

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance	Growth Form Group	Count of Native Species Richness	Sum of Cover
Plot 19										
19	<i>Baumea rubiginosa</i>	Soft twigrush	Grass or grass like	G	Native	0.5	30			
19	<i>Blechnum indicum</i>	Swamp Water Fern	Fern	G	Native	50	-	Tree	4	30.3
19	<i>Crimum pedunculatum</i>	Swamp Lily	Forb	G, M	Native	0.1	3	Shrub	1	0.2
19	<i>Glacilidion ferdinandi</i>	Cheese Tree	Tree	G	Native	0.1	1	Forb	5	30.3
19	<i>Hibiscus diversifolius</i>	Swamp Hibiscus	Shrub	M	Native	0.2	2	Grass or grass like	2	10.5
19	<i>Hypolepis muelleri</i>	Harsh Ground Fern	Fern	G	Native	0.1	2	Fern	3	50.4
19	<i>Ipomoea carnea</i>	Coastal Morning Glory	N/A	G, M	High Threat Exotic	10	-	Other	1	15
19	<i>Lygodium microphyllum</i>	Climbing Snake Fern	Fern	M	Native	0.3	2	High Threat Weed Cover	10	
19	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	G	Native	0.1	1	DBH (cm)	Stem Count	
19	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree	U	Native	30	-	>80 cm	0	
19	<i>Melicope elleryana</i>	Pink-flowered Doughwood	Tree	M	Native	0.1	1	50-79	0	
19	<i>Parsonsia straminea</i>	Common Silkpod	Other	U	Native	15	-	30-49	Present	
19	<i>Paspalum conjugatum</i>	Sour Grass	N/A	G	Exotic	40	-	20-29	Present	
19	<i>Persicaria dichotoma</i>	Blume	Forb	G	Native	0.1	3	10-19	Present	
19	<i>Persicaria sp.</i>	Persicaria	Forb	G	Native	10	-	5-9	Absent	
19	<i>Persicaria strigosa</i>	Spotted Knotweed	Forb	G	Native	20	-	<5	Present	
19	<i>Phragmites australis</i>	Common Reed	Grass or grass like	G	Native	10	-	Stems with hollow (No.)	0	
19	<i>Solanum americanum</i>	Glossy Nightshade	Forb	G	Native	0.1	2	Length of logs (m)	253.5	
Litter plot									Litter cover	
1									100	
2									100	
3									100	
4									100	
5									100	
Average									100	

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance	Growth Form Group	Count of Native Species Richness	Sum of Cover
Plot 16										
16	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm	Other	M	Native	10	-			
16	<i>Baumea rubiginosa</i>	Soft twigrush	Grass or grass like	G	Native	5	100	Tree	5	26.8
16	<i>Blechnum indicum</i>	Swamp Water Fern	Fern	G	Native	90	-	Shrub	2	0.7
16	<i>Carex appressa</i>	Tail Sedge	Grass or grass like	G	Native	5	40	Forb	1	10
16	<i>Cinnamomum camphora</i>	Camphor Laurel	N/A	G, M	High Threat Exotic	3	20	Grass or grass like	5	40
16	<i>Ficus coronata</i>	Creek Sandpaper Fig	Shrub	M	Native	0.2	3	Fern	2	120
16	<i>Ficus macrophylla</i>	Moreton Bay Fig	Tree	M	Native	1	3	Other	2	25
16	<i>Ficus obliqua</i>	Small-leaved Fig	Tree	M	Native	0.5	1	High Threat Weed Cover	13.5	
16	<i>Glacilidion ferdinandi var. pubens</i>	Cheese Tree	Tree	G	Native	0.3	1	DBH (cm)	Stem Count	
16	<i>Hypolepis muelleri</i>	Harsh Ground Fern	Fern	G	Native	30	-	>80 cm	0	
16	<i>Ipomoea carnea</i>	Coastal Morning Glory	N/A	G, M	High Threat Exotic	10	-	50-79	0	
16	<i>Leersia hexandra</i>	Swamp Ricegrass	Grass or grass like	G	Native	10	-	30-49	Present	
16	<i>Lepironia articulata</i>	Grey Rush	Grass or grass like	G	Native	10	-	20-29	Present	
16	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	Tree	U	Native	20	-	10-19	Present	
16	<i>Melicope elleryana</i>	Pink-flowered Doughwood	Tree	M	Native	5	4	5-9	Present	
16	<i>Myrsine howittiana</i>	Brush Muttonwood	Shrub	M	Native	0.5	1	<5	Present	
16	<i>Parsonsia straminea</i>	Common Silkpod	Other	U	Native	15	-	Stems with hollow (No.)	1	
16	<i>Persicaria strigosa</i>	Spotted Knotweed	Forb	G	Native	10	-	Length of logs (m)	252	
16	<i>Phragmites australis</i>	Common Reed	Grass or grass like	G	Native	10	-	Litter plot	Litter cover	
16	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	M	High Threat Exotic	0.5	1	1	95	
2									70	
3									80	
4									95	
5									100	
Average									88	

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance	Growth Form Group	Count of Native Species Richness	Sum of Cover
Plot 11										
11	<i>Acmena smithii</i>	Lilly Pilly	Tree	M	Native	3	1			
11	<i>Alcacia brisbanensis</i>	Confevoi	Forb	G	Native	2	10	Tree	6	110.1
11	<i>Alpinia caerulea</i>	Native Ginger	Forb	G	Native	1	10	Shrub	0	0
11	<i>Archontophoenix alexandree</i>	Alexandra Palm	N/A	G, M, U	Exotic	56	-	Forb	2	3

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance
11	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm	Other	G, M, U	Native	14	-
11	<i>Christella dentata</i>	Binung	Fern	G	Native	0.2	2
11	<i>Cinnamomum camphora</i>	Camphor Laurel	N/A	M	High Threat Exotic	0.1	2
11	<i>Cordyline congesta</i>	Narrow-leaved Palm Lily	Other	G, M	Native	0.1	2
11	<i>Ficus coronata</i>	Creek Sandpaper Fig	Tree	M	Native	2	3
11	<i>Ficus macrophylla</i>	Moreton Bay Fig	Tree	U	Native	80	-
11	<i>Ficus obliqua</i>	Small-leaved Fig	Tree	U	Native	20	-
11	<i>Flagellaria indica</i>	Whip Vine	Other	U	Native	15	-
11	<i>Ipomoea indica</i>	Morning Glory	N/A	M, U	High Threat Exotic	2	5
11	<i>Lantana camara</i>	Lantana	N/A	G, M	High Threat Exotic	0.2	2
11	<i>Ligustrum sinense</i>	Small-leaved Privet	N/A	G, M	High Threat Exotic	2	5
11	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	G	Native	0.1	5
11	<i>Maclura cochinchinensis</i>	Cockspur Thorn	Other	G, M, U	Native	10	-
11	<i>Metaleuca quinquevervia</i>	Broad-leaved Paperbark	Tree	M	Native	5	1
11	<i>Macuna gigantea subsp. gigantea</i>	Burny Bean	Other	G, M	Native	0.2	5
11	<i>Murraya paniculata</i>	Murraya	N/A	G, M	Exotic	0.4	1
11	<i>Ochna serrulata</i>	Mickey Mouse Plant	N/A	G	High Threat Exotic	0.1	2
11	<i>Opismenus aemulus</i>	Australian Basket Grass	Grass or grass like	G	Native	0.1	5
11	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	G, M	High Threat Exotic	5	10
11	<i>Smilax australis</i>	Lawyer Vine	Other	M, U	Native	0.1	5
11	<i>Solanum chrysotrichum</i>	Devil's Fig	N/A	G	Exotic	0.1	2
11	<i>Solanum mauritianum</i>	Wild Tobacco Bush	N/A	M	Exotic	0.2	1

Plot 99									
			N/A	G	High Threat Exotic	10	-		
99	<i>Asparagus aethiopicus</i>	Ground Asparagus	N/A	G	High Threat Exotic	2	20	Tree	Sum of Cover
99	<i>Bidens pilosa</i>	Cobblers Pegs	N/A	G	High Threat Exotic	10	-	Shrub	0
99	<i>Chloris gayana</i>	Rhodes Grass	N/A	G	High Threat Exotic	10	-	Forb	0
99	<i>Cinnamomum camphora</i>	Camphor Laurel	N/A	M, U	High Threat Exotic	10	-	Grass or grass like	0
99	<i>Cupaniopsis anacardioides</i>	Tuckeroo	Tree	M, U	Native	80	-	Fern	0
99	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	M, U	Native	5	10	Other	1
99	<i>Ochna serrulata</i>	Mickey Mouse Plant	N/A	G	High Threat Exotic	1	1	High Threat Weed Cover	42
99	<i>Parsonsia straminea</i>	Common Silkpod	Other	U	Native	5	4	DBH (cm)	Stem Count
99	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	M, U	High Threat Exotic	0.1	5	>80 cm	0
99	<i>Sanctus asper</i>	Prickly Sowthistle	N/A	G	Exotic	0.1	1	50-79	0
99	<i>Strelitzia</i> sp.	Strelizia	N/A	G	Exotic	0.1	1	50-79	0

Plot 99		
Growth Form Group	Count of Native Species Richness	Sum of Cover
Tree	2	90
Shrub	0	0
Forb	0	0
Grass or grass like	0	0
Fern	0	0
Other	1	1
High Threat Weed Cover	42	
DBH (cm)		
>80 cm	0	
50-79	0	
30-49	Present	
20-29	Present	
10-19	Present	
5-9	Present	
<5	Present	
Stems with hollow (No.)	0	
Length of logs (m)	34.5	
Litter plot		
1	85	
2	40	
3	10	
4	70	
5	50	
Average	51	

Plot 98										
		Other	M		Native	0.2	5	Growth Form Group	Count of Native Species Richness	Sum of Cover
98	<i>Amylotheca dicyophleba</i>	Brush Mistletoe		M	Native					
98	<i>Archontophoenix cunninghamiana</i>	Bangalow Palm		G, M	Native	0.5	1	Tree	6	42
98	<i>Asparagus aethiopicus</i>	Ground Asparagus	N/A	G	High Threat Exotic	10	-	Shrub	0	0
98	<i>Bidens pilosa</i>	Cobblers Pegs	N/A	G	High Threat Exotic	5	50	Forb	0	0
98	<i>Chloris gayana</i>	Rhodes Grass	N/A	G	High Threat Exotic	1	20	Grass or grass like	0	0
98	<i>Cinnamomum camphora</i>	Camphor Laurel	N/A	M, U	High Threat Exotic	5	5	Fern	0	0
98	<i>Cryptocarya triplinervis</i> var. <i>triplinervis</i>	Three-veined laurel	Tree	M	Native	2	5	Other	5	4.7
98	<i>Cupaniopsis anacardioides</i>	Tuckeroo	Tree	M	Native	4	3	High Threat Weed Cover	106	

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance	DBH (cm)	Stem Count
98	<i>Eragrostis tenuifolia</i>	Elastic Grass	N/A	G	Exotic	10	-	>80 cm	0
98	<i>Guiaea semiglauc</i>	Guiaea	Tree	M	Native	3	5	50-79	0
98	<i>Ipomoea calrica</i>	Coastal Morning Glory	N/A	M, U	High Threat Exotic	5	10	30-49	Absent
98	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	M	Native	30	-	20-29	Present
98	<i>Melastoma coccineum</i>	Cockscur Thorn	Other	G, M	Native	1	1	10-19	Present
98	<i>Mallotus discolor</i>	White Kamala	Tree	M	Native	1	3	5-9	Present
98	<i>Mallotus philippensis</i>	Red Kamala	Tree	M	Native	2	3	<5	Present
98	<i>Muraya paniculata</i>	Muraya	N/A	M	Exotic	0.5	2	Stems with hollow (No.)	0
98	<i>Ochna serrulata</i>	Mickey Mouse Plant	N/A	M	High Threat Exotic	2	5	Length of logs (m)	0
98	<i>Parsonsia straminea</i>	Common Silkpod	Other	M, U	Native	2	3	Litter plot	Litter cover
98	<i>Pinus elliptica</i>	Slash Pine	N/A	U	High Threat Exotic	75	-	1	100
98	<i>Rhaphiophila indica</i>	Indian Hawthorn	N/A	M	Exotic	1	1	2	40
98	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	M, U	High Threat Exotic	2	5	3	100
98	<i>Senna pendula</i>	Senna	N/A	M	High Threat Exotic	1	1	4	60
98	<i>Sriolax australis</i>	Lawyer Vine	Other	M, U	Native	1	3	5	100
98	<i>Syagrus romanzoffiana</i>	Cocos Palm	N/A	M	Exotic	2	1	Average	80

Plot 100									
100	<i>Bidens pilosa</i>	Cobblers Pegs	N/A	G	High Threat Exotic	10	-	Tree	Sum of Cover
100	<i>Callistemon viminalis</i>	Weeping Bottlebrush	Tree	M	Native	10	-	Shrub	35.8
100	<i>Casuarina glauca</i>	Swamp Oak	Tree	U	Native	25	-	Forb	0
100	<i>Chloris gayana</i>	Rhodes Grass	N/A	G	High Threat Exotic	10	-	Grass or grass like	0.1
100	<i>Diplocladus palmatus</i>	Native bryony	Other	M	Native	3	3	Fern	0
100	<i>Ipomoea calrica</i>	Coastal Morning Glory	N/A	M, U	High Threat Exotic	6	-	Other	0
100	<i>Ipomoea indica</i>	Morning Glory	N/A	M, U	High Threat Exotic	3	10	High Threat Weed Cover	1
100	<i>Lantana camara</i>	Lantana	N/A	M	High Threat Exotic	2	3	DBH (cm)	33.3
100	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	M	Exotic	0.5	10	>80 cm	0
100	<i>Macropitulum atropurpureum</i>	Sratro	N/A	G	Native	2	3	50-79	1
100	<i>Malolatus philippensis</i>	Red Kamala	Tree	M	Native	0.3	1	30-49	Present
100	<i>Megathyrus maximus var. coloratus</i>	Guinea Grass	N/A	G	Exotic	15	-	20-29	Present
100	<i>Melinis repens</i>	Red Natal Grass	N/A	G	Native	0.1	2	10-19	Present
100	<i>Oxalis Sp.</i>	Oxalis	Forb	G	Native	0.1	1	5-9	Present
100	<i>Paspalum subpeltata</i>	White Passionflower	N/A	G, M	Exotic	3	3	<5	Present
100	<i>Cenchrus purpureus</i>	Barner Grass	N/A	M	Exotic	35	-	Stems with hollow (No.)	0
100	<i>Ricinus communis</i>	Castor Oil Plant	N/A	M	High Threat Exotic	0.2	1	Length of logs (m)	9.5
100	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	M	High Threat Exotic	0.1	1	Litter plot	Litter cover
100	<i>Senna pendula</i>	Senna	N/A	M	High Threat Exotic	2	5	1	85
100	<i>Solanum mauritianum</i>	Wild Tobacco Bush	N/A	M	Exotic	5	4	2	95
100	<i>Sonchus asper</i>	Prickly Sowthistle	N/A	G	Exotic	0.1	5	3	90
100	<i>Triumfetta rhomboides</i>	Chinese Bur	N/A	G	Exotic	0.2	20	4	95
								5	95
								Average	92

Plot 101									
101	<i>Ageratina tripartita</i>	Mistflower	N/A	G	High Threat Exotic	0.1	4	Tree	Sum of Cover
101	<i>Ageratum conyzoides subsp. Conyzoides</i>	Goatweed	N/A	G	Exotic	2	20	Shrub	78.4
101	<i>Alcornoque brisbanensis</i>	Cunjevoi	Forb	G	Native	0.1	1	Forb	2
101	<i>Alpinia caerulea</i>	Native Ginger	Forb	G	Native	0.5	2	Grass or grass like	0.7
101	<i>Anabasis artemisioides</i>	Common Ragweed	N/A	G	Exotic	6	-	Fern	0
101	<i>Asparagus aethiopicus</i>	Ground Asparagus	N/A	G	High Threat Exotic	0.5	10	Other	0
101	<i>Bidens pilosa</i>	Cobblers Pegs	N/A	G	High Threat Exotic	10	-	High Threat Weed Cover	6
101	<i>Chloris gayana</i>	Rhodes Grass	N/A	G	High Threat Exotic	0.5	20	DBH (cm)	61.8
101	<i>Chrysanthemoides monilifera</i>	Bitou Bush	N/A	G	High Threat Exotic	0.2	1	>80 cm	0
101	<i>Coryza bonariensis</i>	Flaxleaf Fleabane	N/A	G	Exotic	0.1	1	50-79	Present
101	<i>Cryptocarya triplinervis</i>	Three-veined laurel	Tree	G, M	Native	6	-	30-49	Present
101	<i>Desmodium intortum</i>	Green-leaved Desmodium	N/A	G	Exotic	5	10	20-29	Present
101	<i>Eucalyptus grandis</i>	Flooded Gum	Tree	U	Native	40	-		Present

Plot Name	Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance
101	<i>Eucalyptus microcarps</i>	Tallowood	Tree	U	Native	20	-
101	<i>Ficus coronata</i>	Creek Sandpaper Fig	Tree	M	Native	0.2	2
101	<i>Geltonaplesium cynasum</i>	Scrambling Lily	Other	G	Native	0.1	5
101	<i>Glochidion ferdinandi</i>	Cheese Tree	Tree	G	Native	0.1	1
101	<i>Glochidion sumatranum</i>	Umbrella Cheese Tree	Tree	G	Native	0.1	5
101	<i>Hibbertia scandens</i>	Climbing Guinea Flower	Other	G	Native	0.5	20
101	<i>Hypochoeris glabra</i>	Smooth Catsear	N/A	G	Exotic	0.1	1
101	<i>Ipomoea carnea</i>	Coastal Morning Glory	N/A	G, M	High Threat Exotic	10	-
101	<i>Ipomoea purpurea</i>	Common Morning Glory	N/A	G, M	High Threat Exotic	10	-
101	<i>Macaranga tanarius</i>	Blush Macaranga	Tree	G, M	Native	10	-
101	<i>Madlura cactinchenensis</i>	Cockspur Thorn	Other	G, M, U	Native	5	5
101	<i>Marsdenia rostrata</i>	Milk Vine	Other	G, M	Native	0.1	10
101	<i>Melinis minutiflora</i>	Molasses Grass	N/A	G	High Threat Exotic	10	-
101	<i>Muraya paniculata</i>	Muraya	N/A	M	Exotic	2	10
101	<i>Myrsine variabilis</i>	Muttonwood	Shrub	M	Native	2	10
101	<i>Natelaea longifolia</i>	Large Mock-olive	Tree	M	Native	2	2
101	<i>Ochna serrulata</i>	Mickey Mouse Plant	N/A	G	High Threat Exotic	1	15
101	<i>Oxalis</i> Sp.	Oxalis	Forb	G	Native	0.1	1
101	<i>Passaria straminea</i>	Common Silkpod	Other	M	Native	0.1	4
101	<i>Paspalum conjugatum</i>	Sour Grass	N/A	G	Exotic	1	30
101	<i>Pasiflora subpeltata</i>	White Passionflower	N/A	G, M	Exotic	2	20
101	<i>Schefflera actinophylla</i>	Umbrella Tree	N/A	M	High Threat Exotic	15	-
101	<i>Senna pendula</i>	Senna	N/A	M	High Threat Exotic	2	10
101	<i>Setaria sphacelata</i>	Setaria	N/A	G	Exotic	1	20
101	<i>Smilax australis</i>	Lawyer Vine	Other	G, M, U	Native	2	10
101	<i>Strelitzia</i> Sp.	Strelitzia	N/A	G	Exotic	0.1	1
101	<i>Syagrus romanzoffiana</i>	Cocos Palm	N/A	M	Exotic	0.3	20
101	<i>Tageetes minuta</i>	Striking Roger	N/A	G	Exotic	1	10
101	<i>Triumfetta rhomboida</i>	Chinese Bur	N/A	G	Exotic	20	-
101	<i>Vicia tetragemma</i>	Slender Vetch	N/A	G	Exotic	0.1	5

Plot 102							Sum of Cover	
Scientific Name	Common Name	Growth Form Group	Stratum	Species Type	Cover	Abundance	Growth Form Group	Cover of Native Richness
102	<i>Agave attenuata</i>	N/A	G	High Threat Exotic	0.2	5	Tree	3
102	<i>Asparagus aethiopicus</i>	N/A	G	High Threat Exotic	0.1	3	Shrub	0
102	<i>Bidens pilosa</i>	N/A	G	High Threat Exotic	15	-	Forb	1
102	<i>Cestrum nocturnum</i>	N/A	G, M	High Threat Exotic	0.5	5	Grass or grass like	0
102	<i>Cinnamomum camphora</i>	N/A	M, U	High Threat Exotic	35	-	Fern	0
102	<i>Eucalyptus grandis</i>	N/A	U	Native	40	-	Other	4
102	<i>Guia seniglaucia</i>	N/A	M, U	Native	10	-	High Threat Weed Cover	62.6
102	<i>Hibbertia scandens</i>	N/A	G	High Threat Exotic	0.1	2	DBH (cm)	Stem Count
102	<i>Lantana camara</i>	N/A	G, M	High Threat Exotic	0.2	5	>80 cm	5
102	<i>Ligustrum sinense</i>	N/A	G, M	High Threat Exotic	0.5	6	50-79	Present
102	<i>Macaranga tanarius</i>	N/A	M, U	Native	20	-	30-49	Present
102	<i>Madlura cactinchenensis</i>	N/A	G, M, U	Native	4	10	20-29	Present
102	<i>Melinis minutiflora</i>	N/A	G	High Threat Exotic	10	-	10-19	Present
102	<i>Muraya paniculata</i>	N/A	M, U	Exotic	0.3	10	59	Present
102	<i>Ochna serrulata</i>	N/A	G	High Threat Exotic	0.5	10	<5	Present
102	<i>Oxalis</i> Sp.	N/A	G	Native	0.1	1	Stems with hollow (No.)	1
102	<i>Passiflora suberosa</i>	N/A	G, M	Exotic	0.5	15	Length of logs (m)	146
102	<i>Passiflora subpeltata</i>	N/A	G, M	Exotic	1	3	Litter plot	Litter cover
102	<i>Schefflera actinophylla</i>	N/A	M, U	High Threat Exotic	0.5	3	1	80
102	<i>Senna pendula</i>	N/A	M, U	High Threat Exotic	0.5	10	2	95
102	<i>Smilax australis</i>	N/A	G, M, U	Native	10	-	3	95
102	<i>Solanum nigrum</i>	N/A	G	Exotic	0.2	15	4	97
102	<i>Stephania japonica</i>	N/A	G, M	Native	0.2	3	5	100
102	<i>Syagrus romanzoffiana</i>	N/A	M, U	Exotic	4	3	Average	93.4
102	<i>Tradescantia fluminensis</i>	N/A	G	High Threat Exotic	0.1	10		
102	<i>Triumfetta rhomboida</i>	N/A	G	Exotic	10	-		

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APPENDIX E. DIRECT AND INDIRECT IMPACT ASSESSMENT

Aspect	Project phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before Mitigation	Risk After Mitigation
Noise	Construction	Noise during construction due to construction works and construction traffic. Potential disruption of threatened species or reduced viability of adjacent habitat	All works and associated activities are to be delivered in accordance with an approved Construction Environmental Management Plan (CEMP) and sub plans, including a Noise Mitigation Plan. Noise during construction will be mitigated by applying appropriate safeguards and management measures before works commence including daily timing of construction activities and such as avoiding night works as much as possible in accordance with the Interim Noise Guidelines (2009). Furthermore, construction will be restricted to the southern portion of the Site where the project footprint is at least 62 m (the wide of the proposed Asset Protection Zone for bushfire protection) from the remnant native vegetation.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation	Noise during operations including traffic. Potential disruption of threatened species or reduced viability of adjacent habitat	Noise levels during operations would be delivered in accordance with an approved Operational Environmental Management Plan (OEMP) that details safeguards and management measures in accordance with the <i>POEO (Noise Control) Regulation 2017</i> or any other relevant Tweed Shire Council noise regulation.	During operations	Proponent	Low	Very low
Vibration	Construction	Vibration during construction due to construction works and construction traffic. Potential disruption of threatened species or reduced viability of adjacent habitat	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Vibration Mitigation Plan. Vibration during construction will be mitigated by applying appropriate safeguards and management measures before works commence including daily timing of construction activities and such as avoiding night works as much as possible in accordance. Furthermore, construction will be restricted to the southern portion of the Site where the project footprint is at least 62 m (the wide of the proposed Asset Protection Zone for bushfire protection) from the remnant native vegetation.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation	Vibration during operations including traffic. Potential disruption of threatened species or reduced viability of adjacent habitat	Vibration levels (if any) during operations would be managed in accordance with an approved OEMP that details safeguards and management measures in accordance with relevant standards and guidelines.	During operations	Proponent	Low	Very low
Light spill	Construction	Light spill during construction due to construction lighting and construction traffic. Potential disruption of threatened species or reduced viability of adjacent habitat	Light sensitive species are presumed unlikely to be present at the Site. Construction will be restricted to the southern portion of the Site where the project footprint is at least 62 m (the wide of the proposed Asset Protection Zone for bushfire protection) from the remnant native vegetation. All works and associated activities would be delivered in accordance with an approved CEMP that details applicable safeguards and management measures before works commence including daily timing of construction activities such as avoiding night works as much as possible and directing lights away from remnant vegetation.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation	Light spill during operations Potential disruption of threatened species or reduced viability of adjacent habitat	The Site does not contain habitat for threatened species that are drawn to light (i.e. turtles) that could be adversely impacted by light spill. The development will be located at least 62m (the width of the APZ) from vegetation (Zones 1,2,3). Provision of lighting would be delivered in accordance with an approved CEMP and any relevant standards and guidelines, in particular local hospitals.	During operations	Proponent	Low	Very low
Visual Amenity	Construction	Rubbish and waste retained onsite attracting native fauna.	Activities on the Site will be managed in accordance with the approved CEMP, and designed to limit the amount of rubbish and waste onsite through good housekeeping practices.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation	Rubbish and waste retained onsite attracting native fauna.	Activities on the Site will be managed in accordance with the approved OEMP, and designed to limit the amount of rubbish and waste onsite through good housekeeping practices.	During operations	Proponent	Low	Very low
Dust	Construction	Inadvertent impacts of dust deposition on native vegetation or threatened species Potential disruption of threatened species or reduced viability of adjacent habitat	Dust levels during operations would be managed in accordance with an approved CEMP that details safeguards and management measures in accordance with relevant guidelines for construction sites, including: - Daily monitoring of dust generated by construction activities. - Dust suppression measures (setting maximum speed limits and application of dust suppressants) will be implemented during construction works to limit dust on site - Commence revegetation as soon as practicable to minimise areas likely to create dust	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation	Inadvertent impacts of dust deposition on native vegetation or threatened species Potential disruption of threatened species or reduced viability of adjacent habitat	Adaptive dust monitoring programs to control air quality, in accordance with the approved OEMP.	During operations	Proponent	Low	Very low

Aspect	Project phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before Mitigation	Risk After Mitigation
Retained native vegetation	Construction	Damage or removal of retained native vegetation Unplanned loss of habitat	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Biodiversity Management Plan. All existing trees and areas of native vegetation not identified for removal on approved plans of the proposed development shall be protected from damage during works. This protection shall consist of: - Establishing a Tree Protection Zone in accordance with AS 4970-2009 Protection of trees on development sites around native trees and vegetation adjacent to the construction footprint that are to be retained on the site - Erect temporary 1800mm high protective fencing, securely installed beneath the outer canopy of any tree to be retained - Trees and vegetation may be fenced off in clusters where it is not practical to fence off individual trees - There shall be no stockpiling, storing materials, parking machinery, washing machinery or changes to existing soil levels within the fenced areas. Specific trees identified that must be retained are: <i>Ficus obliqua</i> tree located at the existing Site entry.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
Non-native vegetation	Operation	Introduction of weeds to the Site	In order to avoid the introduction or spread of weeds on the Site, weed hygiene practices in accordance with an approved CEMP and sub plans, including a Biodiversity Management Plan: Mulch generated from exotic trees and/or other weed species that have been cleared shall not be used on site. The mulch shall be removed from the site and disposed of in accordance with legislative requirements.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
Bushfire / Changing Fire Regimes	Construction	Changes to existing fire regime and / or increased prevalence of fire	Bushfire impacts will be identified and managed through bushfire impact assessment and associated management plans.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
	Operation			Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low

Mitigation Measures					Timing	Responsibility	Risk before mitigation	Residual risk
Prescribed Impact	Aspect	Project phase	Potential Impact	Mitigation				
Impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities.	Hydrology	Construction	Sediment run-off during construction. Sediment basin discharge water quality	Sediment and erosion management would be delivered in accordance with an approved Construction Environmental Management Plan (CEMP) that details safeguards and management measures in accordance with relevant guidelines for construction sites. Sediment barriers and sediment ponds will be constructed to control the quality of water released from the Site into the receiving environment. Erosion and sediment measures will be implemented as per the construction phase Erosion and Sediment Control Plan (ESCP). Construction phase erosion and sediment control measures shall achieve water quality objectives outlined in the Tweed Shire Council Development Design Specification - D7. Two pH dependent amphibians have been identified by the BAM Calculator as candidate threatened species within the wetland area(i.e. Wallum froglet Crinia tinnula Wallum Froglet and Olonburra frog Litoria longiburensi). The use of gypsum as a flocculant in the sediment basins may have an impact upon the above threatened amphibian species. Alternative commercially available flocculants that work effectively as a gypsum replacement that do not create the large increases in pH should be used.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	High	Very low
		Operation	Changes in water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	A stormwater drainage system will be constructed to convey stormwater runoff from the newly constructed, buildings and associated, roads, carparks and landscape areas. It will be designed to mimic natural flows to minimise future impact to the endangered ecological community in the receiving wetland. The details of the discharge characteristics will be determined at detail design stage, guided by advice from a suitably qualified ecologist. The water quality strategy for the Site will incorporate swales, enviropods, bioretention basins and extended detention basins. Ultimately the bulk of the stormwater will end up in an extended detention basin where it will settle and discharge to the receiving waters in a controlled manner. The water quality strategy for the Site is outlined in the Tweed Valley Hospital Development Design Report (Bonacci 2018). In accordance with the approved CEMP, stormwater management will be incorporated in landscaping, using Water Sensitive Urban Design (WSUD) principles and the use of landscaped areas for filtering runoff, swale drains and vegetated sediment basins. New plantings within rain gardens that both treat stormwater quality and contribute to providing a range of native habitat or 'moist corridors' across the site (Turf 2018). In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will include measures to monitor water quality in the receiving environment and will include water quality objectives which in the event of exceedances will trigger investigation and adaptive management actions. Water quality monitoring is to be undertaken before, during and after construction and periodically during operations. Water quality results shall be compared against water quality guidelines for ecosystem health as well as monitoring for change (continuous increases or decreases) over time. Any continuous changes in water quality shall trigger investigation and adaptive management actions. Construction phase stormwater quality control measures shall achieve water quality objectives outlined in the Tweed Shire Council Development Design Specification - D7 (TSC 2016).	During operations	Proponent	High	Very low
	Hydrogeology	Construction	Changes in water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Soil and Water Management Plan, in order to avoid any impacts on groundwater, particularly during piling and excavation activities.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Medium	Very low
		Operation	Change in ground water base flow to wetland and water bodies that sustain threatened species and threatened ecological communities.	While no site specific groundwater modelling data was available to the time of writing this report, the level that groundwater encountered in the bores which sit upslope from the wetlands is at a higher elevation than the wetlands, indicating that there is potential for groundwater to influence the wetlands and provide some base flow, however the extent to which groundwater influence flows and water quality within the wetlands is unknown based on available site information. It is expected that any reduction of groundwater recharge due to the development footprint of the hospital would be mitigated through recharge that would occur through the proposed WSUD measures such as: rain gardens, swales, car park plantings to reduce impervious surfaces, managing stormwater and ground water recharge through landscaping. In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will include measures to monitor ground water quality on the Site and will include water quality objectives which in the event of exceedances will trigger investigation and adaptive management actions.	During operations	Proponent	Medium	Very low
		Construction	Vehicle strikes	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Biodiversity Management Plan, Traffic Control Plan and Access and Movement Plan. Traffic will be restricted to the southern portion of the Site where the project footprint is which is approximately 62m from the intact remnant native vegetation. Construction traffic must maintain low vehicle speeds and operators shall take care and be aware of any wildlife that may be in the area. Should wildlife enter the construction footprint, a suitable qualified fauna handler should be notified and actions taken in accordance with the construction EMP.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Low	Very low

Prescribed Impact	Aspect	Project phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Residual risk
Impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community	Traffic	Operation	Vehicle strikes	Turnock Street currently creates a barrier in habitat connectivity of the overall patch of native vegetation in the Site area. In order to mitigate the potential of increase in wildlife vehicle strikes it is recommended that a wildlife crossing zone is installed where the road passes through the Paperbark swamp area along Turnock Street (between the roundabout and Cudgen road). This crossing would be triggered by car movement and would assist species to move across the road barrier (hostile gap). The following wildlife protection and traffic calming measures on the access road are recommended to reduce the risk of vehicle strike on wildlife: • Install roadside street lighting in accordance with the design standards • On the uphill and downhill approaches to the road install: - o Two 50 kilometre an hour speed limit signs and two wildlife warning signs (e.g. 'Wildlife Dawn to Dusk' sign or similar) or two signs that combine both messages - o Two permanent radar speed signs that display vehicle speed on approach or display a warning when the vehicle speed on approach is greater than the speed limit In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will incorporate a Fauna Management Plan, including measures to monitor species mortality and where necessary will outline thresholds for threatened species mortality based on current literature which will trigger investigation and adaptive management actions.	During operations	Proponent	Low	Very low
	Aviation	Operation	Aircraft strike	As a mitigation measure, aviation operations for the development will be conducted in accordance with an approved Aviation Operations Manual. This manual will identify areas of bird and flying fox activity such as the Elrond Drive and Kingscliff Library flying fox camps that are located within 1km of the Site (Ecosure 2018, Greencap 2018). These details will also be incorporated into the Enroute Supplement Australia (ERSA) published by Airservices Australia. The ERSA is a publication which contains information vital for planning a flight and for in flight operations for the aircraft pilot. The location of known flying fox camps would be included as either an 'avoid area' or a 'fly neighbourly' area. In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will incorporate a Fauna Management Plan with measures to monitor fauna at the Site, including species mortality resulting from aircraft movement. The plan will outline objectives and thresholds for threatened species mortality which in the event of exceedances will trigger investigation and adaptive management actions. Adaptive management actions may include actions such as auditory repellents, visual deterrents and physical barriers where birds, bats and other animals are an issue.	During operations	Proponent	Low	Very low
Impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Habitat; established home range and connectivity	Construction	Removal of windrow vegetation in Zone 4 and 8.	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Biodiversity Management Plan. In order to preserve and enhance biodiversity values, including threatened species habitat and connections for foraging and dispersal the following proposed features have been incorporated into the Tweed Valley Hospital Landscape Masterplan Report (Turf 2019): Landscape plan Zone 2 • Low maintenance native landscape including detention basins and buffer plantings that provide stepping stone habitats at a site scale to include: • Locally indigenous native rainforest trees, shrubs and groundcovers • Inclusion of habitat features such as rocks that have been salvaged from other areas of the Site (cleared windrows) that will create habitat for ground dwelling species Landscape plan Zone 5 • New plantings within rain gardens that both treat stormwater quality and contribute to providing a range of native habitat across the site • Locally indigenous native trees along roadways • Water adapted ground covers (e.g. from the Cyperaceae, Juncaceae and Poaceae families) are to be planted in rain gardens Landscape plan Zone 6 and 7 • Retention and enhancement of established windrows (vegetation buffers): • 10m wide vegetated buffer for Zone 6 and 30m wide vegetated buffer for Zone 7 • Augment existing vegetation buffers to increase biodiversity values, including habitat connectivity • Immediate removal of High Threat Exotic weeds that have self-sown within the windrows (e.g. camphor laurel <i>Cinnamomum camphora</i>, small leaved privet <i>Ligustrum sinense</i>, umbrella tree <i>Schefflera actinophylla</i>) • Staged removal of slash pine <i>Pinus elliptii</i> • Planting the understory of windrows with locally indigenous native species In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will incorporate a Vegetation Management Plan with measures to monitor vegetation at the Site, including objectives and thresholds which in the event of exceedances will trigger investigation and adaptive management actions.	Duration of construction works	Project manager, relevant contractor, construction staff and site personnel	Medium	Low
		Operation	Decrease in biodiversity values including connectivity and movement of threatened species that maintains their lifecycle	All works and associated activities are to be delivered in accordance with an approved CEMP and sub plans, including a Biodiversity Management Plan. Weed removal shall be undertaken to preserve and enhance the current biodiversity values in the remnant native vegetation areas at the Site, in particular areas of remnant White Booyong - Fig subtropical rainforest, Paperbark swamp and Flooded Gum forest. Weed removal will include: • Removal of an exotic grassland monoculture composed of barnier grass <i>Pennisetum purpureum</i> located amongst derived and remnant native vegetation in the northern section of the Site (Zone 9) and revegetation with appropriate native rainforest species • Currently there is a <i>Salvinia molesta</i> infestation in the dam located in the central northern section of the Site. This dam would likely overflow during high intensity rainfall events and it is likely that this would pose a risk to the spread of this High Threat Exotic into downstream freshwater bodies. Decommissioning of the dam has been recommended • Removal of weeds including alexandra palms <i>Archontophoenix alexandrae</i>, morning glory <i>Ipomea caerica</i> and Singapore daisy <i>Sphagnetocola trilobata</i> in the remnant native vegetation. In accordance with section 9.4.2 of the BAM, a Biodiversity Management Plan will set out provisions for the ecological restoration, rehabilitation and/or ongoing maintenance of native vegetation habitat on or adjacent to the development Site. Actions will be undertaken in both construction (see above) and operations phases.	During operations	Proponent	Medium	Low

Prescribed Impact	Aspect	Project phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Residual risk
Impacts of development on the habitat of threatened species or ecological communities associated with rocks	Removal of wood or rocks along the windrows, particularly in Zone 4. Removal of native vegetation	Construction	Death or injury to wildlife	All works and associated activities are to be delivered in accordance with a CEMP and sub plans, including a Biodiversity Management Plan, Traffic Control Plan and a Access and Movement Plan. To ensure the safety of any native fauna occupying trees and vegetation proposed for removal, during vegetation clearing works, a suitably qualified and experienced person shall be present as a fauna spotter-catcher to supervise the tree removal. • On the day of clearing and prior to any clearing taking place, all trees within 30 metres of those trees to be cleared are to be inspected for the presence of native fauna by an experienced fauna spotter-catcher • During tree removal and major earth works a fauna spotter-catcher needs to be used at a minimum of one operator per machine. • The fauna spotter-catcher must not be involved in the vegetation clearing works whilst responsible for identifying fauna present on the site and will remain on site during any vegetation clearing works to ensure that any tree occupied by a fauna is not accidentally cleared or interfered with • Any uninjured native fauna detected during the tree removal shall be rescued and relocated into an area of appropriate habitat that is nearby, but outside of the development footprint. • Any injured native fauna detected shall be rescued and transferred to a local veterinarian for treatment and/or WIRES for rehabilitation. Should koalas be found on the Site during vegetation clearing works and/or earthworks, tree clearing works and/or earthworks must be temporarily suspended within a range of 30 metres from any tree which is occupied by a koala. • Works are to be avoided in any area between the koala and the nearest areas of habitat to allow the animal to move to adjacent undisturbed areas. • Works must not resume until the koala has moved from the tree of its own volition. In order to minimise direct impacts on ground dwelling and arboreal fauna, any earthworks conducted to clear rocks and trees along the windrows (zone 4) shall have a suitably qualified fauna spotter-catcher as outlined above.	Duration of vegetation clearing works and/or earthworks	Project manager, relevant contractor, construction staff and site personnel	Low	Very low
Other impacts	Fire	Operation	Risk of increased fire regime on fire-sensitive sub-tropical rainforest and Paperbark swamp vegetation	Landscaping within Landscape Zone 2 (Turf 2018) largely coincides with the mandatory 62m Asset Protection Zone (APZ) for the development. Consequently, all plantings will be designed and maintained in accordance with current published guidelines (RFS 2006, 2007) and in consultation with the NSW Rural Fire Services, as detailed in the Tweed Valley Hospital Landscape Masterplan Report (Turf 2018).	During operations	Proponent	Medium	Low

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APPENDIX F. RISK MATRIX

		Probability				
		A	B	C	D	E
Maximum reasonable consequence	1	CR	CR	HR	HR	MR
	2	CR	HR	HR	MR	LR
	3	HR	HR	MR	LR	LR
	4	HR	MR	LR	LR	LR
	5	MR	LR	LR	LR	LR

CRITICAL	CR
HIGH RISK	HR
MODERATE RISK	MR
LOW RISK	LR

Consequence criteria: Impacts on threatened species and/or threatened species habitat
1. CRITICAL - Impact – Severe; Spatial scale – Widespread; Time scale – Long-term. - Requires consideration of whether impacts may result in a Serious and Irreversible Impact that may lead to local extinction.
2. MAJOR - Impact – Moderate; Spatial scale – Moderate to widespread; Time scale – Mid- to long-term. - May result in temporary or long-term damage.
3. MODERATE - Impact – Moderate; Spatial scale – Local to moderate; Time scale – Short- to mid-term. - May result in a moderate, temporary impact. However, it may be difficult to rehabilitate impact and may have negative implications on the ecosystem.
4. MINOR - Impact – Minor; Spatial scale – Local; Time scale – Short-term. - May result in minor impacts that are relatively easily rehabilitated. Not likely to have negative implications on the ecosystem.
5. NEGLIGIBLE - Impact – Minor; Time scale – Short-term with no lasting effect. - May result in negligible impacts that can be categorised as temporary, local and reversible.
Likelihood criteria
A. ALMOST CERTAIN Very high or certain probability that impact will occur or event is of a continuous nature.
B. LIKELY Likely probability that impact will occur or event is frequent (frequency 1-5 years).
C. MODERATE Moderate probability that impact will occur or event is infrequent (frequency 5-20 years).
D. UNLIKELY Low probability that impact will occur or event is very infrequent (frequency 100 years).
E. REMOTE Very low probability that impact will occur or may occur under extenuating circumstances. Event is very rare of stochastic in nature (frequency 1000 years)