Appendix E2 – Terrestrial Flora

Gladstone Area Water Board

Appendix E2.1 - Photographs from Field Survey

Site 1

Site 2

Site 3a

Site 3b

Site 4

Site 5

Site 6a

Site 6b

Site 6c

Site 6d

Site 7

Site 8a upstream substitute

Site 8b upstream substitute

Site 9a

Site 9b

Site 9c

Site 9d

Site 10a

Site 10b

Site 10c

Site 11a

Site 11c

Site 12

Site 14 understorey

Site 14 overstorey

Site 16a

Site 16b

Site 17

Site 18a

Site 18b

Site 20

Site 21

Site 22a

Site 22b

Site 23

Site 24

Site 25

Site 26

Site 27

Access permission unavailable
Sites 28 (a,b)

Access permission unavailable
Sites 29 (a,b,c)

Access permission unavailable
Site 30a

Site 30b upstream substitute

Access permission unavailable
Site 30c

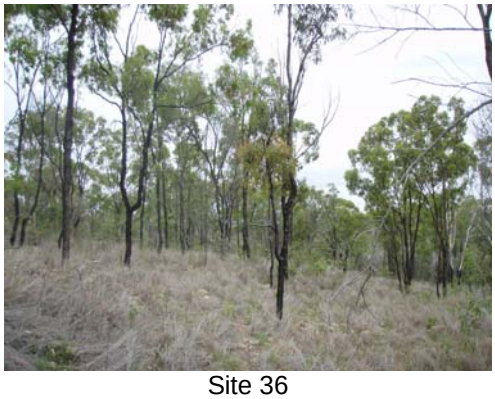
Access permission unavailable
Sites 31 (a,b,c)

Site 32

Site 33

Site 34

Site 35



Site 36

photo unavailable
Site 37

Site 38

Site 39a

Site 39b

Site 40 (does not accurately depict riverine rainforest)

Appendix - E2.2 Detailed Site Species List

- Heights are in metres
- Cover is based on projected crown cover (not projected foliage cover, unless specified)
- * denotes naturalised species (weed)
- Note that Short sites generally do not have structural details recorded

Site 1

Location:E 237824

(MGA94)N 7421498

Zone 56

Level of detail (Detailed/Short): Short

Date: 29/8/07

Locality description: Fitzroy River bank, extraction point

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus tereticornis* *Eucalyptus coolabah* *Eucalyptus crebra*	
Tree 2				*Casuarina cunninghamiana* *Melaleuca leucadendra*	
Tree 3					
Shrub 1				*Acacia salicina* *Lysiphyllum carronii*	
Shrub 2					
Ground dominant				**Megathyrsus maximus*	
Other ground species				*Capparis lasiantha* *Petalostigma pubescens* **Cryptostegia grandiflora*	
Offsite				At water's edge: **Hymenachne amplexicaulis* **Eichhornia crassipes*	

Notes: upstream (western) remnant about 66m long by 26m wide, and downstream (eastern) patch only about 10m wide and about 10 trees (i.e. not a remnant)

Site 2

Location:E 234725

(MGA94)N 7415560

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 29/8/07

Locality description: Collins property, off end of Tyrells Rd, Alton Downs

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1					
Tree 2					
Tree 3					
Shrub 1					

Shrub 2					
Ground dominant	0.25	0.2-0.7	90	Liliaceae	
Other ground species					
Offsite				*Eucalyptus tereticornis* *Eucalyptus coolabah*	

Notes:

Site 3a

Location:E 234287

(MGA94)N 7413050

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 28/8/07

Locality description: Stracey property, immediately north of T-junction of Malchi-Nine Mile Rd and Fairy Bower Rd

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Emergent layer 1	20	18-22	1	*Eucalyptus coolabah*	
Emergent layer 2	7	5-8	1	*Eucalyptus coolabah* *Eremophila bignoniiflora* *Lysiphyllum carronii* *Acacia salicina*	
Tree 1					
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant	0.3	0.1-0.5	70	*Dichanthium* sp. Poaceae	
Other ground species				**Senecio madagascariensis* **Sida rhombifolia* Myoporaceae *"5 petal herb"* *Probably Cirsium vulgare* *Cyperus* sp. *(infertile)* *Crinum* sp. *(infertile)* Brassicaceae Apiaceae *(seedling)*	

Offsite				*Lysiphyllum carronii*	

Notes: grass is in hummocks formed from grazing and possibly water flow, with paths in between the hummocks

Site 3b

Location:E 234027

(MGA94)N 7412180

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 28/8/07

Locality description: Fairy Bower area, about 800m south of T-junction of Malchi-Nine Mile Rd and Fairy Bower Rd

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	28	25-30	20	*Eucalyptus tereticornis*	
Tree 2	20	15-25	32	*Eucalyptus coolabah* *Eucalyptus tereticornis* *Acacia salicina*	
Tree 3	10	8-12	5	*Albizia lebbeck*	
Shrub 1					
Shrub 2					
Ground dominant	0.1	0-0.2	60	Probably *Bothriochloa decipiens* (40%) **Sida rhombifolia* **Senecio madagascariensis*	
Other ground species				Other species present but infrequent and disturbed by grazing	
Offsite					

Notes: *Eucalyptus tereticornis* are very large (DBH > 1m) old-growth trees with hollows. Shrub layer is conspicuously absent – probably cleared for grazing. Ground layer was assessed off-site (over the fence) due to heavy grazing

Site 4

Location:E 234403

(MGA94)N 7410418

Zone 56

Level of detail (Detailed/Short): Short

Date: 28/8/07

Locality description: Killip property "Hillview" on Fairy Bower Rd, about 2.5 km south of T-junction with Malchi-Nine Mile Rd

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Ficus* spp. Numerous softwood scrub spp.	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Photographed from off-site only, because scrub remnant is on the other side of the road to the proposed pipeline corridor.

Site 5

Location:E 238818

(MGA94)N 7409800

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 28/8/07

Locality description: Foxlee property, off Fogarty Rd, north of Fairy Bower Rd, Gracemere.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1					
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant	0.3	0.1-0.4	80	**Senecio madagascariensis* Probably **Artemisia* sp. or **Parthenium hysterophorus*	

Other ground species				**Gomphocarpus physocarpus* **Cuscuta* sp. **Acacia nilotica (seedling)* *Abutilon* sp. Probably *Bothriochloa decipiens* **Cirsium vulgare* **Senna* sp. *Indigofera* sp. **Heliotropium* sp., probably *H.amplexicaule* **Argemone* sp.	
Within 6m of water's edge				*Indigofera linnaei* **Plantago* sp. **Cynodon dactylon* **Ludwigia peploides* subsp. *montevidensis* *Solanum* sp. *Hibiscus* sp. Chenopodiaceae	
In water				*Persicaria attenuata*	
Offsite		2		**Acacia nilotica*	

Notes: Area adjacent to small lagoon

Site 6a

Location:E248200

(MGA94)N7404700

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Gavial Creek, between Rockhampton and Bajool

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	17	15-20	Continuous single tree width either side of creek	*Eucalyptus tereticornis* *Eucalyptus coolabah* *Corymbia tessellaris* *Casuarina cunninghamiana*	
Tree 2					
Tree 3					
Shrub 1	2	2	Scattered in creek	**Acacia nilotica* *Eucalyptus* spp. (juvenile)	

			bed		
Shrub 2				**Cryptostegia grandiflora*	
Ground dominant	0.1	0-0.2	70	**Cynodon dactylon*	
Other ground species			5	**Sida rhombifolia*	
Offsite					

Notes: *Eucalyptus raveretiana* was not seen on site, nor along Gavial Creek back to the Bruce Highway, and not seen on crossing of Gavial Creek on Roope Rd either. Large turtle shells and bivalve shells found along creek bed.

Site 6b

Location:E 248696

(MGA94)N 7404143

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Road reserve on Roope Rd, near merge with River Rd.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	18	15-22	60	*Eucalyptus populnea* *Eucalyptus tereticornis*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: The treed area of the road reserve is past the merge with River Rd, and there is little remnant vegetation when the roads have merged closer to the proposed pipeline corridor.

Site 6c

Location:E 251384

(MGA94)N 7398103

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Road reserve on Georges Rd.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus populnea*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes:

Site 6d

Location:E 251976

(MGA94)N 7397041

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Road reserve on Casuarina Rd.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus populnea* *Eucalyptus tereticornis*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground					

species					
Offsite					

Notes: Observations were taken from the public side of the gate, as access permission was refused.

Site 7

Location:E 253260

(MGA94)N 7394415

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Bobs Creek - Bruce Highway crossing.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Casuarina cunninghamiana* *Melaleuca fluviatilis* *Eucalyptus tereticornis* *Callistemon viminalis*	
Tree 2					
Tree 3					
Shrub 1				Shrubby understorey of species from Tree 1 stratum	
Shrub 2					
Ground dominant				Rank grasses	
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite. This substitute site was done on Bruce Highway creek crossing instead.

Site 8a

Location:E 253870

(MGA94)N 7388838

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Station Creek - Bruce Highway crossing.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus tereticornis*	
Tree 2					
Tree 3					
Shrub 1				*Callistemon viminalis* *Glochidion* sp.	
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite. This substitute site was done on Bruce Highway creek crossing instead. No convenient safe stopping point along road, so creek was photographed from vehicle.

Site 8b

Location:E 254539

(MGA94)N 7388292

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Oaky Creek - Bruce Highway crossing.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Casuarina cunninghamiana* *Melaleuca fluviatilis*	
Tree 2				*Callistemon viminalis* *Ficus* sp. Possibly *Glochidion* sp.	
Tree 3					
Shrub 1					

Shrub 2					
Ground dominant				Rank grasses	
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite. This substitute site was done on Bruce Highway creek crossing instead.

Site 9a

Location:E 263900

(MGA94)N 7383920

Zone 56

Level of detail (Detailed/Short): Short

Date: 6/12/07

Locality description: Inkerman Creek on northern side of Buck property.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Avicennia marina*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				*Sporobolus virginicus*	
Other ground species				*Portulaca* sp.	
Offsite					

Notes: Access permission to southern side of creek only

Site 9b

Location:E 264670

(MGA94)N 7383360

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: About 100m off Port Alma Rd, south of Inkerman Ck

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	6	4-7	80	*Acacia harpophylla*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				Not recorded, as this was an off-site observation	
Other ground species					
Offsite					

Notes: Vegetation structure appears to be advanced regrowth

Site 9c

Location:E 264015

(MGA94)N 7383650

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 6/12/07

Locality description: South of Inkerman Creek on Buck property.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1					
Tree 2					
Tree 3					
Shrub 1				*Acacia harpophylla* **Cryptostegia grandiflora* **Opuntia stricta* Rubiaceae	
Shrub 2				*Acacia harpophylla* **Cryptostegia grandiflora* *Citriobatus spinescens*	

Ground dominant				*Enchylaena* sp. *Chenopodium* sp.1 *Chenopodium* sp.2 *Paspalidium distans* *Portulaca oleracea* gilgai (water) 10% bare ground 10% leaf litter 10%	
Other ground species				*Tribulus* sp. *Panicum effusum* *Portulaca* sp. "trifoliolate erect" **Harrisia* sp. **Megathyrsus maximus* *Sporobolus* sp. *Dichanthium* sp. "red-grey chenopod but like indigo" "opposite leaf vine no white sap" *Capparis lasiantha* *Ocimum* sp. *Indigofera linnaei* *Gnaphalium involucratum*	
Offsite					

Notes: Representative sample site in the middle of the "remnant" or patch. Area is heavily gilgaied.

Site 9d

Location:E 263900

(MGA94)N 7383750

Zone 56

Level of detail (Detailed/Short): Short

Date: 6/12/07

Locality description: About 50m south of Inkerman Creek, on Buck property.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1					
Tree 2					
Tree 3					
Shrub 1				*Acacia harpophylla* **Cryptostegia grandiflora*	
Shrub 2				*Citriobatus spinescens*	
Ground				*Paspalidium distans*	

dominant				*Enteropogon* sp. gilgai (water) 10% bare ground 70% leaf litter 10%	
Other ground species				*Panicum effusum* *Portulaca* sp. "trifoliolate vine – possibly not a legume" *Dichanthium* sp. *Indigofera linnaei*	
Offsite					

Notes: Approximately where planned right of way for pipeline is located, but moved slightly away from existing minor vehicle track. The species composition and structure is generally the same as for Site 9c, confirming that the "remnant" or patch is uniform (*i.e*. no major variation).

Site 10a

Location:E 267350

(MGA94)N 7382380

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 30/8/07

Locality description: Patch of brigalow on O'Grady property on Toonda – Port Alma Road, near link road to Marmor

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	5	3-8	50	*Acacia harpophylla* *Amyema* sp. (on *Acacia harpophylla)*	
Tree 2	2	1-3	5	*Acacia harpophylla* Possibly *Capparis* sp. **Opuntia* sp. *Melaleuca linariifolia*	
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				Suckering growth, possibly *Acacia harpophylla* *Paspalidium* sp.	
Other ground species	0.2	0-1	5	*Sida fibulifera* *Abutilon* sp. *Cyperus* sp.	

				**Bryophyllum* sp. (juvenile) **Harrisia* sp. **Megathyrsus maximus* (small) **Cryptostegia grandiflora*	
Offsite					

Notes: The brigalow (*Acacia harpophylla)* is advanced regrowth, and classifiable as remnant for the purposes of RE mapping.

Site 10b

Location:E 267600

(MGA94)N 7382300

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 30/8/07

Locality description: Patch of belah on O'Grady property on Toonda – Port Alma Road, near link road to Marmor

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	15	10-18	60	Probably *Casuarina cristata* (sterile)	
Tree 2					
Tree 3					
Shrub 1	2	1-3	5	**Cryptostegia grandiflora* (only at edges of remnant) *Carissa ovata* Probably *Alchornea ulicifolia*	
Shrub 2					
Ground dominant	0.1	0.05-0.3	20	*Sporobolus* sp. bare ground (80%)	
Other ground species				Probably *Enchylaena tomentosa*	
Offsite				Chenopodiaceae (wiry) *Harrisia* sp.	

Notes: The belah (*Casuarina cristata*) may possibly be swamp oak (*Casuarina glauca*), but associated scrub species, and lack of saline-tolerant plants, suggest that *Casuarina cristata* is more likely. Hybrids are possible.

Site 10c

Location:E 267200

(MGA94)N 7382350

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Patch of brigalow on fenceline between O'Grady property and Hunter property on Toonda – Port Alma Road, near link road to Marmor

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Acacia harpophylla*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				Not recorded – confirmed as grazed	
Other ground species					
Offsite					

Notes: Viewed from about 100m away, in order to confirm the presence of brigalow (*Acacia harpophylla*)

Site 11a

Location:E269950

(MGA94)N7379320

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 30/8/07

Locality description: Howkins property on north side of Twelve Mile Road. Head waters of tributary of Pelican Creek.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Emergent	24	20-25	<1	*Eucalyptus tereticornis*	
Tree 1					
Tree 2					
Tree 3					
Shrub 1	3	1-4	10	*Eucalyptus coolabah* *Eucalyptus tereticornis*	
Shrub 2	1	1	<1	*Opuntia* sp. Probably *Citriobatus spinescens*	

Ground dominant				Ex pasture, and may be sown or planted with native regeneration species *Dichanthium* sp. *Indigofera* sp. *Sporobolus* sp.	
Other ground species				*Myoporum ellipticum* Asteraceae (white daisy with fat round burr) *Helichrysum* sp. *Crinum* sp. *Brachyscome* sp. *Probably Alectryon oleifolius* *Bryophyllum* sp.	
Offsite					

Notes: Riverine floodplain community with fenced-off regeneration area. Creek is broad flat cracking clay and appears to have salt residue in places. Southern bank was selected for sampling. Fenced off area is ex pasture, and is suspected to have been sown or planted with native regeneration species.

Site 11c

Location:E 270462

(MGA94)N 7379180

Zone 56

Level of detail (Detailed/Short): Short

Date: 30/8/07

Locality description: Twelve Mile Creek on Howkins Property, adjacent to Twelve Mile Road.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	15	12-18	Scattered	*Eucalyptus populnea* *Casuarina cunninghamiana*	
Tree 2	6	4-8	occasional	*Lysiphyllum carronii* Possibly *Terminalia* sp. Possibly *Alectryon oleifolius*	
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				Closely grazed *Sporobolus* sp. *Chloris* sp. *Atriplex* sp. Asteraceae (white daisy with fat round burr)	
Other ground species				Portulacaceae Euphorbiaceae	

Water's edge				*Cyperus polystachyos* *Typha* sp.	
Water surface				*Nymphoides* sp.	
Offsite					

Notes: Area is cleared pasture, with scattered trees near the banks of the creek. Swans at site.

Site 12

Location:E 270742

(MGA94)N 7379041

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 30/8/07

Locality description: Road reserve on Twelve Mile Road, adjacent to Howkins property Lot 29, DS37.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover	Stem count
Tree 1	26	25-28	15	*Eucalyptus tereticornis*		6
Tree 2	18	15-25	20	*Casuarina cristata* *Eucalyptus populnea*		3 4
Tree 3	12	8-15	1	*Eucalyptus tereticornis*		1
Shrub 1	3	2-4	1	*Melaleuca bracteata* *Eucalyptus tereticornis*		4 (=1 mallee) 1
Shrub 2	1	0.5-2	<1	*Acacia salicina* *Casuarina cristata*		
Ground dominant	0.1	0.05-0.5	20	*Probably Dichanthium* sp. (15%) *Sporobolus* sp. (5%) bare ground (15%) leaf litter (50%)		
Other ground species	0.1	0.05-0.5	15	Fabaceae (small yellow flower) *Brunoniella australis* **Sida rhombifolia* **Mimosa pudica* *Senecio* sp. Possibly *Sauropus* sp. *Paspalidium gracile* Possibly *Vernonia* sp.(purple fls) Lamiaceae (solitary opposite purple fls) *Euphorbia* sp. *Soliva* sp. *Myoporum ellipticum* *Verbena* sp. *Atriplex* sp.		

				Cirsium vulgare *Marsilea* sp. Asteraceae (white daisy with fat round burr)		
Offsite						

Notes: Very tall woodland. Relatively diverse ground cover compared with other sites on this field trip.

Site 13

Location:E 270882

(MGA94)N 7379472

Zone 56

Level of detail (Detailed/Short): Short

Date: 3/4/07

Locality description: Northern side of Twelve Mile Road adjacent to Marble Creek.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Cupaniopsis anacardioides* *Pouteria australis* *Trophis scandens* *Denhamia celastroides* *Melaleuca bracteata* *Alectryon diversifolius* *Carissa ovata* *Pittosporum spinescens* *Elattostachys xylocarpa* *Acacia fasciculifera* *Acacia salicina*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Small but dense patch of softwood scrub. *Melaleuca bracteata* tends to dominate the actual stream banks, with the softwood scrub species generally one tree back from the bank if the *Melaleuca* is there at that point.

Site 14

Location:E 271556

(MGA94)N 7379016

Zone 56

Level of detail (Detailed/Short): Short

Date: 1/9/07

Locality description: Marble Creek, on Howkins property Lot 28, DS37, on the south side of Twelve Mile Road.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	
Tree 1	9	6-12	90	*Cupaniopsis anacardioides* *Trophis scandens* *Elattostachys xylocarpa* *Jasminum didymum* subsp. *racemosum* *Brachychiton rupestris* *Brachychiton australis* *Homalium alnifolium* *Coatesia paniculata* *Acacia fasciculifera* *Ficus rubiginosa*	
Tree 2				Probably *Cadellia pentastylis* (listed as Vulnerable)	
Tree 3					
Shrub 1				*Austrosteenisia blackii* var. *blackii* *Carissa ovata*	
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Diverse linear patch of softwood scrub along the banks of Marble Creek. Gallery of scrub is only on or two trees wide on either side of creek, but arches over creek to form a canopy over the creek. The creek

is a deep “U”-shaped channel 10m wide, which was dry at the time of sampling, and has a firm, bare substrate (sometimes sparsely vegetated with herbs), not a loose sandy one. A plague of mosquitoes suggested there was moisture nearby. Species were recorded walking upstream from the fence across the creek near Twelve Mile Road. *Melaleuca bracteata* tends to dominate the actual stream banks, with the softwood scrub species generally one tree back from the bank if the *Melaleuca* was there at that point.

Site 16a

Location:E 276736

(MGA94)N 7376737

Zone 56

Level of detail (Detailed/Short): Short

Date: 31/8/07

Locality description: Hourigan Creek at Raglan

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	16	15-20	90	*Excoecaria agallocha* (dominant) *Melaleuca bracteata* **Cryptostegia grandiflora*	
Tree 2					
Tree 3					
Shrub 1				*Melaleuca linariifolia* **Senna pendula* var. *glabrata*	
Shrub 2					
Ground dominant				**Ruellia* sp.	
Other ground species					
Offsite					

Notes: Width of vegetation about 30m (including creek).

Site 16b

Location:E 277014

(MGA94)N 7376677

Zone 56

Level of detail (Detailed/Short): Short

Date: 31/8/07

Locality description: Bank of Hourigan Creek at Raglan

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	
Tree 1		to 20m		*Excoecaria agallocha* *Eucalyptus crebra* (on bank only)	
Tree 2					
Tree 3					
Shrub 1				**Cryptostegia grandiflora* *Melaleuca bracteata* (on bank only) *Alectryon oleifolius* (on bank only)	
Shrub 2				*Carissa ovata* *Geijera parviflora* **Senna pendula* var. *glabrata*	
Ground dominant				**Lantana camara*	
Other ground species				**Solanum seaforthianum*	
Offsite					

Notes:

Site 17

Location:E 277716

(MGA94)N 7376342

Zone 56

Level of detail (Detailed/Short): Short

Date: 31/8/07

Locality description: Raglan Creek at Raglan.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	variable	3-6	90	*Excoecaria agallocha* (channel) *Amyema* sp. (on *Excoecaria agallocha*) (occasional)	
Tree 2				*Avicennia marina* (banks) *Ficus* sp. (one plant)	
Tree 3					

Shrub 1				**Cryptostegia grandiflora*	
Shrub 2					
Ground dominant				mud and mangrove pneumatophores	
Other ground species				*Crassula* sp. (one plant)	
Offsite					

Notes: Site accessed from lower terrace used as horse paddock.

Site 18a

Location:E 278437

(MGA94)N 7376252

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 3/8/07

Locality description: Western side of Raglan Station (cattle property)

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	18	15-22	60	*Eucalyptus crebra*	
Tree 2	12	6-15	10	*Eucalyptus crebra* *Eucalyptus melanophloia* *Acacia disparrima* *Capparis lasiantha*	8 1 <1 <1
Tree 3	4	3-5	<1	*Eucalyptus crebra*	
Shrub 1	1.25	0.5-1.5	<1	*Citriobatus spinescens* **Opuntia stricta* *Capparis* sp. **Acacia nilotica*	
Shrub 2					
Ground dominant	0.1	0.05-0.4	50	Probably *Eragrostis* sp. Probably *Aristida* sp. loose rock 5% bare ground 10% leaf litter 40%	30 20
Other ground species				Lamiaceae *Glycine tabacina* *Amaranthus* sp. *Hibiscus* sp. *Breynia oblongifolia* *Gnaphalium involucratum* *Panicum* sp.	

				Glycine sp. **Sida cordifolia* **Stylosanthes* sp. **Bidens pilosa* *Alectryon oleifolius* Poaceae	
Offsite					

Notes:

Site 18b

Location:E 285236

(MGA94)N 7373881

Zone 56

Level of detail (Detailed/Short): Short

Date: 3/8/07

Locality description: Reedy Creek Road road reserve

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Eucalyptus populnea* *Eucalyptus crebra*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes:

Site 19

Location:E 288772

(MGA94)N 7370340

Zone 56

Level of detail (Detailed/Short): Short

Date: 1/9/07

Locality description: Eastern end of Raglan Station, north of Dart Creek Rd, off Raglan Station Rd

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1					
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				pasture grasses	
Other ground species					
Offsite					

Notes: Cleared for pasture. Site was selected to check for regrowth because imagery was unclear.

Site 20

Location:E 289237

(MGA94)N 7370003

Zone 56

Level of detail (Detailed/Short): Short

Date: 1/9/07

Locality description: North of Dart Creek Rd, off Raglan Station Rd

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Emergent		25-28	<5	*Eucalyptus crebra* (previous cohort)	
Tree 1					
Tree 2					
Tree 3					
Shrub 1		4-6		*Eucalyptus crebra* (regrowth) *Eucalyptus moluccana* (regrowth) *Acacia* spp. (including probably *Acacia leiocalyx*)	
Shrub 2				*Lantana camara*	
Ground dominant					

Other ground species					
Offsite					

Notes: Sites 19 and 20 were located to compare either side of fenceline. Side with Site 19 is cleared. Side with Site 20 is eucalypt regrowth with scattered emergents of original *Eucalyptus crebra*. Regrowth includes *Acacia* spp.

Site 21

Location:E 289944

(MGA94)N 7369315

Zone 56

Level of detail (Detailed/Short): Short

Date: 2/9/07

Locality description: Western side of Dart Creek Rd on Smith property

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	28			*Eucalyptus tereticornis*	
Tree 2				*Eucalyptus moluccana* (regrowth)	
Tree 3					
Shrub 1				*Acacia* sp.	
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Looks like regrowth of Eucalyptus moluccana from road but is actually a stand of *Eucalyptus tereticornis*, with advanced regrowth of *Eucalyptus moluccana* on the eastern edge.

Site 22a

Location:E 290309

(MGA94)N 7368849

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 2/9/07

Locality description: Eastern side of Dart Creek Rd on Smith property, on crest

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	18	15-20	40	*Eucalyptus crebra*	
Tree 2					

Tree 3					
Shrub 1	6	2-8	50	*Petalostigma pubescens* *Acacia disparrima* *Acacia* sp.1	30 10 10
Shrub 2	1.5	0.2-2	2	*Acacia* sp.1	
Ground dominant	0.1	0-0.2	11	*Themeda triandra* *Acacia* sp.1 Poaceae leaf litter 60% bare ground 20%	10 1 <1
Other ground species				*Lomandra multiflora* *Eragrostis* sp. *Brachyscome* sp. *Panicum* sp. Other species present but no further sampling considered necessary to confirm RE or find EVR spp.	
Offsite					

Notes: Other species present but no further sampling considered necessary to confirm RE or find EVR spp.

Site 22b

Location:E 290107

(MGA94)N 7368885

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 2/9/07

Locality description: Eastern side of Dart Creek Rd on Smith property, on flats

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	18	15-20	50	*Eucalyptus moluccana*	
Tree 2	8	5-15	2	*Eucalyptus moluccana*	
Tree 3					
Shrub 1	1.5	1-5	<1	*Eucalyptus moluccana*	
Shrub 2					
Ground dominant	0.05	0-0.1	20	Poaceae 1 – grazed short Poaceae 2 – grazed short *Cyperus* sp. litter 60% bare ground 20%	
Other ground species					

Offsite					

Notes:

Site 23

Location:E 291567

(MGA94)N 7367906

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 2/9/07

Locality description: 3km NW of Mt Larcom, off Popenia Rd, on Roulston property

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	22	18-25	30	*Eucalyptus moluccana*	
Tree 2	10	3-18	5	*Eucalyptus moluccana*	
Tree 3					
Shrub 1	2	1-3	5	*Acacia* sp. (as per Site 22a) *Eucalyptus moluccana*	4 1
Shrub 2					
Ground dominant			30	*Aristida* sp. leaf/bark/sticks/litter 70% bare ground 20%	30
Other ground species				*Capparis* sp. (as per Site 24 – juvenile) *Acacia* sp. (as per Site 22a and S1 layer here) Very few other species here – no more on actual site – very dry	
Offsite					

Notes: Very few species here –very dry

Site 24

Location:E 291113

(MGA94)N 7366892

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 2/9/07

Locality description: Between Ambrose and Mt Larcom between the railway and the powerline easement

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	24	20-26	40	*Eucalyptus moluccana*	
Tree 2	15	10-20	10	*Eucalyptus moluccana* *Eucalyptus crebra*	
Tree 3					

Shrub 1	5	2-10	5	*Eucalyptus moluccana* *Capparis* sp.	
Shrub 2		0.5-2	5	*Eucalyptus moluccana* **Lantana camara* *Alphitonia excelsa* **Acacia nilotica* *Carissa ovata*	
Ground dominant	0.05	0.02-0.4	70	*Paspalidium* sp. *Eragrostis* sp. *Hibiscus* sp.	
Other ground species				*Sida subspicata* *Panicum* sp. *Myoporum* sp. Other species present but no further sampling considered necessary to confirm RE or find EVR spp.	
Offsite					

Notes: Other species present but no further sampling considered necessary to confirm RE or find EVR spp.

Site 25 (species list from Brief Site 121, approx. 200m away)

Location:E 292156

(MGA94)N 7367360

Zone 56

Level of detail (Detailed/Short): Short

Date: 4/4/07

Locality description: Between Ambrose and Popenia Rd.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1					
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant				*Dichanthium sericeum* *Chloris truncata* *Eragrostis sororia* *Eragrostis* sp. *Euphorbia* sp. **Gomphrena* sp. *Eriachne* sp. *Panicum* sp. Chenopodiaceae	

				Sida sp. *Fimbristylis dichotoma* *Crinum pedunculatum* Asteraceae	
Other ground species					
Offsite					

Notes: Sample of grassland. Site 25 is located on a cleared expansion of what is probably remnant grassland. The species list from Brief Site 121, within the probably remnant part of the grassland approx. 200m away, was used here, since it was anticipated that the species composition would be fairly similar, and suitable for characterizing the grassland at Site 25.

Site 26

Location:E 292941

(MGA94)N 7366625

Zone 56

Level of detail (Detailed/Short): Short

Date: 2/9/07

Locality description: 2 km NW of Mt Larcom on Popenia Rd, on southern side of Semmler property

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Eucalyptus moluccana* *Eucalyptus crebra*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: No access permission at time of survey. Looked over fence, and appeared to be narrow band of remnant vegetation.

Site 27

Location:E 295573

(MGA94)N 7365518

Zone 56

Level of detail (Detailed/Short): Short

Date: 6/9/07

Locality description: Immediately NE of Mt Larcom showgrounds, on Hansen property.

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus moluccana*	
Tree 2				*Eucalyptus moluccana*	
Tree 3					
Shrub 1				*Eucalyptus moluccana*	
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: No access permission at time of survey. Looked over fence from NE corner of showgrounds, and appeared to be patchy regrowth of *Eucalyptus moluccana*. Some is advanced regrowth, and some is possibly remnant.

Site 28a

Location:E 297100

(MGA94)N 7363860

Zone 56

Level of detail (Detailed/Short): Short

Date: 2/9/07

Locality description: About 3km SE of Mt Larcom, on south side of road to Gladstone

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus moluccana* *Eucalyptus crebra* (only one tree) *Eucalyptus tereticornis* (lower slopes only)	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground					

dominant					
Other ground species					
Offsite					

Notes: Site 28a is a remote substitute. Viewed remotely (approx. 200m with binoculars from road).

Site 28b

Location:E 298000

(MGA94)N 7363000

Zone 56

Level of detail (Detailed/Short): Short

Date: 2/9/07

Locality description: About 4km SE of Mt Larcom, on south side of road to Gladstone

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				*Eucalyptus moluccana* *Eucalyptus tereticornis* (lower slopes only)	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Site 28b is a remote substitute. Viewed remotely (approx. 300m with binoculars from road). Larcom Creek immediately west has *Casuarina cunninghamiana* and *Melaleuca bracteata*, which helps to confirm overall species composition of riparian vegetation along Larcom Creek.

Site 29a

Location:E299300

(MGA94)N736010

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: Between Mt Larcom and Aldoga on Dept Infrastructure land

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				Expected species *Eucalyptus moluccana*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite.

Site 29b

Location:E 299275

(MGA94)N 7360360

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: Between Mt Larcom and Aldoga on Dept Infrastructure land

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				Expected species *Eucalyptus moluccana* *Eucalyptus crebra*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground					

dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite.

Site 29c

Location:E 299500

(MGA94)N 7360500

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: Between Mt Larcom and Aldoga on Dept Infrastructure land

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				Expected species *Casuarina cunninghamiana* *Eucalyptus tereticornis* *Callistemon viminalis*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Minor tributary of Larcom Creek. Access permission not granted and site not visible offsite.

Site 30a

Location:E 299580

(MGA94)N 7359470

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: Larcom Creek, between Mt Larcom and Aldoga on Dept Infrastructure land

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				Expected species *Casuarina cunninghamiana* *Corymbia tessellaris*	
Tree 2				Expected species *Callistemon viminalis*	
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite.

Site 30b

Location:E 297670

(MGA94)N 7358390

Zone 56

Level of detail (Detailed/Short): Short

Date:

Locality description: Larcom Creek on the Bruce Highway, south of Mt Larcom

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus tereticornis* *Casuarina cunninghamiana*	
Tree 2				*Callistemon viminalis*	
Tree 3					
Shrub 1					

Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: *Eucalytpus raveretiana* was **not** seen

Site 30c

Location:E 300590

(MGA94)N 7359500

Zone 56

Level of detail (Detailed/Short): Predicted

Date: N/A

Locality description: Minor tributary of Larcom Creek, on the southern side, between Mt Larcom and Aldoga on Dept Infrastructure land.

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				Expected species *Eucalyptus tereticornis*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite.

Site 31a

Location:E 301530

(MGA94)N 7359650

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: On Dept Infrastructure land west of Aldoga

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				Expected species *Eucalyptus tereticornis* *Eucalyptus moluccana*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: This remnant is undersized in the RE mapping, and the mapping polygon needs to be enlarged.

Access permission not granted and site not visible offsite.

Site 31b

Location:E 301400

(MGA94)N 7359740

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: On Dept Infrastructure land west of Aldoga

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				Expected species *Eucalyptus tereticornis*	
Tree 2					
Tree 3					
Shrub 1					

Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and site not visible offsite.

Site 31c

Location:E 302070

(MGA94)N 7359760

Zone 56

Level of detail (Detailed/Short): Predicted Short Site

Date: N/A

Locality description: On Dept Infrastructure land west of Aldoga

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1				Expected species based on offsite observation *Eucalyptus crebra*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Access permission not granted and core of site not visible offsite. Edge of remnant viewed remotely (approx. 200m with binoculars from fenceline).

Site 32

Location:E 302630

(MGA94)N 7360130

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Aldoga, south of the highway between Mt Larcom and Yarwun

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	20	18-24	50	*Eucalyptus crebra* *Eucalyptus tereticornis*	25 25
Tree 2	8	4-10	10	*Acacia* sp. *Eucalyptus crebra* *Eucalyptus exserta*	4 4 2
Tree 3					
Shrub 1	1.5	1-2	2	*Eucalyptus crebra* *Acacia* sp. “red stem as per sites 33,34”	
Shrub 2					
Ground dominant	0.5	0.05-0.5	60	*Panicum* sp. “as per site 34” *Heteropogon contortus* leaf litter 30% bare ground 10%	30 25
Other ground species				*Sida subspicata* *Myoporum* sp. *Acacia* sp. indet. *Eucalyptus crebra* *Dichanthium* sp. *Vernonia cinerea*	
Offsite					

Notes: Flats (low area)

Site 33

Location:E 302850

(MGA94)N 7360215

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Aldoga, south of the highway between Mt Larcom and Yarwun

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	22	18-24	60	*Corymbia citriodora* *Eucalyptus exserta* *Eucalyptus crebra*	30 15 15
Tree 2	10	8-12	15	*Eucalyptus exserta* *Acacia* sp. “thin lanceolate”	13 2
Tree 3					
Shrub 1	1	0.5-3	3	*Capparis* sp. *Eucalyptus crebra*	
Shrub 2					
Ground dominant	0.3	0.05-1.5		*Aristida* sp. *Glycine* sp. *Lomandra* sp.	15 2 2
Other ground species				**Melinis repens* *Capparis* sp. *Acacia* sp. “red stem” *Dianella* sp. *Cyperus* sp. *Breynia oblongifolia*	
Offsite					

Notes: Crest

Site 34

Location:E 303132

(MGA94)N 7360240

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Aldoga, south of the highway between Mt Larcom and Yarwun

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	25	20-28	60	*Eucalyptus moluccana* *Corymbia citriodora* *Eucalyptus crebra*	10 25 25
Tree 2	10	6-20	12	*Lophostemon suaveolens* *Corymbia citriodora*	10 2
Tree 3					
Shrub 1	2	0.5-6	15	*Eucalyptus crebra* *Corymbia citriodora* *Acacia disparrima* *Capparis* sp. *Dodonaea triquetra*	5 5 5 <1 <1
Shrub 2					
Ground dominant	0.6	0.05-1.5	60	*Panicum* sp. *Heteropogon contortus* *Lomandra laxa* *Sida subspicata* litter 50% bare ground 10%	30 10 10 5
Other ground species				*Dianella* sp. *Acacia disparrima* *Cymbopogon refractus* Fabaceae “robust trifoliolate” *Eucalyptus crebra* **Passiflora* sp. *Alphitonia excelsa* *Acacia leiocalyx* Probably *Geitonoplesium cymosum*	
Offsite					

Notes: Drainage depression

Site 35

Location:E 304630

(MGA94)N 7360240

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Aldoga, near Rio Tinto plant

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	16	10-18	50	*Corymbia citriodora* *Eucalyptus crebra* *Eucalyptus tereticornis*	24 25 1
Tree 2	5	3-8	5	*Corymbia citriodora* *Eucalyptus crebra*	2 3
Tree 3					
Shrub 1	10	8-10	10	*Acacia disparrima* *Lophostemon confertus*	8 2
Shrub 2	1.5	0.5-3		*Eucalyptus crebra* *Acacia disparrima* *Alphitonia excelsa* *Sida subspicata*	
Ground dominant	0.2	0.05-1	60	*Aristida* sp. *Heteropogon contortus* leaf litter 40% loose rock 2% bare ground 1%	25 25
Other ground species				**Lantana montevidensis* *Oxalis corniculata* **Sida cordifolia* Possibly *Pterocaulon* sp. *Sida subspicata* *Cyperus* sp. *Vernonia cinerea*	
Offsite					

Notes: Species were sampled from edge of pipeline easement and not within Rio Tinto land

Site 36

Location:E 305916

(MGA94)N 7360930

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Between Aldoga and Yarwun

Stratum	**Av. Top Height**	**Height Range**	**Total Cover %**	**Key Species**	**Indiv. Cover**
Tree 1	12	8-16	15	*Eucalyptus crebra*	
Tree 2	6	4-8	5	*Eucalyptus crebra* *Corymbia* sp. (sterile – either *C.intermedia* or *C.clarksoniana)*	
Tree 3					
Shrub 1	2	1.5-4	5	*Eucalyptus crebra* *Alphitonia excelsa* *Sida subspicata* **Lantana camara* *Corymbia* sp. (as for T1 layer) *Lophostemon suaveolens*	
Shrub 2					
Ground dominant	0.5	0.05-1.5	75	*Heteropogon contortus* litter 10% (and up to 30% if dead grass still attached to live material is counted) loose and fixed rock 10% bare ground 10%	70
Other ground species				**Lantana montevidensis* *Oxalis corniculata* Amaranthaceae Asteraceae indet. (rosette only) *Cheilanthes* sp. **Bidens pilosa* *Grewia latifolia* **Melinis repens* *Phyllanthus* sp. *Acacia disparrima* **Passiflora* sp.	
Offsite					

Notes: Upper slope of steep hill on north side of pipeline

Site 37a

Location:E 306250

(MGA94)N 7361010

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 4/9/07

Locality description: Between Aldoga and Yarwun

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	22	16-24	30	*Lophostemon suaveolens* *Eucalyptus tereticornis* *Eucalyptus crebra* *Corymbia tessellaris* *Corymbia clarksoniana*	20 8 2 <1 <1
Tree 2	7	6-8	5	*Lophostemon suaveolens* *Eucalyptus crebra* *Polyscias elegans* *Erythrina vespertilio* *Eucalyptus crebra*	1 1 1 1 1
Tree 3					
Shrub 1	2	0.5-4	10	**Lantana camara* *Sida subspicata* *Lophostemon suaveolens* *Ficus opposita* *Jagera pseudorhus* *Hibiscus* sp.	
Shrub 2					
Ground dominant		0.05-1.5	>70	**Megathyrsus maximus* **Melinis minutiflora* *Heteropogon contortus* litter 20% bare ground 5%	50 - 20
Other ground species				**Stachytarpheta jamaicensis* **Passiflora* sp. *Sida subspicata* **Bidens pilosa* *Citriobatus spinescens* *Lomandra multiflora*	
Offsite					

Notes: Low lying area on north side of pipeline

Site 37b

Location:E 306180

(MGA94)N 7361000

Zone 56

Level of detail (Detailed/Short): Short

Date: 4/9/07

Locality description: Between Aldoga and Yarwun

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Brachychiton australis* *Erythrina vespertilio* *Polyscias elegans* *Carissa ovata* *Citriobatus spinescens* *Rapanea* sp. *Ficus opposita* *Ficus* sp. "no sap" *Melia azedarach* *Cupaniopsis anacardioides* *Mallotus philippensis* *Capparis* sp.	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Low lying area on north side of pipeline with small patch of scrub species at base of hill

Site 38

Location:E 307453

(MGA94)N 7361722

Zone 56

Level of detail (Detailed/Short): Short

Date: 3/9/07

Locality description: Between Aldoga and Yarwun

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	25	20-28*	70*	*Eucalyptus tereticornis* *Corymbia tessellaris* *Melaleuca fluviatilis* *Melaleuca* sp. (probably *M.quinquenervia*)	
Tree 2				*Lophostemon suaveolens* *Cupaniopsis anacardioides* *Jagera pseudorhus*	
Tree 3					
Shrub 1				Myrtaceae spp. (no EVR spp.)	
Shrub 2					
Ground dominant					
Other ground species				**Megathyrsus maximus* **Lantana camara* *Cyperus* sp.	
Offsite					

Notes: Area had been burnt off within the last few days. Site is definitely remnant, but only the overstorey can be identified

*surrounding area (non-riverine) had height range 15-22m and cover 40%

Site 39a

Location:E 311000

(MGA94)N 7362700

Zone 56

Level of detail (Detailed/Short): Detailed

Date: 3/9/07

Locality description: Yarwun (east of Yarwun township)

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1	25	20-28	50	*Eucalyptus crebra* *Corymbia citriodora* *Eucalyptus acmenoides*	24 25 1
Tree 2	8	6-20	10	*Eucalyptus crebra* *Corymbia citriodora* *Lophostemon suaveolens* *Eucalyptus acmenoides*	4 4 1 1
Tree 3					
Shrub 1	3	1-6	15	*Eucalyptus crebra* *Acacia disparrima* *Xanthorrhoea johnsonii* *Acacia leiocalyx* *Lophostemon suaveolens* *Allocasuarina torulosa* *Capparis* sp. *Eustrephus latifolius*	8 1 1 1 1 1 1 1
Shrub 2					
Ground dominant	0.4	0.05-2	70	*Themeda triandra* litter 20% bare ground 10%	
Other ground species				*Lomandra longifolia*	
Offsite				Gullies on either side of main site: *Melaleuca fluviatilis* *Acacia* sp. *Callistemon viminalis* probably *Casuarina cunninghamiana* **Megathyrsus maximus*	

Notes: Relatively undisturbed area despite being fairly close to an existing pipeline

Site 39b

Location:E 311750

(MGA94)N 7362800

Zone 56

Level of detail (Detailed/Short): Short

Date: 3/9/07

Locality description: Yarwun (east of Yarwun township)

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Tree 1				*Eucalyptus crebra* *Corymbia citriodora* *Corymbia clarksoniana*	
Tree 2					
Tree 3					
Shrub 1					
Shrub 2					
Ground dominant					
Other ground species					
Offsite					

Notes: Highly disturbed area, just south of Comalco industrial site

Site 40

Location:E 311000

(MGA94)N 7364307

Zone 56

Level of detail (Detailed/Short): Short

Date: 3/9/07

Locality description: Boat Creek, north of Yarwun industrial estate

Stratum	Av. Top Height	Height Range	Total Cover %	Key Species	Indiv. Cover
Emergent		25-35		*Corymbia tessellaris*	
Tree 1	20		100	*Castanospermum australe* *Melia azedarach* *Syzygium australe* *Mallotus philippensis* *Harpullia pendula*	
Tree 2					
Tree 3					
Shrub 1					

Shrub 2					
Ground dominant					
Other ground species					
Offsite				*Corymbia tessellaris* on terrace where pipeline might run. Further downstream: *Casuarina cunninghamiana* *Lophostemon suaveolens*	

Notes:

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: Plants (including other non-animals such as fungi and protists)
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: 23.26 to 23.89
Longitude: 150.4 to 150.8
Email: dcjohnson@wbmpl.com.au
Date submitted: Tuesday 07 Aug 2007 16:58:54
Date extracted: Tuesday 07 Aug 2007 17:01:27

The number of records retrieved = 22

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	cycads	Cycadaceae	*Cycas megacarpa*			E	E	22/13
plants	cycads	Cycadaceae	*Cycas ophiolitica*	Marlborough blue		E	E	14/14
plants	higher dicots	Acanthaceae	*Graptophyllum excelsum*			R		8/5
plants	higher dicots	Apocynaceae	*Alyxia magnifolia*			R		2
plants	higher dicots	Apocynaceae	*Parsonsia lenticellata*	narrow-leaved parsonsia		R		4
plants	higher dicots	Asclepiadaceae	*Marsdenia brevifolia*			V	V	1/1
plants	higher dicots	Combretaceae	*Dansiea elliptica*			R		1/1
plants	higher dicots	Combretaceae	*Macropteranthes leiocaulis*			R		10/10
plants	higher dicots	Combretaceae	*Macropteranthes fitzalanii*			R		1
plants	higher dicots	Euphorbiaceae	*Actephila sessilifolia*			R		1
plants	higher dicots	Lamiaceae	*Callicarpa thozetii*			R		1/1
plants	higher dicots	Mimosaceae	*Acacia pubicosta*			R		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus raveretiana*	black ironbox		V	V	2/1
plants	higher dicots	Myrtaceae	*Decaspermum struckoilicum*			E		10/5
plants	higher dicots	Myrtaceae	*Choricarpia subargentea*	giant ironwood		R		3/1
plants	higher dicots	Proteaceae	*Hakea trineura*			V	V	1/1
plants	higher dicots	Sapindaceae	*Atalaya rigida*			R		7/1
plants	higher dicots	Sapindaceae	*Cossinia australiana*			E	E	4
plants	higher dicots	Sapindaceae	*Atalaya calcicola*			R		5/4
plants	higher dicots	Stackhousiaceae	*Stackhousia tryonii*			R		4/4
plants	lower dicots	Hernandiaceae	*Hernandia bivalvis*	cudgerie		R		10/3
plants	monocots	Arecaceae	*Livistona drudei*	Halifax fan palm		V		1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: Plants (including other non-animals such as fungi and protists)
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: 23.26 to 23.89
Longitude: 150.8 to 151.22
Email: dcjohnson@wbmpl.com.au
Date submitted: Tuesday 07 Aug 2007 16:59:43
Date extracted: Tuesday 07 Aug 2007 17:01:46

The number of records retrieved = 20

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	cycads	Cycadaceae	*Cycas megacarpa*			E	E	3/2
plants	ferns	Aspleniaceae	*Asplenium pellucidum*			V	V	2
plants	higher dicots	Acanthaceae	*Graptophyllum excelsum*			R		7/2
plants	higher dicots	Apocynaceae	*Alyxia magnifolia*			R		7/2
plants	higher dicots	Apocynaceae	*Parsonsia larcomensis*			V	V	4/4
plants	higher dicots	Apocynaceae	*Parsonsia lenticellata*	narrow-leaved parsonsia		R		8
plants	higher dicots	Celastraceae	*Denhamia parvifolia*			V	V	1
plants	higher dicots	Combretaceae	*Dansiea elliptica*			R		9/6
plants	higher dicots	Combretaceae	*Macropteranthes leiocaulis*			R		3/3
plants	higher dicots	Combretaceae	*Macropteranthes fitzalanii*			R		3/1
plants	higher dicots	Euphorbiaceae	*Actephila sessilifolia*			R		8/6
plants	higher dicots	Mimosaceae	*Acacia storyi*			R		2/1
plants	higher dicots	Rutaceae	*Philotheca acrolopha*			V	V	1
plants	higher dicots	Rutaceae	*Zieria sp. (Mt Larcom N.Gibson TOI8)*			V		4/4
plants	higher dicots	Sapindaceae	*Atalaya rigida*			R		11/8
plants	higher dicots	Sapindaceae	*Atalaya calcicola*			R		1/1
plants	higher dicots	Sapindaceae	*Cupaniopsis shirleyana*			V	V	10/8
plants	higher dicots	Sapindaceae	*Atalaya collina*			E	E	3/2
plants	higher dicots	Simaroubaceae	*Quassia bidwillii*	quassia		V	V	2/2
plants	lower dicots	Hernandiaceae	*Hernandia bivalvis*	cudgerie		R		8/4

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Presumed Extinct (PE), Endangered (E), Vulnerable (V), Rare (R), Common (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government
Department of the Environment, Water, Heritage and the Arts

Protected Matters Search Tool

You are here: Environment Home > EPBC Act > Search

3 July 2008 10:28

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

You may wish to print this report for reference before moving to other pages or websites.

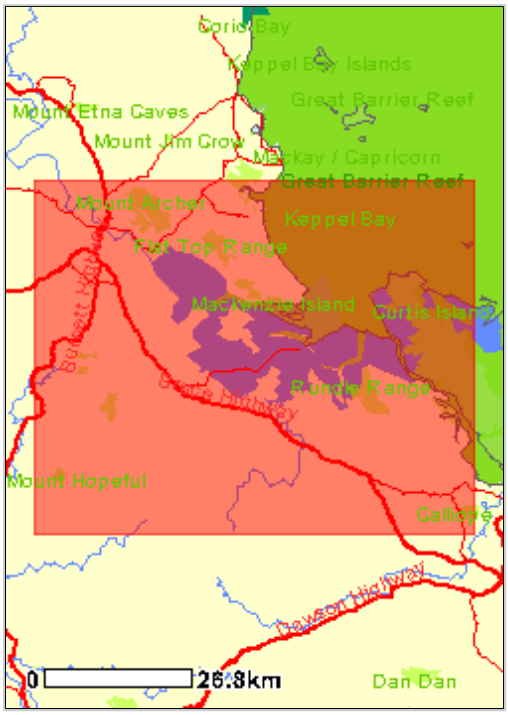
The Australian Natural Resources Atlas at http://www.environment.gov.au/atlas may provide further environmental information relevant to your selected area. Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

---

Search Type: Area

Buffer: 1 km

Coordinates: -23.2908,150.3897, -23.2908,151.1667, -23.9167,151.1667, -23.9167,150.3897



Report Contents:

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Significance:	1

(Ramsar Sites)

Commonwealth Marine Areas:	None
Threatened Ecological Communities:	2
Threatened Species:	44
Migratory Species:	34

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits/index.html.

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Places on the RNE:	50
Listed Marine Species:	72
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	15
Other Commonwealth Reserves:	1
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

World Heritage Properties [Dataset Information]

Great Barrier Reef QLD

National Heritage Places [Dataset Information]

Great Barrier Reef QLD

Wetlands of International Significance [Dataset Information] (Ramsar Sites)	
SHOALWATER AND CORIO BAYS AREA	Within same catchment as Ramsar site

Threatened Ecological Communities [Dataset Information]	Status	Type of Presence
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Community known to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area

Threatened Species [Dataset Information]	Status	Type of Presence
Birds		
Epthianura crocea macgregori Yellow Chat (Dawson)	Critically Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern)	Vulnerable	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern)	Endangered	Species or species habitat likely to occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale	Vulnerable	Breeding known to occur within area
Nyctophilus timoriensis (South-eastern form) Eastern Long-eared Bat	Vulnerable	Species or species habitat may occur within area
Xeromys myoides Water Mouse, False Water Rat	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle	Endangered	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Vulnerable	Species or species habitat may occur within area
Delma torquata Collared Delma	Vulnerable	Species or species habitat may occur within area
Denisonia maculata Ornamental Snake	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle, Luth	Vulnerable	Species or species habitat may occur within area

Egernia rugosa Yakka Skink	Vulnerable	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle	Vulnerable	Species or species habitat may occur within area
Furina dunmalli Dunmall's Snake	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea Pacific Ridley, Olive Ridley	Endangered	Species or species habitat may occur within area
Natator depressus Flatback Turtle	Vulnerable	Breeding known to occur within area
Paradelma orientalis Brigalow Scaly-foot	Vulnerable	Species or species habitat likely to occur within area
Rheodytes leukops Fitzroy Tortoise	Vulnerable	Species or species habitat may occur within area
Sharks		
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish	Vulnerable	Species or species habitat may occur within area
Rhincodon typus Whale Shark	Vulnerable	Species or species habitat may occur within area
Plants		
Atalaya collina	Endangered	Species or species habitat likely to occur within area
Bosistoa selwynii Heart-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
Bosistoa transversa Three-leaved Bosistoa	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme Miniature Moss-orchid	Vulnerable	Species or species habitat likely to occur within area
Corymbia xanthope	Vulnerable	Species or species habitat likely to occur within area
Cossinia australiana Cossinia	Endangered	Species or species habitat likely to occur within area
Cupaniopsis shirleyana Wedge-leaf Tuckeroo	Vulnerable	Species or species habitat likely to occur within area
Cycas ophiolitica	Endangered	Species or species habitat likely to occur within area
Decaspermum struckoilicum	Endangered	Species or species habitat likely to occur within area
Eucalyptus raveretiana Black Ironbox	Vulnerable	Species or species habitat likely to occur within area
Leucopogon cuspidatus	Vulnerable	Species or species habitat likely to occur within area
Parsonsia larcomensis	Vulnerable	Species or species habitat likely to occur within area
Pimelea leptospermoides	Vulnerable	Species or species habitat likely to occur within area
Pultenaea setulosa	Vulnerable	Species or species habitat likely to occur within area
Quassia bidwillii Quassia	Vulnerable	Species or species habitat likely to occur within area
Taeniophyllum muelleri Minute Orchid, Ribbon-root Orchid	Vulnerable	Species or species habitat may occur within area

Migratory Species [Dataset Information]	Status	Type of Presence
Migratory Terrestrial Species		
Birds		
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Hirundo rustica Barn Swallow	Migratory	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Species or species habitat likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Migratory Wetland Species		
Birds		
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Migratory	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift	Migratory	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Migratory	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Migratory	Breeding likely to occur within area
Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Sterna albifrons Little Tern	Migratory	Species or species habitat may occur within area
Migratory Marine Species		
Mammals		
Balaenoptera edeni Bryde's Whale	Migratory	Species or species habitat may occur within area
Balaenoptera musculus Blue Whale	Migratory	Species or species habitat may occur within area
Dugong dugon	Migratory	Species or species habitat likely to occur

Dugong		within area
Megaptera novaeangliae Humpback Whale	Migratory	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin	Migratory	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca	Migratory	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Migratory	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle	Migratory	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Migratory	Species or species habitat may occur within area
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Migratory	Species or species habitat likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle, Luth	Migratory	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle	Migratory	Species or species habitat may occur within area
Lepidochelys olivacea Pacific Ridley, Olive Ridley	Migratory	Species or species habitat may occur within area
Natator depressus Flatback Turtle	Migratory	Breeding known to occur within area
Sharks		
Rhincodon typus Whale Shark	Migratory	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Dataset Information]	Status	Type of Presence
Birds		
Anseranas semipalmata Magpie Goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba Great Egret, White Egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis Cattle Egret	Listed - overfly marine area	Breeding likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus	Listed -	Species or species habitat may occur within

White-throated Needletail	overfly marine area	area
Hirundo rustica Barn Swallow	Listed - overfly marine area	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel	Listed	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Listed - overfly marine area	Species or species habitat likely to occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose	Listed - overfly marine area	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel	Listed - overfly marine area	Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Listed - overfly marine area	Species or species habitat may occur within area
Sterna albifrons Little Tern	Listed	Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong	Listed	Species or species habitat likely to occur within area
Ray-finned fishes		
Acentronura tentaculata Hairy Pygmy Pipehorse	Listed	Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish	Listed	Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys flavofasciatus	Listed	Species or species habitat may occur within

Yellow-banded Pipefish, Network Pipefish		area
Corythoichthys haematopterus Reef-top Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys paxtoni Paxton's Pipefish	Listed	Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish	Listed	Species or species habitat may occur within area
Doryrhamphus excisus Indian Blue-stripe Pipefish, Blue-stripe Pipefish	Listed	Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish	Listed	Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish	Listed	Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish	Listed	Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish	Listed	Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish	Listed	Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish	Listed	Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish	Listed	Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish	Listed	Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish	Listed	Species or species habitat may occur within area
Hippocampus bargibanti Pygmy Seahorse	Listed	Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse	Listed	Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse	Listed	Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse	Listed	Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish	Listed	Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish	Listed	Species or species habitat may occur within area
Micrognathus brevirostris Thorn-tailed Pipefish	Listed	Species or species habitat may occur within area
Nannocampus pictus Painted Pipefish, Reef Pipefish	Listed	Species or species habitat may occur within area
Solegnathus hardwickii Pipehorse	Listed	Species or species habitat may occur within area
Solenostomus cyanopterus Blue-finned Ghost Pipefish, Robust Ghost Pipefish	Listed	Species or species habitat may occur within area
Solenostomus paradoxus	Listed	Species or species habitat may occur within

Harlequin Ghost Pipefish, Ornate Ghost Pipefish		area
Syngnathoides biaculeatus Double-ended Pipehorse, Alligator Pipefish	Listed	Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bend Stick Pipefish, Short-tailed Pipefish	Listed	Species or species habitat may occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake	Listed	Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake	Listed	Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake	Listed	Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake	Listed	Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake	Listed	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle	Listed	Species or species habitat may occur within area
Chelonia mydas Green Turtle	Listed	Species or species habitat may occur within area
Crocodylus porosus Estuarine Crocodile, Salt-water Crocodile	Listed	Species or species habitat likely to occur within area
Dermochelys coriacea Leathery Turtle, Leatherback Turtle, Luth	Listed	Species or species habitat may occur within area
Disteira kingii Spectacled Seasnake	Listed	Species or species habitat may occur within area
Disteira major Olive-headed Seasnake	Listed	Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake	Listed	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle	Listed	Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake	Listed	Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake	Listed	Species or species habitat may occur within area
Laticauda colubrina a sea krait	Listed	Species or species habitat may occur within area
Laticauda laticaudata a sea krait	Listed	Species or species habitat may occur within area
Lepidochelys olivacea Pacific Ridley, Olive Ridley	Listed	Species or species habitat may occur within area
Natator depressus Flatback Turtle	Listed	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake	Listed	Species or species habitat may occur within area
Whales and Other Cetaceans [Dataset Information]	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale	Cetacean	Species or species habitat may occur within area
Balaenoptera musculus	Cetacean	Species or species habitat may occur within

Blue Whale		area
Delphinus delphis Common Dolphin	Cetacean	Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus	Cetacean	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale	Cetacean	Breeding known to occur within area
Orcaella brevirostris Irrawaddy Dolphin	Cetacean	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca	Cetacean	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin	Cetacean	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin	Cetacean	Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin	Cetacean	Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin	Cetacean	Species or species habitat may occur within area

Commonwealth Lands [Dataset Information]

Defence

Places on the RNE [Dataset Information]
Note that not all Indigenous sites may be listed.

Historic

ABC Radio Studios QLD

Alexandra Bridge QLD

Amla QLD

Archer Park Railway Station (former) QLD

Brahman House QLD

Bulletin Building QLD

Central School and Commonwealth Bank Group QLD

Coronation Lamp QLD

Glenmore Homestead Complex (former) QLD

Gracemere Homestead QLD

Harbour Board Building (former) QLD

House QLD

Ken Yen Kee Store (former) QLD

Masonic Hall QLD

Mater Misericordiae Hospital QLD

Morgan Street Shop Group QLD

Mount Morgan Cemetery QLD

Mount Morgan Courthouse and Police Station QLD

Mount Morgan Mine Site and Structures QLD

Mount Morgan Post Office QLD

Mount Morgan Railway Station and Water Tank (former) QLD

Mount Morgan Township QLD

Normanby Hotel (former) QLD
Old School of Arts QLD
Our Lady of Good Counsel Convent (former), Hall and Tower QLD
Quay Street Streetscape QLD
Railway Roundhouse QLD
Rockhampton Botanic Gardens QLD
Rockhampton Court House Precinct QLD
Rockhampton Customs House (former) QLD
Rockhampton Post Office QLD
Rockhampton Technical College QLD
Rockhampton Town Hall QLD
Rockhampton War Memorial and Surrounds QLD
Schotia Place QLD
Shandon QLD
St Christophers Chapel QLD
St Josephs Catholic Cathedral QLD
St Pauls Anglican Cathedral Offices QLD
St Pauls Anglican Cathedral QLD
St Peters Catholic Church QLD
T and G Building QLD
The Supreme Court QLD
Tobruk House QLD
Wisemans Cottage QLD

Natural

Balaclava Island and The Narrows QLD
Curtis Island (part) QLD
Great Barrier Reef Region QLD
Old Lakes Creek Quarry QLD
Peak Island QLD

Extra Information

State and Territory Reserves [Dataset Information]

Bouldercombe Gorge Resource Reserve, QLD
Cawarral Creek Fish Habitat Area, QLD
Flat Top Range Resource Reserve, QLD
Keppel Bay Islands National Park (Scientific), QLD
Keppel Bay Islands National Park, QLD
Keppel Sands Conservation Park, QLD
Limestone Creek Conservation Park, QLD
MacKenzie Island Conservation Park, QLD
Mackay/Capricorn Marine Park, QLD
Mount Archer National Park, QLD
Mount Hopeful Conservation Park, QLD
Rodds Bay Dugong Protection Area, QLD
Rundle Range National Park, QLD

Rundle Range Resource Reserve, QLD

Unnamed Scientific Area, QLD

Other Commonwealth Reserves [Dataset Information]

Great Barrier Reef Marine Park, COM

Regional Forest Agreements [Dataset Information]
Note that all RFA areas including those still under consideration have been included.

South East Queensland RFA, Queensland

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the *Environment Protection and Biodiversity Conservation Act 1999*. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under "type of presence". For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the migratory and marine provisions of the Act have been mapped.

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites;
- seals which have only been mapped for breeding sites near the Australian continent.

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgments

This database has been compiled from a range of data sources. The Department acknowledges the following custodians who have contributed valuable data and advice:

- New South Wales National Parks and Wildlife Service
- Department of Sustainability and Environment, Victoria
- Department of Primary Industries, Water and Environment, Tasmania
- Department of Environment and Heritage, South Australia Planning SA
- Parks and Wildlife Commission of the Northern Territory
- Environmental Protection Agency, Queensland
- Birds Australia
- Australian Bird and Bat Banding Scheme
- Australian National Wildlife Collection
- Natural history museums of Australia
- Queensland Herbarium
- National Herbarium of NSW
- Royal Botanic Gardens and National Herbarium of Victoria
- Tasmanian Herbarium
- State Herbarium of South Australia
- Northern Territory Herbarium
- Western Australian Herbarium
- Australian National Herbarium, Atherton and Canberra
- University of New England
- Other groups and individuals

ANUCliM Version 1.8, Centre for Resource and Environmental Studies, Australian National University was used extensively for the production of draft maps of species distribution. Environment Australia is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Last updated:

Department of the Environment, Water, Heritage and the Arts
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

Appendix E2.5 – Biodiversity Values

Biodiversity Values

The following information was provided by EPA (2005c) as part of the Biodiversity Planning Assessment process:

Biodiversity Values

Biodiversity Planning Assessments (BPA) are developed in two stages: 1) Diagnostic Criteria, and 2) Expert Panel Criteria. The stage 1 Diagnostic Criteria involves the integration of ecological Criteria using the Biodiversity Assessment and Mapping Methodology (BAMM) (EPA,2002) to determine the relative Biodiversity Significance. The stage 2 Expert Panel Criteria allows for the refinement of the mapped information from stage 1 by incorporating local knowledge and expert opinion.

The (BAMM) methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the Biodiversity Status of REs recognised by the EPA.

Biodiversity Planning Assessments assign three levels of overall Biodiversity Significance:

> **State Significance** – Areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales.
> **Regional Significance** – Areas assessed as being significant for biodiversity at the subbioregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
> **Local Significance and or Other Values** – Areas assessed as not being significant for biodiversity at State or Regional scales. Local values are of significance at the local government scale.

For further information refer to the Biodiversity Assessment and Mapping Methodology (EPA, 2002).

1.1.1 Diagnostic Criteria

STAGE 1 Diagnostic Criteria:

1. **Habitat for EVR Taxa (Criteria A)** – this criterion brings together information on Endangered, Vulnerable and Rare (EVR) taxa using buffering of recorded sites in the absence of Habitat Suitability Maps (HSM) for species. HSMs are gradually being developed and will progressively replace point records of species.
2. **Ecosystem Value (Criteria B)** – this criterion combines a number of elements including the Biodiversity Status of Regional Ecosystems, the presence of poorly conserved Regional Ecosystems, the presence of significant wetlands, and areas of national importance such as World Heritage Areas and Ramsar Sites.
3. **Tract Size (Criteria C)** – this criterion is a measure of the relative size of tracts of vegetation in the landscape.
4. **Relative Size of Regional Ecosystems (Criteria D)** – this criterion classifies the relative size of each example of a Regional Ecosystem. Patches are compared with all other occurrences of the same Regional Ecosystem.

5. **Condition (Criteria E)** – this criterion represents the quality of remnants judged by the extent to which they resemble their natural condition.
6. **Ecosystem Diversity (Criteria F)** – this criterion reflects the degree to which Regional Ecosystems are 'packed' within an area. That is, an area with high Ecosystem Diversity will have relatively many Regional Ecosystems and ecotones.
7. **Context and Connection (Criteria G)** – this criterion represents the extent to which a Remnant Unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems, and the degree to which a Remnant Unit is connected to other vegetation.

1.1.2 Expert Panel Criteria

8. **Essential and General Habitat for Priority Taxa (Criteria H) -** this criterion can be used to identify Essential and General Habitat for EVR and other Priority Taxa additional to that derived under Diagnostic Criterion A. Information sources include expert and local knowledge, technical reports and papers, and modelled maps of Essential and General Habitat.

9. **Special Biodiversity Values (Criteria I) -** Areas with Special Biodiversity Values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with Special Biodiversity Values can include the following:
    - Centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
    - Wildlife refugia (Morton *et al.* 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
        1. Areas with concentrations of disjunct populations.
    - Areas with concentrations of taxa at the limits of their geographic ranges.
    - Areas with high species richness.
    - Areas with concentrations of relictual populations (ancient and primitive taxa).
    - Areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
    - An artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
    - Areas with a high density of hollow-bearing trees that provide habitat for animals.
    - Breeding or roosting sites used by a significant number of individuals.

Corridors (Criteria J) - Areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity including regrowth, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Draft Policy Statement: Use of environmental offsets under the *Environment Protection and Biodiversity Conservation Act 1999*

August 2007

Australian Government

Department of the Environment and Water Resources

Environment Protection and Biodiversity Conservation Act 1999
Draft Environmental Offsets Policy

'Environmental offsets' are broadly understood to mean actions taken by developers to compensate for the adverse impacts of their developments. The Australian Government is increasingly considering environmental offsets as part of its process of taking a decision on whether to approve proposed actions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The purpose of this draft policy statement is to outline the Australian Government's position on the use of environmental offsets under the EPBC Act. The aim is to ensure the consistent, transparent and equitable use of environmental offsets under the Act. This draft policy should also provide developers, the community and other governments with greater certainty about the Australian Government's position on a range of issues including: what is an environmental offset; when is it appropriate to consider offsets as part of a project and what is the appropriate nature and scale of environmental offsets?

Comments on this draft policy statement are being invited from interested groups and individuals until [date]. The Australian Government will take any comments received into account when finalising this policy.

This document presents a very short summary of the Australian Government's draft policy on environmental offsets. A more detailed discussion of the issues associated with this policy statement can be found in the companion document 'Use of Environmental Offsets under the *Environment Protection and Biodiversity Conservation Act 1999* – Discussion Paper'.

What are environmental offsets?

There are many definitions of environmental offsets. The Australian Government defines environmental offsets as 'actions taken ***outside a development site*** that compensate for the impacts of that development - including direct, indirect or consequential impacts'.

Environmental offsets provide an opportunity to achieve long-term conservation outcomes whilst providing flexibility for proponents seeking to undertake development which will have environmental impacts.

Environmental offsets are not intended to make proposals with unacceptable impacts acceptable. They are simply intended be provide another tool that can be used during project design, environmental assessment and implementation to achieve the principles of ecologically sustainable development.

Is there any difference between environmental offsets and mitigation measures?

Environmental offsets provide compensation for those impacts which can not be adequately reduced through avoidance and mitigation. They should be distinguished from 'mitigation', which refers to the range of actions that can be undertaken to reduce the level of impacts of a development (typically undertaken on-site).

Types of environmental offsets

Actions that can be considered as environmental offsets are generally categorised into *direct* and *indirect* offsets.

Direct offsets

Direct offsets are aimed at on-ground maintenance and improvement of habitat or landscape values. They may include:

- long-term protection of existing habitat – including through the acquisition and inclusion of land in the conservation estate, and covenanting arrangements on private land;
- restoration or rehabilitation of existing degraded habitat; or
- re-establishing habitat.

Indirect offsets

Indirect offsets are the range of other actions that improve knowledge, understanding and management leading to improved conservation outcomes. They may include:

- implementation of recovery plan actions – including surveys;
- contributions to relevant research or education programs;
- removal of threatening processes;
- contributions to appropriate trust funds or banking schemes that can deliver direct offsets through a consolidation of funds and investment in priority areas; or
- on-going management activities such as monitoring, maintenance, preparation and implementation of management plans etc.

Use of environmental offsets under the EPBC Act

Environmental offsets can be used under the EPBC Act to ***maintain or enhance*** the health, diversity and productivity of the environment as it relates to matters protected by the EPBC Act (i.e. matters of national environmental significance and the environment more broadly for actions involving the Commonwealth).

Environmental offsets can be applied as an approval condition under the EPBC Act for developments that have undergone assessment. They may be used when a development will result in impacts on a matter protected by the EPBC Act.

Environmental offsets are not applicable to all approvals under the EPBC Act. Each approval must be assessed on a case-by-case basis and must take into account the scale and intensity of impact from the development on the site and the potential for conservation outcomes through offsets. They should not be applied where the impacts of a development are considered to be minor in nature or could reasonably be mitigated. In some circumstances suitable offsets may not be available to adequately compensate for the impacts of a development and a decision on the overall acceptability of the project will need to be made.

Principles for the use of environmental offsets

The Australian Government has identified eight principles for the use of environmental offsets under the EPBC Act. These eight principles will be used to assess any proposed environmental offsets to ensure consistency, transparency and equity under the EPBC Act.

The Australian Government's position is that:

1. Environmental offsets should be targeted to the matter protected by the EPBC Act that is being impacted.
2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.
3. Environmental offsets should deliver a real conservation outcome.
4. Environmental offsets should be developed as a package of actions - which may include both direct and indirect offsets.
5. Environmental offsets should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'.
6. Environmental offsets should be located within the same general area as the development activity.
7. Environmental offsets should be delivered in a timely manner and be long lasting.
8. Environmental offsets should be enforceable, monitored and audited.

These eight principles are discussed in greater detail below.

1. Environmental offsets should be targeted to the matter protected by the EPBC Act that is being impacted.

Environmental offsets may be appropriate when they:

- are necessary or convenient to protect or repair impacts to a protected matter – i.e. a matter of national environmental significance or the environment more broadly for actions involving the Commonwealth;
- relate specifically to the matter (for example, species) being impacted; and
- seek to ensure that the health, diversity and productivity of the environment is maintained or enhanced.

Offsets are **not appropriate** where the impacts of a development are considered to be minor in nature; or could reasonably be avoided or mitigated.

2. A flexible approach should be taken to the design and use of environmental offsets to achieve long-term and certain conservation outcomes which are cost effective for proponents.

Offsets are not intended to replace avoidance and mitigation which are expected to be the primary strategies for managing the potential impacts of development proposals. The Australian Government **will not consider** any proposal for environmental offsets unless the intended measures to avoid and/or mitigate the anticipated impacts are presented at the same time.

However, consideration should be given to how offsets can combine with avoidance and mitigation measures to achieve the best outcomes for the matters protected and the proponent. This means that if it can be demonstrated that better conservation outcomes would be achieved by the use of an environmental offset rather than measures to avoid and/or mitigate certain impacts, then the Australian Government will be prepared to consider such an approach.

In assessing the merits of avoidance, mitigation and offsets there needs to be clear information about the scale and intensity of impacts of the development and the relative benefits to be gained through various actions.

3. Environmental offsets should deliver a real conservation outcome.

The Australian Government aims to ensure that offsets deliver a conservation outcome that would not otherwise be achieved. For example, funding open ended research programs which deliver little or no on-ground benefit for the matter impacted are not considered to deliver a conservation outcome. Also, the purchase of existing unprotected habitat only provides a real conservation outcome if that habitat becomes protected in perpetuity and actively managed for long term conservation purposes.

4. Environmental offsets should be developed as a package of actions, which may include both direct and indirect offsets.

When available, direct offsets (e.g. reservation or covenanting of land) are more desirable than indirect offsets (e.g. contribution to research) as they are more likely to lead to long-term conservation outcomes and it is easier to demonstrate a consistent, transparent and equitable relationship between the offset and the impact.

In some cases, however, a package of offsets incorporating direct and indirect actions may deliver the best results. A package of measures increases the scope of possible conservation outcomes, spreads the risk of offsets failing to deliver, and may provide greater flexibility for proponents to successfully deliver a sustainable outcome.

5. As a minimum, environmental offsets should be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'.

Environmental offsets should be developed to ensure the relevant matter protected by the EPBC Act is 'maintained or enhanced' by adequately compensating for the impacts of the development.

The appropriate magnitude of an offset package is determined on a case-by-case basis, with consideration of the following:

- the scale and intensity of impacts of the development – including direct and indirect impacts. As a minimum, offsets should be commensurate with the level of impacts of the development and should provide for both maintenance and enhancement of the relevant protected matter;
- achieving the greatest long-term conservation gains – wherever possible in the context of 'like for like' which requires offsets to be targeted towards the specific environmental value being impacted by a development (e.g. foraging habitat for an endangered species). Offsets are required that are (at a minimum) of equal quantity and quality to the area to be impacted, but preferably of greater quantity and/or higher quality;
- precedents for the previous development of similar offsets – with a view to delivering consistency. Offset ratios may be applied when available;
- the approach of the relevant state or territory – with a view to complementing and/or building on that approach; and

- the level of certainty in the offset providing a conservation gain. In the case of uncertainty a greater variety and/or magnitude of offsets may be required including a focus on lower risk actions.

6. Environmental offsets should be located within the same general area as the development activity.

Environmental offsets should generally be located in the vicinity (e.g. same bioregion or sub-region) of the development site to ensure that one area of importance to a protected matter (e.g. a Ramsar listed area or part of a species' range) does not become severely degraded. This may be less relevant for those indirect offsets that are not location-based.

The Australian Government recognises that it may not always be desirable or possible to locate offsets in the vicinity of a development site. In some cases, greater conservation outcomes may be delivered by locating offsets elsewhere.

7. Environmental offsets should be delivered in a timely manner and be long lasting.

Given that environmental offsets are often complex to develop and may have a time lag before delivering a conservation outcome, it is important that an offset package be well formulated at the time of approval and preferably implemented prior to the commencement of the development. This is likely to maximise the chances of the offset package succeeding.

Environmental offsets should deliver a long lasting benefit to ensure environmental impacts are adequately compensated over the long-term. As a guide, offsets should generally compensate for the impact of a development for the period that the impacts occur. Consideration should be given to mechanisms for guaranteeing the security and long-term management of offset sites.

8. Environmental offsets should be enforceable, monitored and audited.

To ensure the success of environmental offsets, it is important that they are enforceable, monitored and audited. Proponents, or their contractors, must report on the success of the offset so that conditions of approval can be varied if the offset is not delivering the desired outcome and future offset packages can have greater chance of success.

The Australian Government will measure the success of environmental offsets by:

- requiring environmental offsets or offset packages to include clearly articulated measures of success that are linked to the purpose of the offsets and provide clear benchmarks about their success or failure;
- monitoring the performance of agreed offsets as part of the monitoring, compliance and audit program for all projects considered under the EPBC Act; and
- seeking feedback at regular intervals from parties affected by and/or interested in environmental offsets to inform offset policy and future offset negotiations with proponents and state, territory or local governments.

Natural Resources and Water
Managing Queensland's natural resources
... for today and tomorrow

Policy
for
Vegetation Management Offsets

28 September 2007

Queensland the Smart State

Queensland Government
Natural Resources and Water

VERSION HISTORY

Version	Date	Comments
1.0	20 November 2006	New policy endorsed
2.0	23 August 2007	New version endorsed
2.1	28 September 2007	Amendment to Table 2 and Table 3

RATIONALE:

The *Vegetation Management Act 1999* (VMA) regulates the clearing of vegetation over all tenures in both rural and urban areas. The VMA states:

The purpose of the Act is to regulate the clearing of vegetation in a way that—

a) conserves the following:
   i) Remnant *endangered* regional ecosystems
   ii) Remnant *of concern* regional ecosystems
   iii) Remnant *not of concern* regional ecosystems
b) conserves vegetation in declared areas; and
c) ensures the clearing does not cause land degradation; and
d) prevents the loss of biodiversity; and
e) maintains ecological processes; and
f) manages the environmental effects of the clearing to achieve the matters mentioned in paragraphs (a) to (e); and
g) reduces greenhouse gas emissions.

Significant challenges exist to achieve the State's vegetation management objectives whilst recognising other goals of government that include accommodating population growth, maintaining the quality of life for existing and future communities and providing infrastructure.

Vegetation offsets can assist in balancing these interests in some circumstances, as they provide a mechanism for particular development to proceed while ensuring long-term conservation of remnant regional ecosystems.

The VMA codes set out performance requirements that development applications for clearing native vegetation must meet.

A vegetation management offset (offset) is a legal arrangement or agreement that, over time, guarantees to maintain the extent, structure and function of—

a) regional ecosystems;
b) essential habitat; and
c) vegetation associated with—
   i) watercourses;
   ii) natural wetlands; and
   iii) natural significant wetlands.

An offset is a means of meeting relevant performance requirements of an applicable code under the VMA.

An offset may be proposed by an applicant as a solution to meet a number of performance requirements. This policy sets criteria and provides guidance for what would constitute an acceptable offset under the VMA applicable code.

Offsets are not a suitable option where the impacts of development have an irreversible effect on biodiversity.

PURPOSE/SCOPE:

This policy applies to an offset proposed to meet a performance requirement in an applicable *Vegetation Management Act 1999* (VMA) code.

This policy is to be used by Vegetation Management Officers and other relevant officers when assessing a development application.

Definitions

Words underlined in the text of the Policy are defined in the glossary of terms. Where any term is already defined in the *Vegetation Management Act 1999* (VMA) or an applicable VMA code, this policy does not redefine the term.

POLICY:

An offset may be proposed as a solution to meet a performance requirement where the performance requirement requires that a development "maintain the current extent" of certain vegetation or habitat.

"Maintain the current extent" is defined in the Regional Vegetation Management Codes as—

a) not clearing;
b) ensuring the regional ecosystem structure and function are maintained; or
c) providing an offset in accordance with the current policy for vegetation management offsets administered by the Department of Natural Resources and Water.

An offset must meet criteria 1 to 7 described below. Tables 1 and 2 provide guidelines to assist in achieving the criteria. Table 1 provides guidelines for determining ecological equivalence. Table 2 provides offset option guidelines. Table 3 lists endangered and of concern regional ecosystems that have a critically low remnant coverage. To ensure accurate representation of regional ecosystems in Table 3, the Director-Vegetation Management can amend at any time the list of regional ecosystems in Table 3.

Where a project will result in a demonstrated high level of community benefit at a local, regional or state level and identifying the offset would unreasonably delay the project, the offset must at least meet criteria 6 before development approval is granted.

Offset Criteria

1. Limitations on offset vegetation

The proposed offset must not be:

a) mapped as remnant vegetation, unless:
    i) the area has a valid clearing approval that would result in the area being cleared; or
    ii) it is reasonably foreseeable that the remnant vegetation will fall below the criteria for remnant vegetation and appear as white on a regional ecosystem map through an identified and immediate threatening process; and
b) vegetation that is required to be retained under conditions of a development approval; and
c) a category 1 area, category 2 area, category 3 area, or category 4 area on a Property Map of Assessable Vegetation; and
d) an area on which vegetation is protected by another instrument of State Government unless 1.a)i) or 1.a)ii) apply. However, where an offset is required under another Act or policy of the State, the same offset can be used to satisfy multiple requirements providing the requirements of this policy are met.

2. Selection and location of appropriate regional ecosystem

The proposed offset must:

a) maintain ecological processes at a subregional level, including interrelationships of natural values, species distributions and movements—by ideally being within the same bioregion and the same subregion as the area proposed to be cleared. However the proposed offset may be within another bioregion if the area proposed for clearing is in

the following highly vegetated bioregions: the Northwest Highlands, Gulf Plains, Cape York Peninsula, Mitchell Grass Downs, Channel Country or Einasleigh Uplands; and

b) be geographically close to the area proposed for clearing as is reasonably achievable to ensure that localised environmental effects of the clearing will be mitigated and ecological equivalence achieved; and
c) have the same pre-clearing regional ecosystem as the area proposed for clearing if the area proposed for clearing is within a regional ecosystem that is listed in Table 3; and
d) have the same pre-clearing regional ecosystem as the area proposed for clearing when offsetting essential habitat; and
e) for all other regional ecosystems not listed in Table 3 and not mapped as essential habitat, be a pre-clearing regional ecosystem that has the same or higher conservation status as the area proposed for clearing and should ideally be on the same landzone as the regional ecosystem proposed for clearing.

3. Remnant mapping

The proposed offset must be an area which is large enough to be mapped as remnant vegetation in accordance with the current version of the EPA's "Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland".

4. Obtaining ecological equivalence

The proposed offset must become ecologically equivalent to the area proposed for clearing.

Ecological equivalence must be demonstrated using all of the following factors:

a) Location
b) Strategic position
c) Area
d) Comparable vegetation community attributes
e) Condition of vegetation
f) Regaining remnant status
g) Landscape context attributes

Factors may not have equal weight every time. Ecological equivalence is achieved when the ecological equivalence factors achieve equivalence overall, despite one or more factors not achieving equivalence. Table 1 provides guidelines for determining ecological equivalence for each of the factors listed above.

5. Ensuring ongoing management

The proposed offset must include a management plan that specifies how the offset will be managed to ensure it achieves or maintains remnant regional ecosystems status and ecological equivalence.

The management plan must include (but is not limited to):

a) a map clearly showing the boundary of the proposed offset; and
b) the proposed management intent and outcomes; and
c) activities that will be undertaken to achieve the management intent and outcomes; and
d) restrictions, if any, imposed on the use of the offset area to achieve the management intent and outcomes; and
e) an analysis of the risks to achieving the management intent and outcomes, actions to minimise the risks and remedial action that will be undertaken if any of the risks occur; and
f) a monitoring and reporting program.

6. Ensuring the offset is legally secured

a) The offset area and the arrangements for securing the future protection of the offset area must be proposed as part of the development application before a development approval can be issued.
b) However, where a project will result in a demonstrated high level of community benefit at a local, regional or state level, and identifying the offset would unreasonably delay the project, NRW will accept specified arrangements that guarantee the securing of a suitable offset prior to the development approval being issued. Once the development approval is issued, the applicant must, within twelve months, provide an offset that meets all other criteria of this policy.

Acceptable forms of security to meet 6.a) and 6.b) above are provided in the definition of legally secured.

7. Other requirements

The proposed offset:

a) is not required to be on land owned by the applicant. If the land is not owned by the applicant, the offset must be protected and managed under agreement with the landholder; and
b) can not be a financial donation or contribution, although a financial contribution may be made to a third party for the management of an approved offset.

Table 1 – Guidelines for Determining Ecological Equivalence

Ecological Equivalence Factors	Considerations	Resources
Location	Offset areas that are further away from the area proposed to be cleared share less ecological similarity when compared to offset areas that are close by and within the same subregion. The distance between the offset area and the area proposed for clearing also has an impact on local biodiversity. For example, the further away the offset, the less likely it will mitigate the impact of the clearing on local biodiversity values.	• The Conservation Status of Queensland's Bioregional Ecosystems, Sattler and Williams 1999, EPA.
Strategic position	An offset that is located in a State or Regional Wildlife Corridor, part of a local government strategic biodiversity corridor or adjacent to the protected area estate or other protected areas would be a highly desirable outcome for conservation of biodiversity. Strategic corridors have also been identified at different geographical scales by State and local governments. The EPA's Biodiversity Planning Assessment's (BPA's) identify Bioregional Wildlife Corridors while individual local government's may have identified ecological corridors significant to their local area which may be identified in planning schemes or conservation strategies.	• The EPA's biodiversity website: http://www.epa.qld.gov.au/nature_conservation/biodiversity • Local government planning schemes and conservation strategies.
Area	Size is strongly correlated with the long-term viability of areas of native vegetation. Larger areas are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller areas. Smaller areas may make wildlife more vulnerable to disease, bushfire, pests, changes in climate, and inbreeding. Offsets that build on the viability of an area would provide a more desirable biodiversity outcome.	• Native vegetation management in QLD – background science and values, 2000 NRW, Chapter 4.
Comparable vegetation community attributes	An offset that is a regional ecosystem with similar species composition, structure and forest type to the area proposed to be cleared will minimise the loss of specific vegetation community attributes and hence better ensure ecological equivalence. For example, if an area of remnant rainforest is proposed to be cleared, an offset that is either a non-remnant rainforest or wet sclerophyll open forest regional ecosystem with similar canopy and understorey species, would more likely achieve offset requirements as it has similar ecological values and attributes to those being lost. In contrast, woodland would be inappropriate as the ecological values of the rainforest are unrelated to the values provided by the woodland.	• Regional Ecosystem Description Database – EPA website: http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/ • Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland V.J, Neldner et. al. EPA.

Ecological Equivalence Factors	Considerations	Resources
Condition of vegetation (site based condition attributes)	Condition can be described in terms of genetic or species diversity, vegetation community structure, presence and abundance of native fauna, presence and abundance of feral animals, pests and weeds, health of soil and water, long-term viability of the vegetation and ability of the ecosystem to withstand threatening processes. Indicators based on key vegetative structural elements are a reliable and cost effective way to assess biodiversity and hence condition (Eyre *et al*. 2006). The BioCondition field assessment manual produced by the EPA provides for a range of assessable site-based condition attributes that, in combination, provide a thorough assessment of condition. These are: • Recruitment of woody perennial species • Native plant species richness • Tree canopy cover (%) • Tree canopy height • Shrub layer cover (%) • Native perennial grass cover (%) • Native perennial forb and non-grass cover (%) • Native annual grass, forb and non-grass cover (%) • Large trees • Fallen woody material • Weed cover • Litter cover	• BioCondition: A Terrestrial Vegetation Condition Assessment Tool for Biodiversity in Queensland Field Assessment Manual, T.J. Eyre et. al. EPA. • Methodology for the Establishment and Survey of Reference Sites for BioCondition, T.J. Eyre et. al. EPA.

Ecological Equivalence Factors	Considerations	Resources
Regaining remnant status	The type, quality and successional stage of regrowth vegetation (i.e. vegetation that is non-remnant) growing in the proposed offset area, and its alignment to the floristic description of the corresponding regional ecosystem will affect its ability to regain remnant status. Offsetting mature good quality regrowth vegetation is preferable to a degraded regrowth offset or an offset involving revegetation. The ecological values of three different types of regrowth vegetation, in the context of regaining remnant status are analysed below. <u>Mature good-quality regrowth</u> (most desirable): • Low and short term management costs, with input focussing on enhancing the regrowth and facilitating its transition to maturity and remnant status. • Highest ecological value for regrowth as it is an intact vegetation community. • Ecological values easy to describe and analyse, allowing for accurate determination of RE (i.e. contains dominant species, in secondary or tertiary succession phases). • Low risk of failure to regain remnant status. <u>Degraded regrowth</u>: • Moderate to high management costs, with input focussing on removing the threats and fixing the degradation through appropriate management to promote the re-establishment of the RE (dependant upon the type and severity of degradation, for example significant weed infestation). • Difficulty in predicting the success of the management in terms of regaining remnant status. • Higher risk of failure to achieve remnant status. <u>Significant revegetation:</u> • High and long term management costs, with input focussed on re-introducing the correct floristic species of the RE and relatively intensive management (at least until regrowth is self-supporting). • Lowest ecological value. • More analysis required to ensure correct RE and landzone and to ensure required ecological values are achieved (i.e. providing specific habitat). • Complex requirement to design revegetation to ensure the correct floristic species aligned to the RE description (including local provenance), planting schedules and vegetation structure. • Higher risk of failure to achieve remnant status From an on-ground perspective, remnant vegetation—from the VMA—is vegetation, part of which forms the predominant canopy of the vegetation: a) covering more than 50% of the undisturbed predominant canopy; and b) averaging more than 70% of the vegetation's undisturbed height; and c) composed of species characteristic of the vegetation's undisturbed predominant canopy. The Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland, produced by the EPA provides detailed guidance in the regional ecosystem and remnant vegetation mapping process.	Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland V.J, Neldner et. al. EPA.

Ecological Equivalence Factors	Considerations	Resources
Landscape context attributes – incorporating size of patch, connectivity and context considerations	<u>Size of patch</u> Large patches in the landscape are less susceptible to edge effects and are more likely to sustain viable and more varied populations of native flora and fauna than smaller patches. <u>Connectivity</u> Wildlife corridors are areas of native vegetation (both remnant and non-remnant) that link other native vegetation within an otherwise cleared landscape. Corridors are an important tool to mitigate the impact of habitat loss and fragmentation. In a cleared or highly modified environment, if the offset is linked to other areas of native vegetation, there is a greater enhancement of biodiversity and consequently, greater long term conservation outcomes. Corridors play an important role in both providing habitat and assisting in wildlife movement and genetic flow. Corridors have been identified at different geographical scales by State and local governments. The EPA's BPA's identify Bioregional Wildlife Corridors while individual local government's may identify ecological corridors significant to their local area. These may be identified in planning schemes or conservation strategies. <u>Context</u> Large areas of native vegetation that are in close proximity to the site, whether connected or not, generally provide the site a greater landscape conservation value compared to small areas nearby.	• BioCondition: A Terrestrial Vegetation Condition Assessment Tool for Biodiversity in Queensland Field Assessment Manual, T.J. Eyre et. al. EPA. • Methodology for the Establishment and Survey of Reference Sites for BioCondition, T.J. Eyre et. al. EPA. • Native vegetation management in QLD – background science and values, 2000 NRW, Chapter 4. • The EPA's biodiversity website: http://www.epa.qld.gov.au/nature_conservation/biodiversity • Local government planning schemes and conservation strategies.

Table 2 – Offset Option Guidelines

Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered.

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
1. Maintain the current extent of endangered or of concern regional ecosystems proposed to be cleared that are listed in Table 3.	**Option 1.1** The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 10% weed cover; e) with management, attain remnant status within 5 years; and f) not require revegetation.	1:2
	Option 1.2 The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 25% weed cover; e) with management, attain remnant status within 5 years; f) not require revegetation across more than 10% of the offset area; and g) provide connectivity or a buffer to other remnant vegetation.	1:2.5
	Option 1.3 The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 25% weed cover; e) with management, attain remnant status within 20 years; f) not require revegetation across more than 10% of the offset area; and g) provide connectivity or a buffer to other remnant vegetation.	1:4

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
	Option 1.4 The proposed offset must: a) be the same regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; and c) be remnant vegetation of the same or better ecological quality that has a valid clearing approval and therefore would otherwise be cleared.	1:1
2. Maintain the current extent of endangered regional ecosystems proposed to be cleared that are not listed in Table 3.	**Option 2.1** The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 10% weed cover; e) with management, attain remnant status within 5 years; and f) not require revegetation.	1:1.5
	Option 2.2 The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 25% weed cover; e) with management, attain remnant status within 5 years; f) not require revegetation across more than 10% of the offset area; and g) provide connectivity or a buffer to other remnant vegetation.	1:1.75

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
	Option 2.3 The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; c) be non-remnant vegetation; d) have less than 25% weed cover; e) with management, attain remnant status within 20 years; f) not require revegetation across more than 10% of the offset area; and g) provide connectivity or a buffer to other remnant vegetation.	1:3
	Option 2.4 The proposed offset must: a) be the same regional ecosystem as the area proposed for clearing; b) be within 20 kilometres of the area proposed for clearing; and c) be remnant vegetation of the same or better ecological quality that has a valid clearing approval and therefore would otherwise be cleared.	1:1
	Option 2.5 The proposed offset must: a) be an endangered pre-clearing regional ecosystem; b) be on the same land zone as the area proposed for clearing; c) be in the same subregion as the area proposed for clearing; d) be non-remnant vegetation; e) have less than 25% weed cover; f) with management, attain remnant status within 5 years; g) not require revegetation across more than 10% of the offset area; and h) provide connectivity or a buffer to other remnant vegetation.	1:2

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
	Option 2.6 The proposed offset must: a) be an endangered pre-clearing regional ecosystem that contains similar species and habitat values to the area proposed for clearing; b) demonstrate ecological equivalence or better will be provided than the area proposed for clearing; c) be within the same bioregion as the area proposed for clearing; d) provide strategic biodiversity protection that enhances the viability and extent of endangered remnant vegetation; e) with management, attain remnant status within 5 years; and f) not require revegetation across more than 10% of the offset area.	Net benefit (Minimum 1:2.5)
3. Maintain the current extent of of concern regional ecosystems proposed to be cleared that are not listed in Table 3.	**Option 3.1** The proposed offset must: g) be the same pre-clearing regional ecosystem as the area proposed for clearing; h) be within 20 kilometres of the area proposed for clearing; i) be non-remnant vegetation; j) have less than 10% weed cover; k) with management, attain remnant status within 5 years; and l) not require revegetation.	1:1.5
	Option 3.2 The proposed offset must: h) be the same pre-clearing regional ecosystem as the area proposed for clearing; i) be within 20 kilometres of the area proposed for clearing; j) be non-remnant vegetation; k) have less than 25% weed cover; l) with management, attain remnant status within 5 years; m) not require revegetation across more than 10% of the offset area; and n) provide connectivity or a buffer to other remnant vegetation.	1:1.75

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
	Option 3.3 The proposed offset must: h) be the same pre-clearing regional ecosystem as the area proposed for clearing; i) be within 20 kilometres of the area proposed for clearing; j) be non-remnant vegetation; k) have less than 25% weed cover; l) with management, attain remnant status within 20 years; m) not require revegetation across more than 10% of the offset area; and n) provide connectivity or a buffer to other remnant vegetation.	1:3
	Option 3.4 The proposed offset must: d) be the same regional ecosystem as the area proposed for clearing; e) be within 20 kilometres of the area proposed for clearing; and f) be remnant vegetation of the same or better ecological quality that has a valid clearing approval and therefore would otherwise be cleared.	1:1
	Option 3.5 The proposed offset must: a) be an endangered or of concern pre-clearing regional ecosystem; b) be on the same land zone as area proposed for clearing; c) be in the same subregion as the area proposed for clearing; d) be non-remnant vegetation; e) have less than 25% weed cover; f) with management, attain remnant status within 5 years; g) not require revegetation across more than 10% of the offset area; and h) provide connectivity or a buffer to other remnant vegetation.	1:2

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
	Option 3.6 The proposed offset must: a) be an endangered or of concern pre-clearing regional ecosystem that contains similar species and habitat values to the area proposed for clearing; b) demonstrate ecological equivalence or better will be provided than the area proposed for clearing; c) be within the same bioregion as the area proposed for clearing ; d) provide strategic biodiversity protection that enhances the viability and extent of endangered and/or of concern remnant vegetation; e) with management, attain remnant status within 5 years; and f) not require revegetation across more than 10% of the offset area.	Net benefit (minimum 1:2.5)
4. Maintain the current extent of essential habitat proposed to be cleared	The proposed offset must: a) be the same pre-clearing regional ecosystem as the area proposed for clearing; b) include all of the essential habitat factors— including any mandatory habitat factors— as the area of essential habitat proposed for clearing; and c) demonstrate that the impacts on the species are mitigated by the offset.	1:1.5 where proposed offset is in the same subregion; or 1:3 in all other locations.
5. Maintain the current extent of assessable vegetation associated with any natural significant wetland and/or natural wetland proposed to be cleared	The proposed offset must: a) be a wetland pre-clearing regional ecosystem listed in the relevant Regional Vegetation Management Code; or b) be a pre-clearing regional ecosystem associated with a natural significant wetland and/or natural wetland that has the same or higher conservation status than the regional ecosystem proposed for clearing.	1:2 where proposed offset is in the same subregion; or 1:3 in all other locations.
6. Maintain the current extent of assessable vegetation associated with any watercourse proposed to be cleared	The proposed offset must: a) be a pre-clearing regional ecosystem associated with any watercourse that has the same or higher conservation status than the regional ecosystem proposed for clearing; and b) be a pre-clearing regional ecosystem associated with a watercourse that has at least the same stream order as the watercourse proposed for clearing.	1:2 where proposed offset is in the same subregion; or 1:3 in all other locations.

Regional Vegetation Management Code Performance Requirement Note: Reference to regional ecosystems, assessable vegetation and essential habitat in this column is a reference to the regional ecosystems, assessable vegetation and essential habitat proposed to be cleared, to meet the corresponding Performance Requirement in the applicable VMA code.	**Offset options** Note: Other offset proposals that ensure the extent of relevant vegetation and associated environmental values are maintained can be considered. Where the offset is proposed to meet more than one performance requirement, each applicable offset option must be met. It may be possible for one offset area to address more than one performance requirement.	**Minimum area of clearing to offset ratio**
7. Maintain the current extent of regional ecosystems proposed to be cleared that are at risk of— a) the remnant extent of the regional ecosystem falling below 30% of its pre-clearing extent; or b) having a remnant extent of less than 10000 hectares; as listed in the equivalent table of the applicable VMA code (e.g. Table 2 in the Southeast QLD Bioregion Regional Vegetation Management Code).	The proposed offset must: a) be a pre-clearing regional ecosystem that is at risk of the remnant extent of the regional ecosystem falling below 30% of its pre-clearing extent, or, having a remnant extent of less than 10 000 hectares listed in the relevant Regional Vegetation Management Code; or b) be a pre-clearing regional ecosystem that has a higher conservation status than the regional ecosystem proposed for clearing.	For option a), 1:2 where proposed offset is in the same subregion; or 1:3 in all other locations. For option b) refer to the relevant ratios for endangered or of concern regional ecosystems in this table.

Table 3: Regional Ecosystems that have a remnant extent below 5% of their pre-clearing extent and that are less than 500 hectares in total extent, or that have a remnant extent less than 200 hectares, or that are at risk of the remnant extent falling below 200 hectares

Regional Ecosystem description		Status
2.5.4	Cypress (*Callitris glaucophylla*) woodland on plains on deep sandy soils	Of concern
3.2.8	*Corymbia nesophila* ± *C. novoguinensis* woodland on old stabilised dunes	Of concern
3.2.28	Evergreen notophyll vine forest on beach ridges on coral atolls, shingle cays and sand cays	Of concern
3.2.29	*Pisonia grandis* low closed forest. Restricted to a few scattered sand cays	Of concern
3.2.30	*Pemphis acidula* ± low closed forest. Restricted to coral atolls, shingle cays and sand cays	Of concern
3.2.31	*Premna serratifolia* closed scrub. Restricted to coral atolls, shingle cays and sand cays	Of concern
3.2.32	*Lepturus repens* closed herbland. Restricted to sand cays	Of concern
3.3.4	Evergreen mesophyll vine forest with *Archontophoenix* spp. On stream banks	Of concern
3.3.7	Tall semi-deciduous notophyll/microphyll vine thicket. Occurs on colluvial plains	Of concern
3.7.1	Semi-deciduous notophyll/microphyll vine thicket on isolated lateritic hillslopes	Of concern
3.12.1	Semi-deciduous mesophyll/notophyll vine forest on granite slopes, in the central bioregion	Of concern
3.12.5	Simple evergreen notophyll vine forest. Upper slopes of mountains and ranges in the south	Of concern
3.12.20	Evergreen notophyll vine forest dominated by *Welchiodendron longivalve* on headlands	Of concern
3.12.23	*Acacia brassii* low open forest on acid volcanics on northern ranges and islands	Of concern
6.3.23	Springs on recent alluvia, ancient alluvia and fine-grained sedimentary rock	Endangered
6.7.18	Springs associated with lateritised sandstone	Of concern
6.12.1	Scattered *Acacia aneura* around granite boulders	Of concern
7.1.4	Mangrove and vine forest communities of the brackish zone	Of concern
7.2.6	Mosaic of clumps of notophyll vine forest, sclerophyll spp. shrublands and open woodlands, and bare sand blows, on aeolian dunes	Of concern
7.3.2	Grasslands and sedgelands ± *Melaleuca* spp., of wetlands within volcanic craters, often on peat	Of concern
7.3.30	Complex of fernlands and sedgelands with emergent rainforest pioneering spp., in permanently wet peat swamps of alluvial plains	Endangered
7.3.33	Lakes within volcanic craters, including open water, and narrow shoreline sedge fringes	Of concern
7.3.35	*Acacia mangium* and/or *A. celsa* and/or *A. polystachya* closed forest on alluvial plains	Endangered
7.3.37	Complex semi-evergreen notophyll vine forest of uplands on alluvium	Endangered
7.3.38	Complex notophyll vine forest with emergent *Agathis robusta*, on alluvial fans	Of concern
7.3.42	*Eucalyptus grandis* open forest to woodland (or vine forest with emergent *E. grandis*), on alluvium	Of concern
7.3.47	*Allocasuarina littoralis, Corymbia intermedia* and *Lophostemon suaveolens* open forest, on poorly drained alluvium	Of concern
7.3.48	*Eucalyptus portuensis* and *E. drepanophylla* ± *Corymbia* intermedia, ± *C. citriodora* open woodland to open forest, on dry uplands on alluvium	Of concern
7.5.3	*Eucalyptus portuensis, Corymbia citriodora* and *E. drepanophylla* woodland to open forest of uplands, on weathered soils of a remnant surface	Of concern
7.8.13	Simple notophyll vine forest of *Blepharocarya involucrigera* of high rainfall, cloudy uplands on basalt	Of concern
7.8.17	*Eucalyptus portuensis* and *Corymbia intermedia* ± *C. citriodora* woodland to open forest on basalt	Of concern
7.11.2	Notophyll or mesophyll vine forest with *Archontophoenix alexandrae* or *Licuala ramsayi*, on metamorphics	Of concern

Regional Ecosystem description		Status
7.11.36	*Allocasuarina littoralis, Corymbia intermedia, Lophostemon suaveolens* shrubland with *Xanthorrhoea johnsonii* on serpentenite foothills with deep red soils	Of concern
7.11.45	*Eucalyptus cloeziana* open forest on metamorphics	Of concern
7.11.48	*Melaleuca viridiflora* ± *Corymbia clarksoniana* ± *Eucalyptus platyphylla* woodland to open forest, on metamorphics	Of concern
7.12.45	Simple notophyll vine forest dominated by *Dryadodaphne* sp. (Mt Lewis B.P. Hyland+RFK1496) of wet highlands on granite	Of concern
7.12.47	Notophyll-microphyll semi-evergreen vine forest with *Argyrodendron polyandrum* emergents, on rhyolite	Of concern
7.12.67	*Gleichenia dicarpa, Gahnia sieberiana, Lycopodiella cernua, Lycopodium deuterodensum* closed fernland of granite highlands, on Thornton Peak and Mt Bartle Frere	Of concern
7.12.68	Complex notophyll vine forest of cloudy moist to wet highlands on granite	Of concern
8.2.5	Notophyll feather palm vine forest dominated by *Archontophoenix cunninghamiana* on parabolic dunes	Of concern
8.2.9	*Heteropogon triticeus, Imperata cylindrica* and *Themeda triandra* grassland on coastal dunes	Of concern
8.2.11	*Melaleuca* spp. woodland in parallel dune swales (wetlands)	Of concern
8.3.11	*Melaleuca* sp. aff. *viridiflora* closed forest to woodland in broad drainage areas (wetlands)	Endangered
8.11.7	*Xanthorrhoea latifolia* subsp. *latifolia* and *Allocasuarina littoralis* shrubland on exposed metamorphic mountain tops	Of concern
10.3.31	Artesian springs emerging on alluvial plains	Of concern
10.4.9	*Corymbia terminalis* low open woodland on Cainozoic lake beds	Of concern
11.2.4	Lagoons in swales	Of concern
11.8.9	*Callitris* spp. ± vine thicket on Cainozoic igneous rocks. Hillsides	Of concern
11.8.12	*Eucalyptus microcarpa, E. exserta* woodland on Cainozoic igneous rocks	Of concern
11.9.6	*Acacia melvillei* ± *A. harpophylla* open forest on fine-grained sedimentary rocks	Endangered
12.3.10	*Eucalyptus populnea* woodland on alluvial plains	Endangered
12.8.11	*Eucalyptus dunnii* tall open forest on Cainozoic igneous rocks	Of concern
12.8.12	*Eucalyptus obliqua* tall open forest on Cainozoic igneous rocks	Of concern
12.8.18	Simple notophyll vine forest with *Ceratopetalum apetalum* on Cainozoic igneous rocks	Of concern
12.8.22	Semi-evergreen vine thicket with *Brachychiton australis* on Cainozoic igneous rocks. Usually northern half of bioregion	Endangered
12.8.26	*Corymbia trachyphloia* and *Eucalyptus major* woodland on igneous rocks	Of concern
12.9-10.9	Shrubland/low woodland on sandstone lithosols	Of concern
12.9-10.11	*Melaleuca irbyana* low open forest on sedimentary rocks	Endangered
12.9-10.13	*Eucalyptus corynodes* woodland on sedimentary rocks	Of concern
13.3.2	*Eucalyptus nova-anglica* open forest on alluvial plains	Endangered
13.3.3	*Eucalyptus nobilis* open forest on alluvial plains	Endangered
13.3.6	Sedgeland on igneous rocks	Of concern
13.3.7	*Eucalyptus tereticornis, Angophora floribunda* open forest on alluvial plains	Endangered
13.9.2	*Eucalyptus moluccana* open forest on fine-grained sedimentary rocks	Endangered
13.11.2	*Eucalyptus laevopinea* open forest on metamorphics	Of concern
13.11.7	Low microphyll vine forest on metamorphics	Of concern

GLOSSARY OF TERMS:

Note: Where any term is already defined in the *Vegetation Management Act 1999* (VMA) or an applicable VMA code, this policy does not redefine the term.

Bioregions are—

based on broad landscape patterns that reflect the major structural geologies and climate as well as major changes in floristic and faunal assemblages. Bioregions contain a number of subregions. The exact location of the bioregion boundaries are held in digital electronic form by the Department of Natural Resources and Water and are available from Department of Natural Resources and Water service centres.

Criteria for Remnant Vegetation

From an on-ground perspective, remnant vegetation—from the VMA—is vegetation, part of which forms the predominant canopy of the vegetation:

a. covering more than 50% of the undisturbed predominant canopy; and
b. averaging more than 70% of the vegetation's undisturbed height; and
c. composed of species characteristic of the vegetation's undisturbed predominant canopy.

The Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (, produced by the EPA provides detailed guidance in the regional ecosystem and remnant vegetation mapping process.

Demonstrated High Level of Community Benefit:

These projects must be able to demonstrate a high level of benefit to a local, regional or state community in terms of economic, social, cultural, aesthetic or conservation benefits. Such projects may include but are not limited to development that:

a. serves an essential community need such as a school or essential infrastructure; and/or
b. significantly improves the community's access to services such as a hospital or significant museum or library.

Immediate threatening process is—

a demonstrated threatening process where, if action is not taken to address the threat, the vegetation will no longer be classed as remnant within a period of 6 months.

Landzone is—

a simplified geology/substrate-landform classification for Queensland utilised in the regional ecosystem framework.

Legally Binding Mechanism:

A legally binding mechanism may include:

a. Dedication as a protected area under the *Nature Conservation Act 1992* (for example, a voluntary nature refuge or conservation park)*;*
b. Declaration of an area under the *Vegetation Management Act 1999;*
c. Use of a covenant over offset areas under the *Land Title Act 1994, Land Act 1994* and *Integrated Planning Act 1997*; or
d. Another legally binding mechanism, approved by the Department, which provides for the protection of non-remnant vegetation until mapped remnant status is achieved;

Legally secured means—

Either:

1. the offset land is identified and the non-remnant vegetation protected via a legally binding mechanism. The legally binding mechanism must be:
   (a) finalised (ie. registered, declared or gazetted as appropriate to the mechanism) prior to the development approval being given; and
   (b) supported by a management plan to ensure the land achieves remnant status within the relevant period of time.

or

2. the offset land is identified and the non-remnant vegetation is protected via a legally binding agreement between the applicant and a landholder. The legally binding agreement must:
   a) be signed by the applicant and landholder[1] prior to any development approval being given;
   b) accompany a signed but not registered, declared or gazetted legally binding mechanism, and management plan; and
   c) direct the registering, declaration or gazettal of the legally binding mechanism to occur within 4 months of the development approval being given;
   d) identify all relevant payments made by the applicant relevant to the landholder and the offset property.

or

3. the applicant enters into a legally binding agreement to identify and secure the offset requirement—
   a) This can only occur:
      i. between the Department of Natural Resources, the applicant and another party, if relevant; and
      ii. for development that provides a demonstrated high level of community benefit that must proceed in the public interest; and
      iii. the identification and securing of an offset would unreasonably delay the project.
   b) The signed legally binding agreement[2] must:
      i. be provided prior to the development approval being given;
      ii. commit to securing an offset consistent with this policy within 12 months via a legally binding mechanism;
      iii. commit to quarterly reporting on the progress of identifying and securing an offset; and
      iv. is accompanied by financial surety[3,4] of an appropriate amount for compliance with the agreement

or

4. the applicant provides a letter of obligation committing to identify and secure the offset requirement—
   a) This can only occur for development:

[1] The landholder is required to obtain a letter from their solicitor stating that the landholder has received legal advice in regards to their obligations under the legally binding agreement. The letter must accompany the legally binding agreement.
[2] The agreement must be signed by a person with suitable authority, for example, Chief Executive Officer.
[3] The applicant is required to obtain at least one quote for securing and managing the offset. Considerations in developing a quote should include the costs associated with identifying and securing an offset using a legally binding mechanism, the ongoing management costs of the offset property, and any possible administration and legal costs. The quote will be considered in the determination of appropriate financial surety.
[4] Financial security is not required for development undertaken by the State of Queensland and consistent with 3(a) ii and iii.

i. Undertaken by the State of Queensland;
ii. where the State of Queensland cannot enter into a legally binding agreement with itself;
iii. which provides a demonstrated high level of community benefit that must proceed in the public interest; and
iv. where the identification and securing of an offset would unreasonably delay the project.

b) The signed letter of obligation[5] must:

i. be provided prior to the development approval being given;
ii. identify the proponent, project and stage;
iii. identify the offset obligation;
iv. commit to identifying and securing an offset consistent with this policy within 12 months;
v. commit to quarterly progress reports on the identification and securing of the offset;
vi. provide a departmental contact.

or

5. the offset land is identified as remnant vegetation which is subject to either a valid clearing approval or an immediate threatening process, and the remnant vegetation is protected in perpetuity via a legally binding mechanism—

a. The legally binding mechanism must be:
   i. finalised (ie. registered, declared or gazetted as appropriate to the mechanism) prior to the development approval being given; and
   ii. supported by a management plan to ensure the appropriate management of the offset area and the maintenance of its remnant status.
b. For offsets that are subject to a valid clearing approval, they must be supported by documentary evidence that the development approval has been amended to prevent the clearing of the vegetation.

Pre-clearing regional ecosystem is—

the regional ecosystem present before clearing. It is determined by using a range of tools including:

- a digital mapping layer which shows the pre-clear extent of regional ecosystems, available for viewing from Department of Natural Resources and Water service centres;
- geology mapping;
- on-ground ecological assessment of current vegetation coverage (e.g. regrowth);
- remote sensing tools including current and historical aerial photos and satellite imagery.

Subregion means—

an area that is contained within a specific bioregion and that is usually associated with specific geology and geomorphology, finer climatic patterns, ecological processes at a subregional level, interrelationships of natural values, species distributions and movements. The exact location of the subregion boundaries are held in digital electronic form by the Department of Natural Resources and Water, and are available from Department of Natural Resources and Water service centres.

[5] The agreement must be signed by a person with suitable authority, for example, the Director General or Chief Executive Officer.