kinds of climatic effects could have acted on the upper catchment material or on the lower base level. During the erosion phases the finer sediments would be carried away, gradually building up (and rounding) the gravel beds buried today under a later deposit of fine sediment, itself in the early stages of being eroded away. Some of the large boulders suggest they had been fixed in the streambed for some time, as they have been rounded only on the upper side.

Occasional boulders are also exposed in the present stream banks, but they tend to be more angular and suggest a nearby source, such as the bedrock residual (Plate C.4) underlying the old homestead site at "Rose Mount". But they also indicate that the stream may, even today, be able to occasionally shift big rock slabs in exceptional floods if it can tap a suitable source of exposed rocky material. Such sources have presumably been closed off by the development of the flood plain smothering any residual rock outcrops with fine silt, as at the "Rose Mount" site (see Plate C.4). Local sources such as that at Rose Mount can explain the presence of angular rock fragments in Black Creek (see Plate C.7), but not the well-rounded gravels of quartz and other material, which could only have a catchment-wide source.

The gravel beds under the secondary terrace lie ~ 3 m above the bed of the present stream, which itself has an unknown depth of alluvium below it. Only the main thread of any stream would have the necessary velocity to move large rocks. This suggests that the location of the lag gravels was the site of a palaeo version of Black Creek that could be characterised as a steep, single thread mountain stream, responding directly to the local relief of ~ 500 m, with little flood plain development above or below, and a much lower base level at its confluence with the Hunter River.

What is certain is that the lag gravel, composed of all the major durable rock types in the catchment, was a very valuable and useful resource to stone age tool makers, concentrating the best stones in one place and in handy sizes, and close to abundant food and water.

As many of the archaeological finds appeared to be associated with the lag deposit, the problem is to decide whether they were deposited at the time of formation of the gravels (? pre 12 000 BP) or when the gravels were covered (? ~ 10 000–5 000 BP) or, possibly, when the gravels were uncovered (? ~ 500 BP). The last is only possible in the site exposed at the top of the secondary terrace by the bank of the present stream: the grinding stone site has to be older.

It must be assumed that the uppermost gravel deposits of the third and highest terrace is of a greater age than the rest of the flood plain, from its location at a higher level and the erosion of the alluvial expanse of the main terrace to a very gentle incline (1 in 300 gradient). It is surprising, then, to note the presence of some stone artifacts associated with the upper gravels, at a dam site near the Allandale Road. There may be various explanations for this: a later, exceptional flood may have re-

covered the older fluvial gravels with a new layer of silt, and they may have been constantly re-exposed by erosion as the downcutting of the earlier version of Black Creek stranded them at an increasingly higher level (although the level is almost imperceptible to anything but surveying instruments). This could have exposed them to humans quite recently. They may also have been exposed to disturbance by movement on the adjacent slopes. Indeed, some large rounded cobbles were exhumed by the digging of a telecommunications trench several more metres up the bedrock slope, beside the highway. These may be relics of a much higher and older river level (only discharge in the main bed of a stream could deposit cobbles the size of those high up on the valley sides at the bedrock slope/floodplain-interface: they could not be the result of an exceptional one in 1000 year valley wide flood, even if such a flood were conceivable) They could also be the result of human interference, either pre- or post-contact, but they appear to be too extensive for this.

Present erosional reworking of past phases

As described above, the floodplain of Black Creek is presently undergoing net erosion rather than deposition. This erosion takes two forms:

- collapse of the steep stream banks by mass wasting; and
- headward erosion of lateral drainage lines by groundwater sapping, forming the two major 'creeks' called Kangaroo Gully (joining Black Creek near "Rose Mount") and Grinding Stone Gully (see Plates C.3 and C.8-C.13).

The term "gully" is used in preference to "creek" because "creek" in the sense of a semi-permant incised channel with surface flow would probably be a misnomer. These side gullies give every evidence of being erosion gullies formed since European settlement (eg see Plate C.10). Gullies of this kind are usually the result of a a change from a stable to a rapidly fluctuating water table caused by mass removal of native vegetation, and concentration of groundwater flow in pre-existing percolines , or underground flow zones. Whereas prior to mass tree clearing groundwater would have diffused throughout the semi-consolidated sediments of the floodplain, artificial drains, banks, and hard hoof compaction would have directed flow and set off the present cycle of headward erosion through piping and sapping. The gullies worked back from the stream at first along the confluence points with the old infilled billabongs, which are at the lowest level and probably contain the loosest sediments, thus providing the easiest path for groundwater. They then turned inland and cut either into the secondary terrace as at Grinding Stone Gully or, in the case of Kangaroo Gully, followed the boundary of the secondary terrace until it met overland flow coming from the bedrock slopes. It is significant that both these streams have much more water and well defined beds only towards the west of the development site, near the road and the slopes: before European settlement they probably disappeared underground when they reached the edge of the semi-unconsolidated floodplain sediments.

The lateral erosion gullies are therefore strictly not overland flow features except in time of extreme rainfall, but groundwater sapping along percolines. This is illustrated by the collapsed doline depressions in the upper, active reaches of the gullies (see Plate C.11). Piping by underground flow has lead to disjointed collapse of boggy hollows almost back to the Allandale Road (Branxton-Cessnock). It is likely

that these gullies represent new sub-surface drainage lines that post-date the beginning of European settlement. Prior to this they were probably grassy meadows occupying minor hollow depressions, but removal of mature trees after European settlement allowed water tables to rise rapidly after heavy rain and activated gully erosion by underground sapping. The gullies developed from Black Creek outwards by headward erosion at different levels (see Plates C.12 and C.13). They were initiated by reworking the entrance of stranded and infilled oxbow lake where these met the main stream, as can be seen from present examples. These depressions, probably filled with loose and less consolidated sediments are the low points in the flood plain above the bank tops, and have become the outlets to the river for groundwater flow. The erosion gullies however cut back beyond the old oxbows and into the next floodplain feature, the raised relic terraces.

As can be seen in the case of the gully erosion, these relic features represent both opportunities as well as dangers for the developer, if their characteristics are not properly understood. The archaeological sequence can also only be understood in reference to the temporal sequence of these units.

Age of present river planform

The present planform of the river is quite different from that indicated by relic forms on the floodplain as existing in the recent and distant past. This is in line with the analysis of Hunter Valley drainage regimes by Erskine and Warner (1988), who describe the rapid transition represented by different fluvial regimes triggered by minor climatic and environmental changes such as those which have occurred in the Hunter Valley since European settlement. The age of the present fluvial regime cannot be estimated on the basis of available data, but it should be borne in mind that the discharge (velocity x volume) of Black Creek would be greatly augmented (above natural flow deriving from precipitation) by urban effluent inputs from Cessnock. Clearing of vegetation along the entire length of the floodplain and surrounding hills in the last 200 years would have altered groundwater flows and probably periodically raised the watertable, whereas water extraction from the creek for irrigation would alter the flow regime in arbitrary ways. The present fluvial regime and the associated present river planform may therefore, as has been demonstrated to be the case elsewhere in eastern Australia (Eyles 1977), be of very recent origin, and liable to change if any climatic or environmental factors change in the near future or as a result of insensitive development. The numerous fossil landforms on the development site are testimony to the fact that the river regime has been very different in the past.

Environmental audit of floodplain transect

It is recommended that the best way of conserving a representative sample of the archaeological history is by protecting a 200 metre transect across the floodplain from the major find site on Black Creek bank westwards to the Rothbury Estate boundary at Allandale Road. This would include some of the primary terrace and ~ 500 m of the secondary terrace, some of the backswamp (see Plate C.29), and a swathe of the uppermost terrace up to the point where the southern fenceline meets the highway. This would have the added bonus that, as every major landform is preserved, the distinctive vegetation association on each would also have a

representative sample conserved. It would leave most of the bedrock slope available for development, while allowing the vigorous regrowth woodland on the third, uppermost terrace to grow and help deal by evapotranspiration with the inevitable increase in runoff from the development.

Beginning from the stream outwards, the banks are steep, and have been degraded on both sides by landslips (see Plate C.7) triggered by undercutting by typical zigzag sub-contour cattle paths. It is not good practice to allow cattle to walk down steep banks to water, and it is strongly recommended that water is pumped up to troughs and cattle excluded from the entire bank zone, which should be fenced and protected. Despite this erosion, there is healthy regrowth along the banks of Casuarina/Allocasuarina sp. and White Cedar (*Melia azederach*), with some other remnant rain forest as well as Angophora sp. It is likely that the banks supported a gallery rainforest at the time of European settlement.

Riverbed material is reasonably firm sediment, with only limited amounts of gravel and no noxious smell on disturbance. Snags are common and provide good habitat for fauna, particularly aquatic invertebrates. Despite the urban input, water quality seems reasonable at the time of investigation, judging by the healthy aquatic fauna and flora, both native and exotic. This may change in time of extreme flood events and urban and sewer overflow.

The primary (lower) terrace is mainly pasture mixed with wet meadow, with semi-denuded sandy rises on the southern end of this zone.

The secondary (middle) terrace is almost all open pasture, but with an important remnant of mature paperbark tea tree (Melaleuca sp.). The backswamp zone contains some important wet meadow species and some dense groves of *Casuarina glauca* (swamp oak). Several species of birds common to open grasslands were observed in this zone, as well as numerous species of waterfowl in the wetter areas.

The third, uppermost terrace contains the best remnant of the original vegetation association on the property, and significant amounts of regrowth of both canopy species, understorey and herb layer. This area, in the central/southwest sector of the property and underlain by ironstone gravels, was obviously regarded as unsuitable for cultivation for this reason, and has been used as a woodlot. It is probably the only part of the property which has not at one time or another been ploughed or ripped. While many of the large canopy trees have been removed, the integrity of the vegetation association has been preserved. Up to six native ground cover plants were flowering at the time of observation, including one orchid. The conservation of this site as well as the entire proposed transect would enhance the quality of the development as a whole, for the following reasons:

- It would act as a screen between the proposed condominium development and the numerous nearby properties to the southeast.
- It would provide a good passive recreation area for the inhabitants, particularly if it included a walkway through the transect to Black Creek.
- As the extensive regrowth of ironbark, spotted gum and swamp oak matures, it will have a beneficial effect in pumping up and transpiring any excess runoff from the development, and perhaps mitigate the severe gully erosion present further down the hill.

Balance of Dr. Haworth's report.

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ii) It would provide a good passive recreation area for the inhabitants, particularly if it included a walkway through the transect to Black Creek.

iii) As the extensive regrowth of ironbark, spotted gum and swamp oak matures, it will have a beneficial effect in pumping up and transpiring any excess runoff from the development, and perhaps mitigate the severe gully erosion present further down the hill.

iv) It will preserve a representative sample of all the major land units which have been shown to contain significant archaeological material.

In summary, the preservation of a long narrow transect across the property and terminating in the ironstone/woodlot area of the southwest would give maximum conservation benefit and enhance the value of the overall development in a number of ways.

Conclusion

Archaeological finds can have their importance and relevance assessed according to their relationship to the different sedimentary and erosional regimes and landforms described here. Erosion faces expose sedimentary strata in an arbitrary manner, and transport reworks sediment and artifacts in a chaotic manner, except in so far as the processes can be identified. It is hoped that the landforms and processes described in this report will assist in unravelling the cultural past.

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Erskine W.D. and Warner R.F. 1988. Geomorphic effects of alternating flood- and drought-dominated regimes in N.S.W. coastal rivers. In Warner R.F. (ed.) *Fluvial Geomorphology in Australia*, 223-242. Academic Press, Sydney.

Eyles R.J. 1977. Birchams Creek: the transition from a chain of ponds to a gully. *Australian Geographical Studies* 15, 146-157

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Glossary

alluvium: a general term for all deposits laid down by rivers, especially at time of floods; is also used colloquially to refer only to silts.

back swamp: the zone of least deposition on the extreme lateral edge of the current depositional regime sloping inland from the levee, forming a swamp which may be lower in altitude than the stream bed, but certainly lower than the levee and much of the terrace.

base level: the lowest level to which the course of a river is cut down. This is usually sea level, which has changed by ~ 130 m over the last 15 000 years, with the potential to radically change the incision and deposition rate of near-coastal streams such as Black Creek and the Hunter River.

boulder: stone, usually rounded, greater than 256 mm in diameter

clay: in flood sediments, referring to those particles less than 0.002 mm in size

cobble: a rock fragment between 64 and 256 mm in diameter, thus larger than a pebble and smaller than a boulder, rounded or otherwise abraded by running water or other agencies

colluvium: the mixture of sediment and unconsolidated rock fragments deposited on, or at the foot of, a slope

discharge: the volume of water passing through the stream channel cross section per unit time, usually expressed in cubic metres per second

gravels: accumulation of rounded stone material, divided into granule, pebble, cobble and boulder gravels

laterite: reddish residual soil leached of silica and containing concentrations of iron and aluminium hydroxides, and produced by weathering amplified by changing water tables. Humus and silica is leached out and insoluble layers of iron and aluminium compounds accumulate in layers in the soil. Laterisation is the formation of lateritic soils

levee: a raised bank of alluvium flanking a stream, usually consisting of poorly sorted silt and sand. The bank is built up when the river dumps much of its load during overbank flooding, which causes a sharp drop in velocity and therefore the ability to carry suspended sediment load.

oxbow lake: a horseshoe-shaped lake once part of, and now lying alongside, a meandering river. The lake was once part of a meander and erosion at the neck left only a short distance from one neck to the other. When the river breaks through this narrow stretch of land, the old meander becomes a temporary lake. Ox-bow lakes quickly fill up and become hollows in the landscape.

pebbles: smooth rounded stones ranging in size from 2 to 64 mm

pool: topographically low area of a stream bed having a surface of relatively fine material

Quaternary: the most recent geologic period covering the last 1.8 million years

APPENDIX Q

VISUAL IMPACT ASSESSMENT

RICHARD LAMB & ASSOCIATES 2007

UPDATED VISUAL IMPACT ASSESSMENT

RICHARD LAMB & ASSOCIATES 2013

richard lamb & associates

Golden Bear Golf Resort

Wine Country Road, Rothbury

Report prepared for Arris Group

Report prepared by Dr Richard Lamb

Visual Impact Assessment

November 2007

Table of Contents

Executive Summary

- This report concerns the potential impacts of the proposed Golden Bear Golf Resort, Wine Country Road, Rothbury, on the scenic quality, visual character and qualities of the Vineyards District.
- . It is an independent review of the proposed Master Plan, carried out by Dr Richard Lamb, Principal of Richard Lamb and Associates, specialists in visual impacts assessment and strategic planning for scenic amenity protection.
- The report specifically addresses the potential impacts on the "Gateway to the Vineyards District" on Wine Country Road, Rothbury. The site is on the northern margin of the Vineyards District and is not a Visually Significant Area as defined in the DCP.
- The report employed a systematic analytical methodology for establishing the nature and extent of visual effects of the development, the visual impacts of the effects, the effectiveness of proposed mitigation measures and the level of residual impacts.
- The subject site presents a range of opportunities, including its conversion into a golf resort as proposed. It is subject to a range of constraints, including its visual exposure to Wine Country Road, situation near a gateway to the Vineyards District, low existing capacity to absorb development without change and proximity of rural land uses.
- The proposed master plan appropriately addresses each of the future opportunities and existing constraints of the site.
- The flat topography of the site, low viewing angles from the public domain and presence of existing native vegetation, gives the site a high future capacity to absorb the proposed development without significant changes to the visual character of the site or the locality.
- The wide buffer zones proposed are in excess of what is required to manage the interfaces with rural land and satisfy the requirements of the DCP with regard to minimising conflicts between adjacent uses.
- The buffer zones are also more than sufficient to provide space for future landscape screening, vegetation rehabilitation, mass plantings and multiple compatible uses of the site's landscape.
- A naturalistic theme for the landscape of the site as indicated in the Master Plan can increase the low scenic quality of the land, integrate it into the developing character of the setting and have significant ecological and sustainability benefits for the development itself.
- The analysis of view place and viewer sensitivity showed that the land is highly suitable for the intended use and that appropriate visual impact mitigation measures will reduce or eliminate significant impacts.
- The development is considered to be compatible with the site and does not have the potential to impact negatively on the "Gateway to the Vineyards District".

1.0 Purpose of this report

Hunter Development Brokerage on behalf of Arris Group Pty Ltd commissioned this report on the Golden Bear Golf Resort, Wine Country Road, Rothbury. Richard Lamb and Associates (RLA) was commissioned to carry out an independent assessment of the potential impacts of the proposed Master Plan on the visual and scenic attributes of the site and the locality. RLA has had no other involvement in the project.

The report consists of an analysis and assessment of the potential impacts of the proposed development on the subject site. It considers potential visual effects and impacts on its natural and cultural landscape, the scenic character and visual quality of the locality and specifically concerning whether the development would have unacceptable impacts on the "gateway to the Vineyards District".

The report is based on field work and assessment carried out in the locality on 31 October 2007. The author, Dr Lamb, is very familiar with the Cessnock LGA, the Vineyards District and the adjacent Maitland and Singleton LGAs, having carried our assessments of the visual impacts of developments of various kinds in the region over many years.

1.1 Background

Arris Group proposes to construct a golf course and resort with associated housing and a variety of other buildings on the subject land. The proposal is subject to the provisions of State Environmental Planning Policy Major Projects, 2005. RLA understands that the appropriate level of assessment and environmental investigation of the site is yet to be determined.

HDB carried out a visual impact assessment of the Preliminary Masterplan for the Golden Bear Resort in 2005 which included policies and dimensions for proposed buffer zones between the site and adjacent land uses. We understand that the Department of Planning received a small number of submissions expressing concern that the proposed development would have negative impacts on the locality and specifically on the qualities perceived as significant to the 'gateway to the Vineyards District'.

The gateway concept appears to relate to the perception of Wine Country Road running south from Branxton as a major entrance route, passing into the Vineyards District in the vicinity of the site. It provides access to the Vineyards District beyond the site or via McDonalds Road.

The Vineyards District is a designation given to a large proportion of Cessnock Shire, which is zoned 1(v), Vineyards, in the LEP. It is a Special Area included in the DCP and subject to a range of specific controls and policies. It includes many substantial tourism sites and developments, including golf course resorts.

Documents consulted

We have been provided with or researched material from the following documents:

Cessnock Local Environmental Plan, 1989 (as updated to 11 May, 2007) (the LEP).

Cessnock Development Control Plan, 2006 (the DCP), as amended by inclusion of Special Areas in 2007.

Visual Impact Assessment, Preliminary Masterplan, Golden Bear Resort prepared by Hunter Development Brokerage Pty Ltd (HDB), January 2005.

Preliminary Masterplan Scheme 5, 1 November 2004.

Landuse Buffer Plan, Plan 2, 19 Feb 2007 prepared by HDB Pty Ltd.

Deposited Plan 869651.

Detail Survey 97/121, provided by HDB Pty Ltd.

Location Plan (Fig 1) and Aerial View (Plate 1), provided by HDB.

Brochure on behalf of the proponents, provided by Greg Taylor of Arris Group Pty Ltd.

Huntlee New Town, Concept Plan Preliminary Assessment Report prepared by Julie Bindon and Associates (JBA), dated May 2207.

Huntlee New Town, Stage 1 Preliminary Assessment Report prepared by JBA, dated August 2007.

1.2 Context and Concept for the Development

1.2.1 The Visual Context and Setting

The subject land, hereafter called the site, is situated on the northern side of Wine Country Road, Rothbury and partly opposite the north eastern boundary of The Vintage, a golf course resort which fronts both Wine Country Road and McDonalds Road (Figure 1).

The site is on the northern margins of the Vineyards District of Cessnock Shire. The Vineyards district is confined on the north by the natural barrier of low hills which are part of the exposed surface geology of the Greta Coal Measures between the site and Branxton. The Coal Measures are deformed by the north-south trending Lochinvar Anticline and a series of fault lines.

The closest ridges of the Coal Measures landscape to the site trend east-west and are immediately north of Black Creek. A second series of low hills trending north-south to the north west of the site form another natural confinement. They run approximately parallel to and near the Singleton Shire boundary in part.

The site is partly on alluvial land of Black Creek and partly on the lower side slopes below a ridge which runs approximately southward through part of the Vintage site on the south side of Wine Country Road.

The alluvial part of the site has high visibility in views from Wine Country Road between the Belmont Bridge over Black Creek and the proposed site entry. Visibility of the site other than its remnant vegetation is minimal between that location and the southern boundary because of the view blocking effect of the existing vegetation.

The northwest quadrant of the site which includes alluvial and side slope land is also of high visibility from part of McDonalds Road east of the intersection with Coulson Road and from higher parts of McDonalds Road in the vicinity of the Bimbadgen Estate winery.

The lower parts of the site across the entire length and the whole northwest quadrant are visible from Talga Road. The riparian vegetation on Black Creek has some screening effect on views of the lower part of the site.

1.2.2 Existing Scenic Resources

The site is essentially flat to slightly undulating and consists of two distinctive macro scale landscape characters, along the edge of which is a discontinuous band of riparian vegetation along the banks of Black Creek.

The site has been largely cleared for agricultural use in the past. The south eastern section retains some mature trees of up to approximately 18-25m in height, which were retained from clearing, particularly the iron bark (*E. crebra)*, spotted gum (*Corymbia maculata*), grey box (*E. mollucana*) and rough barked apple (*Angophora floribunda*). There are both large individual specimens and stands of re-growth of trees present. Extensive mature and re-growth stands of *Casuarina* sp. are also present. Below and among mature tree stands and Melaleuca thickets there is extensive re-growth, in particular of iron bark, Casuarina and spotted gum. The latter has reached heights of up to approximately 8-10m in places.

The lower lying alluvial land remains largely cleared and appears to function as grazing country, although what appears to be the site of some former vineyard lots can be discerned on aerial imagery in the north east quadrant.

The upper side slopes are more varied, but essentially are of two character sub-types; one is cleared grassland which appears to have been vineyards at some time and the other is re-growth woodland and forest, as described above, over a grassy understorey.

Black Creek forms the northern boundary of the site but is of minimal visual presence. Its location can be discerned by a variably and partly discontinuous band of riparian vegetation, the crowns of which can be seen above the alluvial terraces along the Creek. Remnant flood plain vegetation, comprised of stands of small Melaleuca trees in drainage lines and depressions, is the only indicator of the former natural character of the flood plain.

1.3 Existing Opportunities and Constraints

The site presents both opportunities and constraints, to each of which future development should respond positively.

1.3.1 Opportunities

- Possibility for a landmark building or group of buildings to signify and anchor the development.
- Views to the north, north west and north east across the future golf courses and water bodies to higher quality landscape toward Branxton and Greta.
- The opportunity to share these views with the residential development to the south in Vintage.
- Views to the interior of the site and larger building can be screened and filtered by existing vegetation.
- Low viewing angles from the public domain mean that screening of views can be quickly established in early development stage.
- Internal residential and tourist streets potentially secluded from views from the main road and adjacent Vintage development.
- Capacity to work with existing regeneration of native vegetation to achieve a naturalistic, restorative environment for the site.
- Good exposure to eastern and northern sunlight and to winds for cooling and ventilation.

- Slopes on site predominantly with north east to north aspect.
- Low scenic integrity and scenic quality of the site can be enhanced by sensitive design of the development and interfaces with the public domain.
- The opportunity for high visual and physical permeability and security of the public domain by surveillance.
- Opportunity for a high quality public domain and scenic quality of the site landscape with low presence and visual impact on the public domain outside the site.
- Potential for regeneration and integration of riparian and flood plain forest vegetation with design for the golf courses and residential fringes.

1.3.2 Constraints

- Location on a high sensitivity tourism route.
- Location adjacent to or in part of the 'gateway to the Vineyard District'.
- High existing visual exposure to part of Wine Country Road and the Vintage development.
- Overall low capacity of existing site features such as vegetation to absorb or reduce the impacts of development in the short term.
- Low landscape integrity and variety of landform and vegetation reduce natural features' capacity for visual absorption of the development.
- Potential for cumulative impact of the development of the site on the interface with the Vintage development site.
- Low intrinsic scenic quality of the site.
- Discontinuous riparian zone vegetation on Black Creek has low intrinsic existing capacity to screen the residential component in views from residences to the north.
- Rural and vineyard use of land adjacent to the site on the south west, west and northern boundaries could lead to conflicts of use.
- Exposure of the development to views from elevated locations in the private domain to the north.
- Long interface with Wine Country Road requires diverse treatment of the interface for visual interest and scenic enhancement.
- Existing re-growth vegetation will require management for bushfire safety and partial clearing, reducing screening capacity in the short term.

1.3.3 Proposed Master Plan relative to the Opportunities and Constraints

The proposed master plan generally responds appropriately to each of the identified opportunities and constraints.

2.0 Assessment Methodology

The assessment of visual impacts is a field that requires a degree of subjective judgement and cannot be made fully objective. It is therefore necessary to limit the subjectivity of the work by adopting a systematic, explicit and comprehensive approach. This has the aim of separating aspects that can be more objective, for example the physical setting, visual character, visibility and visual qualities of a proposal, from more subjective elements, such as visual absorption capacity and the compatibility of the proposal with the setting.

The methodology used in the present assessment has been developed over several years and uses relevant aspects of methods accepted in landscape assessment, extended and modified to adapt to urban and rural environments. The modifications introduced are informed by visual perception research that has been carried out by RLA and others in both natural and rural/urban contexts.

An overall flow chart which describes the process logic of the method can be seen at Figure 1 below, with more detailed components at Figures 2 (Visual effects analysis), Figure 3 (Visual impact assessment) and Figure 4 (Evaluation process).

A detailed explanation of the Methodology is appended to this report at Appendix A.

3.0 Assessment

3.1 View Analysis

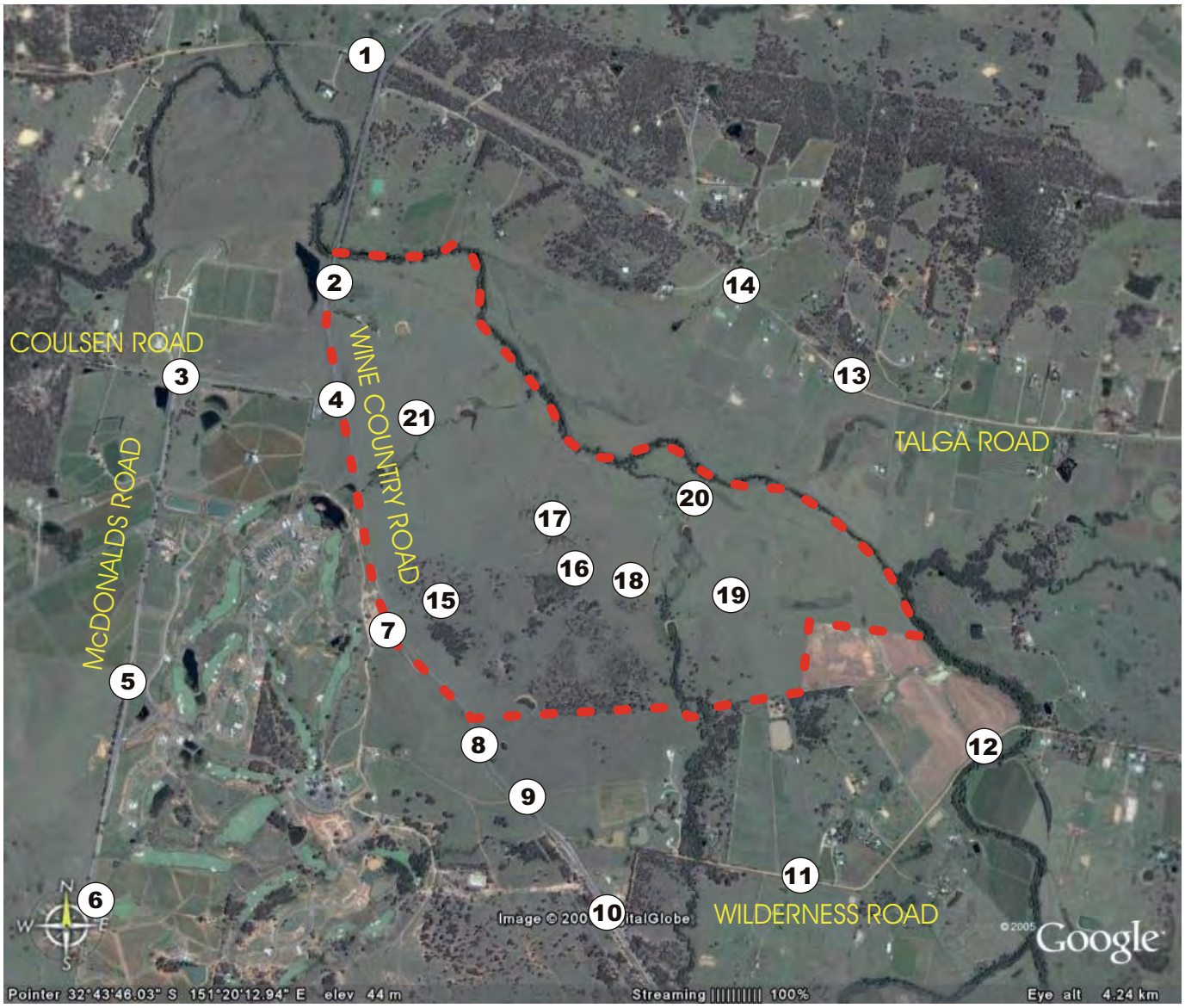
The components and general features of the proposed development are explained in the Draft Preliminary Masterplan for Golden Bear Resort, prepared by HDB in 2005. A detailed field assessment was undertaken on 31 October 2007.

3.1.1 Viewing Locations and Viewing Situations

To assess the visual impacts which would be experienced by viewers, a view point analysis was conducted. This consisted of visiting the site and locality and assessing the likely impact on views from a selected series of locations.

The locations were selected to represent the kinds of viewers' experience of the development which would exist in the immediate area. Locations which represent the main kinds of viewing areas that would be affected were visited and photographed. The photographs taken with a digital 35mm format camera set to simulate a focal length of 55mm, to approximate the correct proportions of the elements of views as experienced by the human eye. At each viewing place a series of observations and assessments were made, as documented in Map 1 and Photographic Figures at the end of Section 3 of the report and in the assessment sheets (Appendix B). A variety of other locations were also visited to ascertain the extent of the catchment and the characteristics of the views.

Map 1 shows the viewing locations analysed during the site analysis and documentation. With the exception of a small number of locations on the site itself, all the viewing locations visited are public domain viewing locations, but they also provide insights into the likely visual effects on private views.



Map 1: Site & Viewing Locations

Approximate location of subject site

4 Viewing Location (refer to Photographic Figures)

Not to Scale

3.1.2 Visual Catchment

Map 1 gives an indication of the potential visual catchment for the proposed redevelopment. The visual catchment for the proposed development is confined by the topography, natural vegetation and settlement pattern to a part of the Rothbury locality generally to the north, north west and north east of the site. This effect is in response to the low relative topography of the site and the surrounding area and lack of elevated viewing situations other than on Talga Road.

The visibility of the proposed redevelopment site is largely confined to the following public and private domain viewing locations.

Public Domain locations

a) Close range and medium range views from the immediate vicinity of Wine Country Road, between Belmont Bridge and Wilderness Road (View Points 2, 4, 7, 8, 9 and 10).

b) Close and medium range views from part of McDonalds Road immediately west of the site (View Points 3 and 4).

c) Distant views from part of McDonalds Road adjacent to the entry to Vintage (View Point 5).

d) Distant views from McDonalds Road adjacent to the Bimbadgen winery entrance (View Point 6).

e) Distant views from Wilderness Road to the east of the site (View Points 11 and 12).

f) Distant views from Talga Road to the north east and north of the site (View Points 13 and 14).

The site is exposed primarily to view from Wine Country Road between the Belmont Bridge over Black Creek at the north western corner of the site and the Wilderness Road intersection to the south. It is also exposed to a small part of McDonalds Road in two locations. It has no significant exposure to Old North Road. It has minimal exposure to Wilderness Road and minor exposure to part of Talga Road. The latter two roads would not be considered of high significance in regard to sensitivity, the former being minimally exposed and the latter a dead end which is not on an established scenic road network.

Private Domain locations

a) Close range views from future residences in Vintage in close proximity to the proposed entry to the site or adjacent to Wine Country Road.

b) Medium to distant views from rural properties on the eastern margin of the site off Wilderness Road.

c) Distant views from rural residences to the west and north west of the site off McDonalds Road.

d) Distant views from residences in Talga Road to the north east and north of the site.

The site is exposed to a small number of existing residences and potentially to a large number of future residences in the Vintage site. The latter can be discounted as a significant issue, because the existing and future buffer vegetation on the Vintage site will significantly or totally screen development on the site from view.

Rural residences west and north west at some distance have views and a small number of rural residential dwellings off Talga Road have views over the site. The latter would also have views beyond it, to the existing development on the Vintage site and the vineyards heartland beyond. In the context of the panoramic views available, the site is relatively small.

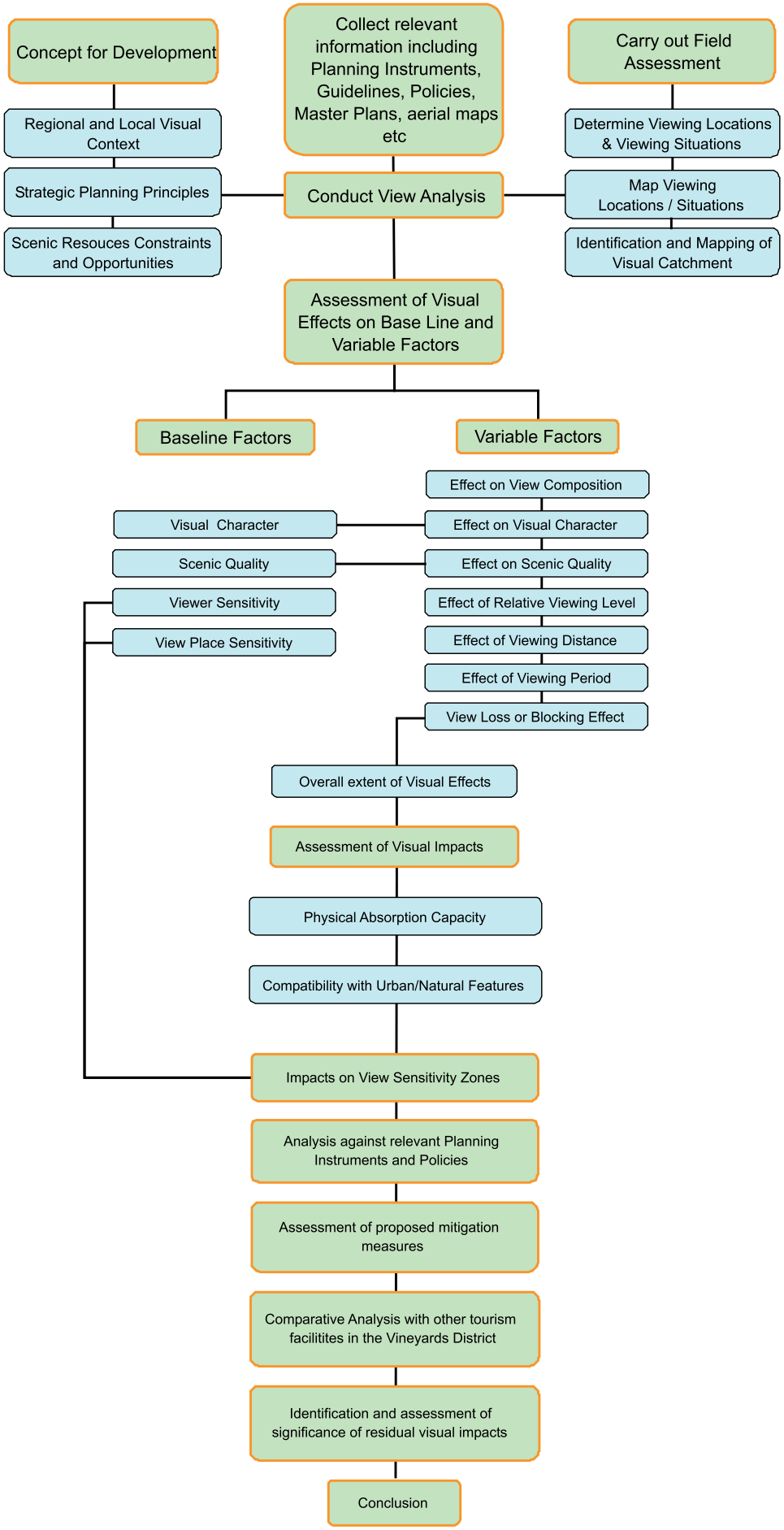


Figure 1: Methodology Flow Chart

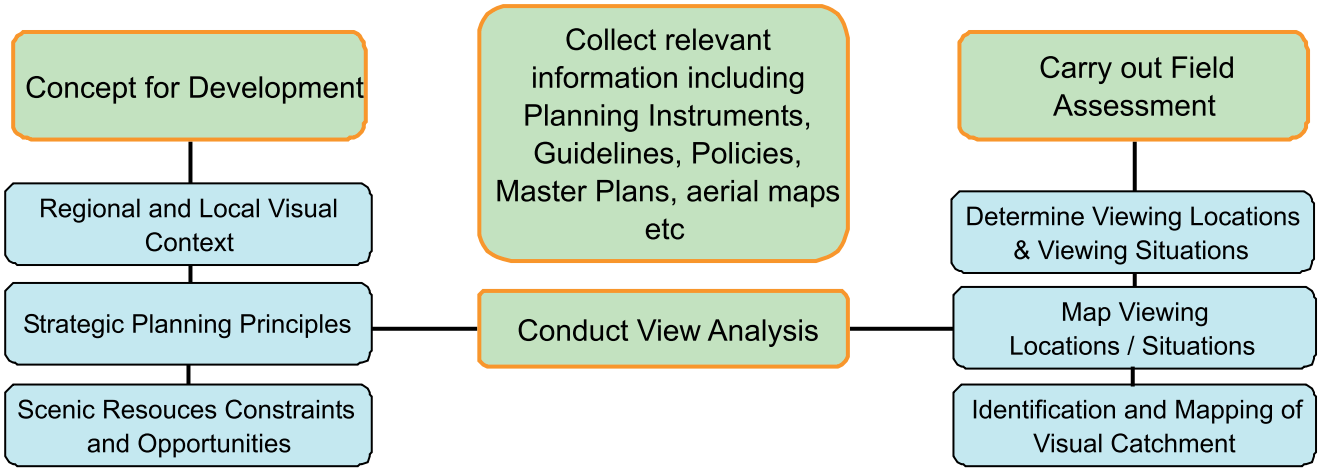


Figure 2: View Analysis Flow Chart

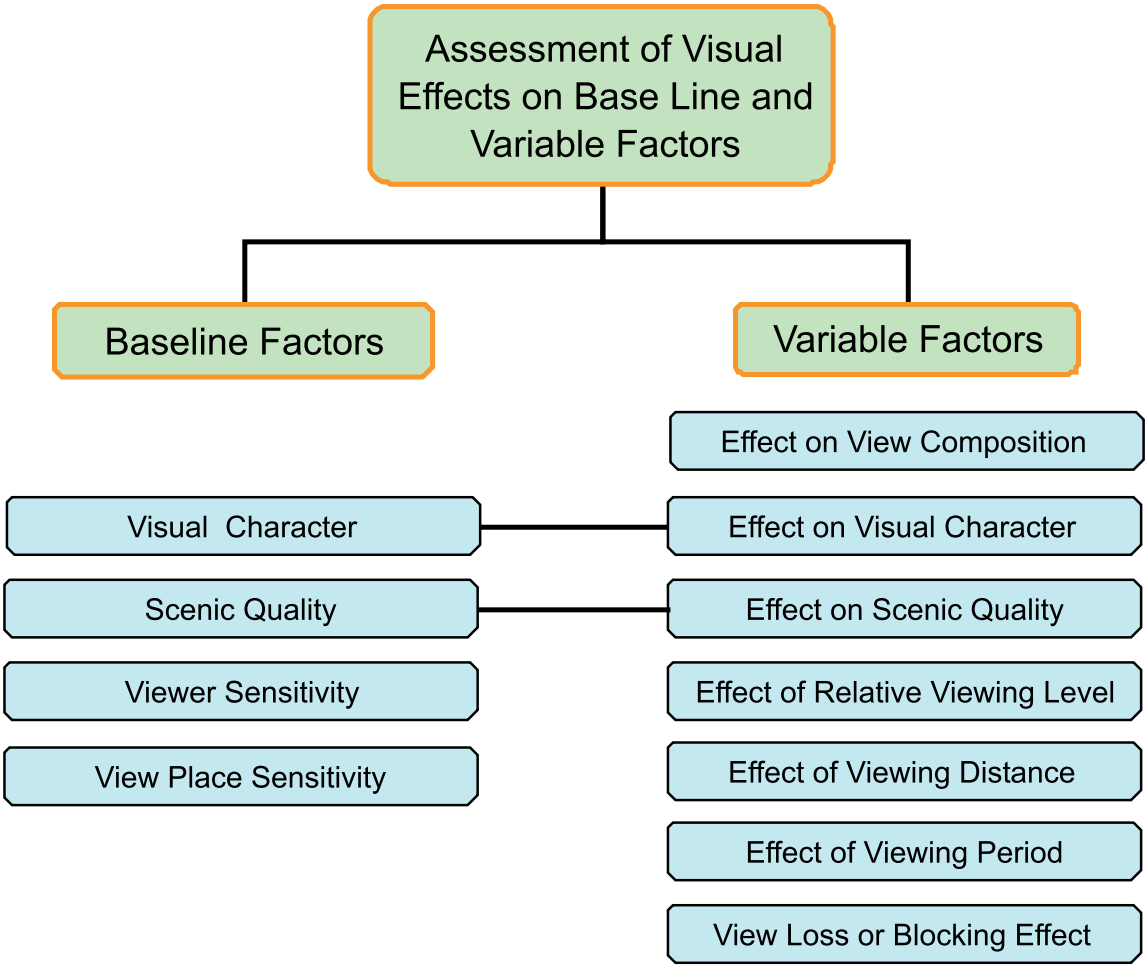


Figure 3: Visual Effects Analysis Flow Chart

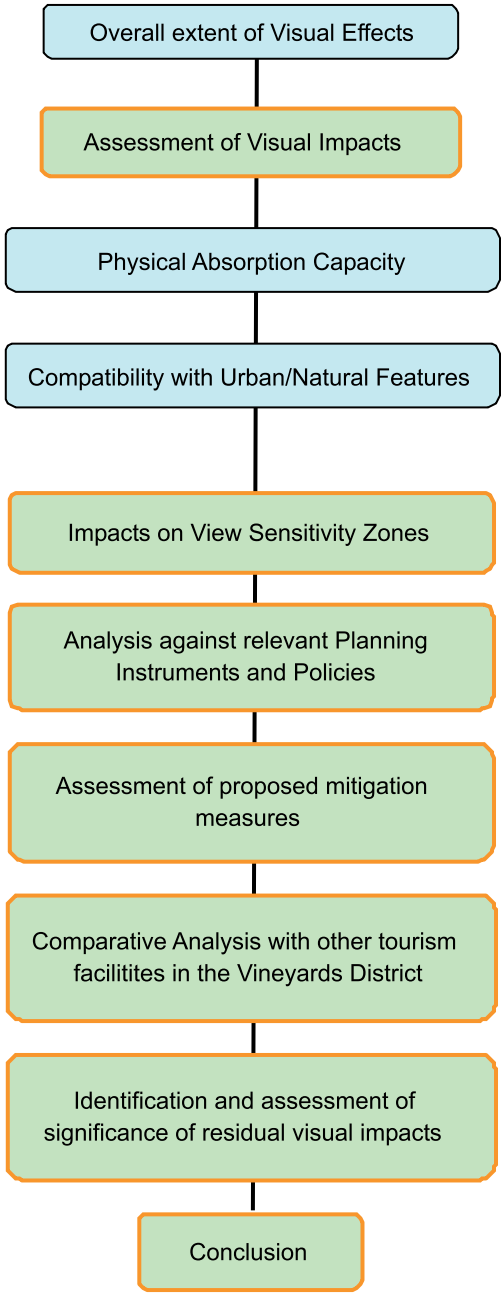


Figure 4: Visual Impacts Assessment Flow Chart

3.2 Visual Effects Analysis

3.2.1 Base-Line Factors

3.2.1.1 Visual character

The existing visual character of the site is described under 1.2.2 above. There are two predominant landscape character types on the site, ie. cleared and grazed floodplain and lower side slopes with some woody regeneration of woodland and forest over a grassy under-storey. These two types are among the commonest in the region and are found throughout the margins and parts of the interior of the Vineyards District. The site is thus of a visual character which is widespread in the region and in the locality and does not have any rare or representative features which would set it apart or give it any special prominence.

3.2.1.2 Scenic quality

Scenic quality is a base line against which the effects of changes to the physical environment can be predicted to impact either positively or negatively on the perceptions and emotional reactions of viewers. There is an extensive empirical research literature concerning general relationships between aspects of the physical environment and predicted judgments of scenic quality or other expressions of this, such as scenic beauty and scenic preference.

The scenic quality of the site determined by reference to the findings of empirical research carried out over many decades using psychophysical research methods would show that the site does not feature elements which are associated with and directly proportional to high scenic quality or scenic beauty judgements. These are : steep, complex or diverse topography, prominent water bodies or water movement features, a high degree of naturalness or scenic integrity and either extensive or prominent natural vegetation.

While there are variations in the scenic quality of the main landscape character types on the site, the woodland and forest area being of higher intrinsic scenic quality, the overall scenic quality would be ranked as low for the grassed area and low to moderate for the area with remnant and re-growth vegetation.

Because the landscape character types are also common and the combination of the two is also widespread in both the Vineyards district and other parts of the Hunter Region, the existing scenic quality rank is not considered to be a constraint to compatible development.

There is nothing on the site which is of any visual significance to the extent that views of it or to it should be preserved in a future development, with the exception of the character and quality of the existing remnant vegetation. The low scenic quality can also be seen as an opportunity for future improvement as is foreshadowed in the proposed Master Plan.

3.2.1.3 View place sensitivity

The highest levels of view place sensitivity in the public domain were determined to exist for Wine Country Road along the site frontage. Close range views are available, predominantly of the areas proposed to be the buffer zones to the primary built development areas, as well as to part of the proposed golf course development area along Black Creek. Medium sensitivity places exist at distances between 100m and 1000m on parts of McDonalds Road and Wilderness Road, with low sensitivity places more distant on part of McDonalds, Talga and Old North Roads.

3.2.1.4 Viewer sensitivity

Highest viewer sensitivity levels were rated for close range views in the public domain on Wine Country Road because of the high numbers of potential viewers and the likely higher expectations of tourists,

Plate 1: View Point 1

Plate 2: View Point 2

Plate 3: View Point 3

Plate 4: Vioew Point 4

Plate 5: View Point 5

Plate 6: View Point 6

Plate 7: view Point 7

Plate 8: View Point 8

Plate 9: view Point 9

Plate 10: View Point 10

Plate 11: View Point 11

Plate 12: View Point 12

Plate 13: View Point 13

Plate 14: View Point 14

Plate 15: View Point 15
Existing trees and extensive regrowth, south west sector of the site

Plate 16: View Point 16
Approximate centre of the site looking north east across the flood plain landscape type

Plate 17: View Point 17
Remnant flood plain vegetation

Plate 18: View Point 18
Telephoto picture taken towards neighbouring property to the south

Plate 19: View Point 19
View toward rural property to the south east

Plate 20: View Point 20
Lower river terrace showing remnant riparian vegetation

Plate 21: View Point 21
View toward the Talga Road area

who would comprise a significant proportion of viewers, for higher scenic quality standards.

Lower viewer sensitivities were considered to exist for residents and users of the nearby Vintage development, because of the future low visibility of the proposal. This is also because of the likely similarity of preferences for scenic quality which can be expected to exist for users of Vintage, who have chosen to occupy a similar environment to that which is proposed.

3.2.2 Variable Factors

3.2.2.1 Effect on view composition

In general, view composition would only be changed in the foreground of a small part of Wine Country Road, where future buffers and changes in internal landscape of the site will decrease views across the flat grassy landscape of the site and create more diverse and complex foregrounds instead. Changes in detail would be evident in longer range views, eg. from Talga Road, however there would be no significant change to the composition of the views.

3.2.2.2 Effect of relative viewing level

Typically, views are either level with or only slightly above the general level of the site and as such the existing and future proposed vegetation will have the capacity to extensively or totally screen the development, including all of its landscape and built components.

The only elevated viewing places from which the overall disposition of the development could be partly visible are residential properties above Talga Road. Views would extend far above and beyond the development site and there would be no change to the scenic quality of the overall views.

3.2.2.3 Effect of viewing period

There are few high sensitivity viewing locations which would provide for sustained views of the site and the future development and as such viewing period does not have a significant effect on the assessment. There are a small number of residences on adjacent residential properties which would provide for sustained views, but these are generally screened from the site by their own vegetation in gardens and are at medium to distant range. There may also be future residences in Vintage relatively close to the site which can experience sustained views, however as explained with regard to viewer sensitivity, the viewers are unlikely to respond negatively to views of a similar environment to that in which they choose to recreate and to live.

The commonest viewing period is a few seconds for travellers on Wine Country Road, where aspects of the development, but little of the overall structure or character of the development, would be visible.

3.2.2.4 Effect of viewing distance

Viewing distance conditions the extent to which the details of the proposal are visible and therefore the extent to which change will be perceived to affect the views. Viewing distance can increase visual exposure if there are significant elevated viewing places.

In this case, the proposal is not significantly changed in visibility by distance and in most cases the views are close to medium range. In these views, the flat topography relative to the site and the potential for buffer areas and future vegetation to screen or disguise the development, means that the visual effects decrease rapidly with distance. In addition, changes to the foreground of the view will often be the only visual evidence of the development once completed. If a naturalistic approach to planting and design is pursued, there would be predominantly positive changes to scenic quality and character of the foreground.

3.2.2.5 View loss or blocking effects

There would be an overall reduction in views across the site toward the north and east from Wine Country Road adjacent to the site. The most scenic components of the views are middle distance hills beyond the site to the north and east, which would be unaffected. There would be no change to access to views from properties to the east and north of the site.

3.2.3 Overall extent of visual effect

The overall extent of visual effects of the proposed development was determined by inspection of the pattern of ratings of visual effects factors for all viewing places on the data sheets. A summary of the pattern of this analysis is shown in Table 3.1 below.

The overall rating of the visual effects of the development was predominantly medium for closer range views, low to medium for medium range views and low for distant views.

The ratings are conservative, because they include the short term visual effects of the development and the low absorption capacity of the existing site for the early stages of change. If the final form of the development was assessed on these criteria, the rankings would be lower.

Table 3.1: Overall Level of Visual Effects

Overall Extent of Visual Effect	Low	Medium	High
Close Range View Points			
VP2			☒
VP4		☒	
VP7		☒	
VP8		☒	
Visual Effect on Close Views		MEDIUM TO HIGH	
Medium Range View Points			
VP3	☒	☒	
VP5	☒		
VP9		☒	
VP10	☒		
VP11	☒		
VP12	☒		
Visual Effect on Medium Range		LOW to MEDIUM	
Distant View Points			
VP1	☒		
VP13	☒		
VP14	☒		
Visual Effect on Distant Views		LOW	

Given the horizontal scale of the site and the size of the proposed development, it is unusual for the analysis of visual effects to result in such low ratings. The ratings indicate the high potential of the site to absorb the development without significant changes to the landscape character and quality.

3.3 Visual Impact Analysis

3.3.1 Physical Absorption Capacity

Existing

The proposal clearly will have the effect of radically changing the existing site character and visibility of existing features and therefore working with existing visual absorption capacity is not the main option for impact mitigation.

The site has a generally low to zero visual absorption capacity for the proposed built form of the development on the alluvial and northern side slopes areas in the absence of mitigation measures. It has a moderate absorption capacity for the golf course component adjacent to Black Creek, given that it will be largely grassy, open space. This is beneficial with regard to the private domain views from dwellings above Talga Road. It has a moderate existing capacity in the southern, side slopes area because of the existing remnant vegetation.

Future

The site has a high potential visual absorption capacity because of its relative flatness vis-à-vis the viewing places in the public domain. Any vegetation composed of riparian or locally indigenous species of tree or shrubs used in buffer, ornamental or golf course plantings has the potential to grow above the eye level of the view and either screen or blank out visibility of the kind of modest scale buildings which appear to be proposed. Assuming that the buildings would have to be compliant with the relevant standards and controls, such as the wall height limit of the DCP, our assumptions will stand.

It would be possible to totally hide the entire development, given the width of the proposed buffers, by using even relatively open or dispersed areas of vegetation in them. We don't see this as necessary to a landmark development overall, however a high general degree of screening of all public domain views can be assured to be feasible with the proposed buffers.

3.3.2 Visual Compatibility

3.3.2.1 Visual compatibility with rural and natural features

The proposal has high compatibility with the adjacent Vintage tourist development. This is an advantage because some of the perceived visual impacts of the proposal can be demonstrated not to be significant, by comparing it with Vintage.

At the same time, there is an argument that there is thereby a cumulative impact issue, ie. that another golf club resort with residential component is not warranted, or alternatively leads to an intrinsic change of landscape character which is unacceptable.

Whether or not the proposal is justified is not a matter for a visual impact report, but for others with wider strategic planning expertise to address. In our opinion, the proposal will not lead to an unacceptable change to the intrinsic landscape character of the site and locality and is capable of considerably increasing the scenic quality of the site itself. As such, it also exhibits significant compatibility with the natural features of the site and the future visual character also.

Notwithstanding, it is important that the proposal does not merge visually with its adjacent neighbour at Vintage, but provides a compatible interface as well as an alternative and sensitive presentation to the public domain.

A comparative analysis with Vintage shows that:

1. The residential component does not dominate the landscape when taken into account with the amount of open space that is provided in this kind of a development.
2. Good planning and a good level of return on investment produces high quality public domain, maintenance and landscape outcomes.
3. Even though Vintage is on much more prominent topography that the proposed site, the existing built component is rapidly integrating into the existing and future landscape as vegetation matures. The intrinsic visibility of buildings on the proposed site is already much lower on part of the site and more easily screened and softened than at Vintage.

4. Even though this was not adequately controlled in Stages 1 and 2 in our opinion, it also shows that modest, tasteful building design can fit into the visual setting in a complementary way.
5. More control is required over the form, character, detailing and materials of the built component, such as is intended in the proposed development.
6. The Golden Bear Resort will be selling packages with constructed dwellings to residents, not land and therefore will have the highest level of control over building form, materials, colours and finishes that is reasonably possible.
7. The narrow vegetation buffer to Vintage on McDonalds Road, which is immature at this stage, will be able to significantly screen the development from the public domain.
8. The buffers that you are proposing for the Golden Bear Resort are much larger, to the extent that they could support multiple uses as well as performing visual softening and screening functions.

In our opinion, the development will be compatible with the immediate locality from which and among which it is visible and will not be out of character with the tourism component of the Vineyards District generally.

3.3.3 Overall Extent of Visual Impact

The overall extent of visual impacts was evaluated by inspection of the pattern of assessment of the visual impacts of all of the individual factors for each viewing location. These overall assessments of the visual impacts of the proposal are shown in summary on Table 3.2. The overall visual impacts rating of the proposed redevelopment on its total visual catchment was assessed to be low.

Table 3.2: Overall Visual Impacts

Overall Extent of Visual Effect	Low	Medium	High
Close Range View Points			
VP2		☒	
VP4		☒	
VP7	☒		
VP8	☒		
Visual Impact on Close Range	LOW to MEDIUM		
Medium Range View Points			
VP3	☒		
VP5	☒		
VP9	☒		
VP10	☒		
VP11	☒		
VP12	☒		
Visual Impact on Medium Range	LOW		
Distant View Points			
VP1	☒		
VP13	☒		
VP14	☒		
Visual Impact on Distant Views	LOW		

Notwithstanding the proposal will change the existing rural land use to a more intense form of development, it will have minor overall visual impacts and subject to detailed design, has the potential to increase the visual quality and character of the site and the locality.

3.4 Visual Sensitivity Zones

3.4.1 Impact Assessment (Ratings)

The overall effects and impacts rating for the high view sensitivity zone in the public domain were assessed to be medium to low. Highest individual levels of effects were found for close views from Wine Country Road and in the developing Vintage site to the south. The overall effects and impacts rating for the medium sensitivity zone, predominantly in the public domain, were assessed to be low.

Low sensitivity zone locations included some private and some public domain views. The overall effects and impacts rating for the low visual sensitivity zone were assessed to be low.

The visual impacts on the high and medium sensitivity zones are then analysed against the proposed mitigation measures in the section below. The views from low sensitivity zones were not analysed. This is because it was considered that no significant impacts could occur for these locations.

3.5 Analysis against relevant planning instruments

The primary planning policy which applies to the site is the Cessnock Development Control Plan, 2006 (the DCP), as amended by inclusion of Special Areas in 2007.

The area is not a Visually Significant Area as defined in the DCP. The DCP provides a number of strategies which are useful and with which the application as it stands complies, as well as providing for the encouragement of appropriate tourism facilities (Part E, Objective 3.1.3).

The DCP indicates ways in which development in the vineyards district should achieve appropriate scenic quality and ecological value through the use of buffer, mass and specific plantings of indigenous native vegetation. In concert with such strategies, the scenic quality of the site can be increased along with achieving the development objectives of the project by adoption of these policies in the buffer areas proposed.

To achieve the DCP objectives, the buffers are opportunities to increase and enhance scenic quality and ecological value of the site rather than be purely ornamental. There is no reason that high quality ornamental landscape cannot exist side by side with them however, as is appropriate to specific precincts within the development site.

The most recognisable scenic backdrop to the Vineyards District is the escarpments of the Brokenback Range. This features in much of the advertising and imagery as well as the design principles shown in Figure 2 of Part E of the DCP. This feature is the subject of specific prohibitions on construction and design of developments which could interrupt views of it.

The Brokenback Range is at the far south west edge of the Vineyards District and is the backdrop feature of the "heartland" of the District. The subject site could hardly be further away from it. It is only from elevated private domain locations in Talga Road that the Range is in the same views as the site. The development of the site will have no impact on views of or toward the Brokenback Range backdrop and will not conflict with the principles of Figure 2 of Part E of the DCP.

Secondary backdrop features exist to the north of Talga Road and to a lesser extent the ridges to the north west, when seen from Wine County Road or part of McDonalds Road. Neither of these is of high scenic quality, however they are of moderate quality and worth consideration in an appropriate development. They are not of relevant to the specific considerations of the DCP because the backdrop feature of the Brokenback Range is not present in the view.

These ridges are widely visible in the locality and potentially affected by the development only along a

short section of Wine Country Road adjacent to the site. Views from the elevated parts of McDonalds Road to this backdrop will not be affected by the proposed development.

Partial access to these views across the site can be protected by the location of specific vista axes, such as the entry road and associated avenues, views into specific linear spaces such as practice fairways, areas of the buffer which have low vegetation and so on. The development will be screened by vegetation beyond and on the margins of these vistas, while the background ridges will remain in view above and behind the vegetation.

In my opinion, the development will not have any significant impacts on views of the scenic backdrops to the Vineyards District.

The DCP also provides a number of strategies which are sensible and useful, as well as providing for appropriate tourism facilities (Part E, Objective 3.1.3). Appendix 1 provides a range of ecologically appropriate species to use in planting generally, most of which occur on the subject site. Appendix 3 provides landscape and building siting and design guidelines with which the proposal appears to comply in general terms.

Clause 3.3 Need to Revegetate Components of the Vineyards district ; provides an opportunity not only to achieve a visually appropriate development by enhancing and rehabilitating the land, but also achieve a high level of regeneration using appropriate (and mostly already existing and viable) indigenous native species of trees and tall shrubs.

3.6 Assessment of the proposed Mitigation Measures

The prominent components of the proposal, ie, golf courses and housing/buildings will significantly alter the intrinsic character of the site. We have addressed the matter of the low visual and scenic significance of the site overall. Nevertheless, impact mitigation is a significant issue.

Setback distances from boundaries

On the basis of our experience and knowledge, the buffers proposed will be more than capable of dealing with any impacts of the management and maintenance of adjacent vineyards on properties on Wine Country Road or Wilderness Road, which abut that site. The setbacks are far in excess of what is required in the DCP and on our reading would not need any vegetation added to them to achieve the purpose of minimising land use conflicts, in particular the use of pesticide sprays.

Setbacks as buffer zones

The width of the setbacks also provides enormous potential for the screening and integration of the development into the surrounding landscape. There is a narrow buffer to McDonalds Road on the Vintage site. The vegetation in the buffer has already grown to the extent that it forms a significant screen. This shows that the much wider buffers proposed in the application, combined with view angles much lower or on grade with the site, will ensure that a variety of different landscape designs and uses which may be proposed at the detailed design stage can be incorporated into the buffer and will be effective in mitigation and visual quality enhancement. The development will be able to achieve excellent scenic and visual impact mitigation outcomes.

General strategies for mitigation of impact on the public domain

We have already foreshadowed what we consider to be appropriate general strategies for mitigation of impacts on the public domain which would be the subject of future design development. None of these would require changes to the overall planning of the development as it is presently proposed.

Ecologically appropriate landscape scheme

Appendix 3 of the DCP provides landscape and building siting and design guidelines with which the proposal appears to generally comply. Appendix 1 provides a range of ecologically appropriate species to use in planting generally, most of which occur naturally on the subject site. Thus the application can provide a visually and ecologically appropriate outcome for the site.

Clause 3.3: Need to Revegetate Components of the Vineyards District in the DCP, provides an opportunity not only to achieve a visually appropriate development by enhancing and rehabilitating the land, but also achieve a high level of regeneration using appropriate indigenous native species of trees and tall shrubs. Most of these already exist on the site and are regenerating naturally. The use of these species will increase the visual compatibility of the proposal as well as achieving a sustainable base for the overall landscape.

Riparian vegetation

It may be appropriate to consider in further detailed development of the plans whether some of the riparian buffer. the interface between it and the development and future water bodies and drainage lines could include a project for recovering the riverine forest vegetation formations which are almost extinct in the locality. There would be some peripheral benefits in providing some further mid distance screening of views from the north, although I do not see them as of such significance as to be determinative.

Buffer plantings

We suggest that subject to future considerations a more naturalistic approach than is shown in the buffer plan to Wine Country Road may be considered. This could feature extensive areas of native grassy forest on the Wine Country Road buffer and among the development site generally. We would suggest a native vegetation theme for the golf course where possible. Individual ornamental gardens, areas of mown grass, areas of vegetation recalling agricultural uses such as olive groves, orchards and so on, could be provided and give the buffers more life, relevance to the rural setting and assist with the fire safety issue.

Water features and drainage lines

Water features as proposed are desirable to link the development back to the floodplain and local drainage system and a native vegetation recovery theme for the riparian and water features would be an appropriate strategy in concert with the existing design. The entry drive, roundabout and formal roadways and so on can be landscaped as required, although a native species palette would again be beneficial with regard to the issue of sustainability.

The landscape throughout would be subject to design for bushfire safety, but with the width of the buffers, golf fairways and residential areas included there should be no problem. The individual precincts can have their own future landscape themes if that is appropriate, since the visibility from off site will be minimal once landscape is established.

Clearing policy

It will be clear that the application has to sacrifice some vegetation to provide space for specific uses, bushfire safety, etc. Clause 3.3.3 of Part E of the DCP provides a principle that equivalent areas of new vegetation are reasonable to expect, in compensation for vegetation needed to be cleared. On such a big site it is reasonable to retain and rehabilitate existing vegetation as a priority and it is hard to justify any excessive vegetation loss. The concept plan appears to allow for such a policy to be implemented.

At the detailed design stage, a policy should be employed to provide the most sensitive and ecologically sustainable outcome. Buffers may be planted in some places to compensate for vegetation to be removed.

In summary
Overall, we consider that the necessary mitigation measures are easily manageable and the future landscape scheme and buffers proposed, subject to future design, are more than adequate to achieve a whole series of desirable outcomes, ie. visual screening, increased scenic quality, recovered floodplain character, assistance with control of salinity, regeneration, mass planting requirement and ecological benefits.

We also note the level of control that will be exercised over the design, form, colours, finishes and materials of buildings, as a result of the development building the golf course component first and then marketing only completed home and landscape packages to residential purchasers. If there were residual concerns about these aspects of the development, they could be the subject of further conditions of development consent when development applications are made to Council.

3.7 Significance of residual visual impacts

Is the Site in the 'heartland' of the Vineyards District?
Physically and visually, the site is not in the heartland, but is on the margins of the district. Black Creek, which ultimately drains a considerable part of the district, runs past the site, but then enters steeper country and steeper valleys of the Greta Coal Measures landscapes closely to the north, before entering the main Hunter River Valley north of Branxton.

The main 'heartland' Vineyard landscapes are formed on undulating side slopes and ridges which have residual basaltic or other lavas as soil parent material. These are present generally to the south, south west and north west of the subject site. While it is true that grapes can be grown on many different soil types with modern techniques and that many small vineyards now extend onto quite marginal country on other soil types, the heartland vineyards are generally not on flat, poor quality marginal land such as the subject site. Our observations are that grape production on marginal land such as this site appears to be generally reducing in significance in the region.

In our opinion, the development of the site will have no negative effect on the extent of or the prominent character of the 'heartland' of the Vineyards District.

The Gateway to the Vineyards District Issue
The site is on the main road which traverses the Vineyards District from north to south, ie. Wine Country Road. Physically, there are two main entry points, ie, Branxton in the north and Cessnock in the south, although secondary entry points link the district from the north east (Maitland, and Lochinvar) and the north west (Broke and Singleton).

Wine Country Road, despite its name, does not actually traverse the main heartland of the Vineyards, but runs down the eastern margin. McDonalds Road is really the most significant local road relative to the centre of the Vineyards District and will not be significantly affected by the proposal. Notwithstanding, the site is adjacent to an important entry point from the north.

The fact that the site is on the border of the Vineyards District, as described above, does not lessen the potential significance of the locality as an entry, but perhaps it even increases it. There is no physical or cultural feature with marks the gateway, however if there is a metaphorical one it would be expected to be where there is a perceptible change from one landscape character to the contrasting landscape of the Vineyards. While there is a mixed character to the area between Branxton and the site, it would be true to say that on crossing Belmont Bridge there is a sense of arrival in the Vineyards District. For those who know it, crossing Black Creek is also crossing into the catchment of the Vineyards District.

The character of the transition between Branxton and the site however, is going to change significantly with Huntlee being developed. The future urban centre and peripheral development which will spread along Wine Country Road toward Rothbury is intended to house a population of around 20,000. The development will transform the trip from Branxton from one with a generally rural feel, with the exception of isolated urban development at North Rothbury and rural residential subdivisions nearby, to an urban or suburban setting. In some ways, this may make the gateway more of a contrasting experience than less (with the urban and rural residential edge of Huntlee advancing toward the Vineyards). The transitional area remains in the vicinity of the proposal.

We are of the view that the two resorts (Vintage and the Golden Bear Resort) can be thought of as part of this transition. They are not out of character with the Vineyards District. There are other examples within the District and they fit in appropriately to their own context. We consider that the proposal is acceptable as part of the transition through this changing locality to the 'heartland' of the District.

The intrinsic capabilities of the site are that development on the site could easily be totally hidden from view entering the area from the north, or south. It could be made to appear like the most prominent emerging character, ie. rural residential with remnant natural areas. What is proposed is a different and better integrated tourism resort compared to Vintage, with significant setting and screening by and integrated with natural areas of mixed forest and regeneration. Any one of these visual outcomes would be a transition that would be hardly perceptible and certainly not a feature that would impact negatively on the Vineyards.

On balance, we do not consider that there is any conflict of the proposal with the gateway issue.

4.0 Summary Conclusions

We consider, based on the assessment above, that the site can be used for the intended purpose as generally represented on the Master Plan and subject to future detailed design of the landscape and buffer components, without significant unacceptable impacts on the public and private domains.

The existing landscape character of the site is not assessed as being a constraint on future development. The landscape of the site is one which is common, widespread, not distinctive or rare and which does not possess intrinsic existing characteristics which would prevent the intended use. The exception is residual woodland and forest vegetation which is intended to be integrated into the resort design. We have provided policies for the extension of these intentions into an overall theme for the buffer zones and riparian areas of the site which may guide future design development.

Views from the high sensitivity public viewing locations along Wine Country Road can be managed using appropriate landscape design, vegetation rehabilitation and vegetation clearing policies to provide a high quality landscape buffer and setting for the built development and golf course use of the site. The general low to moderate scenic quality of the site and the locality, particularly with regard to the buffers to Wine Country Road, will be increased, not decreased, by the proposal. The extent of the proposed buffers is entirely sufficient to satisfy the visual constraints of the site and any conflicts of use which could arise from agricultural use of adjacent land.

Views from low sensitivity viewing places, predominantly on or adjacent to Talga Road, would not be significantly affected by the proposal. However, augmentation of the riparian buffer, planting associated with the golf course on the flood plain and vegetation associated with residences which are set back behind the flood plain and golf course, will partially to largely screen the development, providing an acceptable setting. Despite being closer, the development is likely to be no more prominent than the north eastern part of Vintage. The Vintage site is more elevated and has less physical absorption capacity for the built component of the development, which is soon to feature a large resort hotel.

We consider that the application can be supported on visual grounds. It will not result in negative impacts on the northern gateway to the Vineyards District or on the qualities which are identified as important to the District generally.

Appendix A : Assessment Methodology

2.2.1 The Components of the View Analysis

2.2.1.1 The development proposed and detailed field assessment

This includes a thorough understanding of the proposed Master Plan for the development including its location, scale and extent, to understand the general scale and spatial arrangement of the development. The next step is to carry out a field assessment by identifying potential viewing locations, visiting representative locations, documenting the proposal's approximate location on a base map, photographing representative locations and making an evaluation of the visual effects and relative visual impacts factors.

2.2.1.2 Identifying viewing locations and viewing situations

So as to represent all of the kinds of viewing locations which could be affected by each of the assessment factors and variations among them, a view point analysis was conducted. This was carried out as part of the ground truthing exercise associated with mapping the visual catchment (see 2.2.1.4 below).

The viewing locations fall into two categories, a) Public domain locations and b) Private domain locations. Public domain locations are major and minor roads, public reserves and recreation areas. The private domain viewing locations are predominantly rural residences.

It was not possible for views to be assessed from the many residences that would have views containing the proposal. However, it was possible to interpret the likely effects of the proposal on the basis of views taken toward the proposal from roads in the vicinity of the residences and also by observing the locations of buildings from the site.

The viewing places visited therefore represent views predominantly from the public domain, but they also provide insights into the likely visual effects on private views.

2.2.1.3 Mapping viewing locations and situations

The representative viewing locations visited during the field assessment are indicated on Figure 1. View Points 1 to 14 were analysed and the results entered on data sheets (Appendix (2).

2.2.1.4 Identification and mapping of visual catchment

The potential total visual catchment is described and indicated by the viewing places analysed on Map 1. The potential total visual catchment means the physical area within which the proposal would be visible and identifiable if there were no other constraints on that visibility, such as intervening vegetation and buildings.

Within the potential total visual catchment, the visibility of the proposal would vary. We identify the area within which the proposal would be identifiable and where it could cause visual impacts by assessing visibility.

Visibility means the extent to which the proposal would be physically visible to the extent that it could be identified, for example as a new, novel, contrasting or alternatively a recognisable but compatible feature. Features such as vegetation, buildings and intervening topography can affect the degree of visibility.

2.3 The components of the visual effect analysis matrix

2.3.1 Base-Line Factors

These are the criteria that remain predominantly constant and independent of the nature of viewing locations and factors which condition the viewing situation.

Visual character

The visual character of the locality in which the development would be seen is identified. It consists of identification of the physical and biological components of the area and the setting of the proposal which contribute to its visual character. The character elements include topography, vegetation, natural systems, land use, settlement pattern, urban form and the interface of public domain with the site. Visual character is a baseline factor against which the level of change caused by the proposal can be assessed. The desired future character of the locality and future changes likely to affect it is also relevant to assessing the extent of acceptable change to character.

Scenic Quality

Scenic quality is a measure of the ranking which the setting of the proposal either is accepted to, or would be predicted to have, on the basis of empirical research carried out on scenic beauty, attractiveness, preference or other criteria of scenic quality. Scenic quality is a baseline factor against which the visual impacts caused by the proposal can be assessed.

View place sensitivity

View place sensitivity means a measure of the public interest in the view. The public interest is considered to be reflected in the relative number of viewers likely to experience the view from a publicly available location. Places from which there would be close or middle distance views available to large numbers of viewers from public places such as roads, or to either large or smaller numbers of viewers over a sustained period of viewing time in places such as reserves of scenic routes are considered to be sensitive viewing places.

Viewer sensitivity

Viewer sensitivity means a measure of the private interests in the effects of the proposal on views. The private interest is considered to be reflected in the extent to which viewers, predominantly viewing from private residences, would perceive the effects of the proposal. Residences from which there would be close or medium distance range views affected, particularly those which are available over extended periods from places such as the living rooms and outdoor recreational spaces, are considered to be places of medium and high viewer sensitivity respectively.

The relationship between the viewer's location in either the private or public domain and the viewing distance in determining view place or viewer sensitivity is shown in the table below (For example, a view place in a reserve or roadway at a distance of 100-1000m is rated as of medium sensitivity)

Table 2.1: Relationship between viewing situation, viewing distance and view/viewer sensitivity zones

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads			
	Reserves			
Private Domain	Residence			
		>1000m	100-1000m	<100m
		Viewing Distance		

2.3.2 Variable Factors

These are the assessment factors which vary between viewing places with respect to the extent of visual effects.

View composition type

View composition type means the spatial situation of the proposal with regard to the organisation of the view when it is considered in formal pictorial terms. The types of view composition identified are:

- Expansive (an angle of view unrestricted other than by features behind the viewer, such as a hillside, vegetation and buildings.)
- Restricted (a view which is restricted either at close range or some other distance by features between or to the sides of the viewer and the view such as vegetation and buildings.)
- Panoramic (a 360 degree angle of view unrestricted by any features close to the viewer who is surrounded by space elements.)
- Focal (a view which is focused and directed toward the proposal by lateral features close to the viewer, such as road corridors, roadside vegetation, buildings, boats etc.)
- Feature (a view where the proposal is the form element which dominates the view, for example in close range views.)

It is considered that the extent of the visual effects of the proposal is related to its situation in the composition of the view. The visual effect of the proposal on the composition of the view is considered to be greater on a focal or a feature view, cognisant of the distance effect, compared to a restricted, panoramic or expansive view.

Relative viewing level

Relative viewing level means the location of the viewer in relative relief, compared to the location of the proposal. It is conventional in landscape assessment to assess views from locations above, level with and below the relative location of the proposal.

It is considered that the visual effects of a development are related to the relative viewing level and distance. Viewing levels above the development where views are possible over and beyond it decrease the visual effects, whereas views from level with and close to the development, dependent on viewing distance, may experience higher effects, particularly if built form intrudes into horizons.

Viewing period

Viewing period in this assessment means the influence on the visual effects of the proposal which is caused by the time available for a viewer to experience the view. It is assumed that the longer the potential viewing period, experienced either from fixed or moving viewing places such as dwellings, roads or rural properties, the higher the potential for a viewer to perceive the visual effects of the proposal. Repeated viewing period events, for example views repeatedly experienced from roads as a result of regular travelling, are considered to increase perception of the visual effects of the proposal.

Viewing distance

Viewing distance means the influence on the perception of the visual effects of the proposal which is caused by the distance between the viewer and the development proposed. It is assumed that the viewing distance is inversely proportional to the perception of visual effects: the greater the potential viewing distance, experienced either from fixed or moving viewing places, the lower the potential for a viewer to perceive and respond to the visual effects of the proposal.

Three classes of viewing distance have been adopted, i.e. short range (<100m), medium range (100-1000m) and distant (>1000m).

View loss or blocking effects

View loss or blocking effects in this assessment means a measure of the extent to which the proposal is responsible for view loss or blocking the visibility of items in the view. View loss is considered in relation to the principles enunciated in the Land and Environment Court of NSW by Roseth SC in Tenacity v Warringah [2004] NSWLEC 140. Although Tenacity concerned view losses from residential properties, the matter of what could be construed to be a valuable feature of the view which could be lost, e.g. specific features of views such as whole views and iconic element are of some relevance to the public domain also.

It is assumed that view loss and blocking effects increase the perception of the visual effects of the proposal. It is also assumed that view loss and view blocking can be important matters for consideration in regard to short range views from the public domain and potentially from nearby adjacent residences.

2.3.3 Overall Extent of Visual Effect

Based on the inspection of the pattern of the assessment ratings for the above factors an overall rating is arrived at which represents an overall extent of visual effects for a viewing location.

2.3.4 The Components of the Visual Impact Analysis

The criteria in 2.3 concern assessment of the extent of the visual effects of the proposal when seen from specific viewing places. The extent of the visual effects is the baseline assessment against which to judge the visual impacts.

Whether or not a visual effect is an impact of potential significance cannot be equated directly to the extent of the visual effect. For example, a high visual effect can be quite acceptable, whereas a small one can be unacceptable. As a result, it is necessary to give a weighting to the assessed levels of effects to arrive at an assessment of the impact.

This method therefore does not equate visual effects directly to visual impacts. The approach is to assess visual effects as in 2.3 above to arrive at an overall level of visual effect of the proposal for each kind of viewing place and then to assess the level of impact, if any, by giving differential weighting criteria to impact criteria. By this means, the relative importance of impacts are distinguished from the size of the effect. We consider that two weighting criteria are appropriate to the overall assessment of visual impacts, Physical Absorption Capacity and Visual Compatibility. Each of these addressed the primary question of the acceptability of the visual effects and changes caused by the proposal.

2.3.5 Physical Absorption Capacity

Physical Absorption Capacity (PAC) means the extent to which the existing visual environment can reduce or eliminate the perception of the visibility of the proposed redevelopment.

PAC includes the ability of existing elements of the landscape to physically hide, screen or disguise the proposal. It also includes the extent to which the colours, material and finishes of buildings and the scale and character of these allows them to blend with or reduce contrast with others of the same or closely similar kinds to the extent that they cannot easily be distinguished as new features of the environment.

Prominence is also an attribute with relevance to PAC. It is assumed in this assessment that higher PAC can only occur where there is low to moderate prominence of the proposal in the scene.

Low to moderate prominence means:

Low: The proposal has either no visual effect on the landscape or the proposal is evident but is subordinate to other elements in the scene by virtue of its small scale, screening by intervening elements, or difficulty of being identified.

Moderate: The proposal is either evident or identifiable in the scene, but is less prominent, makes a smaller contribution to the overall scene, or does not contrast substantially with other elements or is a substantial element, but is equivalent in prominence to other elements and landscape alterations in the scene.

Design and mitigation factors are also important to determining the PAC. Appropriate colours, materials, building forms, line, geometry, textures, scale, character and appearance of buildings and use of appropriate landscape strategies are relevant to increasing PAC and decreasing prominence.

PAC is related to but distinct from Visual Compatibility (see below).

2.3.6 Visual Compatibility

Visual Compatibility is not a measure of whether the proposal can be seen or distinguished from its surroundings. The relevant parameters for visual compatibility are whether the proposal can be constructed and utilised without the intrinsic scenic character of the locality being unacceptably changed. It assumes that there is a moderate to high visibility of the proposal to some viewing places. It further assumes that novel elements which presently do not exist in the immediate context can be perceived as visually compatible with that context provided that they do not result in the loss of or excessive modification of the visual character of the locality.

A comparative analysis of the compatibility of similar items to the proposal with other locations in the area which have similar visual character and scenic quality or likely changed future character can give a guide to the likely future compatibility of the proposal in its setting.

Visual compatibility with urban, rural and natural features

This assessment is a measure of the extent to which the visual effects of the proposal are compatible with urban, rural and natural features. It is assumed that in some views the proposal can be seen and clearly distinguished from its surroundings. Compatibility does not require that identical or closely similar features to those which are proposed exist in the immediate surroundings.

Compatibility with Urban and Natural Features means that the proposal responds positively to or borrows from within the range of features of character, scale, form, colours, materials and geometrical arrangements of urban and natural features of the surrounding area or of areas of the locality which have the same or similar existing visual character.

2.3.7 Overall Extent of Visual Impact

Based on the inspection of the pattern of the assessment ratings for the above factors on the relevant analysis sheet for each viewing location an overall rating is arrived at which represents an overall extent of visual impacts for a viewing location.

2.3.8 Visual Sensitivity Zones

Three visual sensitivity zones are identified which are based on the view place sensitivity or viewer sensitivity as explained above in 2.3.1. These are related to the distance zones from the development site and whether views are from significant public domain or private viewing locations. Viewing places within the high or medium visual sensitivity zones are further assessed as explained below.

2.3.8.1 Impact assessment for each zone

An overall impact rating for each of the three visual sensitivity zones is arrived at by inspecting the pattern of the assessment ratings for the visual impacts factors (as given in 2.3.4) on the relevant analysis sheet for each viewing location in that zone. It is generally found that the close range visual sensitivity zone is most affected by any development as the development forms part of the foreground views from the viewing locations within this zone.

2.3.8.2 Analysis against relevant information/planning instruments/policies & master plans

The proposed redevelopment and its overall impacts on each of the visual sensitivity zones is analysed against the relevant information. These include:

Cessnock Local Environmental Plan, 1989 (as updated to 11 May, 2007)(The LEP).

Cessnock Development Control Plan, 2006 (the DCP), as amended by inclusion of Special Areas in 2007.

Huntlee New Town, Concept Plan Preliminary Assessment Report prepared by Julie Bindon and Associates (JBA), dated May 2007.

2.3.8.3 Assessment of the mitigation measures proposed to eliminate visual impacts

The mitigation measures that are already proposed as part of the development are then assessed in terms of their capability to overcome the visual effects and impacts on each of the visual sensitivity zones. Other mitigation measures and management guidelines are then formulated to overcome every possible visual effect and impact.

2.3.8.4 Significance of residual visual impacts

Finally and subsequent to the visual effects of the mitigation factors being assessed, a relevant question is whether there are any residual visual impacts and whether they are acceptable in the circumstances. These residual impacts are predominantly related to the extent of visual change to the immediate setting and are also a result of personal choices and preferences.

In terms of the urban component of the development, residual impacts relate to individuals' preferences for the nature and extent of change which cannot be mitigated by means such as vegetation, colours, materials and the articulation of building surfaces.

These personal choices are also a result of people's resistance or resilience towards any change to the existing arrangement of views. Particular individuals or groups may express strong preferences for forms of development. There is no clear research evidence of which we are aware to support either preference.

The significance of these residual impacts is assessed on the basis of the relative sensitivity of viewers and viewing places that may experience these impacts. Whether overcoming these impacts would result in undermining of the potential capacity of the development site to economically support the intended use is not the focus of a visual impacts assessment such as this.

Appendix B : View Point Data Sheets

View Point 1: Intersection of Wine Country Road and Old North Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads	☒		
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level		☒		
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		NA		
Compatibility with Natural/Rural Features		NA		
Overall Extent of Visual Impact		**LOW**		
Comments		The view shows the location of future large lot residential development in Huntlee to the north west of the site. The area will change to an urban character. It will have low visual exposure to the site.		

View Point 2: Site from Wine Country Road on Belmont Bridge

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads			☒
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View				☒
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance			☒	
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW-MEDIUM**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity				☒
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**MEDIUM**		
Comments		The lower part of the site is of low scenic quality and integrity. The site has low existing visual absorption capacity, however the wide buffers are capable of providing extensive or total screening to the built components of the development. The golf course use of the floodplain is considered to have a high compatibility with the existing character of the landscape.		

View Point 3: Intersection of Coulson and McDonalds Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance			☒	
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features			☒	
Overall Extent of Visual Impact		**LOW-MEDIUM**		
Comments		The north west sector of the site proposed to predominantly be golf courses forms part of the mid ground of the view. The low viewing angle means that the development would be screened by future vegetation in the buffers to Wine Country Road and vegetation among fairways and housing. The background hills toward Greta and Lochinvar would remain the dominant feature of the view. The avenue planting on the boundary of the property on the right gives and indication of how effective planting would be in screening the development in this landscape.		

View Point 4: Intersection of McDonalds Road and Wine Country Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads			☒
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View				☒
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance				☒
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW-MEDIUM**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	High	Medium	Low	Low
	(Low Impact)	(Medium impact)	(High impact)	(High impact)
Physical Absorption Capacity				☒
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**MEDIUM**		
Comments		The lower part of the site is of low scenic quality and integrity. The site has low existing visual absorption capacity, however the wide buffers are capable of providing extensive or total screening to the built components of the development. A naturalistic landscape design for the buffer areas will provide significant and appropriate screening and setting for the development. The golf course use of the floodplain is considered to have a high compatibility with the existing character of the landscape, but will also be of low future visibility.		

View Point 5: Near western entry to Vintage, McDonalds Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The site is partly visible beyond the Vintage site. The narrow vegetated buffer in the foreground will soon remove any significant views into Vintage and any to the subject site. The view also indicates the extent to which future vegetation is capable of integrating development into the local landscape. On the much flatter subject site, there will be minimal visual exposure of the built components of the development in views inward from outside the site.		

View Point 6: Near entry to Bimbadgen Winery and resort, McDonalds Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads	☒		
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		Part of the north west sector of the site is of minimal visibility from this location, virtually the only elevated viewing place which is on an established tourist and high use public domain site, McDonalds Road. The future development of Vintage and vegetation within the subject site will remove any visibility in a relatively short time.		

View Point 7: Wine Country Road near proposed entry point

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads			☒
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View				☒
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition				☒
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance				☒
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**MEDIUM**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The site has low existing visual absorption capacity in the foreground, however the wide buffers are capable of providing extensive or total screening to the changed use of the site. The vegetated sector of the site in this view has a high intrinsic capacity to absorb the built components of the development as a result of its existing and future potential to support regrowing forest and woodland vegetation. A naturalistic landscape design for the buffer areas will provide significant and appropriate screening and setting for the development.		

View Point 8: Wine Country Road near south east boundary of the site

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads			☒
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View				☒
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition				☒
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance				☒
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**MEDIUM**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The site has low existing visual absorption capacity in the foreground, however the wide buffers are capable of providing extensive or total screening to the changed use of the site. The vegetated sector of the site in this view has a high intrinsic capacity to absorb the built components of the development as a result of its existing and future potential to support regrowing forest and woodland vegetation. A naturalistic landscape design for the buffer areas will provide significant and appropriate screening and setting for the development.		

View Point 9: Wine Country Road between Wilderness Road and site

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View			☒	
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level			☒	
Effect of Viewing Period		☒		
Effect of Viewing Distance			☒	
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW-MEDIUM**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The site has high visual absorption capacity and the buffers are capable of providing extensive or total screening to the changed use of the site if this is considered necessary. The vegetated sector of the site in this view has a high intrinsic capacity to absorb the built components of the development.		

View Point 10: Wine Country Road near the Wilderness Road intersection

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level		☒		
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The proposed development would have no significant visual effects or impacts on this viewing location or others with similar visual composition or exposure to the site.		

View Point 11: Wilderness Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level		☒		
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The proposed development would have no significant visual effects or impacts on this viewing location or others with similar visual composition or exposure to the site.		

View Point 12: Wilderness Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads		☒	
	Reserves			
Private Domain	Residences			
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition		☒		
Effect of Relative Viewing Level		☒		
Effect of Viewing Period		☒		
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity		☒		
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW**		
Comments		The proposed development would have no significant visual effects or impacts on this viewing location or others with similar visual composition or exposure to the site.		

View Point 13: Talga Road

		View Place or Viewer Sensitivity		
		L	M	H
Public Domain	Roads	☒		
	Reserves			
Private Domain	Residences	☒		
		>1000m	100-1000m	<100m
		Viewing Distance		

View Composition Type	Expansive	Restricted	Panoramic	Focal	Feature

Assessment on each Factor ☒

Assessment Factor where effects increase as ratings increase	Assessment	Low	Medium	High
	Visual Effect	(Low Effect)	(Medium effect)	(High effect)
Base-line factors				
Effect On Visual Character of View		☒		
Effect on Scenic Quality of View		☒		
Variable factors				
Effect On View Composition			☒	
Effect of Relative Viewing Level			☒	
Effect of Viewing Period			☒	
Effect of Viewing Distance		☒		
View Loss or Blocking Effect		☒		
Overall Extent of Visual Effect		**LOW-MODERATE**		

Assessment on each Factor ☒

Assessment Factor where impacts decrease as ratings increase	Assessment	High	Medium	Low
	Visual Impact	(Low Impact)	(Medium impact)	(High impact)
Physical Absorption Capacity			☒	
Compatibility with Natural/Rural Features		☒		
Overall Extent of Visual Impact		**LOW-MEDIUM**		
Comments		The development would make a moderate change to the composition of the view in the distance, but have a high compatibility with the existing and future site conditions. The view places are considered to be of low sensitivity, meaning that the low-moderate effects are considered not to be significant. The scenic aspects of the views would predominantly be unchanged and there would be no effect on the Brokenback Range.		

richard lamb & associates

3 June 2013

The General Manager
Cessnock City Council
PO Box 152
CESSNOCK 2325

Cc: Mr Kerry Nichols
HDB Town Planning and Design
PO Box 40
MAITLAND 2320

Dear Sir/Madam,

Jack Nicklaus Golf Resort, Wine Country Road, Rothbury
Updated Visual Impact Assessment

As you will be aware, I undertook a Visual Impact Assessment of the original application for Arris Group, under directions from HDB Town Planning and Design in November, 2007.

I recently received a request from HDB Design to undertake a review of the methods, assumptions and findings of that assessment and provide a response to comments by planning officers for Cessnock Council, in particular, the following comment on the application:

> "Council staff do not consider that a roundabout with flowers is a suitable gateway treatment to the new district. A more appropriate treatment would reflect the rural

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character of the area and the vineyards that sit within this rural area. In particular the residential component of the proposal is out of character with the rural character and needs to be significantly screened so that it is not visible from Wine Country Drive."

I have been appointed to undertake a review of my assessment report and to comment specifically on the matters quoted above. This letter is the outcome of my review. In undertaking the review I have had regard to:

1. my original report;
2. the documentation on which it was based;
3. current aerial imagery of the area over which the proposal was assessed;
4. a desktop review of the former and current planning instruments and polices relative to the site, including Cessnock LEP 1989, CLEP 2011 and Cessnock DCP 2010;
5. draft DCP for Huntlee;
6. my recent experience in the locality, which has included casual inspection of the site and its environs while passing through the area and assessing it in comparison with other 'gateway' areas for other purposes, and:
7. the Schematic Concept Site Plan prepared by HDB Design.

1 Structure of Report

The report follows the process logic that is presented in the Methodology Flow Chart that is at Page 11. The methodology is in three main components, ie. the View Analysis (Page 12), the Visual Effects Analysis (Page 13) and the Visual Impact Assessment (Page 14). The criteria and logic of each of the parameters of the Methodology is explained in detail in Appendix A, between Pages 33 and 39.

1.1 View Analysis

The view analysis stage of the methodology has three components, ie;

1. Analysis of the concept for development in relation to the regional and local visual context, strategic planning principles and scenic resources and constraints of the site;
2. collection of relevant information, planning instruments, polices, aerial images etc; and:
3. field assessment, following determination of the viewing locations and situations and the identification and mapping of the visual catchment.

Comment:

The visual context and setting for the site is described in the first part of the View Analysis phase (Section 1.2 1). Section 1.2.2 describes the existing scenic resources of the site and setting at page 6. No significant changes have occurred in the intervening period and the analysis remains current. Of the plates in the report which represent views of the site, Plates 1-4 and 7-21, no significant changes have occurred in the intervening period

The general visual Opportunities and Constraints are summarised in Section 1.3 at Pages 6-7. The existing settlement pattern and land uses have not changed, as can be seen by comparison of a recent aerial image at Figure 1 in this submission to Map 1 at Page 9 of the report. The overall concept for the development has also not changed, albeit at the detailed level the planning of both the golf course and residential component is slightly different. The development component of the nearby Vintage has increased, however the future constraints of the proximity of this development had been considered in formulating the opportunity and constraints

analysis in the report and as a consequence the analysis of opportunities and constraints remains relevant.

The View Analysis component of the report at Section 3.1.2 determined the extent of the visual catchment and identified representative locations for assessment of the range of view opportunities and situation that are shown on Map 1 at Page 9. There have been no significant changes to the parameters used to select and locate these viewing places, which therefore represent an adequate and representative range of viewing places for the purpose of assessment. Figure 1 below, a recent Google Earth aerial image, can be compared to Map 1 at Page 9 of my original report. It is evident that minimal change has occurred to the site and its surrounding context, other than changes to the Vintage as a result of its roll-out.

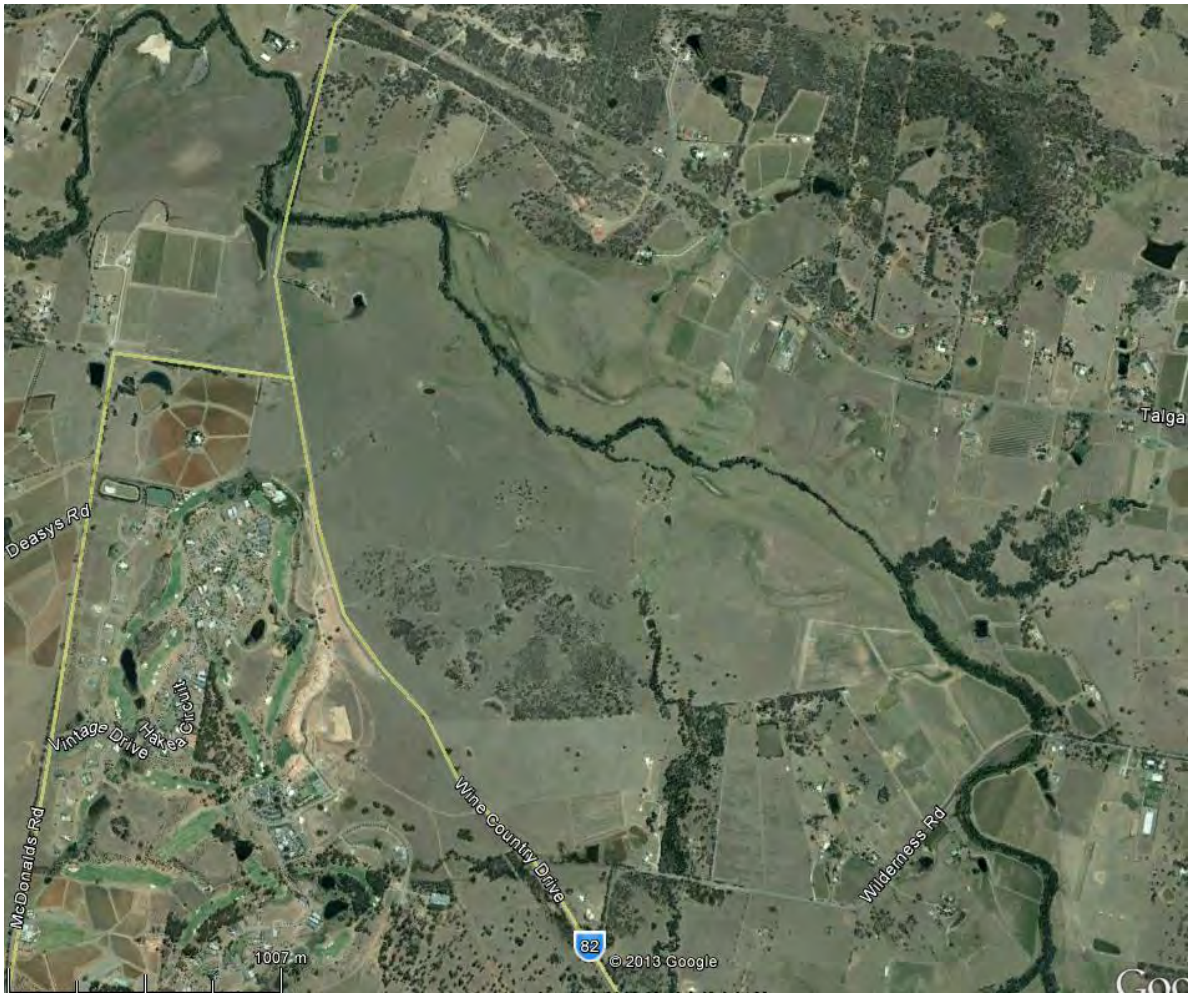


Figure 1: Recent Google Earth aerial image: compare with Map 1 of RLA report of 2007.

1.2 Visual Effects Analysis

The Visual Effects Analysis is the second major component of the Methodology (see the summary of steps and logic on Figure 3 at Page 13). It consists of an analysis of

Baseline Factors of Existing Visual Character, Scenic Quality and Sensitivity of Viewers and View Places. This is followed by an analysis of the visual effects of the proposal on those baseline factors. The effects are variable depending on viewing location, viewing level, distance, viewing period and view loss of blocking effects. The analysis is at Pages 15-24.

Comment:

The baseline factors Visual character (3.2.1.1), Scenic Quality (Section 3.2.1.2), View Place Sensitivity (3.2.1.3) and Viewer Sensitivity (3.2.1.4) have not significantly changed in the intervening period. If they were substituted for by new ones taken in mid-2013, the photographic images that involve the site itself, (Plates 1-4 and 7-21), would look essentially the same. There would be subtle differences in the two (Plates 5 and 6) that show the details of aspects of the adjacent Vintage development, as a result of the roll-out of that development, including the residential component. Given that the character elements of golf course and residential buildings in the Vintage already existed at the time the original assessment was made, the increase in intensity of the residential component and growth of associated vegetation was anticipated and is considered to make no significant difference to existing landscape quality and character in the context of considering the current application.

View Place and Viewer Sensitivity were analysed and assessed in Sections 3.2.1.3 and 3.2.1.4 at Pages 15 and 23. The highest sensitivity in the public domain was determined for Wine Country Drive and the part of McDonalds Road in the immediate vicinity of their intersection. Nothing has changed in the intervening period to alter this situation. Both the high number of viewers and the close range of views were determined to increase the sensitivity of the interface.

The effects of variable factors are assessed in Section 3.2.2 at Pages 23 and 24. The categories of variable factors assessed were effects on view composition, of viewing level relative to the site, period of view, viewing distance and view loss or blocking effects. As is the case for the assessment of baseline factors, nothing has changed in the physical landscape or in the way the site can be experienced by viewers that would change these assessments.

The overall extent of visual effects was tabulated at Section 3.2.3 at Page 24 of the report. The overall levels of visual effects were noted to be unusually low overall, in the context of the previous application, in which the buffers to Wine Country Drive in particular had been proposed to be landscaped with a combination of vineyards and olive groves, as well as significant areas of retained and additional indigenous native vegetation. It was noted that the site has a high potential to absorb the visual effects of the development.

Given the application now proposes Spotted Gum-Ironbark forest as a dense screen to the views from Wine Country Drive, the amended proposal would have a lower overall extent of visual effects than had been assessed in the report and summarised on Table 3.1. The final note under the table, applied to the amended application, is that it now has a higher potential to absorb the visual effects of the development without significant changes to the landscape character and quality.

1.3 Visual Impact Analysis

The Visual Impact Analysis is the third and final major component of the Methodology (see the summary of steps and logic on Figure 4 at Page 14). Its starting point is the findings of the overall assessment of the extent of Visual Effects. It then assesses the Physical Absorption Capacity of the site and locality and the Compatibility of the Proposal with Urban and Natural features of the environment, to determine the level

of residual effects, both in the existing situation and in the future (ie. the impacts of the proposal when complete or at a stage of early maturity of the landscape and vegetation).

The rating of existing and likely future Absorption Capacity at 3.3.1 remains as in the report at Page 25. I expressed the view that while I did not consider it necessary for a landmark development, it would be possible to hide the built forms of the development given the width of the buffers and the potential for a screen of vegetation to achieve this outcome.

The report assessed Visual Compatibility with Rural and Natural features in Section 3.3.2 at Page 25 and noted a high compatibility with the Vintage and at the same time a potential cumulative impact issue. It was determined that the proposal will not lead to an unacceptable change to the intrinsic landscape character of the site and locality and is capable of considerably increasing the scenic quality of the site itself. As such, it also exhibits significant compatibility with the natural features of the site and also the future visual character.

Notwithstanding, it was considered that it was important that the proposal does not merge visually with its adjacent neighbour at the Vintage, but provides a compatible interface as well as an alternative and sensitive presentation to the public domain.

The application that I initially assessed adopted a contextual approach to the interface between the road and the development, proposing the use of vineyards, olive groves and native vegetation in combination in the buffers. The intention was to provide an interface of scenic and cultural relevance to the setting, without attempting wholesale blocking of views into the site by vegetation. Dense screening vegetation in the buffers is in any event unnecessary in many locations, as in reality, only residences

associated with the northern part of the site would be of significant potential visibility (along proposed Holes 11 and 15) from Wine County Drive.

I had however recommended a more naturalistic approach for buffer plantings (at Page 29 of the report), a grassy woodland character for the buffers in general, a native vegetation theme for the course if appropriate and a native species palette for the entry drive and the proposed roundabout, both for aesthetic and ecological sustainability reasons. This would not exclude use of feature exotic species where appropriate, or exotic-themed gardens in specific locations. I noted that the buffers were wide enough for a relatively open vegetation screen to provide a high level of screening of the built forms of the proposal in views from Wine Country Drive, given the flatness of the site and the low viewing angles from almost all viewing places.

The concept I had proposed is compatible with the preference for dense screening expressed above by Council officers, notwithstanding I do not agree that the residential component of the development is intrinsically out of character with the rural setting. The tourism benefits and attraction of the use of the land and the presence of other examples of the same land use and character in various places in the Vineyards district, including the site immediately opposite on Wine Country Drive, also contribute to the locality's character and to its tourism potential.

The Overall Extent of Visual Impacts was tabulated in Table 3.2 in Section 3.3.3 of the report. In my opinion the amended proposal would give rise to slightly lower impacts. Different weightings were given according to the sensitivity of viewing places, in which Wine Country Road was considered the highest sensitivity zone. Even taking this into account, the impact rating on the road was considered medium to low.

1.3 Mitigation Measures

In Section 3.6 at Pages 28 and 29, the report assesses the measures proposed or with the potential to mitigate the visual impacts of the proposal, such as setback distances from boundaries, buffer zones, general strategies for mitigation of impacts on the public domain, ecologically appropriate landscape, riparian vegetation, buffer plantings, etc. All of this was in the context of a general recommendation for the use of indigenous native vegetation in buffers, enhancing remnant communities and achieving both visual and ecological benefits and it remains relevant to the amended application.

1.4 Significance of residual visual impacts

The report assessed two aspects of the residual impacts of the proposal in Part 3.7 at Page 31-31, including consideration of the 'gateway to the Vineyards District' issue. This is relevant to the view expressed by Council officers about the roundabout, viz.

> "Council staff do not consider that a roundabout with flowers is a suitable gateway treatment to the new district. A more appropriate treatment would reflect the rural character of the area and the vineyards that sit within this rural area."

The entry to the proposed development was assessed as being in an area that can be considered part of the 'gateway to the Vineyards District' from the north and one likely to experience higher use when the Hunter Expressway is completed to Branxton and Huntlee is developed.

There is no existing structure or node that is an entry; it is a perceptual entry from the north, as discussed in the report. Both Wine Country Drive and McDonalds Road provide access through the gateway to the Vineyards District. There are various cues to the transition from the Greta Coal Measures landscapes to the Vineyards District, such as landform and land use changes, vineyards, tourism sites etc. that denote an

entry. Having the proposed development in the entry is not in conflict with the perception of entry.

Perhaps the concern is that a roundabout would become a separate signifier of entry and compete with other cues. However, other roundabouts have been cited by Council as important and valuable as denoting entries to the Vineyards District, such as the one at the intersection of Oakey Creek and Marrowbone Roads in Pokolbin, which also provides an entry to Kelman Estate.

I do not have a strong view as to whether a roundabout is unsuitable as a "gateway treatment to the new district", in fact I am not sure what the reference to the new district means. However, the entry proposed that is set back from the road in a semi-circular landscape setting wide enough to provide manoeuvring space, a deep setback to the entry, sufficient sight lines for safety and space for landscape, native or exotic, is in my opinion entirely acceptable.

1.5 Conclusions

The conclusions to the report are summarised in Section 4.0 at Page 32 and they remain valid for the proposed amended development. They foreshadowed the landscape design that is now proposed for the development overall and for the buffers to Wine Country Drive, and I quote from Page 32 (correcting the references to Wine Country Road);

> "Views from the high sensitivity public viewing locations along Wine Country Drive can be managed using appropriate landscape design, vegetation rehabilitation and vegetation clearing policies to provide a high quality landscape buffer and setting for the built development and golf course use of the site. The general low to moderate scenic quality of the site and the locality, particularly with regard to the buffers to Wine Country Drive, will be increased, not decreased, by the proposal."

The amended scheme for the buffers would satisfy the requirements expressed by Council for a high level of screening of the built component of the development.

Please do not hesitate to contact us with any questions or comments.

Yours sincerely

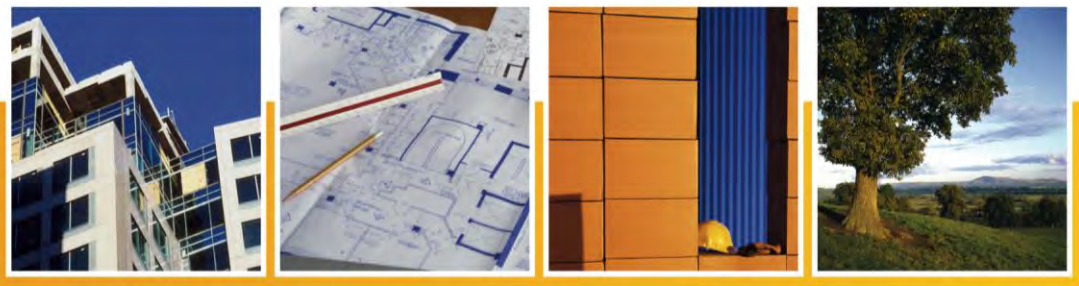
Dr Richard Lamb

APPENDIX R

STORMWATER MANAGEMENT PLAN

HDB 2016

STORMWATER MANAGEMENT PLAN



For

Staged Integrated Residential Tourist Development

At

Lots 2 - 4 DP 869651 and Lot 11 DP 1187663
Wine Country Drive, Rothbury

Prepared for

Capital Hunter Pty Ltd

August 2016
Report 15/029 - 3

Prepared by

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HDB Reference Number:	15/029
Project Manager	Tony O'Beirne

Project Manager  ***Date*** 10th August 2019

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CONTENTS

APPENDICES

FIGURES

1.0 INTRODUCTION

HDB Town Planning and Design (HDB) have been engaged by *Capital Hunter Pty Ltd* to prepare a Stormwater Management Plan (SMP) to accompany a Staged Development Application for an integrated residential/tourist development within Lots 2 - 4 DP 869651 and Lot 11 DP 1187663, Wine Country Drive, Rothbury. The development site is located approximately 12 km from Cessnock CBD and is comprised of approximately 240 ha of historically cleared land.

The proposed subdivision includes:

- Allocation of 300 residential lots as a staged application;
- Allocation of tourism lots with development applications associated with a motel and villas; and 300 units;
- Allocation of separate lot for the future proposed 18-hole golf course.

The site is bounded by Wine Country Drive to the west, Black Creek to the north-east and rural residential property to the south.

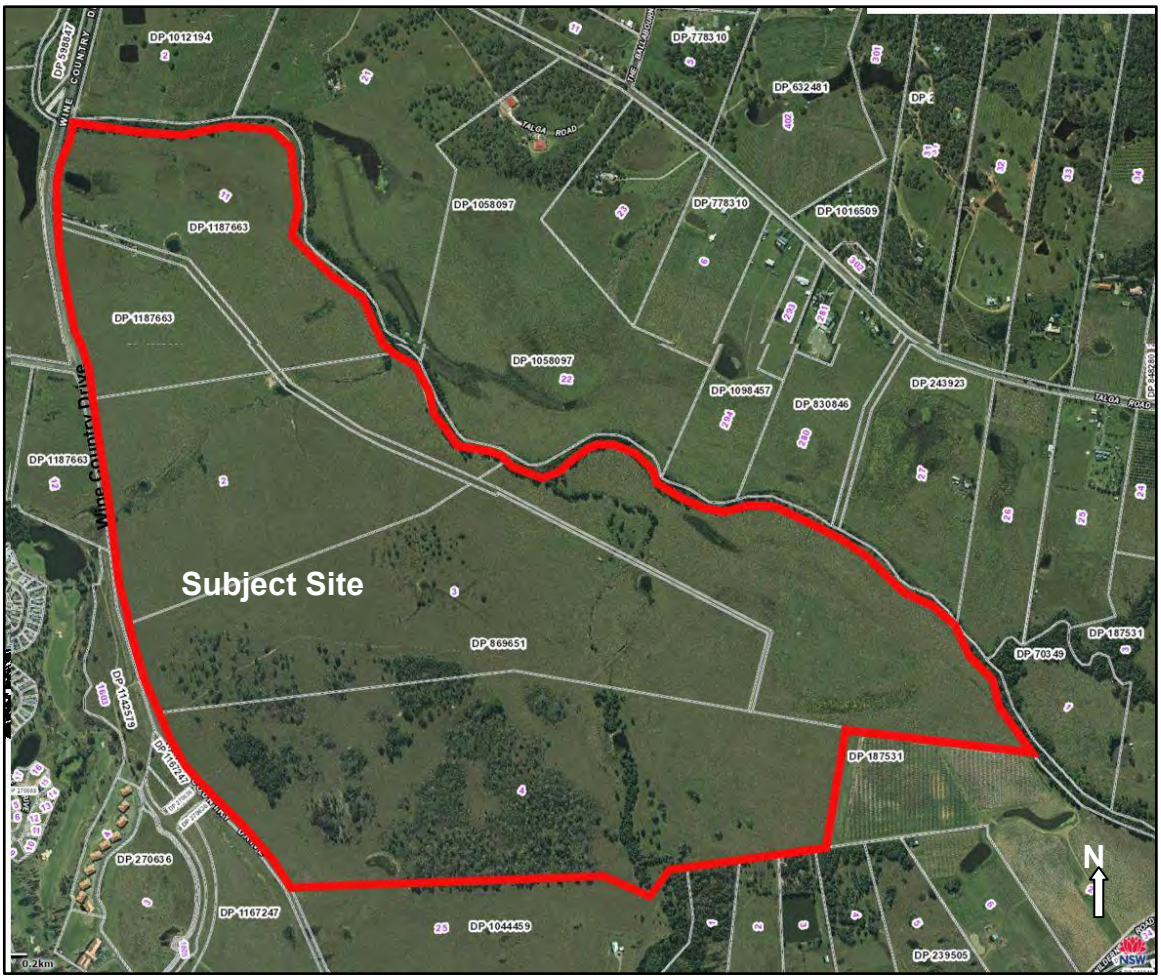

***Figure 1**: Site*
Source: Six maps – June 2016

PURPOSE OF THIS PLAN

The purpose of this document is to demonstrate that the proposed development can effectively satisfy all applicable legislative requirements and best practice guidelines with regard to flood impact, stormwater quality and quantity management. The development has been strategically planned to take into consideration all social and environmental sensitivities within the proposed development area and surrounding catchments. The analysis and evaluation of the potential water related issues of the development will be designed in such a manner as to ensure:

- All proposed residential development is free from potential flood impact for up to and including the flood planning level associated with 1% Annual Exceedance Probability (AEP) flood event;
- Attenuation of peak stormwater runoff from the post-development catchment to be comparable to the pre-development (existing) catchment runoff in all storm events;
- Design of the system with respect to the minor/major system principals described in Australian Rainfall and Runoff;
- Channel re-design of minor watercourses and defined overland flow paths to ensure safe and adequate flow conveyance capacity is accommodated for up to the 1% AEP flood event from the local catchment with the proposed new lot layout;
- Water quality control and innovative recycling and re-use of the proposed development's grey-water system; on-site effluent use for irrigation purposes;
- Potential water quality issues have been effectively catered for, with treatment measures designed and employed to ensure water quality is not compromised and total water cycle management principals are adhered to.

It is intended that the document will provide guidance to both the developer and future designers and contractors as to their obligations to ensure that any potential impacts or public disturbances are minimised.

The design strategy is conceptual in nature and does not include detailed design or sophisticated water quality treatment modelling, as this will from parts of subsequent Development Applications, for each stage as a part of the detailed design.

GUIDING DOCUMENTS

The design strategy has been undertaken using recent best practice guidelines and documentation. The following documents have provided key inputs into this Stormwater Management Plan:

- *National Water Quality Management Strategy* (ANZECC, 2000);
- *Australian Runoff Quality* (Engineers Australia, 2006);
- *Australian Rainfall and Runoff: A guide to flood estimation* (Engineers Australia, 2001);
- *NSW Floodplain Development Manual* (DIPNR, 2005);
- *Black Creek Flood Study Stage 2 (Nulkaba to Branxton)* (WMA, 2015);
- *NSW Environmental Guidelines for Use of Effluent by Irrigation* (DEC, 2003);
- *Improving the Environmental Management of NSW Golf Courses* (AGCSA, 2003, rev DECC,2007);
- *Landcom's Water Sensitive Urban Design Guidelines;*
- *The Vintage Rezoning Flood Assessment Report, Rothbury, NSW* (Martens Consulting Engineers, 2014);
- *Site Water Budget Jack Nicklaus Golf Course of Australia Hunter Valley NSW* (Water Wise Consulting, 2013);
- *Preliminary Site Contamination Assessment* (Coffey 2006);
- *Viticulture Soil Assessment of the Golden Bear Golf Resort* (Allynbrook Pty Ltd, 2007); and
- *Cessnock City Council's Engineering Requirements for Development* (Cessnock City Council, 1994).

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2.0 EXISTING HYDROLOGICAL ENVIRONMENT

PREVIOUS STUDIES AND BACKGROUND DOCUMENTATION

The site has previously been the subject of a variety of investigations and reports for the rezoning application. Various modelling assumptions have relied upon the use of previous investigations and documented reports by alternate consultants. Parameters specified by geotechnical and water engineering consultants have been assumed to be accurate and have not been validated for the purpose this Stormwater Management Concept.

CATCHMENTS, TOPOGRAPHY, WATERWAYS AND KNOWN FLOOD INFORMATION

The site is approximately 240 ha in area and is triangular in shape. It is bounded by Black Creek at the north-eastern boundary, rural residential property to the south and Wine Country Drive to the west. The site is traversed by minor watercourses and existing dams receiving runoff predominantly from the 'Vintage' development to the south-west.

The localised catchment associated with the watercourse traversing the site to the east is approximately 17.7 ha. The local catchment associated with flow discharging from the south-east is approximately 51 ha. The 'Vintage' land contains a golf course; bush land; roads and residential areas; vineyards and cleared areas dominated by grass cover and low density trees.

Surface water discharging to these two watercourses have been previously identified by Martens Consulting Engineers for the purpose of a rezoning application. The assessment used RAFTs hydrological modelling and includes 2D hydraulic modelling using Tuflow software and DTM data. The study is bounded by Wine Country Drive and does not extend onto the Jack Nicklaus Golf Course site. Flood information reported by Martens in the Vintage Rezoning has been assumed to be accurate and considered as a part of this assessment. The southern watercourse has recently been identified as being inundated during the 1:100 year flood event of Black Creek.

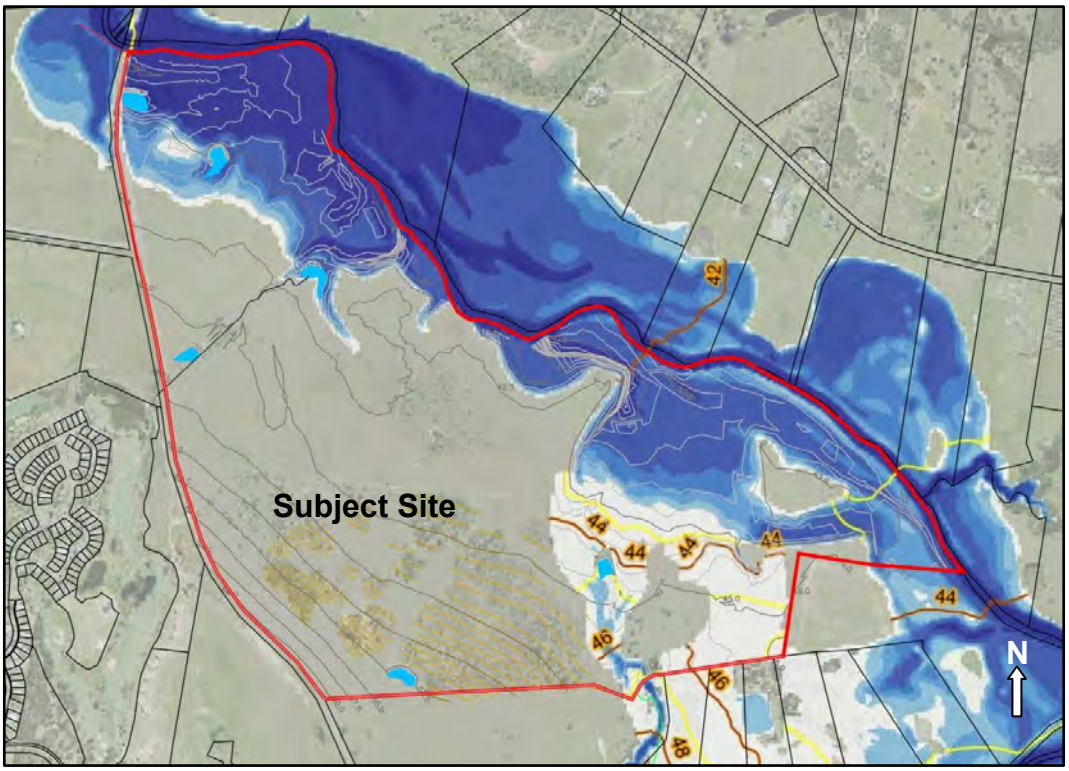


***Figure 2**: Peak flood levels and depths - Black Creek catchment (1% AEP event)*
Source: Draft Black Creek Flood Study - Stage 2 (Nulkaba to Branxton) by WMA Water

Black Creek at the Rothbury Stream Gauge, downstream of the development site, has a catchment area of approximately 220 km^2, giving an indication of the magnitude of Black Creek. The watercourse has been subject to a variety of studies, commissioned both privately and publicly. The most recent and relevant flood investigation in relation to the site is the Black Creek Flood Study Stage 2 (Nulkaba to Branxton) undertaken be WMA (2015).

Black Creek has been subject to flood investigations inclusive of 2D flood modelling recently (2015) by WMA within the site's vicinity, for the purpose of this report, this information has determined the proposed floor levels and fill levels associated with the development. At the time of writing this report, Black Creek flood modelling has not incorporated the proposed fill levels prepared for this site; however, discussions with Council have indicated that the cumulative impact of the development on the floodplain will be considered by Council in WMA's Tuflow model. At this stage, the proposed fill is assumed not to have a cumulative impact and this Stormwater Management Plan has been designed as such.

FLOOD PLANNING LEVEL (FPL)

The recent flood study by WBM, commissioned by Cessnock City Council for Black Creek, has now been adopted and will determine the FPL for the site. This level ranges from approximately 44 AHD at the south-eastern corner down to approximately 41 AHD at Belmont Bridge. The catchment that enters the site from the south has been included in the mapping and reaches a level of 47 AHD at the boundary.

The FPL for the residential and commercial\resort buildings will be set at 500 mm above the 1% AEP level.

In respect to Probable Maximum Flood (PMF) event, a 'flood evacuation policy' will be developed for the entire development, if such an event should occur. Best practice and legislative overrides will be incorporated into the document. There is however no part of the residential or tourist accommodation that can be cut-off by the PMF.

WATER QUALITY

The site is historically cleared for agricultural and rural land use. The residential and resort components of the development will follow water quality guidelines as specified under Council's Development Control Plan (DCP) and "Engineering Requirements for Development' manual together with Water Sensitive Urban Design (WSUD) principles.

This can be achieved by a series of WSUD devices, including Gross Pollutant Traps (GPT's) wet and dry detention\retention basins, and/or bio-retention swales and basins. All impervious areas will be treated in some way to remove silts, oils, hydrocarbons and litter from stormwater before it reaches Black Creek.

Run-off water from the golf course area, which is predominantly below the 1% AEP level, will conform with the goals and measures set out in the publication produced by the Department of Environment and Climate Change NSW "Improving the Environmental Management of New South Wales Golf Courses", 2003.

It targets specifically, air pollution, energy use, heritage, management and monitoring programs, control and use of pesticides, soil, vegetation and wildlife management, waste, efficient use and re-use of water, and most of all education.

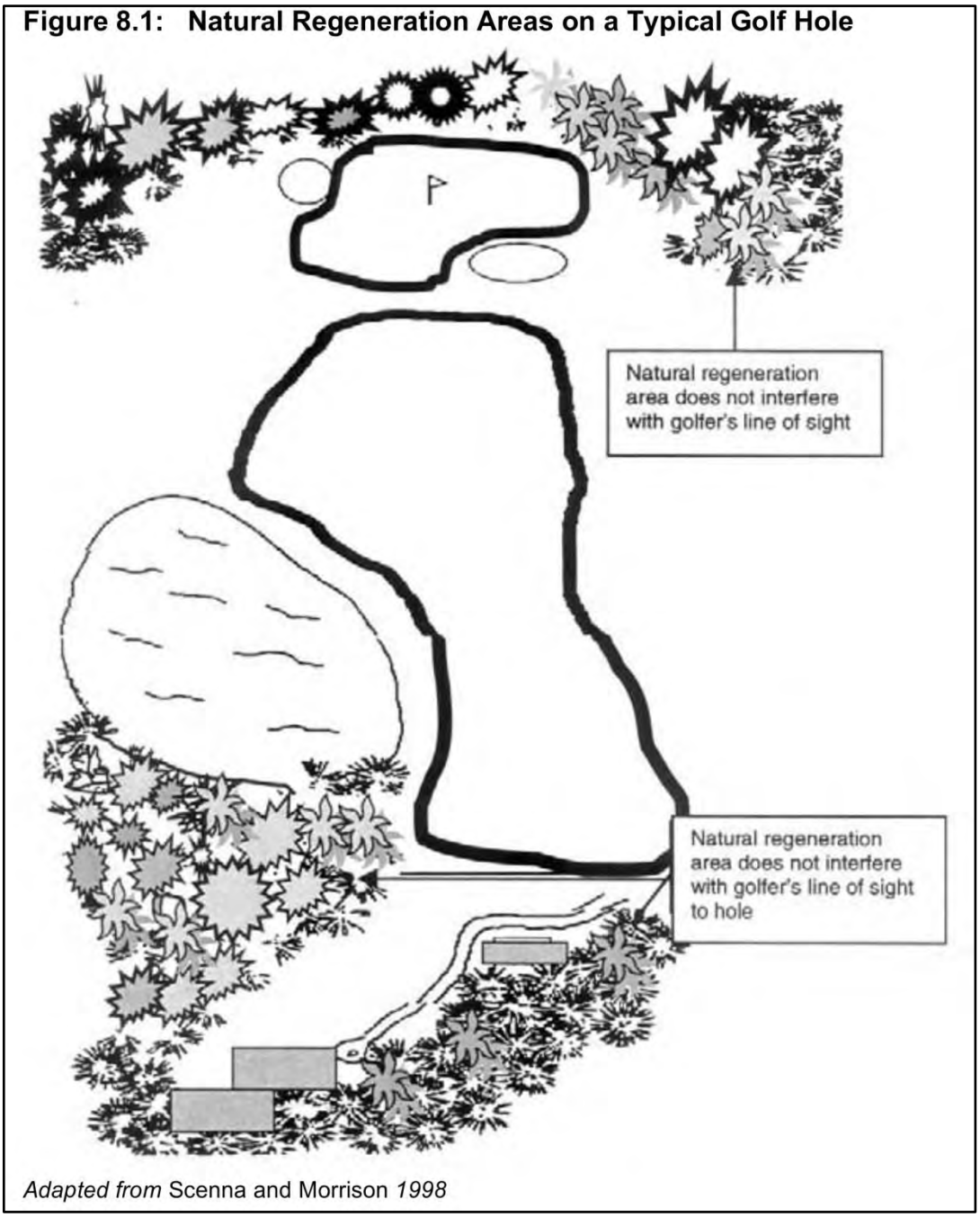


***Figure 3**: Typical golf hole*

Source: Excerpt from 'Improving the Environmental Management of New South Wales Golf Courses'

***Figure 4**: Typical bio-retention/detention basin*
Source: HDB Town Planning & Design - June 2016

FLOODING AND CATCHMENT RUNOFF

It is intended that major water entering the site from external catchments be freely conveyed through the site as not to disrupt flows or adversely impact on adjoining properties. It is intended to enhance and, where needed, redirect or formalise these watercourses to allow safe water flows to traverse the development.

Investigation of the existing surface water-flow across the proposed subdivision site has occurred through the creation of a hydrological model using DRAINS modelling software. DRAINS is an event-base hydrologic and hydraulic software package which adopts ILSAX hydrological routing using time-area calculations and Horton infiltration to derive catchment flow hydrographs.

The existing catchment that contributes to the watercourse that traverses the site in the north (Watercourse “A”), was modelled using a single catchment with a base flow determined from the Martens Flood Assessment for the ‘Vintage’. The study identified several sub-catchments which ultimately arrive at the triple culvert that conveys the water under Wine Country Drive and onto the subject land.

Figure 5: Existing culvert under Wine Country Drive
Source: HDB Town Planning & Design - June 2016

The hydraulic modelling for the existing surface water environment was undertaken using nine (9) cross-sections. These sections were selected upon average grades and typical sections imported into the modelling. Where a constriction was observed adjacent to the development area this constriction was adopted for the entire reach, giving conservative flood levels for the local drainage line. The existing dams have been incorporated into the modelling assuming the dams are full (that is the bed level has been set to the weir level), as a conservative assumption.

Figure 6*: Vie of watercourse "A" looking down-stream*
Source: HDB Town Planning & Design - June 2016

The purpose of the model was to confirm visual inspection and assessment that the existing watercourse is inadequate for the anticipated flows from the road culvert and to estimate a formalised channel that will form part of later Development Applications. Flat grades, and only a small defined channel at the outlet, will cause overtopping and disperse most of the flow, resulting in sheet flow over a broad area.

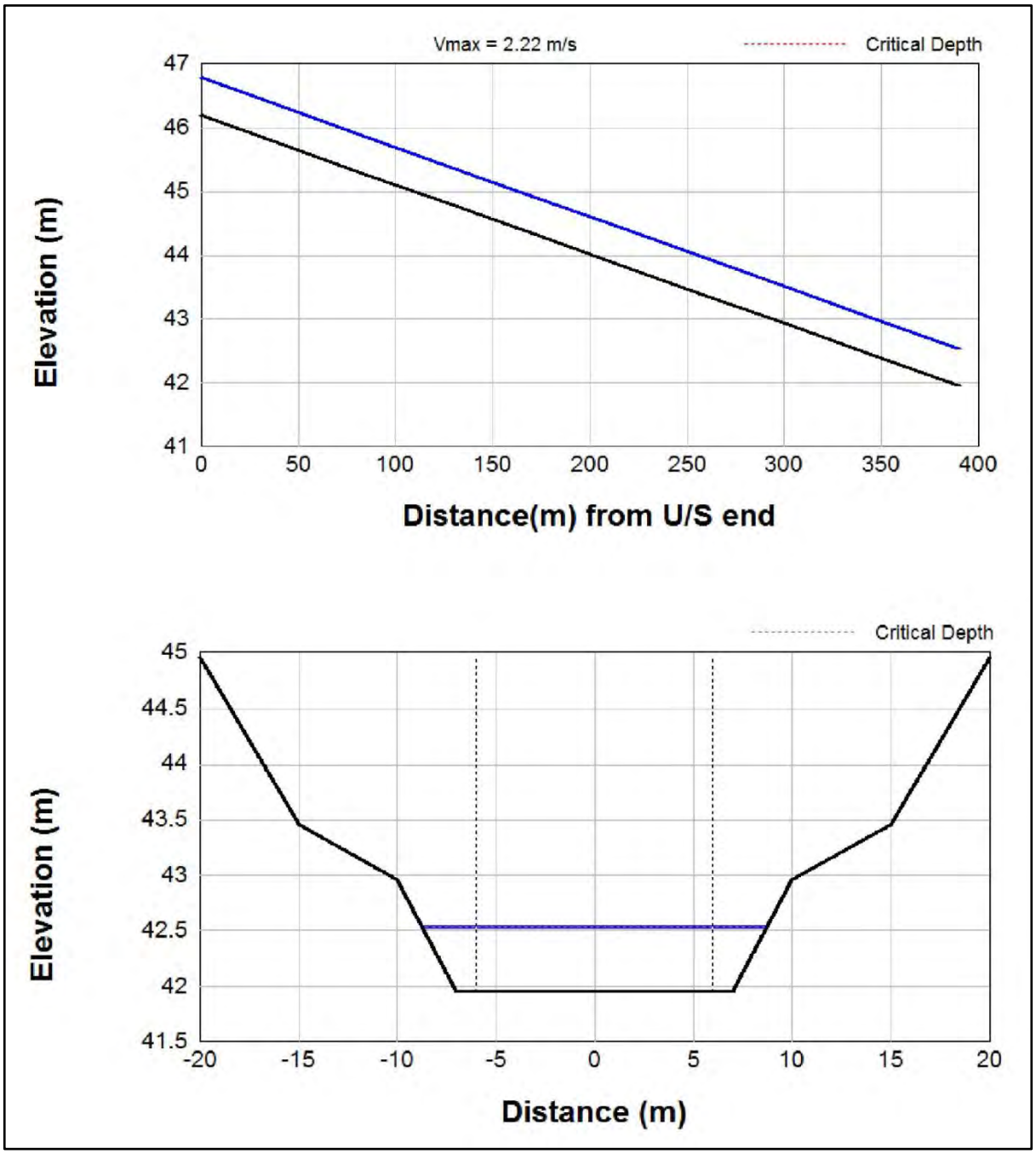


***Figure 7**: DRAINS model output of proposed watercourse "A" upgrade*
Source: HDB Town Planning & Design - June 2016

It is however intended, at the design stage, to reshape, consolidate and formalise a 'natural' man made stream that can adequately cater for the anticipated flows through the site. This will not only form an aesthetically pleasing and challenging feature to the Golf Course, it will facilitate the safe flow of water during storms and flood events. Bridges made from reinforced concrete culverts will allow safe and flood-free access to the residential community.

***Figure 8**: Typical road-bridge over watercourse*
Source: HDB Town Planning & Design - June 2016

3.0 STORMWATER DESIGN STRATEGY

Proposed future development should incorporate:

- Piped stormwater drainage network (required to cater for the 5yr ARI design storm event from the development);
- Effective allocation of floodway areas for up to and including the 100yr ARI design storm event, including incorporating a 500 mm freeboard to property building envelopes;
- Attenuation of the 100yr post-development flows to be comparable to that of the pre-development scenario;
- Safe design of roadway culverts with adequate capacity to accommodate the 100yr ARI design event, including greater than 150 mm freeboard;
- Channel re-alignment and re-design with 500 mm freeboard to the top of channel banks (as per Cessnock City Council's Engineering Guidelines);
- Integrated water quality treatment basins, including detention storage, taking consideration of a range of design storms;
- Consideration of safe overflow route flows greater than the 100yr ARI; and
- Evaluation of the impacts of filling on upstream and downstream areas for the local catchment up to the 100yr ARI design storm.

4.0 RECOMMENDATIONS AND CONCLUSIONS

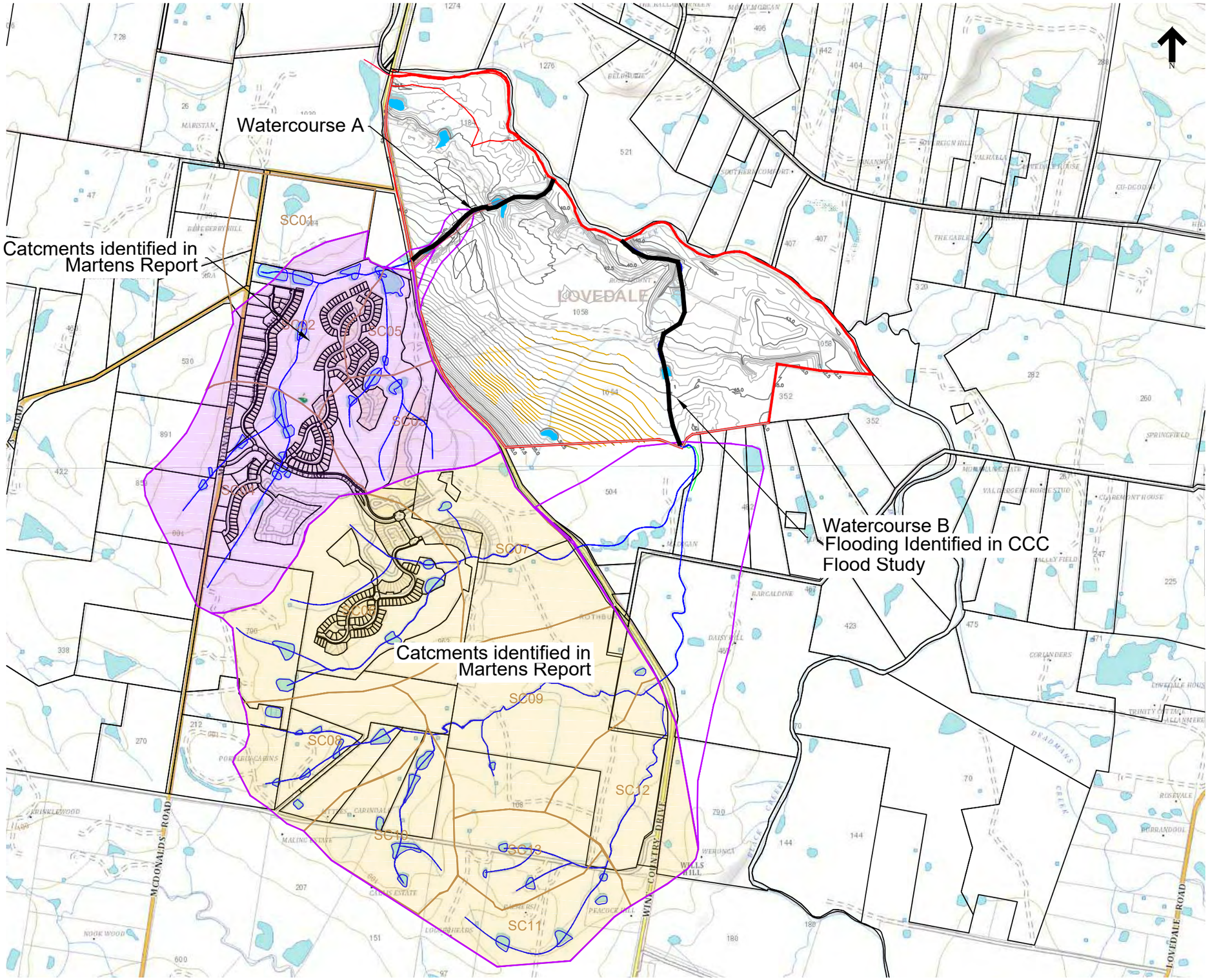
It is recommended that at the Development Application stage for each precinct, a comprehensive detailed report be prepared to support each land use independently. This should identify specific treatment and conveyance of stormwater, and identify impacts of any intended site filling on the overall flood regime of Black Creek. It should incorporate and consider types and sizes of structures, such as channels and culverts, basins, and outlets. It should be directly aimed at the purpose of the preparation of detailed Engineering Designs for construction of each stage.

The proposed development has been assessed with respect to water quality, stormwater mitigation measures and flooding. The development will incorporate an integrated stormwater quality and mitigation network using a treatment train approach. Flood levels at the boundary of the proposed development site are not increased, and velocities and peak flow rates are of similar magnitude for all storm events. Water Sensitive Urban Design measures will be employed to ensure treatment of the flows leaving the development site.

APPENDIX A

EXTERNAL CATCHMENT PLAN

NOTE: All dimensions, areas, lot numbers, easments & number of lots are subject to the approval of council & other authorities and the final survey & linen plan and should be considered as conceptual only. Do not rely on the information in this plan for any purchase, disposal or other matter.



TITLE: External Catcment Plan

PROJECT: Pokolbin Tourist, Golf & Residential Development
Wine Country Drive
Lovedale

DWG NO: SW 101 REV: A

DATE: 14/07/2016

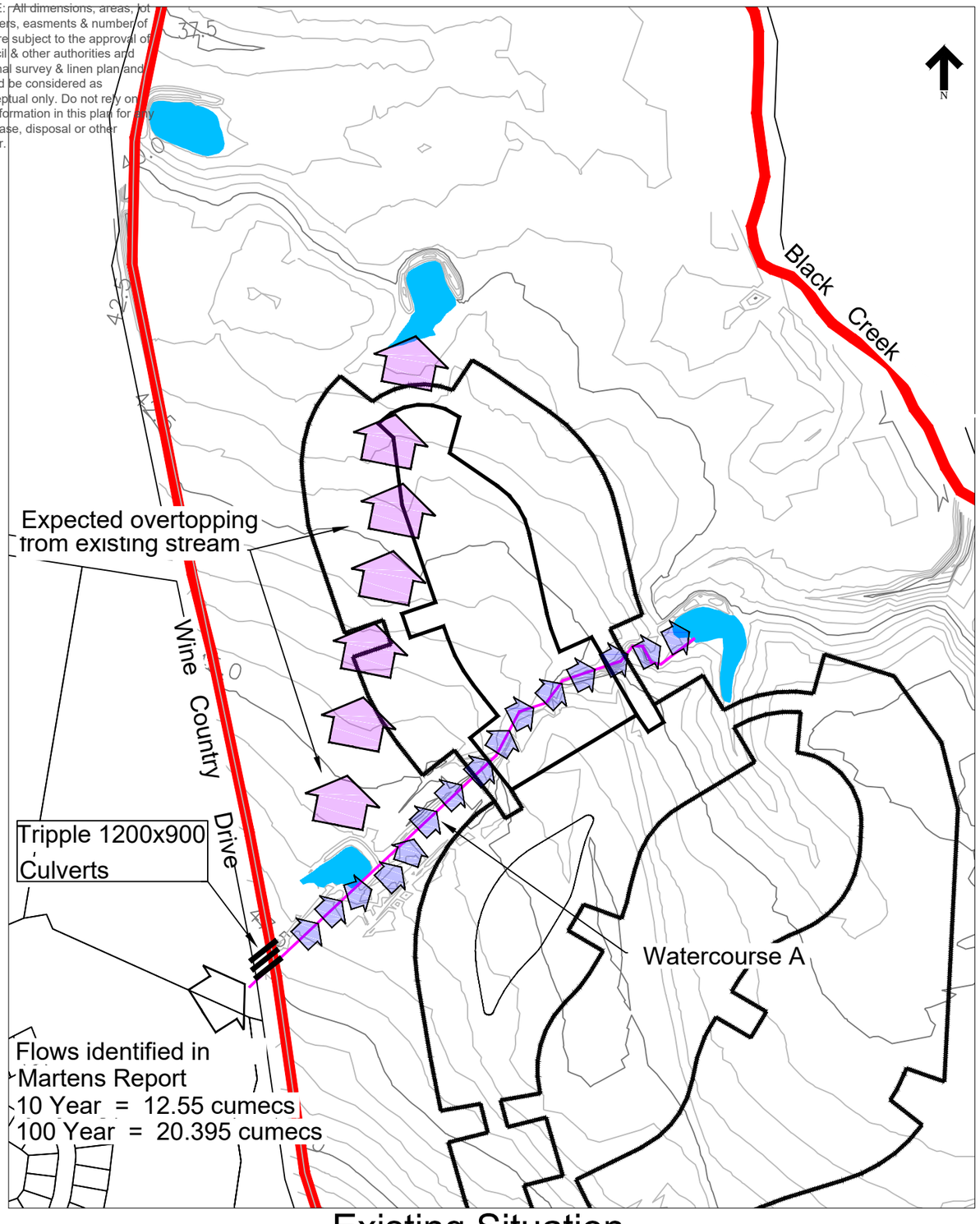
SCALE: 1:20 000 @ A3

hdb
planning > design > development

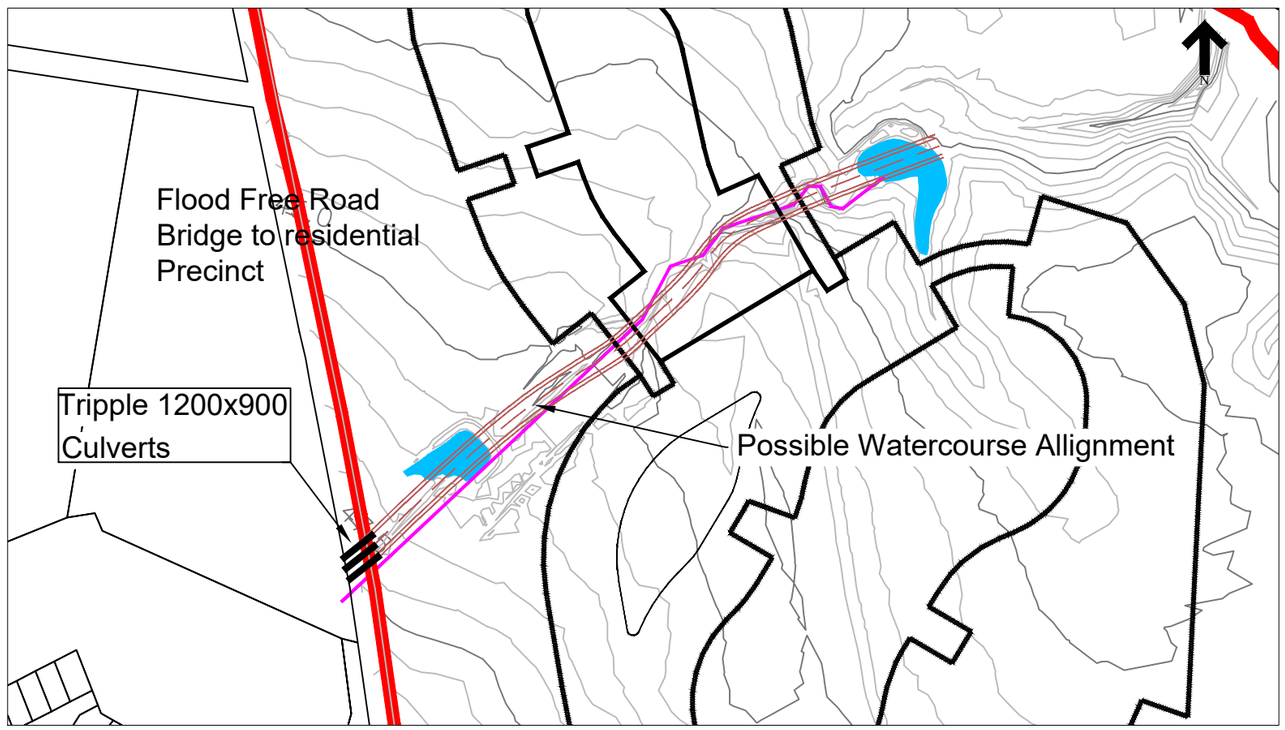
APPENDIX B

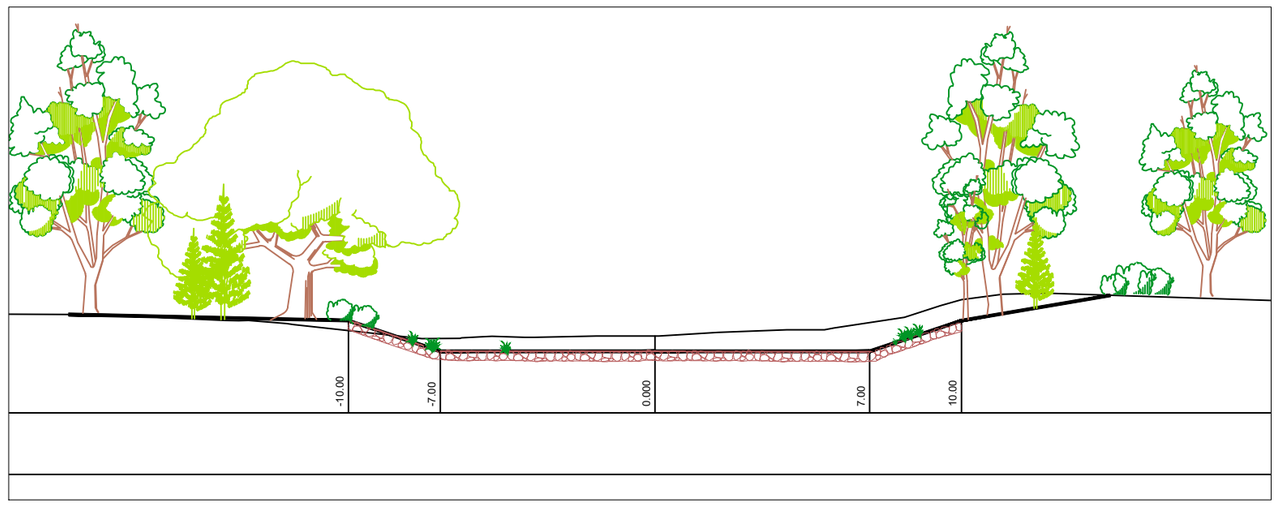
WATERCOURSE "A"

NOTE: All dimensions, areas, lot numbers, easments & number of lots are subject to the approval of council & other authorities and the final survey & linen plan and should be considered as conceptual only. Do not rely on the information in this plan for any purchase, disposal or other matter.



Existing Situation





Possible Watercourse Upgrade

TITLE: Watercourse A

PROJECT: Pokolbin Tourist, Golf & Residential Development
Wine Country Drive
Lovedale

DWG NO: SW 102

REV: A

DATE: 14/07/2016

SCALE: 1:500 @ A3

hdb planning > design > development

APPENDIX S

DRAFT COMMUNITY MANAGEMENT STATEMENT

HDB 2016

DRAFT

POKOLBIN TOURIST, GOLF & RESIDENTIAL DEVELOPMENT

COMMUNITY LAND DEVELOPMENT ACT 1989
COMMUNITY LAND MANAGEMENT ACT 1989

COMMUNITY MANAGEMENT STATEMENT

WARNING

The terms of this Management Statement are binding on the Community Association, each Subsidiary Body (if any) within the Community Scheme and each person who is a Lot Owner, lessee, Occupier or mortgagee or covenantee chargee in possession of a Community Development Lot within the Community Scheme.

PART 1

BY-LAWS FIXING DETAILS OF DEVELOPMENT

These by-laws relate to the control and preservation of the essence or theme of the community scheme and as such may only be amended or revoked by a unanimous resolution of the Community Association (See section 17(2) Community Land Management Act 1989).

BY-LAW 1: LANDSCAPING & BUILDING GUIDELINES FOR THE SCHEME

By-Law 1.1 Architectural Standards

(a) The Community Association may from time to time make Rules and Regulations pursuant to and in accordance with By-Law 10 prescribing architectural standards for the Community Scheme ("Architectural Standards").

(b) The Original Proprietor may prescribe Architectural Standards for any Community Development Lot.

1.1.1: Maintaining Community Property

The Community Association must maintain all Community Property in accordance with the Architectural Standards.

By-Law 1.2 Approval Required for Alterations Etc

An Owner or Occupier shall not, except with the approval of the Executive Committee of the Community Association make any alterations or additions to a Lot including without limitation an alteration to the colour of any improvements constructed thereon or the addition to the Lot of any sign, placard, banner, notice, any transmitting or receiving device, screen, pergola or awning.

1.2.1: Signs

Notwithstanding By-Law 1.2, the Owner of a Lot may erect and maintain on the Lot up to two signs being:

(a) one "For Sale" and one "For Lease" sign;

(b) two "For Sale" signs; or

(c) two "For Lease" signs;

in respect of the proposed sale or lease of the Lot, and provided that no sign can be bigger than 90cm (length) x 90cm (width) x 3cm (depth) nor can the top of the sign protrude more than 1.5m from the ground.

By-Law 1.3 Owner to Provide Plans and Specifications

At the time of request for approval in accordance with By-Law 1.2, an Owner or Occupier who wishes to alter or add to a Lot shall provide to the Secretary of the Executive Committee a copy of such plans and specifications as are sufficient to show the nature dimensions colour and location of the proposed alterations or additions together with any additional plans specifications and/or information which the Community Association may reasonably require to properly consider the Owner's or Occupier's request.

By-Law 1.4: Community Association Not to Unreasonably Refuse

The Community Association shall promptly consider and give its approval or refusal to any request made by an Owner or Occupier for its approval under By-Law 1.2 and shall not unreasonably refuse any such request where the proposed alteration or addition is in harmony with the Architectural Standards or if there are no Architectural Standards at the time of the making of the request by the Owner or Occupier where the proposed alteration or addition is in harmony with the design and colour of the existing improvements and the existing landscaping within the Community Parcel.

By-Law 1.5 No Inappropriate Use

1.5.1: Proper Purpose

The Owner or Occupier of a Lot shall not use anything in the Community Parcel for any purpose other than that for which it was constructed or provided.

1.5.2: No Purpose Other than a Residence

The Owner or Occupier of a Lot shall not within three (3) years from the date of registration of the Community Plan, unless approved in writing by the Original Proprietor, use a Lot for any purpose other than a residence.

1.5.3: Council Consent

If an Owner or Occupier of a Lot is granted consent by the Original Proprietor under By-Law 1.5.2 the proposed use of the Lot must be consented to by Council.

By-Law 1.6 Community Association may Impose Conditions of Approval

The Community Association may impose conditions on an approval given pursuant to By-Law 1.2 including without limitation a condition requiring the Owner or Occupier to provide a bank guarantee in favour of the Community Association or other sufficient security on account of any damage that may be caused to Community Property as a result of any such alteration or addition provided that any bank guarantee or other security so given shall be

returned to the respective Owner or Occupier on completion of the alteration or addition subject to the right of the Community Association to deduct any such amount as is reasonably necessary to cover the cost of repairing any damage caused by the Owner or Occupier to Community Property.

By-Law 1.7 Signs and Original Proprietor

Whilst ever the Original Proprietor owns a Lot the Original Proprietor shall have the right to erect and maintain "For Sale" and other signage in respect of the leasing or sale of Lots on a Lot owned by it or on the Community Property.

By-Law 1.8 Intruder Alarm

The Owner or Occupier of a Lot shall have the right to install an intruder alarm providing that it complies with the requirements of the Protection of the Environment Operations Act 1997 and any other relevant legislation.

By-Law 1.9 Maintenance of Landscaping on Community Property

The Community Association may enter into and maintain a contract containing such terms and conditions as are reasonably satisfactory to the Community Association with reputable and appropriately qualified persons or companies for the provision of landscaping services to the Community Association.

By-Law 1.10 Maintenance of Landscaped Areas on Lots

1.10.1: Landscaped Area of Lot Clean and Tidy

The Owner or Occupier of a Lot shall keep the landscaped areas of the Lot clean and tidy and in good repair and condition.

1.10.2: Maintenance and Repairs

The Owner or Occupier of a Lot shall effect all maintenance and repairs to the Lot in a proper and workmanlike manner to the reasonable satisfaction of the Executive Committee.

1.10.3: Failure to Carry Out Maintenance and Repairs

(a) The Community Association may give a notice to the Owner or Occupier of a Lot requiring him to comply with the terms of this By-Law.

(b) The Community Association shall be empowered to carry out maintenance and repairs to a Lot if the Owner should fail to carry out the required maintenance and repairs under By-Law 1.10.1 and/or 1.10.2. The cost of the repairs or maintenance shall be the responsibility of the Owner of the Lot.

By-Law 1.11: Decision Final

A decision of the Community Association made in accordance with this By-Law shall be final and binding on the Owner or Occupier.

By-Law 1.12: Vehicles on Lots

An Owner or Occupier of Lot must not permit or allow any truck, trailer, caravan, boat, sailing

craft, containers, heavy machinery or equipment, building materials, flammable liquids or hazardous materials other than of domestic quantities to be kept on the Lot at anytime.

An Owner or Occupier of a Lot may, notwithstanding the foregoing, keep a truck, trailer, caravan, boat or sailing craft on the Lot provided that it is at all times when on the Lot kept wholly contained in the rear yard or garage of the Lot.

By-Law 1.13: Fixing of Shutters, Blinds, Security Devices and Fly Screens

(a) The Owner or Occupier of a Lot must not, except with the approval of the Community Association:

(i) fix shutters, blinds, canopies or awnings to the outside of a building on a Lot or the outside of a building containing a Lot;

(ii) fix bars, screens, security doors or other security devices, to the outside of a building on a Lot or the outside of a building containing a Lot;

(iii) fix fly screens to windows or fly screens to doors to doorways of a building on a Lot or a building containing a Lot.

(b) The approval of the Community Association may not be withheld unreasonably where the items to be fixed comply with the Architectural Standards established for a Lot in relation to the items provided further, approval for the purposes of subparagraph (iii) shall be deemed to have been given to a flyscreen to a window and/or door which is the same colour as the window frame and/or door frame as the case may be.

(c) The Original Proprietor is not bound by this By-Law.

By-Law 1.14: Things Not in Keeping

The Owner or Occupier of a Lot must not, except with the approval of the Community Association, construct, install or maintain on or in a Lot anything which can be seen from outside the Lot and which in the reasonable opinion of the Community Association is not in keeping with the building or on the landscaped areas of the Lot.

PART 2

RESTRICTED COMMUNITY PROPERTY

These by-laws may not be amended during the initial period and may only be amended after the expiry of the initial period by special resolution and with the written consent of each person entitled by the by-law to use the restricted community property (See Section 54 Community Land Management Act 1989).

BY-LAW 2: RESTRICTED PROPERTY

By-Law 2.1: Landscaped Open Areas

(a) Use of the Landscaped Open Areas is restricted under this By-Law of the purposes of construction of the Landscaped Open Areas and carrying out Development Activities associated with that construction. The Original Proprietor will have exclusive use of the Landscaped Open Areas for the term of this By-Law.

(b) Restricted use of the Landscaped Open Areas shall cease when the Original Proprietor serves on the Community Association a notice informing the Community Association that construction of the Landscaped Open Areas is complete.

(c) The matters set out in By-Law 2.3 under clause 6 of Schedule 3 of the Community Land Development Act 1989 (and the Regulations made under those Acts) apply to and form part of this By-Law.

By-Law 2.2: Development in Stages

(a) The Original Proprietor or its nominee and all persons authorised by it shall be entitled to and have the right to complete the development of the Community Property and to develop any Community Development Lot whether in stages or otherwise and for this purpose to undertake the Development Activities and such rights shall include:

(i) Access Rights - complete and unrestricted access by foot or motor vehicle over Community Property;

(ii) Parking Rights - the right to park motor vehicles and equipment on Community Property;

(iii) Temporary Facilities - the right to place on or attach to Community Property temporary offices, sheds, depots, building materials, cranes and other equipment;

(iv) Right to install services - the right to install Services on Community Property;

(v) Right to connect services - the right to connect Services within Community Property; and

(vi) Right to attach signs - the right to attach and place marketing and advertising signs, placards, banners, notices or advertisements on the Community Property.

(b) The matters set out in By-Law 2.3 under clause 6 of Schedule 3 of the Community Land Development Act 1989 (and the Regulations made under those Acts) apply to and form part of this By-Law.

(c) The owner of any Community Development Lot shall (subject to compliance with the By-Laws) have the right to undertake development on that Community Development Lot in accordance with any approval from Council and such right shall include:

(i) Access Rights - complete and unrestricted access by foot or motor vehicle over Community Property;

(ii) Right to connect services - the right to connect Services within Community Property.

By-Law 2.3: Clause 6 Schedule 3 Matters

(a) The matters set out in this By-Law under clause 6 of Schedule 3 of the Community Land Development Act 1989 and the Community Land Management Act 1989 (and the Regulations made under those Acts) apply to and form part of By-Laws 2.1 and 2.2 unless the context indicates to the contrary.

(b) The conditions relating to use of the Community Property under By-Laws 2.1 and 2.2(a) and (b) are:

(i) All damage or interference with the Community Property must be made good at the expense of the Original Proprietor as soon as possible after that damage or interference occurs;

(ii) The interference with the use or enjoyment by Owners or Occupiers of Lots or of the Community Property must, insofar as it is consistent with the carrying out of the Development Activities, be kept to a minimum; and

(iii) On completion from time to time of Development Activities the relevant Community Property must be left in a clean and tidy condition.

(c) The conditions relating to the use of the Community Property under By-Laws 2.2(c) are:

(i) All damage or interference with the Community Property must be made good at the expense of the Owner of the Community Development Lot as soon as possible after that damage or interference occurs;

(ii) The interference with the use or enjoyment by Owners or Occupiers of Lots or of the Community Property must be kept to a minimum; and

(iii) On completion of any development on a Community Development Lot, all Community Property must be left in a clean and tidy condition.

(d) Access to Community Property may be exercised by the Open Accessway which is part of the Community Property.

(e) In the case of By-Laws 2.1 and 2.2 the restrictive use rights conferred on the Original Proprietor or Owner of a Community Development Lot may be exercised between the hours of 7.00am and 7.00pm on Mondays to Saturdays inclusive, except Christmas Day and Good Friday or such other times as they may be permitted by the Council.

(f) Subject to the obligations imposed under By-Law 2.3(b) the Community Association must maintain the Community Property referred to in By-Laws 2.1 and 2.2.

The Community Association must levy a contribution on its members for any costs associated with maintaining the Community Property referred to in By-Laws 2.1 and 2.2 unless that cost is payable by the Original Proprietor under By-Law 2.3(b) or an Owner of a Community Development Lot under By-Law 2.3(c).

PART 3

MANDATORY MATTERS

These are matters which must be addressed in every Management Statement.

BY-LAW 3: OPEN ACCESSWAYS OR PRIVATE ACCESSWAYS

By-Law 3.1: Community Property and Open Accessways

(a) The Community Property comprises:

(i) Open Accessways;

(ii) Landscaped Open Areas.

(b) That part of the Community Property designated as an Open Accessway in the Open Accessway Plan is an Open Accessway.

By-Law 3.2: Control Management Use and Maintenance

The Community Association shall be responsible for the control, management, use and maintenance of the Open Accessway and any associated stormwater drainage system.

The Community Association may enter into and maintain a contract containing such terms and conditions as are reasonably satisfactory to the Community Association with reputable and appropriately qualified persons or companies for the provision of maintenance of the Open Accessway and stormwater drainage system.

By-Law 3.3: Traffic

The Open Accessway is limited to a speed of 20 KPH and may be used by:

(a) the Owners and Occupiers of Lots;

(b) the Community Association;

(c) service providers;

(d) Council; and

(e) Authorised Persons.

By-Law 3.4: Parking

The following conditions apply to the use of the Open Accessway:

(a) A person shall not drive, park or stand any vehicle on the Open Accessway unless:

(i) if the vehicle must be registered under Traffic Laws, it is registered and complies with the Traffic Laws;

(ii) if a licence is required for the use of the vehicle on a public road, that person

holds a current drivers licence under the Traffic Laws.

(b) A person must not:

(i) drive, park or stand any vehicle in a manner that is or may be dangerous, causes obstruction or prevents or restricts the free movement of vehicles or pedestrians;

(ii) sound any horn other than in an emergency;

(iii) park on any part of the Open Accessway other than visitors in those areas designed for visitor parking.

(d) Notwithstanding the foregoing, an Owner or Occupier of a Lot is entitled to stand any vehicle temporarily on the Open Accessway for the purposes of dropping off or picking up persons or goods provided that the vehicle must not unreasonably obstruct or prevent or restrict the movement of other vehicles or pedestrians in the Open Access Way.

BY-LAW 4: PERMITTED USES OF AND SPECIAL FACILITIES ON THE COMMUNITY PROPERTY

By-Law 4.1: Open Accessway and Community Property

(a) The Community Property is the property set apart as an Open Accessway, Landscaped Open Area. Authorised Persons or Owner or Occupier of a Lot shall not except with the prior approval of the Community Association use any part of the Community Property other than in accordance with the uses for which the respective part of the Community Property was intended to be used and shall immediately notify the Community Association upon becoming aware that any part of the Community Property is damaged or otherwise in a state of disrepair.

(b) Authorised Persons or the Owner or Occupier of a Lot must not, except with the approval of the Community Association leave anything on or obstruct the use of Community Property.

(c) Authorised Persons or the Owner or Occupier of a Lot must not damage Community Property including without limitation, any paved area, landscape feature, lawn, garden, tree, shrub, plant or flower which is part of or situated on Community Property.

(d) Authorised Persons or the Owner or Occupier of a Lot must give notice to the Community Association of any damage to or defect in Community Property immediately upon Authorised Persons or Owner or Occupier becoming aware of it.

(e) The Original Proprietor is not bound by this By-Law.

By-Law 4.2: Community Property Area

(a) The terms of this By-Law commence when the restricted use rights conferred by By-Law 2 cease.

By-Law 4.3: Landscaped Open Areas

(a) The rights conferred and the obligations imposed by this By-Law commence when the restricted use rights conferred by By-Law 2 cease.

(b) The Landscaped Open Areas are available for use by the Owners and Occupiers of Lots and Authorised Persons.

BY-LAW 5: INTERNAL FENCING

By-Law 5.1: Application of Dividing Fences Act 1991

Subject to Section 117 of the Community Land Management Act 1989, the provisions of the Dividing Fences Act 1991 shall have effect in relation to dividing fences between:

(a) one Lot and another Lot;

(b) where a Lot adjoins Community Property, the repair, replacement and maintenance will be at the expense of the respective Owner of the Lot.

By-Law 5.2: Owner or Occupier to reimburse Community Association

Where pursuant to Section 117 of the Community Land Management Act 1989 the Community Association is obliged to make contribution to an Owner of land outside the Community Parcel in relation to a dividing fence between that land and a Lot within the Community Parcel, the Owner or Occupier, being the Owner or Occupier of that Lot, shall reimburse the Community Association in respect of such contribution.

By-Law 5.3: Owner to maintain

An Owner or Occupier of a Lot must maintain any fences including any dividing fences in good condition and repair and, if in need of repair or replacement, must to the extent reasonably possible use the same materials having the same colour, style, appearance and characteristics as, or be consistent with, the current or previously existing fence (as the case may be) (if any) promptly undertake such repair or replacement.

In respect of a dividing fence between one Lot and another Lot (excepting a Lot that is Community Property) the obligations of the Owner or Occupier of each Lot under this by-law are joint and several in terms of the Community Association be entitled to require the Owner or Occupier to comply with this clause.

By-Law 5.4: Owner not permitted to

An Owner or Occupier is not permitted to:

(a) erect a fence on the street front alignment or between the front street boundary and the building line as fixed by Council;

(b) construct any new fence of a Lot without the approval of the Executive Committee.

BY-LAW 6: GARBAGE

By-Law 6.1: Agreement with Council

The Community Association shall prior to commencement of waste and/or recycling services enter into an agreement with Council for on site waste collection in a form required by

Council.

By-Law 6.2: Garbage Container

An Owner or Occupier of a Lot must provide and use a garbage container as required by the Council from time to time for the removal of garbage from the Lot.

By-Law 6.3: Storage

An Owner or Occupier must keep any garbage container and/or garbage secure:

(a) so that it does not emit odours;

(b) so that it is properly stored and concealed from view from outside the Lot unless the garbage container has been placed on the designated area set aside to enable the collection and removal of garbage by the Council on that or the following day.

An Owner or Occupier of a Lot shall be responsible for keeping any garbage container clean and shall be responsible for the maintenance of its garbage container.

By-Law 6.4: Collection

The Owner or Occupier of a Lot must ensure that garbage in his/her garbage bin and on or from the Lot is made available for collection by the Council in accordance with the Council's by-laws and ordinances relating to the disposal and collection of garbage and at the garbage access collection locations determined by Council or if no such location is determined by Council, then the location determined by the Community Association.

Garbage containers, including for recyclable material, must only be placed in the designated collection area no more than 12 hours before or 12 hours after the scheduled Council collection time.

By-Law 6.5: Recyclable Garbage

An Owner or Occupier of a Lot must ensure that recyclable materials is made available for collection by the Council in accordance with the Council's by-laws and ordinances relating to the disposal and collection of recyclable garbage.

By-Law 6.6: Access

(a) The Community Association must provide access to the Council for the purpose of garbage collection and the Community Association shall ensure that designated collection points are kept clear and unobstructed for collection vehicles.

(b) The Community Association is to indemnity Council and/or its contractors against any damage to the driveway caused by the movement of garbage collection vehicles over that part of the driveway required by Council to be used for the collection of bins on collection day.

BY-LAW 7 SERVICES

By-Law 7.1

The services to be provided in this scheme are as follows:

(a) electricity -
(b) water supply -
(c) telecommunications -
(d) sewerage -
(e) stormwater drainage -
(f) gas -

By-Law 7.2

This Management Statement includes a Prescribed Diagram in respect of the telecommunications services.

It is intended to create a statutory easement pursuant to Community Land Development Act 1989 section 36 in respect of the telecommunications shown in the Prescribed Diagram.

By-Law 7.3

This Management Statement includes a Prescribed Diagram in respect of the stormwater drainage.

It is intended to create a statutory easement pursuant to Community Land Development Act 1989 section 36 in respect of the stormwater drainage shown in the Prescribed Diagram. Council is not liable for the repair or maintenance of the stormwater drainage services with the Community Property.

By-Law 7.4

This Management Statement includes a Prescribed Diagram in respect of the gas services.

It is intended to create a statutory easement pursuant to Community Land Development Act 1989 section 36 in respect of the gas shown in the Prescribed Diagram.

By-Law 7.5

To the extent that responsibility for the cost of repair or maintenance from time to time of such services is not borne or liable to be borne by the provider of such services such costs shall:

(a) in the event the requirements for repair or maintenance arises out of any act or omission by a Lot Owner, Occupier or his servant, agents or invitees, shall be borne by the Owner of the Lot concerned who shall indemnify and keep indemnified the other Lot Owners in the scheme and the Community Association in respect of such costs; and

(b) in respect of the internal connections within Community Lots for the services of electricity, water supply, telecommunications, sewerage, stormwater and gas referred to in 7.1 (a) to (f), be the responsibility of the Owner of the Lot concerned; and

(c) in any other event shall be borne by the Community Association.

BY-LAW 8: INSURANCE

By-Law 8.1: Compulsory Insurance

The Community Association shall effect all insurances which it is required to effect from time

to time under each of the Community Land Development Act 1989 and Community Land Management Act 1989 or any other Act in such manner and with such insurer as is provided therein or in the Regulations made pursuant thereto or in the event there is no such provision in the manner determined by the Community Association from time to time.

By-Law 8.2: Optional Insurances

The Community Association may effect such insurances other than the insurances referred to in By-Law 8.1 hereof which it considers necessary in the interests of Owner or Occupiers.

By-Law 8.3: Insurance in respect of Lots

Each Owner or Occupier shall be responsible for insuring against all and any risks of being the Owner of a Lot including without limitation the risk of damage or destruction to any improvements constructed thereon.

By-Law 8.4: Obligation to Rebuild

If any improvement constructed upon any Lot or any part thereof is destroyed or damaged by fire, flood, lightning, storm, tempest or other disabling cause, the respective Owner shall rebuild or reinstate the respective improvement or part thereof within a reasonable time after such destruction or damage and such rebuilding or reinstatement shall be deemed to be an alteration or addition for which the Owner is required to obtain approval form the Original Proprietor or the Executive Community pursuant to By-Law 1.2.

BY-LAW 9: EXECUTIVE COMMITTEE

By-Law 9.1: The Executive Committee

The Executive Committee and the Chairperson, Secretary and Treasurer thereof must respectively be elected and appointed in accordance with Division 2 of Part 2 of the Community Land Management Act 1989.

By-Law 9.2: Notice of Executive Committee Meetings

The Executive Committee shall cause notice to be given to Owners in the manner prescribed by the rules and regulations (or if no manner is prescribed, in such other manner as it considers appropriate having regard to where Owners reside) of its intention to hold a meeting setting out the time, location and reasonable details of the agenda for the meeting not less than seventy two (72) hours prior to the scheduled commencement time of the meeting as set out in such notice. The Executive Committee shall not at any meeting held following the giving of such notice deal with any business the reasonable details of which were not included in the agenda set out in such notice.

By-Law 9.3: Owners at Executive Committee Meeting

An Owner or a nominee for the Owner is entitled to attend a meeting of the Executive Committee but may not address the meeting unless authorised by resolution of the Executive Committee and shall not be entitled to vote at such meeting.

By-Law 9.4: Voting in writing

Where:

(a) By-Law 9.2 has been complied with in relation to a meeting; and

(b) each Owner or Occupier of the Executive Committee has been served with a copy of any motion for a proposed resolution to be submitted at that meeting; and

(c) the proposed resolution has been approved in writing by a majority of the Executive Committee, then the resolution is, if a notice has not been given under Section 38(3) of the Community Land Management Act, as valid as if it had been duly passed at a duly convened meeting of the Executive Committee, even though the meeting was not held.

By-Law 9.5: Minutes to be kept

(a) The Executive Committee shall within fourteen (14) days after each meeting cause a copy of the minutes of the meeting prepared in accordance with Section 38(7) of the Community Land Management Act 1989 to be given in the manner prescribed by the rules and regulations to all Owners (or if no manner is prescribed, in such a manner as the Executive Committee considers appropriate having regard to where the Owner or Occupiers reside).

(b) Minutes of the meetings of the Executive Committee and all resolutions passed must be placed with the minutes of the General Meetings of the Community Association.

By-Law 9.6: Conduct, Place and Frequency of Meetings

The Executive Committee shall:

(a) conduct its meetings in accordance with the rules and regulations or if there are no such rules and regulations which relate thereto in such manner as the Executive Committee thinks fit;

(b) hold its meetings as often as is necessary having regard to the interest of Owners or Occupiers and its obligations and functions under this Management Statement, the rules and regulations or any law;

(c) hold its meetings at such place as it considers appropriate and if the rules and regulations so provide may hold its meetings by correspondence.

By-Law 9.7: Powers and Duties of Secretary

The powers and duties of the Secretary of the Community Association are:

(a) preparing and displaying or distributing minutes of meetings and resolutions of the Community Association and the Executive Committee;

(b) giving on behalf of the Community Association and the Executive Committee, notices required to be given under the Community Land Management Act;

(c) maintaining the community roll;

(d) making available for inspection, on behalf of the Community Association, the documents and records set out in clause 1 of Schedule 4 of the Community Land Management Act;

(e) supplying on behalf of the Community Association, certificates in accordance with Schedule 4 of the Community Land Management Act;

(f) answering communications addressed to the Community Association of the Executive Committee;

(g) convening meetings of the Executive Committee and the Community Association (other than the first annual general meeting);

(h) performing and exercising matters of an administrative or secretarial nature which are associated with the functions and duties of the Community Association or the Executive Committee, and;

(i) keeping records for the Community Association under:

(i) Part 3 of Schedule 1 of the Community Land Management Act; and

(ii) Part 1 of Schedule 3 of the Community Land Management Act.

By-Law 9.8: Powers and duties of Treasurer

The powers and duties of the Treasurer of the Community Association include:

(a) notifying Owners of Lots of contributions levied pursuant to the Community Land Management Act or this Management Statement and collecting all contributions;

(b) receiving, acknowledging, banking and accounting for all money paid to the Community Association;

(c) preparing any certificate applied for under and in accordance with Section 26 and clause 2 of Schedule 4 of the Community Land Management Act;

(d) keeping the prescribed accounting records referred to in clause 10 of Schedule 1 of the Community Land Management Act;

(e) preparing the prescribed financial statements referred to in clause 11 of Schedule 1 of the Community Land Management Act; and

(f) the functions set out in clause 36(1) of the Community Land Management Act.

By-Law 9.9: Executive Committee and Loss or Damage

The Executive Committee and its members shall not be liable for any loss or damage which arises as a result of any act done by the Executive Committee or the Owner or Occupier in its, his or her respective capacity as the Executive Committee or member of the Executive Committee except fraud on the part of the Executive Committee or that member.

By-Law 9.10: Executive Committee Reimbursement for Out of Pocket Expenses

Members of the Executive Committee are not entitled to any remuneration for the performance of their functions but are entitled to reimbursement for reasonable out-of-pocket expenses incurred by them in the performance of their functions.

PART 4

OPTIONAL MATTERS

BY-LAW 10: RULES AND REGULATIONS

By-Law 10.1: Community Association may make rules and regulations

The Community Association may at any time and from time to time make, amend, cancel, add to or suspend rules and regulations which are not inconsistent with any by-laws contained in this Management Statement or any function or obligation imposed on the Community Association under any Act. Each Owner or Occupier shall be bound by the rules and regulations. If there shall be any inconsistency between the by-laws contained in this Management Statement and any of the rules and regulations, the by-laws contained in this Management Statement shall prevail.

By-Law 10.2: Copy of rules and regulations to be distributed

The Community Association shall upon making, amending, cancelling or suspending any rule or regulation contained in or to be added to the rules and regulations distribute a copy of such additional or altered rule or regulation, as the case maybe, to each Owner or Occupier or to such person as the Owner and each Occupier nominates as its representative.

By-Law 10.3: Owners or Occupiers shall observe rules and regulations

Each Owner or Occupier shall at all times observe and comply with the rules and regulations made in accordance with By-Law 10 and shall not do, permit or suffer to be done anything contrary thereto. A failure by an Owner or Occupier to observe and comply with any rule or regulation contained in the rules and regulations shall constitute a breach by that Owner or Occupier of this By-Law 10. An Owner or Occupier shall be responsible for ensuring that the by-laws contained in this Management Statement and the rules and regulations are continuously observed and complied with by all of that Owner's or Occupier's invitees and any persons claiming through or under that Owner or Occupier. A failure by any such invitee or other person claiming through or under an Owner or Occupier to observe and comply with any by-law contained in this Management Statement or of the rules and regulations shall constitute a breach of this By-Law 10 by the Owner or Occupier.

By-Law 10.4: Community Association to give notice

In the event of a breach by an Owner or Occupier of a by-law contained in this Management Statement or of any rule or regulation contained in the rules and regulations, the Community Association shall (except in the case of a breach requiring the Community Association to act immediately to prevent damage to property or injury to person) serve a notice upon such Owner or Occupier specifying the by-law(s) and/or rule or regulation which the Owner or Occupier has breached and the works to be carried out and/or the matters to be attended to by the Owner or Occupier and the time within which such works must be carried out or matters attended to so that the Owner or Occupier shall no longer be in breach of the said by-law(s) or rules and regulations. In the event that such breach by any Owner or Occupier has resulted in damage to any part of the Community Property such notice shall specify the damage to be repaired by the Owner or Occupier and the period of time within which such repairs shall be completed.

By-Law 10.5: Failure to comply with Notice

Where the Owner or Occupier fails to comply with the notice served upon the Owner or

Occupier by the Community Association under By-Law 10.4, then the Community Association may, as soon as practicable thereafter, where appropriate:

(a) apply to the Registrar for an order (or interim order as the case may be) directing the Owner or Occupier to observe the said by-law or rule or regulation in respect of which the Owner or Occupier is in breach; or

(b) carry out the works and/or repairs set out in such notice and/or attend to the matters set out in such notice which should have been attended to by the Owner or Occupier.

By-Law 10.6: Power of Entry of Community Association

In addition to the powers conferred by Section 60 of the Community Land Management Act 1989 upon the Community Association to enter upon any part of the Community Property for the purposes as specified therein, the Community Association shall also have the power to enter any part of the Community Property including any part of a Lot for the purpose of performing any of the functions conferred or imposed upon the Community Association by any Act or by this Management Statement.

By-Law 10.7: Reimbursement of costs, charges and expenses

An Owner or Occupier must pay or reimburse the Community Association on demand for all costs and expenses incurred by the Community Association in connection with the contemplated or actual enforcement, or preservation of any rights under the by-laws in relation to the Owner including, without limitation, all expenses incurred in retaining any independent consultant or other person to evaluate any matter and its administration costs in connection therewith.

By-Law 10.8: Community Association not to be liable

The Community Association shall not be liable for any loss or damage howsoever caused or arising from the non-enforcement of any by-law contained in this Management Statement or of any of the rules and regulations contained in the rules and regulations in accordance with this By-Law 10.

By-Law 10.9: Owner or Occupier to comply at own expense

An Owner or Occupier shall comply with the obligations under these by-laws and the rules and regulations at the Owner's or Occupier's own cost except where the by-laws or rules and regulations provide to the contrary.

By-Law 10.10: Pets

(a) What animals an Owner may keep

An Owner or Occupier may keep in their Lot:

(i) fish in an indoor aquarium;

(ii) subject to By-Law 10.10(c):

A. up to two small animals being one small cat and one small dog or two small cats or two small dogs; or

B. one dog.

(iii) a guide dog hearing dog or other animal trained to assist to alleviate the affect of disability if an Owner or another person who lives with you needs a dog or other animal because of a visual disability, a hearing disability or any other disability if the Owner needs the dog because he or she is visually or hearing impaired.

(b) When will an Owner or occupant need consent?

(i) An Owner must have consent from the Executive Committee to keep any other types or numbers of animals.

(ii) An Owner will be responsible for compliance by an occupant with the terms of these By-Laws.

(c) Restrictions on the Keeping of animals

An Owner must:

(i) ensure his or her dog or dogs is/are kept indoors within his or her Lot at night and otherwise within a fenced compound on the Lot or on a lead;

(ii) ensure his or her cat or cats is/are kept indoors within the Lot at night; and

(iii) in addition to this By-Law, comply with the development consent, easements and all laws requirements of Government Agencies regarding the keeping of animals.

(d) When will the Executive Committee refuse consent

The Executive Committee will not give consent to keep:

(i) an animal that is vicious, aggressive, noisy or difficult to control;

(ii) an animal that is not registered under the Companion Animals Act 1998 (NSW); or

(iii) a dangerous dog or nuisance cat under the Companion Animals Act 1998 (NSW).

(e) Controlling an animal

An animal an Owner keeps under this By-Law must not be permitted to wander onto another Lot or Community Property. If it is necessary to take an animal onto Community Property it must be restrained (eg, by leash or pet cage) and controlled at all times.

(f) Conditions for keeping an animal

The Executive Committee may make conditions for giving consent to keep an animal.

(g) Removal of animals

The Executive Committee has the right, at any time to order an Owner to remove his or her animal or the animal of the occupant of his or her Lot (and revoke any consent to keep an animal) if:

(i) it becomes offensive, vicious, aggressive, noisy or a nuisance;

(ii) an Owner does not comply with his or her obligations under this By-Law;

(iii) an Owner breaches a condition made by the Executive Committee when it gave consent to the keeping of the animal; or

(iv) an Owner keeps a dog, the dog is a dangerous dog or is not registered under the Companion Animals Act 1998 (NSW).

(h) Responsibilities of Owner

An Owner is responsible:

(i) to other Owners and Occupiers and people using Community Property for:

A. any noise the animal makes which causes unreasonable disturbance; and

B. damage to or loss of property or injury to any person caused by the animal; and

(ii) to clean up after the animal.

(i) Visitors

An Owner must not allow a visitor to bring animals onto the Community Property or onto any other Lot unless they are guide dogs, or hearing dogs and the visitors are visually or hearing impaired or other animals trained to assist to alleviate the affect of a disability if they need a dog or other animal because of a visual disability, a hearing disability or any other disability.

By-Law 10.11: Storage of Flammable Liquids

The Owner or Occupier of a Lot must not, without the approval of the Community Association, use or store on the Lot or any other part of the Community Property any flammable chemical, gas or other material other than chemicals, liquids, gases or other material used or intended to be used for domestic purposes or in the fuel tank of a motor vehicle or internal combustion engine.

BY-LAW 12: BEHAVIOUR

By-Law 12.1: Noise Control and Behaviour

The Owner or Occupier of a Lot must not create any noise or behave in a manner which interferes or may interfere with the peaceful use and enjoyment of the Owner or Occupier of another Lot or any person lawfully using Community Property, nor shall they allow any invitee to create any noise or behave in a manner which interferes or may interfere with the peaceful use and enjoyment of the Community Property by any Owner or Occupier.

By-Law 12.2: Appearance

The Owner or Occupier of a Lot must not hang any towel, clothing, or other article on the outside of a building on a Lot or on any part of the Lot so that it may be seen from any street frontage.

By-Law 12.3: Compliance with Requirements of Authorities

An Owner or Occupier of a Lot must comply on time with all requirements and orders of

authorities and all laws in connection with the Lot and use or occupation of the Lot.

By-Law 12.4: Communications with Community Association

Complaints, noises or applications to or requests for consideration of matters by the Community Association must be in writing and forwarded to the Managing Agent of the Community Association or the Secretary if no Managing Agent is appointed.

By-Law 12.5: Communications from Community Association

An approval, notice or authorisation by the Community Association under the By-Laws must be in writing.

BY-LAW 13: RIGHTS TO ENTER CONTRACTS

By-Law 13.1: Negotiation and Administration of Service Contracts

The Community Association, to more effectively perform the functions conferred and obligations imposed on it by any Act by this Management Statement, may enter into any contracts for the provision of any service or services to be performed by any third party which contracts shall be on such terms and conditions as the Community Association reasonably determines and the consideration payable under such contracts shall be paid out of contributions to either of the Administrative or Sinking Funds levied on Owners.

By-Law 13.2: Managing Agent

In the event that the Community Association appoints a Managing Agent pursuant to Section 50 of the Community Land Management Act 1989, the Community Association may delegate to the Managing Agent, in addition to the functions the Community Association is entitled to delegate to the Managing Agent under the said Act, the functions imposed upon the Community Association by this Management Statement or by any other Act. The consideration or fees payable to the Managing Agent for the performance of any of the functions of the Community Association delegated to the Managing Agent shall be payable out of the Administration Fund.

By-Law 13.3: Employees and Consultants

The Community Association may employ such staff, advisers, consultants, agents or lawyers as it may require, whether on a permanent, part time or casual basis, to assist with its management, control and maintenance of the Community Property and the performance of the functions conferred and obligations imposed on the Community Association by any Act or this Management Statement.

By-Law 13.4: Agreement between Community Association and an Owner or Occupier

A Community Association may only enter into an agreement under Section 22 of the Community Land Management Act 1989 which has the effect of conferring a benefit on one (1) or some but not all Owners where the Community Association charges such Owner or Owners a reasonable fee for receiving such benefit.

By-Law 13.5: Owner or Occupier Not to Instruct

An Owner or Occupier shall not instruct or request that any contractor, employee, consultant, agent or lawyer appointed or employed by the Managing Agent to do any act or thing without

the prior approval in writing of the Managing Agent. Any Owner or Occupier who gives any such instruction or makes any such request shall be liable for all costs or expenses incurred by the Managing Agent as a consequence thereof.

BY-LAW 14: INTEREST

(a) An Owner or Occupier of a Lot must pay the Community Association interest on any amount, other than a contribution levied by the Community Association that has become due for payment and remains unpaid from and including the date it becomes due for payment.

(b) During the period that an amount under By-Law 14(a) remains unpaid, on demand or at times notified by the Community Association, interest shall be calculated on daily balances at the rate equal to 2% per annum above the rate quoted from time to time by the Community Association's bankers (as nominated by the Community Association) on overdraft accommodation in excess of $100,000.

(c) Interest which is not paid when due for payment may be capitalised by the Community Association at monthly intervals and is payable on capitalised interest at the rate and in the manner referred to in By-Law 14(b). Nothing in this By-Law 14 prevents the Community Association from recovering any amount exceeding the interest calculated under this by-Law as a consequence of any amount not being paid when due.

BY-LAW 15: COMMUNITY PROPERTY

By-Law 15.1: Community Property

(a) The Owner or Occupier of a Lot must not except with the approval of the Community Association, leave anything on or obstruct, prevent or restrict the use or access to Community Property.

(b) The Owner or Occupier of a Lot or their invited guests must not leave litter on Community Property which would infringe the enjoyment of other Owners or Occupiers.

(c) The Owner or Occupier of a Lot must not damage Community Property including, without limitation, any gate, Open Accessway, paved area, landscape feature, garden, tree, shrub, plant or flower which is part of or situated on Community Property.

(d) If a dispute arises between an Owner/Occupier or Subsidiary Body and the Community Association in regard to the use of the Community Property the parties agree that the dispute is a civil matter and is not the responsibility of Council.

By-Law 15.2: Owner not to Use for Own Purposes

The Owner or Occupier of a Lot must not except with the approval of the Community Association or pursuant to By-Laws in force in the Community Parcel, use for his own purposes any part of the Community Property.

By-Law 15.3: Access by Australia Post

(a) The Community Association must do all that is reasonably required to ensure that

Australia Post or any other relevant Government Agency has access to the Community Parcel for the purpose of mail delivery.

(b) The Owner or Occupier of a Lot must maintain, repair and replace at the Owner's cost the letterbox on their Lot. The letterbox may only be used for the purpose of a letterbox.

(c) The Owner or Occupier must not remove or replace a letterbox unless the letterbox is damaged or destroyed in which case:

(i) the structure of the replacement letterbox must be in accordance with the Standards; and

(ii) the replacement letterbox must be located in the same position as the original letterbox.

By-Law 15.4: Private Services

(a) The Community Association may, on its own behalf:

(i) provide Private Services to the Owner or Occupier of a Lot;

(ii) arrange for the installation and maintenance of Service Lines for the provision of Private Services; and

(iii) contract with persons to monitor or provide, in part or in whole, Private Services.

(b) The Owner or Occupier of a Lot must not:

(i) carry out any works which interfere with Private Services;

(ii) carry out any works which interfere with Private Services except with the approval of the Community Association; or

(iii) obstruct access to, overload or damage Private Services.

By-Law 15.5: No Interference

An Owner or Occupier of a Lot shall not:

(a) do anything or permit anything to be done on or in relation to that Lot so that:

(i) any support or shelter provided by that Lot for another Lot or Community Property or any part of it is interfered with; or

(ii) Service Lines, garbage services and Private Services are interfered with; or

(b) use or enjoy the Community Property in such a manner or for such a purpose as to interfere unreasonably with the use and enjoyment of the Community Property by the Owner or Occupier of any other Lot or Authorised Person.

BY-LAW 16: CONTROL OF LESSEES/LICENSEES

An Owner whose Lot in whole or in part is the subject of a lease or licence agreement must:

(a) provide the lessee or licensee with a copy of this Management Statement;

(b) require the lessee or licensee to perform and observe the obligations on the part of the Owner under the by-laws; and

(c) take all reasonable steps including, without limitation, any action available to him/her under the lease or licence agreement to ensure that the lessee or licensee of the Lot and any person on the Community Property with the consent (express or implied) of the lessee or licensee complies with the by-laws.

BY-LAW 17: DEFINITIONS, INTERPRETATION AND GENERALLY

If a word used in this Management Statement is used in the Community Land Development Act 1989 or the Community Land Management Act 1989 it has the same meaning as attributed to it in the Acts respectively.

Otherwise the following words have the meanings:

Architectural Standards means architectural standards prescribed under this Management Statement by:

(a) the Community Association for the Community Parcel; and

(b) the Original Proprietor for Community Development Lots

and amended under this Management Statement.

Authorised Persons means a person on the Community Property with the consent express or implied of a Lot Owner or Occupier or with the consent of the Community Association.

Community Association means a corporation that:

(a) is constituted by section 25 of the Community Land Development Act 1989 on the registration of the Community Plan; and

(b) is established as a Community Association by section 5 of the Community Land Management Act 1989.

Community Development Lot means land that is a Lot in a Community Plan that is not Community Property, a public reserve or a drainage reserve and not land that has become subject to a subsidiary scheme or a Lot that has been severed from the community scheme.

Community Parcel means the land the subject of the Community Scheme.

Community Plan means that plan of subdivision registered with the Management Statement.

Community Property means Lot 1 in the Community Plan and includes the Open Accessway

Community Scheme is as defined in the Community Land Management Act 1989 and regulations made under it.

Council means Cessnock City Council or any replacement of it.

Development Activities means any work which the Original Proprietor and all persons authorised by the Original Proprietor must do or may undertake to complete any development on the Community Parcel including:

(a) any form of demolition work, building work, and work ancillary to or associated with building work on the Community Parcel;

(b) the installation of Services;

(c) the construction of Community Property;

(d) any form of landscaping work or work ancillary to or associated with landscaping work on the Community Parcel;

(e) carrying out development in stages;

(f) any form of work which the Original Proprietor, in its absolute discretion, considers necessary or desirable;

(g) the subdivision of land forming part of the Community Parcel by any means, including strata subdivision; and

(h) the exercise of any right or discretion given to the Original Proprietor under this Management Statement.

Executive Committee means the executive committee of the Community Association as determined pursuant to the Community Land Management Act 1989.

General Meetings means the general meetings of the Community Association under Division 1 of Part 2 of the Community Land Management Act 1989.

Government Agency means a governmental or semi-government, administrative, fiscal or judicial department or entity, a statutory authority or a local council.

Landscaped Open Areas means the landscaped open areas on the Community Property.

Lot means a Community Development Lot

Management Statement means this management statement.

Occupier is an occupier or lessee of a Lot and includes a mortgagee in possession.

Open Accessway means an accessway designated as a private accessway on the Open Accessway Plan pursuant to Part 5 of the Community Land Development Act 1989.

Open Accessway Plan means a plan attached to this Management Statement creating access ways pursuant to Part 5 of the Community Land Development Act 1989.

Original Proprietor has the same meaning as given by the Community Land Development Act 1989 and the Regulations made under it.

Owner means a person for the time being recorded in the Register as entitled to an interest in fee simple in a Lot.

Prescribed Diagram means the diagram or diagrams relating to the Service Lines with in the Community Plan and prescribed in Section 36 of the Community Land Development Act 1989.

Register has the same meaning as contained in the Community Land Management Act 1989 and the Community Land Development Act 1989

Service:

(a) the supply of water, gas, electricity, artificially heated or cooled air or heating oil;

(b) the provision of sewage and drainage;

(c) transmission by telephone, radio, television, satellite or other means;

(d) security systems; and

(e) any other facility, supply or transmission.

Service Lines means a pipe wire cable duct conduit or pole by means of which a service is or is to be provided, the location of which is illustrated in the Prescribed Diagram.

Service Provider mean, without limitation, any authorities or corporations assuming their functions.

Statutory Service means a service running through or servicing Lots or Community Property provided by a Service Provider.

Subsidiary Body has the same meaning as contained in the Community Land Management Act 1989 and the Community Land Development Act 1989

Subsidiary Scheme has the same meaning as contained in the Community Land Management Act 1989 and the Community Land Development Act 1989

Traffic Laws means any applicable legislation or any regulations, ordinances, by-laws or orders made thereunder relating to the regulation and use of vehicles.

In this Management Statement, unless the context otherwise requires:

(a) a reference to one gender includes all other genders;

(b) a reference to a person includes a corporation.

PART 5

BY-LAWS REQUIRED BY PUBLIC AUTHORITY

This part may specify by-laws made at the request of a public authority. These by-laws may provide that amendments may not be made without the consent of the public authority.

BY-LAW 18: PUBLIC AUTHORITY

In this by-law the expression 'the Act' shall mean the Conveyancing Act 1919.
To be inserted

BY-LAW 19: COUNCIL

Development is to proceed in accordance with Cessnock City Council Determination No. DA ……..dated ……..

To be completed

PART 6

PRESCRIBED DIAGRAM

DRAFT

SIGNATURES, CONSENTS AND APPROVALS

DATED day of

*Signature/*seal of developer/*developers authorised agent .

Signature of witness …….....

Name, address and occupation of witness…….....

……..…….....

CERTIFICATE OF APPROVAL

It is certified:

(a) that the consent authority has approved of the development described in Development Application No. ; and

(b) that the terms and conditions of this Management Statement are not inconsistent with the development as approved.

Date:.....

Signature on behalf of consent authority .....
Authorised Officer

* Strike out whichever is inapplicable