8.2 Condition 6bii): at least once each calendar year following the commencement of clearing and/or construction within 30 m of retained Coastal Swamp Oak TEC, and continuing for at least two calendar years after clearing and/or construction within 30 m of retained Coastal Swamp Oak TEC, assess and document: the quality and extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction, and any degradation in quality and/or extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction, that is attributable to this Action.

Provided below.

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Coomera Connector - Threatened Ecological Community Assessments

Prepared for:
DTMR

Report issued:
August 2024

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Document status

Revision	Reason for issue	Author	Reviewed	Issued to	Date
A	Internal Review	N. Praschifka	T. Shields	B.Jeffers	04/07/2024
B	Internal Review	N. Praschifka, T.Shields	R.Regeer	B.Jeffers	05/07/2024
0	Client Review	N. Praschifka, T.Shields	R.Regeer	DTMR	30/08/2024

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Glossary of Terms

Acronym	Description
CWD	Coarse Woody Debris
DEE	Department of the Environment and Energy
DTMR	Department of Transport and Main Roads
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
EDL	Ecologically Dominant layer
Ha	hectare
TEC	Threatened Ecological Community
RE	Regional Ecosystem
SS	Superseded

1 Introduction

1.1 Project context

1.1.1 Background

The Coomera Connector Stage 1 (the Project) is a new 16 km motorway that is under construction between Coomera and Nerang. The Project is jointly funded by the Queensland and Australian Governments aiming at reducing congestion and improving safety on the M1 between Logan and the Gold Coast. The project includes several environmental and construction constraints, including listed species and Threatened Ecological Communities (TEC) listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South-east Queensland ecological community (Swamp Oak TEC) is an ecosystem listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2024). The TEC is defined by Key Diagnostic criteria and condition thresholds described in the Approved Conservation Advice. Large areas of the TEC are mapped within the Project footprint and it is recognised as key constraint.

1.1.2 Approval Conditions

As per EPBC Approval Notice 2020/8646, The Department of Transport and Main Roads (DTMR) must not clear or cause the functional loss of more than 15.928 ha of Coastal Swamp Oak TEC. They must also engage an independent Suitably Qualified Person (SQP) to undertake an assessment of coastal swamp oak TEC.

The relevant EPBC Conditions are as follows:

6) To maintain the quality of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction as a result of this Action, the approval holder must:

a) Ensure that the quality and/or extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction does not degrade due to impacts attributable to this Action

b) Engage an independent suitably qualified expert to:

i. Assess and document the quality and extent of Coastal Swamp Oak TEC to be retained within 30 m of clearing and/or construction, prior to the commencement of clearing and/or construction within 30 m of Coastal Swamp Oak TEC.

ii. At least once each calendar year following the commencement of clearing and/or construction within 30 m of retained Coastal Swamp Oak TEC, and continuing for at least two calendar years after clearing and/or construction within 30 m of retained Coastal Swamp Oak TEC, assess and document:

- *the quality and extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction,*
- *and any degradation in quality and/or extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction, that is attributable to this Action.*

iii) Provide a report of the assessment required by condition 6(b) (ii) to the approval holder by 1 February of each calendar year following the undertaking of such assessment.

1.2 Study objectives and scope

Ausecology Pty Ltd (Ausecology) has been engaged by the Department of Transport and Main Roads (DTMR) to conduct an ecological assessment of Coastal Swamp Oak TEC adjacent to the Coomera Connector Stage 1 project footprint and assess compliance with conditions under the EPBC Decision Notice 2020/8646.

This survey and report is concentrated on determining any changes to the quality of retained Coastal Swamp Oak TEC within 30m of the project footprint as per condition 6 of EPBC Approval 2020/8646. If the condition of Coastal Swamp TEC has decreased, the extent of the area impacted must also be quantified. Plots must be aligned to ensure the full 30m width from the clearing footprint is surveyed.

Preliminary surveys were undertaken in 2023 by BAAM (BAAM, 2023) and the raw data from this report will form a baseline of comparison for this report and future monitoring events. BAAM (2023) established 10 BioCondition monitoring transects that will be monitored yearly as part of the project.

1.3 Survey site details

Table 1-1 A summary of GPS locations for the start and end points of each transect, including updated locations. GDA94 Zone 54.

Site ID	Start		End	
	Latitude	Longitude	Latitude	Longitude
BC01	-27.858	153.3268	-27.8588	153.3271
BC02	-27.8576	153.3279	-27.8584	153.3282
BC03	-27.8922	153.3397	-27.8924	153.3393
BC03 *(SS)**	-27.8921	153.3396	-27.8927	153.339
BC04	-27.8937	153.3383	-27.894	153.3383
BC04 *(SS)**	-27.8934	153.3381	-27.8942	153.338
BC05	-27.9026	153.3409	-27.9035	153.341
BC06	-27.8986	153.3394	-27.8995	153.3398
BC07	153.3417	153.3417	-27.9164	153.3417
BC08	-27.9177	153.3424	-27.9181	153.3432
BC09	-27.9305	153.3402	-27.93	153.3409
BC10	-27.9396	153.3427	-27.9392	153.3425

* Superseeded (SS)

1.4 Site Weather and Climate

Rainfall data was sourced from the Bureau of Meteorology (2024). Rainfall throughout most of the state over the last 12 months has been above average (Figure 1-2), and the same can be said for the Coomera area comprising the study sites. Although 2023 saw predominately below average rainfall at the site compared with the historical average, the start of 2024 saw extremely high rainfall totals, well above the average (Figure 1-2). Observations at the site corroborate this data, as the wetlands were significantly inundated in some areas and there was significant new growth observed.

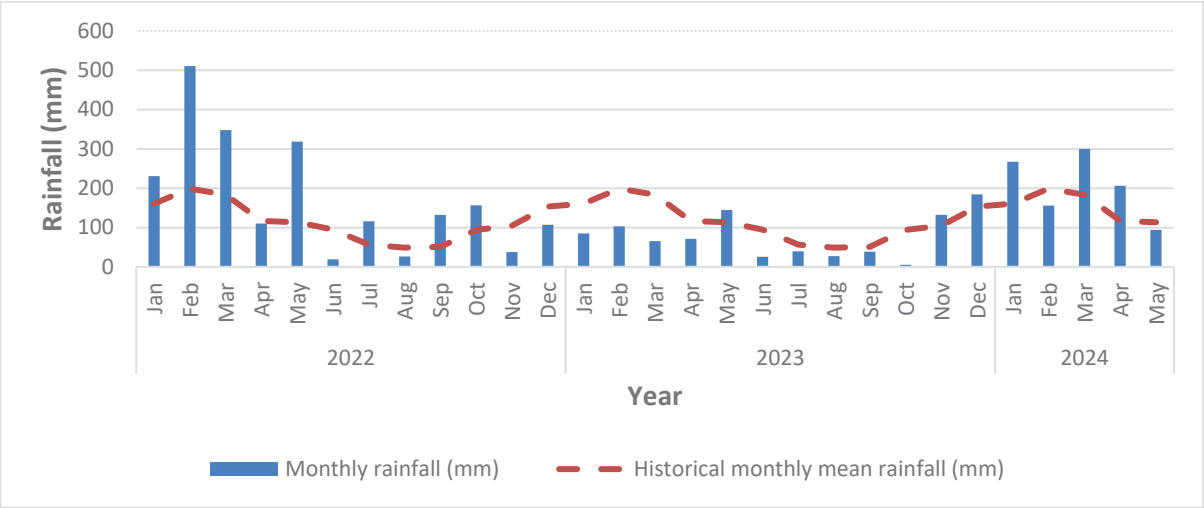

Figure 1-1 Monthly total rainfall (mm) at the nearest weather station (Coombabah Water Treatment Plant Station ID: 40849) since 2022 compared with the historical monthly total rainfall average

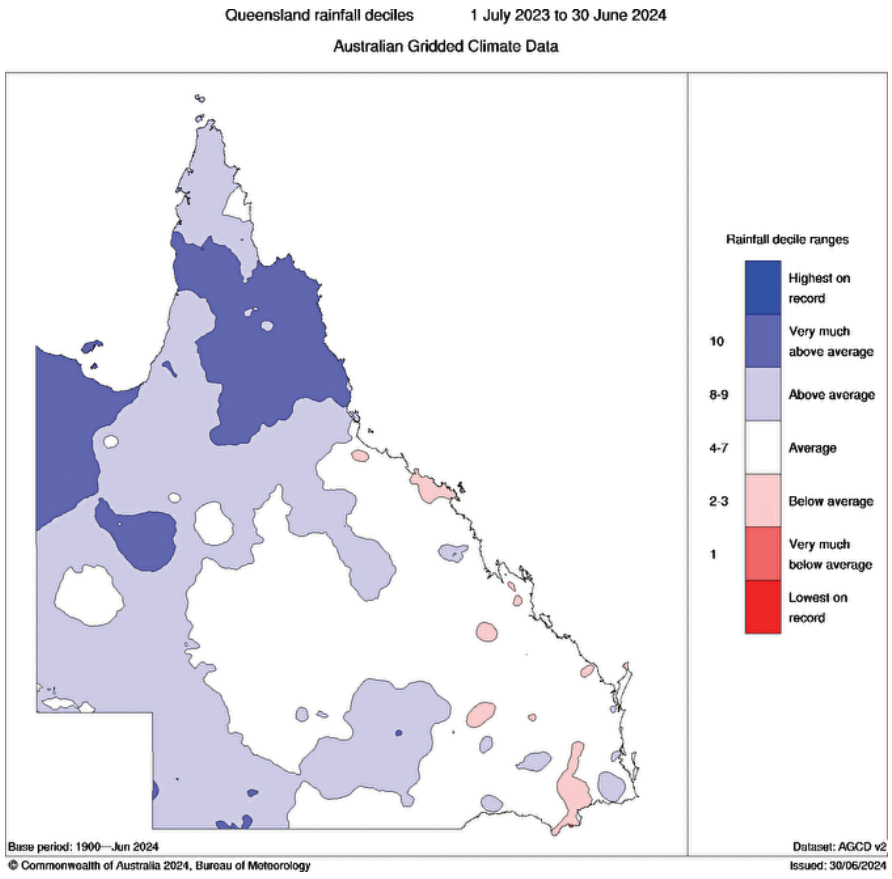

Figure 1-2 12-monthly rainfall deciles for Queensland 01/07/2023 – 30/06/2024

2 Methodology

2.1 BioCondition methodology

Fieldwork was undertaken on four separate occasions: 29th May, 5th June, 27th June and 29th August 2024 by teams of two Ausecology ecologists. BioCondition surveys were undertaken at all ten sites from the baseline report, with methodology in accordance with *BioCondition – A Condition Assessment Framework for Terrestrial Biodiversity in Queensland, Assessment Manual* (Eyre et al., 2015). A summary of the attributes assessed at each site is presented in Table 2-1. Field based attributes have been compared to BioCondition benchmark scores for the relevant Regional Ecosystems (REs) to determine habitat quality.

Table 2-1 Site-based attributes measured by BioCondition methodology (Eyre et al., 2015)

Assessment plot	Attribute	Description
100 m x 50 m plot	Large trees	Number of large trees per hectare (determined by BioCondition benchmarks for relevant RE)
	Tree canopy height	Median canopy height in metres of the ecologically dominant layer (EDL)
	Recruitment (%)	Proportion of canopy EDL species regenerating (<5 cm DBH)
	Tree species richness	Number of native tree species
100 m transect	Tree canopy cover (%)	Vertical projection of living, native tree canopy cover overlapping the transect
	Shrub layer cover (%)	Vertical projection of living, native shrub layer cover overlapping the transect
50 m x 20 m plot	Coarse wood debris	Length of fallen woody logs and other coarse woody debris (>1cm diameter, 0.5 m length) per hectare
50 m x 10m plot	Native plant species richness	Number of species in each of the three-life forms: shrubs, grasses and forbs/other
	Non-native plant cover	Cover of exotic species as a component of overall vegetation cover
Five 1 m x 1 m quadrat	Native perennial grass cover (%)	Average percentage cover of native perennial grass species
	Litter cover	Average percentage cover of fine and coarse organic material such as fallen leaves, twigs and branches <10 cm diameter

2.1.1 Relocated plots

The EPBC approval conditions require an area the width of 30m immediately adjacent to edge of the disturbance footprint (within the TEC) be surveyed to determine any potential impacts of the Coomera Connector Stage 1 development to the TEC. Given the total width of a BioCondition plot is 50m, the centre line must be placed a minimum of 25m from the edge of the disturbance. Plots cannot be placed closer to the disturbance footprint or the large tree plot will overlap with the impact zone and result in under sampling of large trees. For example, a transect placed 15m from the edge of the disturbance footprint would lose 10m x 100m of the large tree and tree richness plots, resulting in sampling bias.

Two previously established plots do not comply with this condition and were subsequently relocated. This resulted in an extra 20 m of survey area beyond the required 30m outside of the impact disturbance footprint, however this is considered necessary to obtain a meaningful sample in a confined survey footprint.

2.1.2 Reduced BioCondition Plots

A reduced length BioCondition methodology (Eyre et al., 2015) was utilised at four sites (BC03, BC04, BC07 and BC10). Each plot had been modified by reducing the total length of the 100 m transect to 50 m (start: 0 m, centre: 25 m and end: 50 m). The justification for this action is that there was no viable option to place the transect completely within the target TEC without overlapping into a non-target adjacent RE.

The reduced transect utilises the start location as 0 m for all attributes, with each measured across its typical distance between 0 m and 50 m.

Quadrats will commence at the 4 m mark on the left-hand side of the centre transect, repeating every 10 m on alternating sides until the last quadrat at the 44 m mark.

BioCondition attributes that are typically measured utilising the full 100 m transect length have been scaled up to allow comparison with benchmark scores. These attributes include: large trees, tree canopy cover and shrub layer cover.

For example, reduced 50 m transects:

- Equate to a plot size of 0.25 ha and large tree site data have been multiplied by four prior to comparison to benchmark data (instead of being multiplied by two).
- Require line intercept data (tree canopy cover and shrub layer cover site data) to be doubled to achieve a score comparable with benchmark data (out of 100 m or 100%).

A full species richness plot is able to be conducted in a 50m BioCondition plot, with the species count commencing at zero rather than 25m.

2.2 Limitations

Survey transect placement adjustments were required to be made in response to a shift in the project footprint since the baseline monitoring. The footprint near Helensvale Road has expanded, with two baseline plots no longer occurring within a buffer area and now appearing in an impact area. The location of these plots was adjusted such that the 30 m buffer directly adjacent to the project footprint was included within the plot, as close as possible to the previous transect position to keep baseline data relevant. Although the overall ecological community and vegetation composition appeared relatively similar in the new location, moving a long-term transect even a small distance can reduce the consistency of results.

Intensive pumping into the wetland appeared to have caused significant inundation of previously surveyed areas, which proved extremely difficult to traverse, often having sections of waist high water or deeper. Subsequently, inferences were made regarding some large tree DBHs and two BioCondition plots were reduced in size.

Additionally, many of the existing plots, as well as the surrounding area, have been significantly impacted by a large storm cell over Christmas 2023. Large areas no longer have canopy present and there are hundreds of trees knocked over, often snapped in half. It is possible to map the areas that have been damaged, and this will definitely have an impact on the results. However, it is possible to demonstrate and isolate this damage from the Coomera Connector project and this is presented throughout this report.

Lastly, it was also extremely difficult to reconstruct the exact alignment of the BAAM (2023) surveys for a number of reasons. Firstly, many of the transects are not straight to begin with and have large kinks in them, which are difficult to recreate. Additionally, in some cases flagging tape has been used and/or wooden stakes. It is evident that both flagging tape and wooden stakes do not last in this extremely wet environment and rate of decay is extremely high and the sites will rarely look the same year on year. The principal contractor on site (Fulton

Hogan joint venture) also does not allow driving of star pickets without an additional permit. Wooden stakes and flagging tape have been replaced where possible, however the likelihood of these lasting in the field is low. It is also worth noting that the BAAM report (2023) does not have transect start or end photos, making the correct trajectory and alignment of transects difficult to recreate.

3 Results

Field surveys have revealed that between 2023 and 2024, there has been moderate variation in the extent and direction of changes across the ten sites. The nature and extent of the changes also vary from site to site. As such, results are split by site in sections below, allowing emphasis on areas that have undergone more significant changes than others, and a precise breakdown of potential impacting factors. Total scores are presented in a summary table (Table 3-1) to be continually updated following annual monitoring.

Table 3-1 BioCondition site attributes total scores by year

Site ID	Monitoring Year						
	Baseline (2023)	2024	2025	2026	2027	2028	2029
BC01	58	53					
BC02	64	58					
BC03	58	50.5					
BC04	51.5	52.5					
BC05	40	37.5					
BC06	45	48					
BC07	49.5	50					
BC08	43.5	35.5					
BC09	37.5	42.5					
BC10	52	53.5					

NB: Orange cells indicate a decline, and green cells indicate an increase in score since baseline monitoring. Greyed out cells are left blank for future year scores

3.1 BC01

3.1.1 BC01 Summary

With minor exceptions detailed below the overall plot is mostly unchanged from 2023 and there is little evidence of additional disturbance caused by the project (Table 3-2).

Individual attribute scores are presented in Section 3.1.2. Given the location of existing plot and its proximity to the edge of the impact footprint several large trees that would have once been within the 100x50 m plot have subsequently been cleared by the project. These trees have been cleared within the approved impact footprint and the loss of their data within the BioCondition plot is a natural consequence of the width of the BioCondition plot being wider than the 30m buffer width applied in the EPBC Conditions. Depending on the location of the centre of the plot and where it was established, the large tree plot would either sample areas beyond the 30m buffer or areas that are within the impact footprint. The loss of these large trees should therefore not be considered an additional impact and the 2024 large tree count should be used as an adjusted baseline. See Figure 3-1 in Section 3.2.3 for aerial imagery of the site before and following storm damage.

Non-native cover has seen a slight increase within the plot based on new growth of broad-leafed pepper tree and easter cassia, particularly in the southern end of the plot. New saplings have germinated in some areas but are a likely product of existing seed stock from mature individuals and will continue to persist without weed management intervention. There is some minor discrepancy in the canopy cover (Section 3.1.2) between years that is not representative of a natural increase. Rather the canopy has increased while the subcanopy has decreased due to a difference in which trees were classified into each respective stratum.

Table 3-2 Summary of score for BC01 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
58	53	Loss of large trees due to permitted destruction within the impact footprint	No

3.1.2 BC01 Results Table

Site ID: BC01	RE: 12.1.1	Site Summary:	Dense woodland dominated by *Casuarina glauca*. Some areas of dense weed cover dominated by *Lantana camara* and broad-leaved pepper tree. Lots of large trees have fallen over in intense Gold Coast storms around Christmas 2023.	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	58	53
No. Large Non-Eucs (per ha)	14	8	**BC01 Centre North 2023**	**BC01 Centre North 2024**
Total Large Trees (per ha)	14	8		
EDL Recruitment	75	100		
Emergent Tree Height	-	-		
Canopy Tree Height	8	8		
Subcanopy Tree Height	4	5		
Mean Tree Height	6	6.5		
Emergent Tree Cover	-	-		
Canopy Tree Cover	56.1	85		
Subcanopy Tree Cover	32.1	20		
Mean Tree Cover	44.1	47.5	**BC01 Centre East 2023**	**BC01 Centre East 2024**
(Native) Shrub Cover	3.1	7		
Native Perennial Grass Cover	0.2	7		
Litter Cover	98	63		
Non-native Cover	20*	32		
Native Tree Species Richness	5	8		
Native Shrub Species Richness	4	4		
Native Grass Species	2	2		
Native Forbs & Other Species Richness	9	7		
CWD (m/ha)	1060	1064		

*Note that the value used for non-native cover for 2023 was taken from the line intercept data rather than the 50x20 m plot, due to inconsistency between these two scores. This was likely a result of a dense infestation of weeds outside the 50x20 m plot.

3.2 BC02

3.2.1 BC02 Summary

With minor exceptions detailed below the overall plot is mostly unchanged from 2023 and there is little evidence of additional disturbance caused by the project (Table 3-3).

As with BC01, the large tree totals for BC02 have decreased between 2023 and 2024 due to a combination of clearing within the permitted Impact footprint and several trees that have been destroyed in the major storm event on the 25th of December 2023. The other major difference between 2023 and 2024 is regarding native perennial grass cover. There were large areas of native grass near the start of the transect but the middle sections were devoid of most grass cover as is typical in dense Casuarina canopies with a high leaf litter cover. There were also some large patches inundated through the transect that may have also reduced the grass cover overall. However, neither change can be attributed to a primary or secondary impact of the project works.

See Figure 3-1 in section 3.2.3 for aerial imagery of the site before and following storm damage.

Table 3-3 Summary of score for BC02 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
64	58	Loss of large trees due to permitted destruction within the impact footprint. Loss of native grass cover	No

3.2.2 BC02 Results Table

Site ID: BC02	RE: 12.1.1	Site Summary:	Closed *Casuarina glauca*. Woodland with a grassy understory. Moderate cover of broadleaf pepper tree. Several large trees have either been destroyed in storms or pushed over from the edge of the disturbance footprint	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	64	58
No. Large Non-Eucs (per ha)	50	40	**BC02 Centre South 2023**	**BC02 Centre South 2024**
Total Large Trees (per ha)	50	40		
EDL Recruitment	16	100		
Emergent Tree Height	-	-		
Canopy Tree Height	16	16		
Subcanopy Tree Height	7	8		
Mean Tree Height	11.5	12		
Emergent Tree Cover	-	-		
Canopy Tree Cover	74.7	69		
Subcanopy Tree Cover	48.8	29		
Mean Tree Cover	61.75	41.75	**BC02 Centre North 2023**	**BC02 Centre North 2024**
(Native) Shrub Cover	4.1	0		
Native Perennial Grass Cover	37.8	3		
Litter Cover	59	54		
Non-native Cover	5	3		
Native Tree Species Richness	1	1		
Native Shrub Species Richness	2	3		
Native Grass Species	3	2		
Native Forbs & Other Species Richness	13	15		
CWD (m/ha)	200	199		

3.2.3 Aerial imagery timestamps

Figure 3-1 Timestamped aerial images of sites BC01 and BC02 before and after storms on Christmas Day 2023. Source: Nearmap.

3.3 BC03

3.3.1 BC03 Summary

Site BC03 should be compared with caution between years 2023 and 2024 as the entire plot was realigned to comply with the scope (see Section 1.3 and Table 1-1 for GPS locations and mapping of adjusted transects). The reason for the realignment was twofold:

1. The impact footprint has been adjusted between the 2023 monitoring and 2024 due to the added requirement for water management infrastructure adjacent to Helensvale Road. This resulted in significant parts of the existing plot being located within the impact footprint; and
2. The 25th of December 2023 major storm event decimated the TEC areas adjacent to Helensvale Road as illustrated by the timelapse imagery in Figure 3-6, Section 3.2.3.

Note that positioning a plot representative of the correct swamp oak TEC, within the required 30m buffer that also did not cross into a mangrove Regional Ecosystem was not possible due to insufficient space. This section of the TEC was also extremely inundated, with some locations waist deep with large areas of deep water that were impossible to traverse on foot. In light of these constraints, the overall plot was also reduced to a length of 50 m.

The site has decreased slightly in condition since 2023 (Table 3-4), but given the severity of the destruction caused by the December storm it is almost impossible to determine whether there are any additional impacts from the project. However, the area is likely to change once again following the construction of a new Bio basin or similar. Future monitoring events will thus be integral in determining whether there are any secondary impacts and loss of quality. Nearmap aerial imagery depicting vegetation changes near the site since December 2023 up until the current survey date can be viewed in Figure 3-6, Section 3.4.3.

Table 3-4 Summary of score for BC03 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
58	50.5	Realignment of transect	Unclear

Figure 3-2 Areas of open canopy created by extreme storm events knocking over canopy trees

Figure 3-3 Examples of canopy trees snapped in half by storms on December 25, 2023

3.3.2 BC03 Results Table

Site ID: BC03	RE: 12.1.1	Site Summary:	Patchy storm damaged *Casuarina glauca* swampland. Reduced 50m plot. Reduced 50x30 large tree plot due to storm damaged areas and mangrove RE. Open *Casuarina glauca* woodland with dense ferny undergrowth and considerable inundation throughout the entire plot.	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	58	50.5
No. Large Non-Eucs (per ha)	12	6	**BC03 Centre West 2023***	**BC03 Centre West 2024**
Total Large Trees (per ha)	12	6		
EDL Recruitment	40	100		
Emergent Tree Height	-	-		
Canopy Tree Height	16	15		
Subcanopy Tree Height	7	7		
Mean Tree Height	11.5	11		
Emergent Tree Cover	-	-		
Canopy Tree Cover	67.9	62		
Subcanopy Tree Cover	19.3	38		
Mean Tree Cover	43.6	50	**BC03 Centre North 2023***	**BC03 Centre North 2024**
(Native) Shrub Cover	10	5		
Native Perennial Grass Cover	0	0		
Litter Cover	4	33		
Non-native Cover	1	5		
Native Tree Species Richness	5	3		
Native Shrub Species Richness	3	1		
Native Grass Species	2	1		
Native Forbs & Other Species Richness	16	10		
CWD (m/ha)	850	30		

*Note that the plot at BC04 was required to be relocated due to the adjustment in the impact footprint and subsequent shifting of the 30m buffer area.

3.4 BC04

3.4.1 BC04 Summary

Similar to site BC03, site BC04 should be compared with caution between years 2023 and 2024 as the entire plot was realigned to comply with the scope. The reason for the realignment was consistent with site BC03:

1. The impact footprint has been adjusted between the 2023 and 2024 monitoring due to the added requirement for water management infrastructure adjacent to Helensvale Road. This resulted in significant parts of the existing plot being located within the impact footprint; and
2. The 25th of December 2023 major storm event decimated the TEC areas adjacent to Helensvale Road as illustrated by the timelapse imagery in Figure 3-6, Section 3.2.3.

While the realigned plot avoids the worst impacted areas and overall condition scores are consistent between 2023 and 2024 (Table 3-5) there are still many fallen trees scattered through the site. Given the severity of the destruction caused by the storm it is almost impossible to determine whether there is any additional impacts from the project as the area now looks completely different as shown in Figure 3-6.

As with BC03, the area is likely to change once again following the construction of a new Bio basin or similar and future monitoring events will be integral in determining whether there are any secondary impacts and loss of quality.

Nearmap aerial imagery depicting vegetation changes near the site since December 2023 up until the current survey date can be viewed in Figure 3-6, Section 3.4.3.

Table 3-5 Summary of score for BC04 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
51.5	52.5	Realignment of transect	Unclear

Figure 3-4 Deep pools filled with restricted Salvinia molesta making traversing the area extremely challenging

Figure 3-5 Large number of canopy trees knocked over in storm damage leading to challenges in navigating the site as well as reducing canopy cover and other related BioCondition metrics

3.4.2 BC04 Results Table

Site ID: BC04	RE: 12.1.1	Site Summary:	Patchy cover of *Casuarina glauca* with deep inundations and dense coverage of *Salvinia molesta*. Dense cover of swamp fern in the understory. Deep pools making movement extremely difficult. Plot has been realigned based on the altered construction footprint. Only 50m transect. Large amount of damage from recent summer storms and lots of trees over.	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	51.5	52.5
No. Large Non-Eucs (per ha)	22	24	**BC04 Centre South 2023***	**BC04 Centre South 2024**
Total Large Trees (per ha)	22	24		
EDL Recruitment	60	100		
Emergent Tree Height	-	-		
Canopy Tree Height	18	18		
Subcanopy Tree Height	7	7		
Mean Tree Height	12.5	12.5		
Emergent Tree Cover	-	-		
Canopy Tree Cover	62.2	54		
Subcanopy Tree Cover	20.4	37		
Mean Tree Cover	41.3	45.5	**BC04 Centre West 2023***	**BC04 Centre West 2024**
(Native) Shrub Cover	10.6	0		
Native Perennial Grass Cover	2	0		
Litter Cover	40	13		
Non-native Cover	2	1		
Native Tree Species Richness	5	4		
Native Shrub Species Richness	2	2		
Native Grass Species	1	2		
Native Forbs & Other Species Richness	19	10		
CWD (m/ha)	30	100		

*Note that the plot at BC04 was required to be relocated due to the adjustment in the impact footprint and subsequent shifting of the 30m buffer area.

3.4.3 Aerial imagery timestamps

Figure 3-6 Timestamped aerial images of sites BC03 and BC04 before and after storms on Christmas Day 2023. Red boundary highlights mapped storm damage areas. Realigned transects can be seen in Appendix A. Source: Nearmap.

3.5 BC05

3.5.1 BC05 Summary

BC05 saw very little variation in condition between 2023 and 2024 and no evidence of impacts from the Coomera Connector project. Interestingly, Ausecology recorded a significant increase in the number of large trees, and this patch in general has more large trees per hectare than indicated in the 2023 BAAM report. It was also noted there was a significant increase in the non-native cover observed. This can be attributed primarily to an increase in *Salvinia molesta* and other aquatic weeds. This is likely due to an increase in the level of inundation throughout the site as a result of preceding rainfall events. The level of cover comprised by these type of species is likely continually fluctuate naturally based on rainfall and inundation levels. The proportion of this site that is inundated is also likely to result in fluctuations in native grass and forb cover/richness which will get temporarily drowned by long periods of water logging.

Table 3-6 Summary of score for BC05 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
40	37.5	Increase in non-native cover, offset by large increase in large trees	No

3.5.2 BC05 Results Table

Site ID: BC05	RE: 12.3.20	Site Summary:	Low lying woodland dominated by *Casuarina glauca*. Pockets of retained ponding water with *Salvinia molesta*. Large areas of ponded water have contributed to a substantial increase in non-native cover and reduction in leaf litter. No storm damage noted.	
BioCondition Site Attributes	**2023**	2024	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	40	37.5
No. Large Non-Eucs (per ha)	8	22	**BC05 Centre North 2023**	**BC05 Centre North 2024**
Total Large Trees (per ha)	8	22		
EDL Recruitment	60	100		
Emergent Tree Height	-	-		
Canopy Tree Height	10	17.8		
Subcanopy Tree Height	7	8.24		
Mean Tree Height	8.5	13.02		
Emergent Tree Cover	-	-		
Canopy Tree Cover	40.9	74.9		
Subcanopy Tree Cover	26	23.7		
Mean Tree Cover	33.45	49.3	**BC05 Centre South 2023**	**BC05 Centre South 2024**
(Native) Shrub Cover	0	0		
Native Perennial Grass Cover	0	0.4		
Litter Cover	82.4	44.6		
Non-native Cover	20	60		
Native Tree Species Richness	5	5		
Native Shrub Species Richness	1	2		
Native Grass Species	1	1		
Native Forbs & Other Species Richness	11	7		
CWD (m/ha)	35	45		

3.6 BC06

3.6.1 BC06 Summary

Site BC06 showed minimal variation between years 2023 and 2024 other than what can be attributed to natural variation and minor differences between plot alignment between years (Table 3-7). Note that in 2023 the transects were only marked with flagging tape tied to trees which in this case was unable to be located, forcing ecologists to rely on GPS points which have a minor degree of inaccuracy (several metres). This is likely to lead to minor variations in canopy and subcanopy cover. Regardless the site has increased in BioCondition score overall and noticeably decreased in key metrics such as non-native cover (see Section 0 for individual attribute scores). The number of large trees has also increased, although there is some confusion around the 2023 data for large trees recorded by BAAM. This site was also mostly unimpacted by the 2023 storms given it is relatively sheltered away from exposed edge of the patch. Overall there is no evidence of primary or secondary impacts from the project.

Table 3-7 Summary of score for BC06 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
45	48	Increase in large trees and decreased non-native cover	No

Figure 3-7 Dense cover of Asparagus aethiopicus towards the end of the transect.

Figure 3-8 Example of shallow inundations throughout site BC06

3.6.2 BC06 Results Table

Site ID: BC06	RE: 12.1.1	Site Summary:	Patchy, near closed casuarina glauca woodland, nearly fully inundated at the northern end. ferns and wetland species present in a moderately dense to open shrub layer and an infestation of *Lantana* and *Asparagus* at the south as a result of disturbance on the periphery.	
BioCondition Site Attributes	**2023**	2024	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	45	48
No. Large Non-Eucs (per ha)	12	20	**BC06 Centre South 2023**	**BC06 Centre South 2024**
Total Large Trees (per ha)	12	20		
EDL Recruitment	100	100		
Emergent Tree Height	-	-		
Canopy Tree Height	18	19		
Subcanopy Tree Height	9	9		
Mean Tree Height	13.5	14		
Emergent Tree Cover	-	-		
Canopy Tree Cover	93.9	67		
Subcanopy Tree Cover	12.8	21		
Mean Tree Cover	53.35	44	**BC06 Centre North 2023**	**BC06 Centre North 2024**
(Native) Shrub Cover	1.9	0		
Native Perennial Grass Cover	1	1		
Litter Cover	65	67		
Non-native Cover	60	15		
Native Tree Species Richness	4	3		
Native Shrub Species Richness	1	2		
Native Grass Species	4	3		
Native Forbs & Other Species Richness	13	11		
CWD (m/ha)	30	0		

3.7 BC07

3.7.1 BC07 Summary

Site BC07 is almost unrecognisable from the 2023 surveys and has been decimated by the December 2023 storms. This is demonstrated in Figure 3-9 and Figure 3-10. There are numerous large trees that have been pushed over by the storms and debris is scattered throughout the site making traversing the site nearly impossible. The 2023 baseline plot was also crooked and replicating the bowed transect line was consequently challenging. Despite the loss of several canopy trees, the overall BioCondition score is roughly the same as the baseline due to increases in native grass cover and tree height overall (see Section 3.7.2 for individual attribute scores). Given the severity of the destruction caused by the December 2023 storm it is almost impossible to determine whether there are any additional impacts from the project.

Table 3-8 Summary of score for BC07 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
49.5	50	Loss of canopy cover countered by increases in other metrics	No

Figure 3-9 Large volume of canopy trees such as this Melaleuca quinquenervia ripped out from the roots by storms on December 25, 2023

Figure 3-10 Entire root area ripped from the ground and leaving a large pool of water up to 1.5m deep. This tree would have qualified as a large non-eucalypt tree. These new pools are frequently colonised by the restricted weed Salvinia molesta

3.7.2 BC07 Results Table

Site ID: BC07	RE: 12.3.20	Site Summary:	Swamp oak TEC with dense patches of Mangrove fern and some inundated pools. Some areas where trees have been knocked over in storm damage. Will likely lead to reduced canopy cover. Transect start point very close to pedestrian footpath.	
BioCondition Site Attributes	**2023**	2024	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	49.5	50
No. Large Non-Eucs (per ha)	18	16	**BC07 Centre North 2023**	**BC07 Centre North 2024**
Total Large Trees (per ha)	18	16		
EDL Recruitment	100	100		
Emergent Tree Height	-	-		
Canopy Tree Height	16	20		
Subcanopy Tree Height	7	6		
Mean Tree Height	11.5	13		
Emergent Tree Cover	-	0		
Canopy Tree Cover	86.2	64		
Subcanopy Tree Cover	16	0		
Mean Tree Cover	51.1	32	**BC07 Centre South 2023**	**BC07 Centre South 2024**
(Native) Shrub Cover	0	0		
Native Perennial Grass Cover	19	29		
Litter Cover	26	20		
Non-native Cover	5	5		
Native Tree Species Richness	3	3		
Native Shrub Species Richness	5	5		
Native Grass Species	2	3		
Native Forbs & Other Species Richness	14	15		
CWD (m/ha)	200	0		

3.8 BC08

3.8.1 BC08 Summary

Despite a marked decrease in score, there is no evidence of direct impacts from the project itself as the key score losses can be directly attributed to the storm damage.

The first 30 m of the transect at BC08 has had major impacts from the December 2023 storms. This is reflected in the overall loss in canopy cover and loss of BioCondition Score overall (Table 3-9). The impact of the storm can be clearly seen as illustrated in Figure 3-12.

The site retains a poor score overall for non-native cover with 60% cover recorded in this monitoring run. Most weed cover is contained within the second half of the transect along the flat, dry sections and is primarily comprised of Singapore daisy and broad-leafed pepper tree.

It was also noted that a vehicle track is present at the end of the transect. Although not regularly used, this track will worsen the non-native cover in the direct area given the increased edge effect and seed spread (Figure 3-11). Non-native cover is likely to continue to degrade given the existing coverage throughout the survey area. It is recommended that this track be rehabilitated and weed control implemented to demonstrate that the project is improving the area rather than continuing to worsen it.

Nearmap aerial imagery depicting vegetation changes near the site since December 2023 up until the current survey date can be viewed in Section 3.8.3.

Table 3-9 Summary of score for BC08 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
43.5	35.5	Loss of canopy cover due to storm damage	No

Figure 3-11 Access track running immediately behind the end of the transect with high volume of blue billy goat weed (Ageratum houstonianum)

Figure 3-12 Evidence of potential large non-eucalypt trees snapped in half by storm damage on December 25, 2023

3.8.2 BC08 Results Table

Site ID: BC08	RE: 12.1.1	Site Summary:	Swamp oak TEC with dense patches of Mangrove fern and some inundated pools. Some areas where trees have been knocked over in storm damage. Will likely lead to reduced canopy cover	
BioCondition Site Attributes	**2023**	2024	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	43.5	35.5
No. Large Non-Eucs (per ha)	28	32	**BC08 Centre South 2023**	**BC08 Centre South 2024**
Total Large Trees (per ha)	28	32		
EDL Recruitment	60	100		
Emergent Tree Height	-	0		
Canopy Tree Height	17	18		
Subcanopy Tree Height	10	10		
Mean Tree Height	13.5	14		
Emergent Tree Cover	-	-		
Canopy Tree Cover	94.6	54		
Subcanopy Tree Cover	10	20		
Mean Tree Cover	52.3	37	**BC08 Centre North 2023**	**BC08 Centre North 2024**
(Native) Shrub Cover	0	0		
Native Perennial Grass Cover	0	0		
Litter Cover	2	21		
Non-native Cover	55	60		
Native Tree Species Richness	5	4		
Native Shrub Species Richness	1	0		
Native Grass Species	1	1		
Native Forbs & Other Species Richness	4	5		
CWD (m/ha)	40	0		

3.8.3 Aerial imagery timestamps

Figure 3-13 Timestamped aerial images of sites BC07 and BC08 before and after storms on Christmas Day 2023. Red boundary highlights mapped storm damage areas. Realigned transects can be seen in Appendix A. Source: Nearmap.

3.9 BC09

3.9.1 BC09 Summary

BC09 has very little evidence of change between 2023 and 2024 monitoring with only small differences in the raw results (see Section 0) and a slight overall improvement (Table 3-10).

The site has no evidence of storm damage and is adjacent to a well sheltered mangrove creek system. Non-native cover at BC09 is very high, with the ground layer being a monoculture of Singapore daisy *(Sphagneticola trilobata)*. Many other non-native species are also present, including a number of shrubs and exotic sub canopy trees. Non-native cover was similarly high in 2023 and the large coverage cannot be attributed to the commencement of the project, however it will continue to increase as the project continues. It is therefore recommended that actions be undertaken to reduce the non-native cover in this area of the project footprint to clearly demonstrate that the project is not contributing to negative changes.

Table 3-10 Summary of score for BC09 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
37.5	42.5	Natural variation	No

Figure 3-14 Extremely dense cover of Singapore daisy (Sphagneticola trilobata) at BC09.

3.9.2 BC09 Results Table

Site ID: BC09	RE: 12.3.20	Site Summary:	Lower bank of creek with *Casuarina glauca*. Scattered *Eucalyptus tereticornis, Eucalyptus siderophloia*. Ground cover is almost monoculture Singapore daisy.	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	37.5	42.5
No. Large Non-Eucs (per ha)	14	18	**BC09 Centre South 2023**	**BC09 Centre South 2024**
Total Large Trees (per ha)	14	18		
EDL Recruitment	90	100		
Emergent Tree Height	-	0		
Canopy Tree Height	12	14		
Subcanopy Tree Height	6	6		
Mean Tree Height	9	10		
Emergent Tree Cover	-	0		
Canopy Tree Cover	95.9	91		
Subcanopy Tree Cover	41.1	36		
Mean Tree Cover	68.5	63.5	**BC09 Centre North 2023**	**BC09 Centre North 2024**
(Native) Shrub Cover	0	0		
Native Perennial Grass Cover	0	0		
Litter Cover	41.4	21		
Non-native Cover	70	77		
Native Tree Species Richness	9	8		
Native Shrub Species Richness	4	7		
Native Grass Species	0	2		
Native Forbs & Other Species Richness	4	7		
CWD (m/ha)	0	0		

3.10 BC10

3.10.1 BC10 Summary

BC10 saw an overall increase in score between 2023 and 2024, albeit a slight increase. There is minimal construction activity currently occuring in this southern section and there is accordingly no evidence of any unpermitted damage to the Swamp Oak TEC. This area is slightly younger than all other sites and only just meets remnant status. The only noticeable change between 2023 and 2024 is the drop in subcanopy cover. However this was likely a result of differences in how the subcanopy and canopy were split and which trees were accredited to which stratum. In future the Ausecology stratum heights should be used as a baseline as the BAAM report does not contain any detailed tree height information other than a single average height. Detailed tree height information is included in Appendix B. As with BC05, the number of large trees per hectare has also been increased at this site.

Table 3-11 Summary of score for BC10 and comparison with EPBC Approval Conditions

Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
52	53.5	Natural variation	No

3.10.2 BC10 Results Table

Site ID: BC10	RE: 12.3.20	Site Summary:	Dense *Casuarina glauca* forest with an understory of *Melaleuca* and *Acacia* spp. Ground layer is dominated by thick pine needle leaf litter with scattered *Lomandra hystrix* and *Ottochloa gracilima.* No storm damage noted.	
BioCondition Site Attributes	**2023**	**2024**	**Baseline (2023) score out of 80**	**Current (2024) score out of 80**
No. Large Eucs (per ha)	0	0	52	53.5
No. Large Non-Eucs (per ha)	2	8	**BC10 Centre South 2023**	**BC10 Centre South 2024**
Total Large Trees (per ha)	2	8		
EDL Recruitment	100	100		
Emergent Tree Height	-	-		
Canopy Tree Height	10	13.66		
Subcanopy Tree Height	7	5.4		
Mean Tree Height	8.5	9.53		
Emergent Tree Cover	-	-		
Canopy Tree Cover	81.8	88.8		
Subcanopy Tree Cover	52	13.6		
Mean Tree Cover	66.9	47.8	**BC10 Centre North 2023**	**BC10 Centre North 2024**
(Native) Shrub Cover	20	14.4		
Native Perennial Grass Cover	24.4	2.4		
Litter Cover	70.2	77.6		
Non-native Cover	5	5		
Native Tree Species Richness	5	7		
Native Shrub Species Richness	13	8		
Native Grass Species	3	2		
Native Forbs & Other Species Richness	13	12		
CWD (m/ha)	10	95		

4 Conclusion

Table 4-1 below summaries to overall BioCondition score for each site assessed along the Coomera Connector Project. This includes highlighting whether the overall score has increased or decrease along with a brief statement on the reasons for the change. Finally, Table 4-1 comments on whether there is any evidence of change resulting from the Project itself in accordance with EPBC 2020/8646 condition 6, which specifies that the proponent:

"Ensure that the quality and/or extent of retained Coastal Swamp Oak TEC within 30 m of clearing and/or construction does not degrade due to impacts attributable to this Action".

At the conclusion of the 2024 monitoring there is no direct evidence of any degradation of the TEC as a direct or indirect result of the impact. However, as discussed at length, many areas of the Project have been decimated by the December 25 2023 storms and drawing conclusions is difficult in these circumstances. Further monitoring is required as per the EPBC Conditions and will continue for the length of the construction period.

Table 4-1 Final Summary of 2024 findings and compliance with EPBC 2020/8646 Condition 6.

Site ID	Baseline Score	2024 Score	Reason for change	Is the change likely a direct or indirect impact of the project?
BC01	58	53	Loss of large trees due to permitted destruction within the impact footprint	No
BC02	64	58	Loss of large trees due to permitted destruction within the impact footprint. Loss of native grass cover	No
BC03	58	50.5	Realignment of transect	Unclear
BC04	51.5	52.5	Realignment of transect	Unclear
BC05	40	37.5	Increase non-native cover	No
BC06	45	48	Increase in large trees and decreased non-native cover	No
BC07	49.5	50	Loss of canopy cover countered by increases in other metrics	No
BC08	43.5	35.5	Loss of canopy cover due to storm damage	No
BC09	37.5	42.5	Natural variation	No
BC10	52	53.5	Natural variation	No

4.1 Recommendations

It is recommended that weed control be undertaken and targeted to sites with more than 25% non-native cover. This includes the sites and target species contained in Table 4-2. Improving the non-native cover score in these sites will increase the BioCondition score as well as allow more recruitment of native species richness across all strata.

Table 4-2 Sites with more than 25% weed cover and target species for control works

Sites	Weed Cover	Target Species
BC01	32%	*Lantana camara, Schinus terebinthifolius*
BC05	60%	*Salvinia molesta*
BC08	60%	*Sphagneticola trilobata*
BC09	77%	*Sphagneticola trilobata, Schinus terebinthifolius, Solanum spp.*

5 References

BAAM 2023. Coastal Swamp Oak TEC Condition Monitoring – Coomera Connector Stage 1 February 2023.

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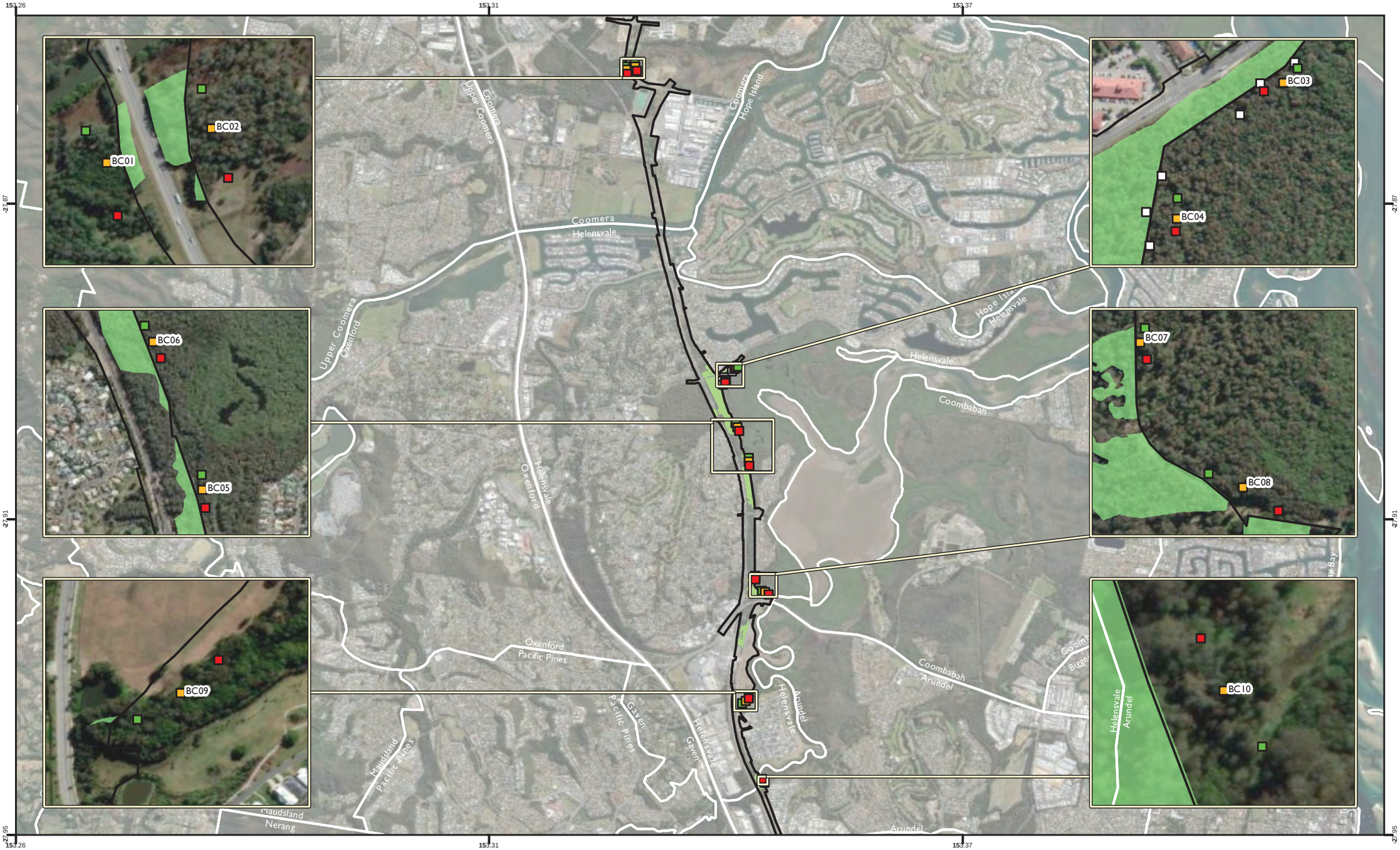
Department of the Environment and Energy 2018. Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community. Canberra: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/141-conservation-advice.pdf. In effect under the EPBC Act from 20-Mar-2018.

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. 2015. BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane. Available from: https://www.qld.gov.au/__data/assets/pdf_file/0029/68726/biocondition-assessmentmanual.pdf.

Appendix A – BioCondition Locations



Ausecology

APPENDIX A:

Overview Map
Coomera TEC

- Development Boundary
- Suburbs
- TEC Extent

Transect Position

- Start
- Centre
- End
- Superseded Transect

REVISION	AUTHOR	REVIEWER	DATE
0	NC	TS	04/07/2024

COORDINATE SYSTEM: GCS GDA 1994

SCALE: 1:60,000

0 0.5 1 1.5

Kilometres

Appendix B – BioConditions Raw Data

Ausecology

Site Details:

Site Code:	BC01	**Date:**	2024-05-29	**Time:**	09:25
Ecologist/s:	Tim Shields, Yasmin Feile				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
90

Ground-truthed Regional Ecosystem:	12.1.1.	Remnant

Habitat Description:
Dense woodland dominated by Casuarina glauca. Some areas of dense weed cover dominated by Lantana camara and broad leaved pepper tree

General Comments:
Lots of large trees have fallen over in intense Gold Coast storms around Christmas 2023

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	5.0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	3.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	2.0	5.0

Total	53.0	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	8.4	84.9
Subcanopy:	7.0	19.7
Shrub:	na	6.6

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	4	29.0
Total No. Large Trees per site:	4	
Total No. Large Trees per ha:	8	

Species Richness:

Native Trees:	8
Native Shrubs:	4
Native Grasses:	2
Native Forbs & Other:	7
Non-Natives:	17

Non-Native Plant Cover (%):
32.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	9.4	9.4	C	78.4	85.3	6.9
SC	7.9	9.9	2.0	SHR-E	78.7	79.8	1.1
SHR	12.8	15.5	2.7	SC	81.0	86.1	5.1
C	12.8	15.8	3.0	SHR-E	81.7	82.8	1.1
SC	17.7	18.4	0.7	SHR-E	83.7	85.0	1.3
C	18.4	69.9	51.5	SC	86.9	90.0	3.1
SHR	21.0	22.2	1.2	SHR-E	87.8	90.0	2.2
SHR-E	40.8	41.2	0.4				
SHR-E	42.2	42.8	0.6				
SHR-E	46.0	46.9	0.9				
SHR	65.1	65.6	0.5				
SHR	67.0	67.3	0.3				
SHR-E	67.4	67.9	0.5				
SC	67.2	74.0	6.8				
SHR	70.1	70.9	0.8				
C	71.8	77.4	5.6				
SHR-E	73.7	75.8	2.1				
SHR	76.2	76.6	0.4				
SHR-E	76.7	76.9	0.2				
SC-E	78.0	78.8	0.8				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	84.9	0
Total Subcanopy (%)	19.7	0.9
Total Shrub (%)	6.6	11.6

Coarse Woody Debris:

Total Length (m):	106.4	Total Length (m/ha):	1,064.0

Length/s (m):																			
1	2.80	6	1.10	11	3.50	16	5.00	21	8.00	26		31		36	
2	3.00	7	3.00	12	3.00	17	5.00	22	8.50	27		32		37	
3	2.00	8	3.00	13	4.00	18	4.00	23		28		33		38	
4	9.00	9	8.00	14	10.00	19	0.50	24		29		34		39	
5	9.00	10	2.00	15	9.00	20	3.00	25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Schinus terebinthifolius		Restricted -	NN-SC
3	Corymbia torelliana			SC
4	Eucalyptus propinqua			C
5	Alphitonia excelsa			SC
6	Acacia disparrima			SC
7	Jagera pseudorhus			OTH
8	Melaleuca quinquenervia			SC
9	Ficus rubiginosa			OTH
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
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27				
28				
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31				
32				
33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Schinus terebinthifolius		Restricted -	Non-Native
2	Passiflora foetida		*	Non-Native
3	Asparagus aethiopicus		Restricted -	Non-Native
4	Cupaniopsis anacardioides			SHR
5	Ageratum houstonianum		*	Non-Native
6	Rivina humilis		*	Non-Native
7	Senna pendula		*	Non-Native
8	Alternanthera denticulata			F
9	Parsonsia straminea			F
10	Enydra woollsii			F
11	Passiflora pallida		*	Non-Native
12	Solanum mauritianum		*	Non-Native
13	Crassocephalum crepidioides		*	Non-Native
14	Lantana camara		Restricted -	Non-Native
15	Solanum seaforthianum		*	Non-Native
16	Casuarina glauca			SHR
17	Macroptilium atropurpureum		*	Non-Native
18	Commelina benghalensis		*	Non-Native
19	Geitonoplesium cymosum			F
20	Alphitonia excelsa			SHR
21	Solanum americanum		*	Non-Native
22	Cyperus sp.			F
23	Paspalidium distans			G
24	Commelina diffusa			F
25	Emilia sonchifolia		*	Non-Native
26	Brassica sp.		*	Non-Native
27	Einadia hastata			SHR
28	Ottochloa gracillima			G
29	Dianella brevipedunculata			F
30	Solanum chrysotrichum		*	Non-Native
31				
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44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	0	0	0	0	63	0	30	7	100%
	2	0	5	0	0	35	48	0	10	0	100%
	0	0	0	0	0	0	100	0	0	0	100%
	6	0	0	0	0	3	91	0	0	0	100%
	25	0	0	0	0	50	15	0	10	0	100%
Mean:	6.60	0	1.00	0	0	17.60	63.40	0	10.00	1.40	

Ausecology

Site Details:

Site Code:	BC02	**Date:**	2024-05-29	**Time:**	12:52
Ecologist/s:	Tim Shields, Yasmin Feile				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
100

Ground-truthed Regional Ecosystem:	12.1.1	Remnant

Habitat Description:
Closed casuarina glauca. Woodland with a grassy understory. Moderate cover of broadleaf pepper tree.

General Comments:
Several large trees have either been destroyed in storms or pushed over from the edge of the disturbance footprint

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	10.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	5.0	5.0

Total	58.0	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	15.8	69.2
Subcanopy:	7.0	29.2
Shrub:	na	0.1

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	20	29.0
Total No. Large Trees per site:	20	
Total No. Large Trees per ha:	40	

Species Richness:

Native Trees:	1
Native Shrubs:	3
Native Grasses:	2
Native Forbs & Other:	15
Non-Natives:	12

Non-Native Plant Cover (%):
3.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	5.5	5.5				
C	9.6	28.0	18.4				
SHR-E	14.0	14.2	0.2				
SC	21.0	33.5	12.5				
SHR-E	23.2	23.5	0.3				
SHR-E	24.1	24.3	0.2				
SHR-E	24.9	25.0	0.1				
SHR	29.7	29.8	0.1				
SHR-E	30.0	30.3	0.3				
C	30.0	33.0	3.0				
C	37.0	40.0	3.0				
SC	40.0	45.9	5.9				
C	49.0	71.5	22.5				
SC	57.8	61.5	3.7				
SC	70.0	77.1	7.1				
C	76.1	92.9	16.8				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	69.2	0
Total Subcanopy (%)	29.2	0
Total Shrub (%)	0.1	1.1

Coarse Woody Debris:

Total Length (m):	19.9	Total Length (m/ha):	199.0

Length/s (m):																			
1	8.00	6	4.00	11		16		21		26		31		36	
2	1.60	7	1.20	12		17		22		27		32		37	
3	1.00	8		13		18		23		28		33		38	
4	1.10	9		14		19		24		29		34		39	
5	3.00	10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Schinus terebinthifolius		Restricted -	NN-SC
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
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21				
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29				
30				
31				
32				
33				
34				
35				

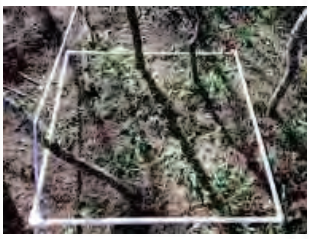
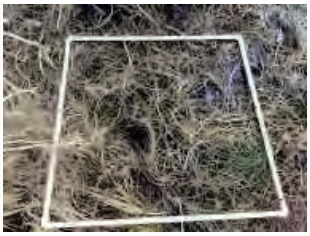
Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Schinus terebinthifolius		Restricted -	Non-Native
2	Casuarina glauca			SHR
3	Alternanthera denticulata			F
4	Emilia sonchifolia		*	Non-Native
5	Parsonsia straminea			F
6	Paspalidium distans			G
7	Cupaniopsis anacardioides			SHR
8	Asparagus aethiopicus		Restricted -	Non-Native
9	Solanum americanum		*	Non-Native
10	Crassocephalum crepidioides		*	Non-Native
11	Goodenia mystrophylla			Non-Native
12	Cyperus polystachyos			F
13	Eclipta prostrata		*	Non-Native
14	Centella asiatica			F
15	Ludwigia octovalvis			F
16	Cuphea carthagenensis		*	Non-Native
17	Entolasia stricta			G
18	Phyla nodiflora			F
19	Eclipta platyglossa			F
20	Juncus kraussii			F
21	Bacopa monnieri			F
22	Cynodon dactylon		*	Non-Native
23	Cyperus difformis			F
24	Dianella revoluta			F
25	Paspalum notatum		*	Non-Native
26	Solanum seaforthianum		*	Non-Native
27	Senna pendula		*	Non-Native
28	Lantana camara		Restricted -	Non-Native
29	Einadia hastata			SHR
30	Dianella brevipedunculata			F
31	Commelina diffusa			F
32	Enydra woollsii			F
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	2	0	10	0	0	12	76	0	0	0	100%
	13	0	7	0	0	0	10	0	70	0	100%
	0	0	23	0	0	0	77	0	0	0	100%
	0	0	70	0	0	0	20	0	10	0	100%
	0	0	0	0	0	0	85	0	15	0	100%
Mean:	3.00	0	22.00	0	0	2.40	53.60	0	19.00	0	

Ausecology

Site Details:

Site Code:	BC03	**Date:**	2024-06-05	**Time:**	14:09
Ecologist/s:	Tim Shields, Nicola Praschifka				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
50

Ground-truthed Regional Ecosystem:	12.1.1	Remnant

Habitat Description:
Patchy storm damaged Casuarina glauca swampland

General Comments:
Reduced 50m plot. Reduced 50x30 large tree plot due to storm damaged areas and mangrove RE. Open Casuarina glauca woodland with dense Ferny undergrowth and considerable inundation throughout the entire plot

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	5.0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	5.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	2.5	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	0	5.0
Total	50.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	15.5	62.2
Subcanopy:	7.0	38.2
Shrub:	na	5.2

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	3	29.0
Total No. Large Trees per site:	3	
Total No. Large Trees per ha:	6	

Species Richness:

Native Trees:	3
Native Shrubs:	1
Native Grasses:	1
Native Forbs & Other:	10
Non-Natives:	4

Non-Native Plant Cover (%):
5.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	7.8	7.8				
SC	4.2	7.6	3.4				
SC	10.1	15.0	4.9				
C	11.8	28.4	16.6				
SHR-E	15.3	16.1	0.8				
SHR	16.7	18.3	1.6				
SHR	19.1	20.1	1.0				
SC	20.3	20.9	0.6				
SC	26.0	29.1	3.1				
C	30.0	36.7	6.7				
SC	31.4	36.2	4.8				
SC	39.5	41.4	1.9				
SC	44.8	45.2	0.4				
E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic							

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	62.2	0
Total Subcanopy (%)	38.2	0
Total Shrub (%)	5.2	1.6

Coarse Woody Debris:

Total Length (m):	3.0	Total Length (m/ha):	30.0

Length/s (m):																			
1	3.00	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

Species		Other	Status	Strata
1	Casuarina glauca			C, SC
2	Avicennia marina subsp. australasica			C, SC
3	Melaleuca quinquenervia			C
4				
5				
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33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Acrostichum speciosum		Special least	F
2	Salvinia molesta		Restricted -	Non-Native
3	Phragmites australis			G
4	Vincetoxicum carnosum			F
5	Enydra woollsii			F
6	Parsonsia straminea			F
7	Platycerium bifurcatum		Special least	F
8	Schinus terebinthifolius		Restricted -	Non-Native
9	Centella asiatica			F
10	Hypolepis muelleri			F
11	Juncus kraussii			Non-Native
12	Lygodium microphyllum			F
13	Solanum mauritianum		*	Non-Native
14	Avicennia marina subsp. australasica			SHR
15	Crassocephalum crepidioides		*	Non-Native
16	Hydrocotyle verticillata			F
17				
18				
19				
20				
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23				
24				
25				
26				
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42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native		Litter	Rock	Bare-ground	Crypto-grams	Total
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs					
	0	0	65	0	0	0	35	0	0	0	100%
	0	0	96	0	0	1	3	0	0	0	100%
	0	0	60	0	0	15	25	0	0	0	100%
	0	0	20	0	0	2	78	0	0	0	100%
	0	0	75	0	0	0	25	0	0	0	100%
Mean:	0	0	63.20	0	0	3.60	33.20	0	0	0	

Ausecology

Site Details:

Site Code:	BC04	**Date:**	2024-06-05	**Time:**	11:51
Ecologist/s:	Tim Shields, Nicola Praschifka				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
50

Ground-truthed Regional Ecosystem:	12.1.1	Remnant

Habitat Description:
Patchy cover of Casuarina glauca with deep inundations and dense coverage of Salvinia. Dense cover of swamp fern in the understory

General Comments:
Deep pools making movement extremely difficult. Plot has been realigned based on the altered construction footprint. Only 50m transect. Large amount of damage from recent summer storms and lots of trees over

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	0	5.0
- Subcanopy	5.0	5.0
Average	2.5	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	10.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	2.0	5.0

Total	52.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	17.9	-25.8
Subcanopy:	7.0	37.2
Shrub:	na	0.4

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	12	29.0
Total No. Large Trees per site:	12	
Total No. Large Trees per ha:	24	

Species Richness:

Native Trees:	4
Native Shrubs:	2
Native Grasses:	2
Native Forbs & Other:	10
Non-Natives:	4

Non-Native Plant Cover (%):
1.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
SC	0	2.7	2.7				
C	4.0	9.8	5.8				
SC	8.5	9.9	1.4				
SHR	11.5	11.7	0.2				
SC	13.8	20.5	6.7				
C	15.9	25.6	9.7				
SC	22.5	26.4	3.9				
C	28.4		-28.4				
SC	30.9	34.8	3.9				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	-25.8	0
Total Subcanopy (%)	37.2	0
Total Shrub (%)	0.4	0

Coarse Woody Debris:

Total Length (m):	10.0	Total Length (m/ha):	100.0

Length/s (m):																			
1	2.00	6		11		16		21		26		31		36	
2	3.50	7		12		17		22		27		32		37	
3	1.00	8		13		18		23		28		33		38	
4	2.00	9		14		19		24		29		34		39	
5	1.50	10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Ficus rubiginosa			SC, C
3	Cupaniopsis anacardioides			SC
4	Excoecaria agallocha			SC
5	Schinus terebinthifolius		Restricted -	NN-SC
6				
7				
8				
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33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Casuarina glauca			SHR
2	Acrostichum speciosum		Special least	F
3	Phragmites australis			G
4	Lomandra hystrix			F
5	Parsonsia straminea			F
6	Ottochloa gracillima			G
7	Cuphea carthagenensis		*	F
8	Enydra woollsii			F
9	Salvinia molesta		Restricted -	Non-Native
10	Centella asiatica			F
11	Bacopa monnieri			F
12	Excoecaria agallocha			SHR
13	Lygodium microphyllum			F
14	Hypolepis muelleri			F
15	Solanum mauritianum		*	Non-Native
16	Schinus terebinthifolius		Restricted -	Non-Native
17	Senna pendula		*	Non-Native
18	Platycerium bifurcatum		Special least	F
19				
20				
21				
22				
23				
24				
25				
26				
27				
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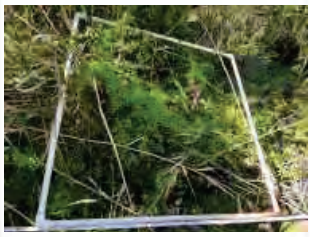
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	85	0	0	0	15	0	0	0	100%
	0	0	90	0	0	0	10	0	0	0	100%
	0	0	75	0	0	0	25	0	0	0	100%
	0	0	90	5	0	0	5	0	0	0	100%
	0	0	90	0	0	0	10	0	0	0	100%
Mean:	0	0	86.00	1.00	0	0	13.00	0	0	0	

Ausecology

Site Details:

Site Code:	BC05	**Date:**	29-08-2024	**Time:**	11:43
Ecologist/s:	Tim Shields, Lachlan Willis				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
100

Ground-truthed Regional Ecosystem:	12.3.20	Remnant

Habitat Description:
Low lying woodland dominated by Casuarina glauca. Pockets of retained ponding water with Salvinia

General Comments:
No evidence of storm damage here. Heavy inundation resulting in reduced diversity

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	5.0	5.0
Non-Native Plant Cover	0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	2.5	5.0
- Grasses	2.5	5.0
- Forbs & Other	2.5	5.0
Coarse Woody Debris	0	5.0
Total	37.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	17.8	74.9
Subcanopy:	8.0	23.7
Shrub:	na	0

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	11	30.0
Total No. Large Trees per site:	11	
Total No. Large Trees per ha:	22	

Species Richness:

Native Trees:	5
Native Shrubs:	2
Native Grasses:	1
Native Forbs & Other:	7
Non-Natives:	5

Non-Native Plant Cover (%):
60.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	14.6	14.6	SC	95.7	96.5	0.8
SC	0	3.5	3.5				
SC-E	3.9	9.0	5.1				
SC	14.3	16.6	2.3				
SC-E	18.6	20.2	1.6				
C	20.3	26.4	6.1				
C	31.3	32.2	0.9				
SC	37.4	39.0	1.6				
SC	42.0	43.4	1.4				
C	41.9	64.0	22.1				
SC	48.9	49.2	0.3				
SC	50.6	52.3	1.7				
SC	56.4	58.9	2.5				
SC	64.2	66.8	2.6				
C	65.0	71.2	6.2				
SC	71.2	73.0	1.8				
C	72.0	88.0	16.0				
SC	80.0	84.0	4.0				
SC	87.2	88.4	1.2				
C	91.0	100.0	9.0				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	74.9	0
Total Subcanopy (%)	23.7	6.7
Total Shrub (%)	0	0

Coarse Woody Debris:

Total Length (m):	4.5	Total Length (m/ha):	45.0

Length/s (m):																			
1	4.50	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Acacia disparrima			SC
3	Melaleuca quinquenervia			C, SC
4	Schinus terebinthifolius		Restricted -	NN-SC
5	Ficus rubiginosa			C
6	Alphitonia excelsa			SC
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
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29				
30				
31				
32				
33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Parsonsia straminea			F
2	Schinus terebinthifolius		Restricted -	Non-Native
3	Acrostichum speciosum		Special least	F
4	Salvinia molesta		Restricted -	Non-Native
5	Limnobium laevigatum		*	Non-Native
6	Enydra woollsii			F
7	Casuarina glauca			SHR
8	Juncus kraussii			F
9	Ipomoea cairica		*	Non-Native
10	Clematicissus opaca			F
11	Alternanthera denticulata			F
12	Phragmites australis			G
13	Bacopa monnieri			F
14	Phytolacca octandra		*	Non-Native
15	Melaleuca viminalis			SHR
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
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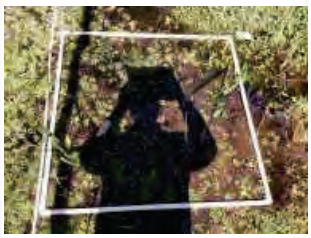
42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	5	0	0	90	0	0	0	0	100%
	2	0	5	0	0	60	25	0	0	0	100%
	0	0	10	0	0	0	90	0	0	0	100%
	0	0	1	0	0	89	10	0	0	0	100%
	0	0	2	0	0	0	98	0	0	0	100%
Mean:	0.40	0	4.60	0	0	47.80	44.60	0	0	0	

Ausecology

Site Details:

Site Code:	BC06	**Date:**	2024-06-05	**Time:**	08:51
Ecologist/s:	Nicola Praschifka, Tim Shields				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
100

Ground-truthed Regional Ecosystem:	12.1.1	Remnant

Habitat Description:
Patchy, near closed casuarina glauca woodland, nearly fully inundated at the northern end. ferns and wetland species present in a moderately dense to open shrub layer and an infestation of lantana and asparagus at the south as a result of disturbance on the periphery

General Comments:

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	5.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	0	5.0
Total	48.0	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	18.5	66.9
Subcanopy:	7.0	21.4
Shrub:	na	0

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	10	29.0
Total No. Large Trees per site:	10	
Total No. Large Trees per ha:	20	

Species Richness:

Native Trees:	3
Native Shrubs:	2
Native Grasses:	3
Native Forbs & Other:	11
Non-Natives:	3

Non-Native Plant Cover (%):
15.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	5.1	5.1				
C	9.5	18.8	9.3				
C	21.4	29.7	8.3				
SC	31.2	33.2	2.0				
C	40.1	58.7	18.6				
SC	40.0	42.8	2.8				
SC	54.0	58.1	4.1				
C	61.1	63.6	2.5				
SC	65.2	66.1	0.9				
C	66.2	74.6	8.4				
SC-E	66.7	68.5	1.8				
SC	72.2	72.9	0.7				
SC	75.9	76.5	0.6				
SC-E	79.0	81.2	2.2				
SC	80.8	83.9	3.1				
SC-E	82.2	87.4	5.2				
C	85.3	100.0	14.7				
SC	89.7	96.9	7.2				
SC-E	91.3	93.5	2.2				
SC-E	96.4	100.0	3.6				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	66.9	0
Total Subcanopy (%)	21.4	15.0
Total Shrub (%)	0	0

Coarse Woody Debris:

Total Length (m):	0	Total Length (m/ha):	0

Length/s (m):																			
1	0	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Schinus terebinthifolius		Restricted -	NN-SC
3	Eucalyptus siderophloia			C
4	Melaleuca quinquenervia			SC
5				
6				
7				
8				
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30				
31				
32				
33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Enydra woollsii			F
2	Centella asiatica			F
3	Acrostichum speciosum		Special least	F
4	Schinus terebinthifolius		Restricted -	Non-Native
5	Asparagus aethiopicus		Restricted -	Non-Native
6	Parsonsia straminea			F
7	Casuarina glauca			SHR
8	Bacopa monnieri			F
9	Alternanthera denticulata			F
10	Vincetoxicum carnosum			F
11	Phragmites australis			G
12	Hibiscus diversifolius			SHR
13	Paspalidium distans			G
14	Juncus kraussii			F
15	Platycerium bifurcatum		Special least	F
16	Pyrrosia rupestris		Special least	F
17	Eleocharis dulcis			F
18	Ottochloa gracillima			G
19	Salvinia molesta		Restricted -	Non-Native
20				
21				
22				
23				
24				
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42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native		Litter	Rock	Bare-ground	Crypto-grams	Total
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs					
	0	0	45	0	0	0	55	0	0	0	100%
	0	0	60	0	0	0	40	0	0	0	100%
	0	0	4	3	0	0	93	0	0	0	100%
	0	0	0	0	0	0	100	0	0	0	100%
	7	0	0	0	0	45	48	0	0	0	100%
Mean:	1.40	0	21.80	0.60	0	9.00	67.20	0	0	0	

Ausecology

Site Details:

Site Code:	BC07	**Date:**	2024-06-27	**Time:**	12:00
Ecologist/s:	Tim Shields, Lachlan Willis				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
50

Ground-truthed Regional Ecosystem:	12.3.20	Remnant

Habitat Description:
Swamp oak TEC with dense patches of Mangrove fern and some inundated pools. Some areas where trees have been knocked over in storm damage. Will likely lead to reduced canopy cover. Transect start point very close to pedestrian footpath.

General Comments:

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	0	5.0
Average	2.5	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	5.0	5.0
Litter Cover	5.0	5.0
Non-Native Plant Cover	5.0	10.0
Species Richness		
- Trees	2.5	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	0	5.0

Total	50.0	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	19.8	64.0
Subcanopy:	8.0	0
Shrub:	na	0

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	9	30.0
Total No. Large Trees per site:	9	
Total No. Large Trees per ha:	18	

Species Richness:

Native Trees:	3
Native Shrubs:	5
Native Grasses:	3
Native Forbs & Other:	15
Non-Natives:	7

Non-Native Plant Cover (%):
5.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	4.8	4.8				
SHR-E	7.9	8.4	0.5				
C	10.5	13.6	3.1				
C	17.0	27.1	10.1				
C	27.3	41.3	14.0				
E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic							

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	64.0	0
Total Subcanopy (%)	0	0
Total Shrub (%)	0	1.0

Coarse Woody Debris:

Total Length (m):	0	Total Length (m/ha):	0

Length/s (m):																			
1	0	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Melaleuca quinquenervia			C, SC
3	Aegiceras corniculatum			C
4				
5				
6				
7				
8				
9				
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32				
33				
34				
35				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Parsonsia straminea			F
2	Casuarina glauca			SHR
3	Solanum seaforthianum		*	Non-Native
4	Ipomoea cairica		*	Non-Native
5	Senna pendula		*	Non-Native
6	Paspalidium distans			G
7	Acrostichum speciosum		Special least	F
8	Ottochloa gracillima			G
9	Schinus terebinthifolius		Restricted -	Non-Native
10	Passiflora pallida		*	Non-Native
11	Cyperus eragrostis			G
12	Glochidion ferdinandi			SHR
13	Phragmites australis			G
14	Vincetoxicum carnosum			F
15	Acrostichum speciosum		Special least	SHR
16	Enydra woollsii			F
17	Macaranga tanarius			SHR
18	Stephania japonica			F
19	Cupaniopsis anacardioides			SHR
20	Lepidium sp.		*	Non-Native
21	Bacopa monnieri			F
22	Commelina diffusa			F
23	Asplenium australasicum			F
24	Persicaria strigosa			F
25	Sphaeropteris cooperi			F
26	Pyrrosia rupestris		Special least	F
27	Vigna marina			F
28	Eleocharis dulcis			F
29	Platycerium bifurcatum		Special least	F
30	Hibiscus diversifolius			F
31				
32				
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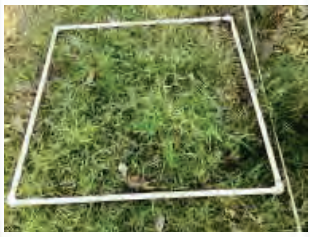
42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	93	0	2	0	0	0	5	0	0	0	100%
	0	0	75	0	0	0	25	0	0	0	100%
	25	0	10	0	0	3	62	0	0	0	100%
	5	0	85	0	0	0	10	0	0	0	100%
	20	0	70	0	0	0	0	10	0	0	100%
Mean:	28.60	0	48.40	0	0	0.60	20.40	2.00	0	0	

Site Details:

Site Code:	BC08	Date:	2024-06-27	Time:	10:08
Ecologist/s:	Lachlan Willis, Tim Shields				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
90

Ground-truthed Regional Ecosystem:	12.1.1 Remnant

Habitat Description:

Swamp oak TEC with dense patches of Mangrove fern and some inundated pools. Some areas where trees have been knocked over in storm damage. Will likely lead to reduced canopy cover

General Comments:

Area of storm damage mapped in field maps

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	0	5.0
- Grasses	2.5	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	0	5.0
Total	35.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	18.2	54.1
Subcanopy:	7.0	19.6
Shrub:	na	0

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	16	29.0
Total No. Large Trees per site:	16	
Total No. Large Trees per ha:	32	

Species Richness:

Native Trees:	4
Native Shrubs:	0
Native Grasses:	1
Native Forbs & Other:	5
Non-Natives:	11

Non-Native Plant Cover (%):
60.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	3.6	3.6				
C	36.0	48.4	12.4				
SC	43.8	46.9	3.1				
C	49.0	53.0	4.0				
SC-E	49.4	51.0	1.6				
SC-E	51.7	56.0	4.3				
C	54.0	68.7	14.7				
SC	55.3	57.5	2.2				
SHR-E	59.1	60.5	1.4				
SC	70.0	78.3	8.3				
C	76.0	90.0	14.0				
SC	80.6	81.7	1.1				
SC	83.2	84.6	1.4				
SC	87.0	88.5	1.5				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	54.1	0
Total Subcanopy (%)	19.6	6.6
Total Shrub (%)	0	1.6

Coarse Woody Debris:

Total Length (m):	0	Total Length (m/ha):	0

Length/s (m):																			
1	0	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC
2	Aegiceras corniculatum			C
3	Melaleuca quinquenervia			C
4	Schinus terebinthifolius		Restricted -	NN-SC
5	Leucaena leucocephala		*	NN-SC
6	Acacia disparrima			OTH
7				
8				
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Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Senna pendula		*	Non-Native
2	Ageratum houstonianum		*	Non-Native
3	Parsonsia straminea			F
4	Ipomoea cairica		*	Non-Native
5	Acrostichum speciosum		Special least	F
6	Bacopa monnieri			F
7	Cyperus eragrostis		*	Non-Native
8	Sphagneticola trilobata		Restricted -	Non-Native
9	Hypolepis muelleri			F
10	Pyrrosia rupestris		Special least	F
11	Schinus terebinthifolius		*	Non-Native
12	Solanum mauritianum		*	Non-Native
13	Solanum seaforthianum		*	Non-Native
14	Euphorbia heterophylla		*	Non-Native
15	Lantana camara		Restricted -	Non-Native
16	Chloris gayana		*	Non-Native
17	Ottochloa gracillima			G
18				
19				
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Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	15	0	0	0	80	0	5	0	100%
	0	0	70	0	0	30	0	0	0	0	100%
	0	0	5	0	0	85	10	0	0	0	100%
	0	0	0	0	0	90	10	0	0	0	100%
	0	0	0	0	0	95	5	0	0	0	100%
Mean:	0	0	18.00	0	0	60.00	21.00	0	1.00	0	

Ausecology

Site Details:

Site Code:	BC09	**Date:**	2024-06-27	**Time:**	14:28
Ecologist/s:	Tim Shields, Lachlan Willis				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
100

Ground-truthed Regional Ecosystem:	12.3.20	Remnant

Habitat Description:
Lower bank of creek with Casuarina glauca. Scattered Eucalyptus tereticornis, Eucalyptus siderophloia. Ground cover is almost monoculture Singapore daisy

General Comments:

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Shrub Cover	0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	5.0	5.0
Non-Native Plant Cover	0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	2.5	5.0
Coarse Woody Debris	0	5.0

Total	42.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	14.2	91.2
Subcanopy:	8.0	36.3
Shrub:	na	0

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	9	30.0
Total No. Large Trees per site:	9	
Total No. Large Trees per ha:	18	

Species Richness:

Native Trees:	8
Native Shrubs:	7
Native Grasses:	2
Native Forbs & Other:	7
Non-Natives:	14

Non-Native Plant Cover (%):
77.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	12.4	12.4				
SC	9.6	11.4	1.8				
C	15.2	25.7	10.5				
SC	18.6	21.3	2.7				
SC-E	20.3	20.8	0.5				
C	26.8	72.0	45.2				
SC	31.0	31.5	0.5				
SC	35.7	36.9	1.2				
SC-E	47.6	50.3	2.7				
SC	48.3	49.5	1.2				
SC	53.5	55.5	2.0				
SC	59.0	60.8	1.8				
SC	61.7	64.0	2.3				
SC	66.7	87.3	20.6				
C	75.0	81.4	6.4				
C	81.9	90.0	8.1				
C	91.4	100.0	8.6				
SC	97.4	99.6	2.2				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	91.2	0
Total Subcanopy (%)	36.3	3.2
Total Shrub (%)	0	0

Coarse Woody Debris:

Total Length (m):	0	Total Length (m/ha):	0

Length/s (m):																			
1	0	6		11		16		21		26		31		36	
2		7		12		17		22		27		32		37	
3		8		13		18		23		28		33		38	
4		9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Eucalyptus tereticornis			C
2	Eucalyptus siderophloia			C
3	Casuarina glauca			C, SC
4	Aegiceras corniculatum			C
5	Schinus terebinthifolius		Restricted -	NN-SC
6	Duranta erecta		*	NN-SC
7	Syagrus romanzoffiana		*	NN-OTH
8	Ligustrum lucidum		Restricted -	NN-SC
9	Melaleuca quinquenervia			C, SC
10	Heptapleurum actinophyllum			SC
11	Alphitonia excelsa			SC
12	Cryptocarya triplinervis var. pubens			SC
13				
14				
15				
16				
17				
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33				
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Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Solanum seaforthianum		*	Non-Native
2	Sphagneticola trilobata		Restricted -	Non-Native
3	Passiflora foetida		*	Non-Native
4	Passiflora suberosa		*	Non-Native
5	Ligustrum lucidum		Restricted -	Non-Native
6	Casuarina glauca			SHR
7	Causonis clematidea			F
8	Lantana camara		Restricted -	Non-Native
9	Ageratum houstonianum		*	Non-Native
10	Geitonoplesium cymosum			F
11	Macaranga tanarius		*	SHR
12	Murraya sp.		*	Non-Native
13	Melaleuca salicina			SHR
14	Asparagus aethiopicus		Restricted -	Non-Native
15	Eustrephus latifolius			F
16	Solanum torvum		*	Non-Native
17	Solanum americanum		*	Non-Native
18	Cupaniopsis anacardioides			SHR
19	Aegiceras corniculatum			SHR
20	Ludwigia octovalvis			F
21	Paspalidium distans			G
22	Gomphocarpus physocarpus		*	Non-Native
23	Acacia disparrima			SHR
24	Alphitonia excelsa			SHR
25	Dockrillia linguiformis		Special least	F
26	Clematicissus opaca			F
27	Ottochloa gracillima			G
28	Crassocephalum crepidioides		*	Non-Native
29	Passiflora subpeltata		*	Non-Native
30	Parsonsia straminea			F
31				
32				
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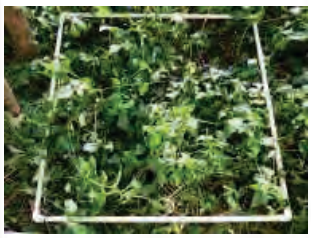
Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	0	0	0	95	5	0	0	0	100%
	0	2	0	0	0	93	5	0	0	0	100%
	0	3	0	0	0	10	87	0	0	0	100%
	0	0	0	0	0	95	5	0	0	0	100%
	0	0	0	0	0	95	5	0	0	0	100%
Mean:	0	1.00	0	0	0	77.60	21.40	0	0	0	

Ausecology

Site Details:

Site Code:	BC10	**Date:**	29-08-2024	**Time:**	08:49
Ecologist/s:	Lachlan Willis, Tim Shields				

	Start	End
Latitude:		
Longitude:		

Transect Length (m):
100

Ground-truthed Regional Ecosystem:	12.1.1	Remnant

Habitat Description:
Dense casuarina glauca forest with an understory of melaleuca and acacia Spp. Ground layer is dominated by thick pine needle leaf litter with scattered lomandra hystrix and ottochloa gracilima.

General Comments:

BioCondition Scoring Summary:

Site Based Attributes	Site BC Score	Max BC Score per Attribute for RE
No. Large Trees	5.0	15.0
EDL Recruitment	5.0	5.0
Tree Height		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	5.0	5.0
Average	5.0	5.0
Tree Cover		
- Emergent	na	0
- Canopy	5.0	5.0
- Subcanopy	2.0	5.0
Average	3.5	5.0
Shrub Cover	5.0	5.0
Native Perennial Grass Cover	0	5.0
Litter Cover	3.0	5.0
Non-Native Plant Cover	5.0	10.0
Species Richness		
- Trees	5.0	5.0
- Shrubs	5.0	5.0
- Grasses	5.0	5.0
- Forbs & Other	5.0	5.0
Coarse Woody Debris	2.0	5.0

Total	53.5	80.0

Site Photos:

Transect Start	Transect End
	

Centre Forward	Centre Right
	

Centre Back	Centre Left
	

Site Measurements:

	Height (m)	Cover (%)
Emergent:	0	0
Canopy:	13.7	44.4
Subcanopy:	7.0	6.8
Shrub:	na	7.2

EDL:	Canopy
% EDL Recruitment:	100.0

Large Trees:

	No. Large trees	DBH threshold (cm)
Eucalypt:	0	0
Non- Eucalypt:	4	29.0
Total No. Large Trees per site:	4	
Total No. Large Trees per ha:	8	

Species Richness:

Native Trees:	7
Native Shrubs:	8
Native Grasses:	2
Native Forbs & Other:	12
Non-Natives:	16

Non-Native Plant Cover (%):
5.0

Line Intercept:

Strata	Start (m)	End (m)	Total (m)	Strata	Start (m)	End (m)	Total (m)
C	0	2.6	2.6	SHR	45.5	45.6	0.1
SC	0	4.4	4.4	SC	49.8	50.0	0.2
SHR	0.6	1.6	1.0	SHR	49.7	49.9	0.2
C	4.5	16.0	11.5				
SHR	4.9	5.1	0.2				
SC	7.5	8.0	0.5				
SHR	9.4	10.3	0.9				
SHR	11.2	12.2	1.0				
SHR	12.5	13.0	0.5				
SC-E	13.8	16.7	2.9				
C	17.8	33.8	16.0				
SHR	17.6	17.8	0.2				
SHR	19.3	19.7	0.4				
SHR	25.2	25.5	0.3				
SHR	27.1	27.7	0.6				
SHR	32.5	33.1	0.6				
SHR	33.6	34.5	0.9				
C	35.7	50.0	14.3				
SC	37.1	38.8	1.7				
SHR	38.2	38.5	0.3				

E – Emergent, E-E – Emergent Exotic, C – Canopy, C-E – Canopy Exotic, SC – Subcanopy, SC-E – Subcanopy Exotic, SHR – Shrub, SHR-E – Shrub Exotic

	Native	Non-Native
Total Emergent (%)	0	0
Total Canopy (%)	44.4	0
Total Subcanopy (%)	6.8	2.9
Total Shrub (%)	7.2	0

Coarse Woody Debris:

Total Length (m):	9.5	Total Length (m/ha):	95.0

Length/s (m):																			
1	3.00	6		11		16		21		26		31		36	
2	1.00	7		12		17		22		27		32		37	
3	4.00	8		13		18		23		28		33		38	
4	1.50	9		14		19		24		29		34		39	
5		10		15		20		25		30		35		40	

Species Lists – Trees:

	Species	Other	Status	Strata
1	Casuarina glauca			C, SC, OTH
2	Eucalyptus major			OTH, SC
3	Cupaniopsis anacardioides			OTH
4	Melaleuca viminalis			SC
5	Acacia disparrima			SC, OTH
6	Melaleuca quinquenervia			C
7	Alphitonia excelsa			SC
8	Schinus terebinthifolius		Restricted -	NN-SC
9				
10				
11				
12				
13				
14				
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35				

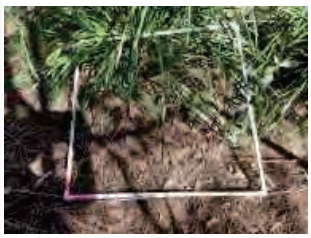
Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

Species List – Shrubs, Grasses, Forbs & Other and Non-Natives:

	Species	Other	Status	Lifeform
1	Bidens pilosa		*	Non-Native
2	Urena lobata		*	Non-Native
3	Glycine tabacina			F
4	Parsonsia straminea			F
5	Oxalis sp.			F
6	Casuarina glauca			SHR
7	Solanum seaforthianum		*	Non-Native
8	Ageratum houstonianum		*	Non-Native
9	Cuphea carthagenensis		*	Non-Native
10	Paspalidium distans			G
11	Eucalyptus major			Non-Native
12	Cyperus difformis			F
13	Senna pendula var. glabrata		*	Non-Native
14	Sphaeromorphaea australis			F
15	Centella asiatica			F
16	Maclura cochinchinensis			F
17	Schinus terebinthifolius		Restricted -	Non-Native
18	Cupaniopsis anacardioides			SHR
19	Ottochloa gracillima			G
20	Other species	Forb sp		F
21	Bryophyllum delagoense		Restricted -	Non-Native
22	Callisia repens		*	Non-Native
23	Sonchus oleraceus		*	Non-Native
24	Pseuderanthemum variabile			F
25	Sida rhombifolia		*	Non-Native
26	Clematicissus opaca			F
27	Trema tomentosa			SHR
28	Melaleuca quinquenervia			SHR
29	Dianella brevipedunculata			F
30	Asparagus africanus		Restricted -	Non-Native
31	Glochidion ferdinandi			SHR
32	Lomandra hystrix			F
33	Corymbia torelliana			Non-Native
34	Passiflora suberosa		*	Non-Native
35	Acacia fimbriata			SHR
36	Macaranga tanarius			SHR
37	Sphagneticola trilobata		Restricted -	Non-Native
38	Phytolacca octandra		*	Non-Native
39				
40				
41				
42				
43				
44				
45				

Status: NT – Near Threatened (*Nature Conservation Act 1992*), V – Vulnerable (NC Act), E – Endangered (NC Act), * - Exotic species.
Stratum: E – Emergent, C – Canopy, SC – Subcanopy.

1m x 1m Quadrats:

Quadrat	Native				Non-native						
	Perennial Grass	Other Grass	Forbs & Other	Shrubs	Grasses	Forbs, Other & Shrubs	Litter	Rock	Bare-ground	Crypto-grams	Total
	0	0	0	30	0	0	70	0	0	0	100%
	2	0	0	0	0	0	98	0	0	0	100%
	0	0	0	0	0	0	100	0	0	0	100%
	10	0	0	15	0	0	75	0	0	0	100%
	0	0	45	10	0	0	45	0	0	0	100%
Mean:	2.40	0	9.00	11.00	0	0	77.60	0	0	0	