


Biodiversity Condition Mapping

Report to the Campbelltown City Council

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Cover photos (clockwise from top left): *Arthropodium fimbriatum* at Fox Reserve; tree hollow at Demeter / Roy Reserve; Echidna diggings at Shepherdson Reserve; Shepherdson Reserve

All maps are produced by Miles Environmental Pty Ltd

SUMMARY

The objectives of the Biodiversity Condition Mapping project were to:

1. Develop a methodology to assess the biodiversity condition of parks and reserves that could be used by Council staff, and
2. To assess the biodiversity condition of parks and reserves within the Campbelltown City Council (Council) area.

The survey and scoring methodology developed is based on the *Bushland Assessment Manual* (NVC 2017), modified for small sites and to take into consideration factors that are important for urban ecology. 18 indicators of biodiversity condition were selected, each of which are weighted and aggregated to contribute towards one of five biodiversity condition Aspects:

- Vegetation Condition
- Habitat Values
- Threats Score
- Conservation Values
- Landscape Context.

Combining the score for each of the Aspects provides an overall Biodiversity Condition Score out of 100.

Thirty-two reserves selected by Council Staff were surveyed in December 2017 using the method developed. The results of previous surveys of Third, Fourth and Fifth Creeks riparian reserves were also incorporated into this assessment. The ten highest scoring sites were:

- Wadmore Park (86)
- Lochiel Park (63)
- Hakea Drainage Reserve (scoring 56)
- Fox Reserve (56)
- Shepherdson Avenue Reserve (55)
- Biodiversity Park (55)
- Sheoak (Tatiara) Reserve (54)
- Melaleuca Drainage Reserve (53)
- Demeter Reserve (also known as Roy Reserve - Bradbrook) (52)
- Quandong Avenue West (51).

Flora surveys of Council reserves undertaken in 1999 – 2000 were used to look for changes in biodiversity condition within the Council reserves. This comparison showed a dramatic decline in species diversity through the Hakea Drainage reserves network, and less dramatic declines at another ten sites, however fifteen sites had increased species diversity.

The results of the Biodiversity Condition surveys provide a baseline assessment for the Council which may be used to set objectives and targets for biodiversity, report on condition now and into the future, as well as providing a strategic tool for investing resources. The individual site scores will be linked to the Council's spatial layers for the reserves to provide mapped outputs, however mapping was not available at the time of the report preparation.

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1. INTRODUCTION

The objectives of the Biodiversity Condition Mapping project were to:

1. Develop a methodology to assess the biodiversity condition of parks and reserves that could be used by Council staff, and
2. To assess the biodiversity condition of parks and reserves within the Campbelltown City Council (Council) area.

Preparation of maps was not within the scope of the works, but the data has been provided in a format to be incorporated into the Council's spatial datasets.

The project contributes to the Council's Environmental Management Plan actions under the theme of Connected and Healthy Landscapes (CCC 2016), particularly actions 10 and 11:

> *"Action 9: Identify priority biodiversity areas and prepare management strategies for protection and enhancement of these areas*
>
> *Action 10: Develop a biodiversity report card to measure and track changes to the quality of biodiversity within our area.*
>
> *Action 11: Develop processes for ongoing monitoring of biodiversity conservation and enhancement progress.*
>
> *Action 16: Identify biodiversity 'areas' within Council development plans to ensure and enshrine their protection."*

A survey of the native plant diversity and vegetation conservation significance of Council reserves was previously undertaken in 1999-2000 (Brewer et al. 2000). The methodology developed for the Biodiversity Condition Mapping project included an assessment of the native vegetation condition, habitat for fauna and threats to the site, as well as the broader landscape context of each site.

2. METHODS

The survey and scoring methodology is based on the *Bushland Assessment Manual* (NVC 2017), modified for small sites and to take into consideration factors that are important for urban ecology, such as the amount of vegetation in the surrounding urban 'matrix'. The methodology is also designed for rapid assessment by anyone with a moderate level of vegetation survey understanding.

BIODIVERSITY CONDITION FIELD SURVEY

Sites

Thirty-four Council reserves were selected by Council staff for biodiversity condition mapping. The reserves were surveyed between the 13th and 19th of December 2017 using the Biodiversity Condition Survey Method (see Appendix 2). Two of the 34 reserves could not be surveyed, one because access was blocked and the second as it had been built over by adjoining landholders. Two additional reserves (Lochiel Park and Wadmore Park) were surveyed in October 2018.

The sites were surveyed at the scale of the MI PRINX reference in the Council's open space classification maps, except where there was a clear boundary of two or more different biodiversity condition states within larger sites.

Field Survey Method

The field survey data sheets and scoring method are presented in Appendix 1 and 2 for use in future surveys.

DATA ENTRY

All data is entered into the accompanying Microsoft Excel Workbook "CampbelltownBiodiversityCondition.xls". Data is entered into a separate worksheet for each site, except for the flora species observations, which are entered into two worksheets, one for native species and one for exotic species. An observation of the species is recorded as "1".

The Template worksheet includes formulas to calculate the weighted scores and aggregated scores.

Future data can be entered into a new worksheet by copying and pasting the contents of the "Template" worksheet to a new worksheet. Any additional native and exotic species names, codes and conservation ratings, can be obtained from the Vascular Plants BDBSA Taxonomy:

https://www.environment.sa.gov.au/files/sharedassets/public/science/vascular-plants-bdbsa-taxonomy.xlsx

The native species worksheet includes the NSX codes for each species which are unique codes required for uploading data to the Biological Databases of SA (BDBSA).

INCORPORATION OF PRE-EXISTING DATASETS

Third, Fourth and Fifth Creeks

The riparian reserves of Fourth Creek were surveyed in May 2016 and Third and Fifth Creeks in March 2017 for the preparation of management plans for each of these watercourses (Miles 2016, 2017a, 2017b). While the watercourse surveys employed a slightly different method, there was sufficient similarity in the methods to enable the results of the previous surveys to be incorporated into the biodiversity condition mapping with the following modifications:

- The watercourse management surveys did not record the amount or size of tree hollows, amount or size of fallen timber or amount of leaf litter; these were simply recorded as present or absent. Scores were applied for these indicators based on examination of the photographs and notes taken during the watercourse surveys.
- The vegetation species data has not been entered into the Biodiversity Condition Mapping workbook as this was previously entered for the watercourse projects.

Indigenous Biodiversity Survey

Where sites included in the Biodiversity Condition Mapping project had been previously surveyed by Brewer et al. (2000), the species diversity data from that survey were entered into the Biodiversity Data Spreadsheet. It should be noted that the Brewer et al. (2000) surveys were undertaken between June 1999 and August 2000 and therefore capture a wider range of species, including annual species that would not have been present at the time of the Biodiversity Condition Survey. Most of the Brewer et al. (2000) surveys were also undertaken at different spatial scales to the Biodiversity Condition Mapping, further complicating comparison between the data sets.

Data Analysis

Data collected in the field is entered into the Biodiversity Condition Mapping workbook using the method in Appendix 2. Each score contributes towards one of the aggregated biodiversity condition Aspects, with some scores contributing a greater percentage than others based on an understanding

of their contribution to urban biodiversity (see NVC 2017; Miles 2008). All scores are converted in the worksheet to a weighted score using the following formula unless otherwise indicated in Table 1:

Weighted score = (Site score / Maximum score) x 100 x percent contribution to Aspect

The Total Biodiversity Condition Score is determined by adding the score for each of the five Aspects divided by five to give a score out of 100.

Table 1. Aggregation of scores into Biodiversity Aspects and percent contribution to aspect

Biodiversity Aspect	Indicator	Percent contribution to Aspect	Alternative conversion / comments
Vegetation condition	Habitat richness	40	
	Regeneration	20	
	Native species diversity score 2017	40	
Habitat values	Hollow-bearing trees	25	
	Logs	25	
	Leaf litter	25	
	Availability of water	25	
Threats score	Number of exotic species	10	= ((number / maximum number) x 100 x percent contribution) x -1
	Number of high threat species	30	= ((number / maximum number) x 100 x percent contribution) x -1
	Cover of high threat species	60	
Conservation Value	Vegetation association score 2017	50	
	Threatened plant species score 2017	50	
Landscape Context	Size of reserve/site	30	
	Size of block	30	
	Edge length	0	Used only to determine edge to area ratio
	Edge to area ratio	20	
	Distance to large remnant	10	
	Surrounding matrix	10	This factor is more critical but hard to score using the methods

3. RESULTS

The aggregate score results are presented below in Figure 1 and Appendix 3. Data for each indicator is provided in the accompanying Excel Workbook.

Wadmore Park scored the highest overall Biodiversity Condition Score. The average total Biodiversity Condition Score across all sites is 39. The ten highest scoring sites were:

- Wadmore Park (86)
- Lochiel Park (63)
- Hakea Drainage Reserve (scoring 56)
- Fox Reserve (56)
- Shepherdson Avenue Reserve (55)
- Biodiversity Park (55)
- Sheoak (Tatiara) Reserve (54)
- Melaleuca Drainage Reserve (53)
- Demeter Reserve (also known as Roy Reserve - Bradbrook) (52)
- Quandong Avenue West (51).

Meath Avenue Drainage Reserve scored the lowest (19).

Few sites had a significant conservation score, with only two sites (Sheoak / Tatiara Reserve and Wadmore Park) having a vegetation association with conservation significance, and plants with conservation ratings only present in a small number of reserves.

Comparison of the results for the "biodiversity reserves" with the creek reserves shows the "biodiversity" reserves generally had higher total Biodiversity Condition Scores than the creek reserves. The creek reserves in particular tended to have poor weed threat scores, reflecting the susceptibility of riparian areas to weed invasion.

The results for each of the indicators are summarised in Table 2. In general, sites scored high (comparing the average score against the potential score) for habitat richness and cover of high threat weeds, and moderately well for leaf litter, native species diversity, availability of water and distance to core habitats, but low for natural regeneration, hollows, logs, size and edge to area ratio.

The aggregate scores are summarised and highest rating sites are shown in Table 3. The mean and median average biodiversity scores across all sites are similar (39.3 and 40.9 respectively), and the variation amongst the total scores is less than the aggregate indicators, except Conservation Values.

COMPARISON WITH PREVIOUS SURVEY

27 of the reserves surveyed in 2017 had been previously surveyed in 1999/2000 (Brewer et al. 2000). Comparison of species diversity data between the surveys was complicated by a number of factors including:

- The spatial scales at which the reserves were surveyed often differed, generally the earlier surveys were undertaken at larger spatial scales;
- The earlier survey was a compilation of plant survey records collected over a longer timeframe whereas for this survey each site was only surveyed once, therefore the earlier survey was more likely to detect more species, particularly Winter annuals and lilies;
- In some cases it was difficult to determine the location of the earlier survey reserve areas.

A general comparison of the results shows a higher mean average species diversity recorded at sites in the previous surveys (27.4 +/-15 S.D.) compared with this survey (18.16 +/-17S.D.), however the mean average for the earlier surveys is strongly influenced by a very high species diversity of 83 at one site, and comparison of the median average shows a higher species diversity of 17 recorded in 2017

compared with a median of 15 in 1999/2000. Of the sites where a previous survey was undertaken, 15 sites had increased species diversity while 11 had decreased diversity.

The Hakea Drainage Reserve network, which was surveyed as an aggregate site by Brewer et al. (2000) and where 83 species were recorded, has had the most notable decline in species diversity. Even aggregating the species diversity results from the 2017 surveys only identified a total of 51 species, amounting to a reduction of 32 species across this reserve network. While a number of the species previously found in the reserve were annual species, there were also numerous perennial and woody species that would be identifiable all year.

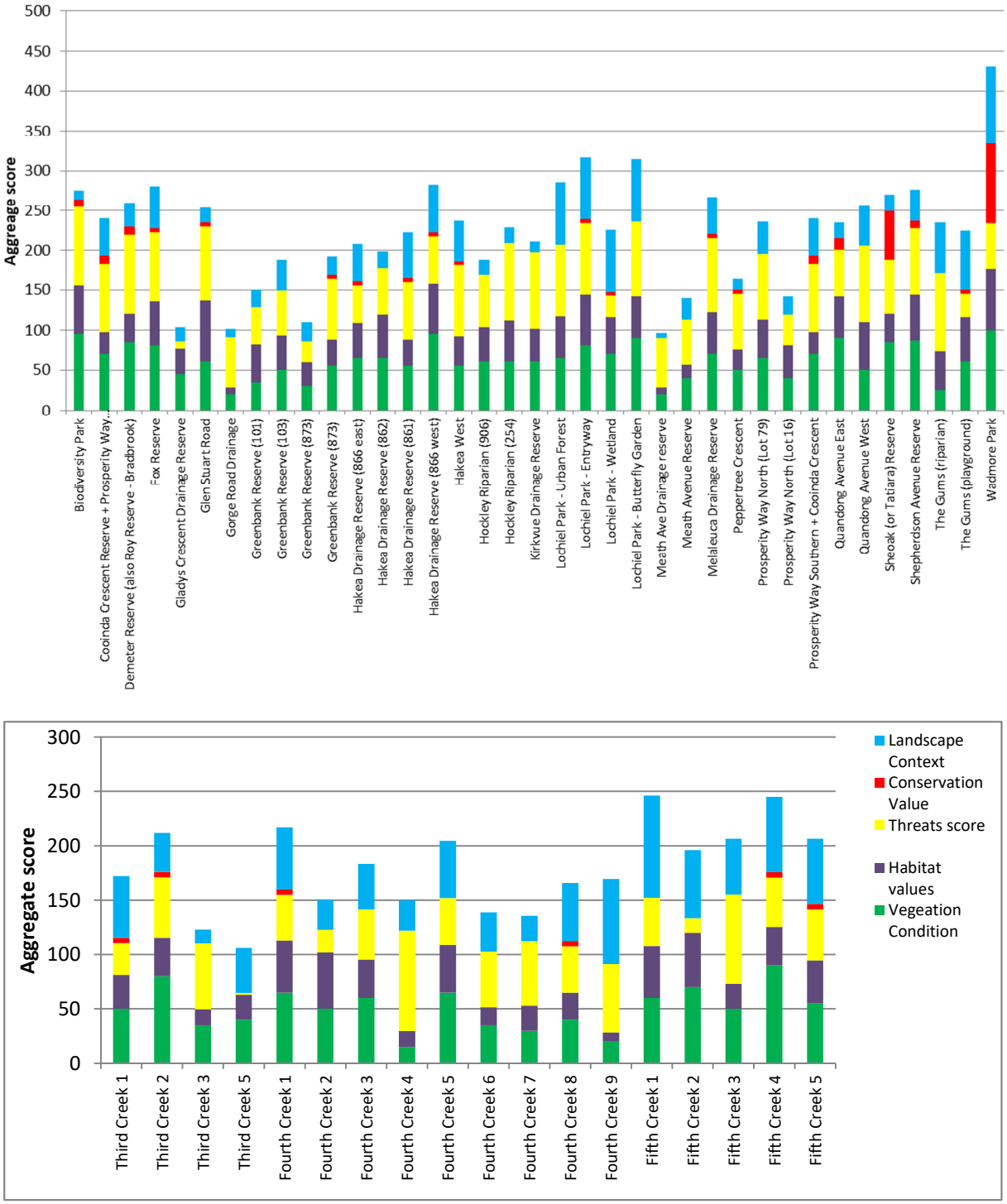


Figure 1. Aggregate scores for each Biodiversity Asset for biodiversity mapping sites (top) and creek zones (bottom)

Table 2. Summary of results for each indicator

Indicator	Maximum Score	Minimum Score	Mean Average Score	Median Average Score
Habitat richness score (0 to 4)	4.0	1.00	2.7	3.0
Regeneration score (0 to 4)	4.0	0.00	1.5	1.0
Hollow bearing trees score (0 to 4)	3.0	0.00	1.3	1.0
Logs score (trunk + branch, 0 to 3)	3.0	0.00	0.7	0.5
Leaf litter score (0 to 3)	3.0	0.00	1.8	2.0
Availability of water score (0 to 3)	2.0	0.00	1.3	1.0
Native species diversity 2017	185.0	1.00	22.1	18.0
Species diversity score (0 to 4)	4.0	0.50	2.4	2.5
Native species diversity 1999	83.0	3.00	27.4	15.0
Number of exotic species	29.0	1.00	11.4	11.0
Number of high threat and declared pest plants	11.0	0.00	4.7	4.0
Cover rating for declared and high threat weeds (0 to 4)	4.0	1.00	3.2	3.0
Size of reserve (ha)	5.0	0.02	1.5	0.7
Size of vegetation block (ha)[1]	1000.0	0.02	139.4	1.7
Edge length (km)	2.0	0.01	0.6	0.3
Edge to area ratio	4.0	0.00	0.9	0.8
Vegetation association score	5.0	0.00	0.2	0.0
Threatened plant species score 2017	1.0	0.00	0.1	0.0
Threatened plant spp score 1999	0.5	0.00	0.1	0.0
Distance to core/remnant habitat score	3.0	0.00	1.6	2.0
Surrounding matrix score	3.0	0.00	2.0	2.0

Table 3. Aggregate results

Indicator	Max. Score	Min. Score	Mean Average Score	Median Average Score	Standard Deviation	Max. sites	Min. site
Vegetation condition	100.0	15.0	58.3	60.0	21.4	Wadmore Park, Biodiversity Park	Fourth Creek Section 4
Habitat values	77.1	8.3	40.0	41.7	16.4	Wadmore Park, Glen Stuart Road	3 sites
Threats score	99.3	1.8	62.7	60.6	25.7	Demeter Roy, Gums (playground)	Third Creek Section 5
Conservation Value	100.0	0.0	5.7	0.0	15.5	Wadmore Park, Sheoak	Numerous sites
Landscape Context	96.7	6.7	42.6	41.3	23.1	Fifth Creek 1	Meath Drainage Reserve
Total Biodiversity Score	86.1	19.4	41.9	42.3	12.8	Wadmore Park, Lochiel Park	Meath Drainage Reserve

[1] Any site larger than 1000 ha was assigned 1000 ha as values above this did not influence the scoring.

4. CONCLUSIONS AND RECOMMENDATIONS

The results of the Biodiversity Condition surveys provide a baseline assessment for the Council which may be used to set objectives and targets for biodiversity, report on the condition now and into the future, as well as providing a strategic tool for investing resources.

APPLICATION OF THE RESULTS FOR BIODIVERSITY REPORTING AND PLANNING

Council may utilise the Biodiversity Condition Mapping results in reporting simply as change in average scores across the Council area, e.g. improvement in the average Total Biodiversity Condition Score across the Council. However it may be more useful to break the objectives and reporting scale down to more specific areas, using targets such as:

- Increase the number of sites scoring a Total Biodiversity Score of 50 or higher;
- Increase the number of sites where the sum of the Vegetation Condition, Habitat Values and Threats score is greater than "X" for sites with a Landscape Value above "Y";
- No decline in the Vegetation Condition for all sites or for sites with a Total Biodiversity score above a certain value.

FUTURE BIODIVERSITY CONDITION ASSESSMENTS

The survey and condition assessment methodology is designed to detect change over the medium to long term and it is recommended that it be repeated on a five-yearly basis. Future assessment may be used to detect change at the individual site scale, or across a group of sites or all the sites.

Depending on the biodiversity objectives of the Council, or understanding of urban ecology, the method of weighting and aggregating indicator scores may be adjusted in future assessments. The Landscape Context in particular may need to be given greater weighting towards the overall Biodiversity Condition Score. Therefore the raw data collected in the surveys is provided in the accompanying workbook.

Future improvements to the assessment method would be:

- To include a fauna survey component - this requires specialist expertise that may found within the Council's community and could be delivered by volunteer citizen scientists. These surveys could assist to rank sites as well as to assess the validity of the scoring system.
- A more detailed assessment of habitat condition – the method used in this survey is a simplified assessment of the ecological values of a site intended to be quickly undertaken by persons with a moderate level of vegetation survey skills, however a more detailed assessment of the range of plant life forms (e.g. as per NVC 2017) would provide better differentiation between sites. In particular the NVC (2017) method involves an assessment of the level of native cover for each plant life form.
- Incorporation of a more rigorous and/or standardised assessment of the surrounding matrix – this indicator was particularly difficult to assess and alternate methods could be automated analysis of remote sensing imagery (e.g. Miles et al. 2008), or the tree mapping work that the Council is currently undertaking.

APPLICATIONS FOR MANAGEMENT AND INVESTMENT

Whilst this assessment does not include management recommendations for each site, the results may help guide strategic investment in the management of reserves within the Council. For example:

- Sites with a high Landscape Context score are generally a high priority for biodiversity restoration or management as the score for this indicator is unlikely to be able to be improved.

- Sites that have a high Landscape Context and Habitat Values scores but low Vegetation Condition (e.g. the Gums riparian) represent sites where vegetation restoration (through revegetation or encouraging natural regeneration) would be a more cost effective biodiversity investment.
- Sites with low Landscape Context scores may provide limited habitat for native fauna, but may still be of value for human engagement with and enjoyment of natural areas.
- Sites with low Habitat Values and high Vegetation Condition and Landscape Context scores should be targeted for habitat enhancement work (e.g. installation of various sized nest boxes, retention of fallen timber).
- Sites with low Threat score should be a low priority for revegetation as there will be significant weed reduction requirements, unless they have high Landscape Context and/or Habitat scores.

5. REFERENCES

Brewer K, Guerin G and Smith J (2000) *The Indigenous Biodiversity of the City of Campbelltown District Stage One – Survey*, produced for the Campbelltown Landcare Group with assistance from the SA Urban Forest Bio-diversity Program.

CCC (2016) *City of Campbelltown Environmental Management Plan 2020*, Revised 2016, Campbelltown City Council.

Miles C, London A, Drew M and Baldock P (2008) *Ecological Mapping of the City of Tea Tree Gully*, Rural Solutions SA report to the City of Tea Tree Gully.

Miles C (2016) *Fourth Creek Survey and Management Plan*, Miles Environmental Pty Ltd report to Campbelltown City Council

Miles C (2017a) *Third Creek Survey and Management Plan*, Miles Environmental Pty Ltd report to Campbelltown City Council

Miles C (2017b) *Fifth Creek Survey and Management Plan*, Miles Environmental Pty Ltd report to Campbelltown City Council

NVC (2017) *Bushland Assessment Manual*, Native Vegetation Council, Government of South Australia

APPENDIX 1: FIELD DATA SHEET

Reserve name: **MI Prinx:** **Date:**

Habitat richness and structure

Minimal structure (e.g. ovals, mown grass)	0
Simple structure (e.g. scattered non-local native plantings / large trees no understorey)	1
Complex structure, predominantly exotic species / low diversity plantings (e.g. < 10 native spp.)	2
Degraded remnant (10 – 25 spp.)	3
Moderate to good remnant (26 + spp.)	4

Cover for declared and high threat weeds

> 75 %	0
40 to 75%	1
5 to 40	2
1 to 5%	3
< 1%	4

Regeneration

No regeneration present	0
Very low regeneration, consisting of highly scattered juvinile plants of a limited number of species	1
Regeneration present, consisting of multiple individual juvinile plants but a limited number of species	2
Multiple species regenerating, but low numbers of juvenile plants	3
Multiple species regenerating with multiple individual juviniles present with varying age classes	4

Leaf litter

None	0
Sparse / patchy	1
Large areas but discontinuous	2
Dense and continuous	3

Hollow-bearing trees
(N – natural, B – boxes)

None	0
A small number of small hollows only	1
Moderate to plentiful small hollows	2
Large +/- small hollows in few trees	3
Large +/- small hollows common (4)	4

Availability of water

No permanent / seasonal water	0
Intermittent water within site	1
Semi-permanent water within site (e.g. > 1 month)	2
Permanent water within site	3

Logs

	Trunk	Branch
None	0	0
Few	1	0.5
Numerous	2	1

Vegetation description:……

……

Comments:

Species	Dom	Planted?	Regen?	Species	Planted?	Regen?

APPENDIX 2: BIODIVERSITY CONDITION ASSESSMENT METHOD

Field survey methods

Each site is assessed at the scale of the MI PRINX reserve definitions unless there is a very clear change in condition across a large (e.g. > 3 ha) site.
In addition to scoring the indicators below, at least one representative photo is taken for each site and record the survey date.

Vegetation Association
Describe the dominant overstorey and understorey and their density.

Comments
Any additional information relevant to the condition of the site, e.g. sightings of native fauna, revegetation or remnant vegetation.

Habitat richness and structure
See below for examples of each class

	Score
Minimal structure (majority of the site is oval, mown grass, concreted surfaces)	0
Simple structure (e.g. scattered non-local native tree plantings / large trees no understorey)	1
Complex structure with low native species diversity, predominantly exotic species (e.g. areas dominated by a mixture of exotic trees and shrubs) or low diversity native plantings (e.g. < 10 native spp.)	2
Degraded remnant or revegetation area where the majority of plants are shrubs and trees with very little to no native groundlayer species (10 – 25 spp.)	3
Moderate to good remnant or revegetation area (26 + spp.), with at least 5% native ground layer comprising multiple species and most other expected plant life forms present	4

Regeneration
Tick which species are regenerating in the species list

No regeneration present	0
Very low regeneration, consisting of highly scattered juvenile plants of a limited number of species	1
Regeneration present, consisting of multiple individual juvenile plants but a limited number of species	2
Multiple species regenerating, but low numbers of juvenile plants	3
Multiple species regenerating with multiple individual juveniles present and varying age classes	4

Hollow-bearing trees
Small hollows are <5cm diameter, large hollows are >5cm diameter
Hollows include cracks in bark or stems that a small animal (e.g. skink or bat) could fit into as well as artificial nest boxes. An "N" can be added to the data sheet for natural hollows and "B" for artificial, however only the score is entered in the worksheet.

None	0
A small number of small hollows only	1
Moderate to plentiful small hollows	2
Large +/- small hollows, with large hollows in a few trees	3
Large +/- small hollows with large hollows common to most trees where the density of large trees is as expected for the vegetation type	4

Logs

The size of the logs is compared against mature trees on the site or, if no mature trees are present, the size that they would be expected to grow to.

Enter the combined score (i.e. Trunk score + Branch score) when entering the data. E.g. Limited trunk-sized logs and numerous branch-sized logs = 1 + 1 = 2

	Trunk-sized	Branch-sized
None	0	0
Limited and sparse	1	0.5
Numerous	2	1

Leaf litter

Does not include dead grass

None	0
Sparse / patchy (< 5% cover of the reserve)	1
Covering approximately 5 - 50% of the reserve	2
Dense and continuous cover (> 50%)	3

Availability of water

No permanent / seasonal water within the reserve (or nearby if part of a larger block)	0
Intermittent water within site (e.g. pools holding water for < 1 month)	1
Semi-permanent water within site (e.g. pools holding water > 1 month to 1 year)	2
Near permanent to permanent water within site (e.g. holding water all year for most years)	3

Native Species Diversity (enter actual number of species and score)

Native species diversity can simply be recorded as a count of the number of native species, however it is advisable to record the names of species if possible. If surveyed, the species recorded in the field are entered into the worksheet Native Species or Exotic Species.

No. species	Score
0	0.0
1 – 3	0.5
4 – 6	1.0
7 – 10	1.5
11 - 15	2.0

No. species	Score
16 – 21	2.5
22 – 29	3.0
30 - 40	3.5
41+	4.0

Cover for declared and high threat weeds

Record exotic species present in the field, common and low threat exotics are not recorded. High threat weeds are those with a regional rating of 3 or higher from NVC Appendix 11 or local expert opinion. Declared weeds are weeds declared under the NRM Act 2004.

> 75% cover	0
40 to 75% cover	1
5 to 40 cover	2
1 to 5% or < 1% but numerous	3
< 1% cover and/or very few	4

Examples of habitat type

(0) Minimal structure (e.g. ovals, mown grass, concreted surfaces)

Oval in City of Tea Tree Gully

(1) Simple structure (e.g. scattered non-local native tree plantings / large trees no understorey)

Meath Avenue Drainage Reserve (left), Lochiel Golf Course (right)

(2) Complex structure with low native species diversity and/or predominantly exotic species (e.g. areas dominated by a mixture of exotic trees and shrubs) or low diversity native plantings (e.g. < 10 native spp.)

Third Creek section 1 (left), Meath Avenue Reserve (right)

(3) Degraded remnant or revegetation area where the majority of plants are shrubs and trees with very little to no native groundlayer species (10 – 25 spp.)

Glen Stuart Road (left), Hakea Drainage Reserve (Sheoak Drive MI PRINX 866) (right)

(4) Moderate to good remnant or revegetation area (26 + spp.), with at least 5% native ground layer comprising multiple species and most other expected plant life forms present

Biodiversity Park (left), Sheoak / Tatiara Reserve (right)

Desktop methods

The website Naturemaps will assist with the desktop scoring of sites: www.data.environment.sa.gov.au/NatureMaps

Size category scores

The Reserve is the area designated for the survey. Where the reserve area is joined to a larger block of vegetation or reserve, the total area of the block (including the surveyed reserve) is entered, if the reserve is not part of a larger block, the same area is entered for the block size. Enter the actual area in hectares. Where block is a very large site (e.g. contiguous with Black Hill CP) the size is entered as 1000. If the reserve is separated from another area by a road the two areas are not considered to be part of the same block.

Size of Reserve (ha)	Site score
<0.1	0
0.1 – <0.5	1
0.5 - <1.0	2
1.0 - <3.0	3
3.0 - <5.0	4
5+	5

Size of Vegetation Block (ha)	Block score
<0.5 ha	0
0.5 – 2 ha	1
2 – 5 ha	2
5 – 20 ha	3
20 – 50 ha	4
> 50 ha	5

Length

Enter the length of the edge of the reserve (not the block) in kilometres. If the reserve is part of a larger block, only enter the length of the edge that is exposed to the non-bush/reserve area

Edge to area

The edge to area ratio is calculated in the worksheet using the following formula:
Edge to area Ratio = Size of reserve (ha) / Edge length (km) and assigned a weighted score as follows:

Km edge /1 ha area	Ratio	Score
Square joined on one side (0.3/1)	≤0.3	5
Square (0.4/1)	≤0.4	4
Rectangle (50m x 200m) (0.5/1)	≤0.5	2
Rectangle (20m x 500m) (1.04/1)	≤1.04	0.5
10m wide corridor (10m x 1000m) (2.02/1)	>1.04	0

Vegetation association

See NVC (2017) Bushland Assessment Manual Appendix 9 for State ratings, enter score

	Score
State (Provisional List of Threatened Ecosystems of SA) Rare, Vulnerable or Endangered community or Nationally (EPBC Act) Vulnerable, Endangered or Critically endangered	1

Number of threatened plant species

*Enter combined points for all threatened plant species to a **maximum of 1.0 only***	Score
State Rare species recorded	0.1 pt each
State Vulnerable species recorded	0.25 pt each
State Endangered recorded	0.5 pts each
Nationally Vulnerable, Endangered or Critically endangered species recorded	1 pts each

Distance to core/remnant habitats > 50 ha

Enter score. See Naturemaps for remnant habitats > 50 ha, however the Wadmore Park, Morialta Conservation Park and Black Hill Conservation Park areas comprise the relevant large remnant for Campbelltown Council area.

Distance	Score
> 2 km	0
0.5 – 2 km	1
0.01 - 0.5 km (ie separated by a road)	2
contiguous to < 10 m (i.e. roadwidth)	3

Surrounding matrix

Enter score for proportion of open space within 100m radius. The dashed lines below indicate 100m.

	Score
Surrounded by predominantly built surfaces (concrete, bitumen, rooves) (>95% built, e.g. industrial or retail area)  Biodiversity park	0
5 to 25 % unbuilt surfaces / open space (75 – 95% built, e.g. high density housing area)  Fourth Creek Section 7	1

25 to 50% unbuilt surfaces / open space (50 – 75% built)  Fox Reserve	2
>50% reserves /native vegetation  Quandong Avenue West	3

APPENDIX 3: RESULTS FOR EACH SITE

Table 4. Aggregate scores for each site sorted by Total Biodiversity Score

Common Name	Property Address	MI PRINX REF	Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
Biodiversity Park	Montacute Rd, Campbelltown	506	95	60	99	10	11	**55**
Cooinda Crescent Reserve + Prosperity Way South	ATHELSTONE - Prosperity Way ATHELSTONE - Cooinda Court	925	70	27	87	10	46	**48**
Demeter Reserve (also Roy Reserve - Bradbrook)	ATHELSTONE - Roy Street	61	85	35	99	10	30	**52**
Fifth Creek 1	Wadmore Park		60	48	44	0	94	**49**
Fifth Creek 2	St Ignatius		70	50	13	0	63	**39**
Fifth Creek 3	Manresa Crt to Max Amber Res.		50	23	82	0	51	**41**
Fifth Creek 4	Max Amber Res		90	35	45	5	69	**49**
Fifth Creek 5	George St to Torrens LP		55	40	47	5	60	**41**
Fourth Creek Lower 6	Montacute Rd		35	17	51	0	36	**28**
Fourth Creek Lower 7	Montacute Rd to NE Rd		30	23	59	0	23	**27**
Fourth Creek Lower 8	NE Rd to Golf Course		40	25	43	5	53	**33**
Fourth Creek Lower 9	Golf Course		20	8	63	0	78	**34**
Fourth Creek Upper 1	Stradbroke Rd to Stradbroke PS		65	48	42	5	57	**43**
Fourth Creek Upper 2	Sheila St to Forest Ave		50	52	21	0	28	**30**
Fourth Creek Upper 3	Forest Ave to Council Offices		60	35	46	0	42	**37**
Fourth Creek Upper 4	Council Offices to St Bernards Rd		15	15	92	0	28	**30**
Fourth Creek Upper 5	St Bernards Rd to Montacute Rd		65	44	43	0	53	**41**
Fox Reserve	ATHELSTONE - Fox Avenue	613	80	56	86	5	53	**56**
Gladys Crescent Drainage Reserve	ATHELSTONE - Gladys Crescent	606	45	31	10	0	18	**21**
Glen Stuart Road	ROSTREVOR - Glen Stuart Road	763	60	77	93	5	18	**51**
Gorge Road Drainage	Athelstone , Kerry Avenue	1016	20	8	63	0	10	**20**
Greenbank Reserve	ATHELSTONE - Meadowvale Road	103	50	44	55	0	39	**38**
Greenbank Reserve	ATHELSTONE - Gladys Crescent	873	55	33	75	5	24	**38**
Greenbank Reserve	ATHELSTONE - Greenbank Road	101	35	46	48	0	21	**30**

Common Name	Property Address	MI PRINX REF	Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
Greenbank Reserve	ATHELSTONE - Meadowvale Road	873	30	29	27	0	24	**22**
Hakea Drainage Reserve	ATHELSTONE - Hakea Avenue (lots 227, 228, 229)	866	95	63	60	5	59	**56**
Hakea Drainage Reserve	ATHELSTONE - Sheoak Drive	861	55	33	71	5	58	**45**
Hakea Drainage Reserve	ATHELSTONE - Sheoak Drive (lots 147 & 148)	866	65	44	47	5	47	**42**
Hakea Drainage Reserve	ATHELSTONE - Sheoak Drive (lots 149 & 150)	862	65	54	59	0	21	**40**
Hakea West	ATHELSTONE - Hakea Avenue	987	55	38	89	5	50	**47**
Hockley Riparian	ATHELSTONE - Cooinda Crescent	254	60	52	97	0	19	**46**
Hockley Riparian	ATHELSTONE - Gorge Road	906	60	44	65	0	19	**38**
Kirkvue Drainage Reserve	ATHELSTONE - Gorge Road	261	60	42	97	0	13	**42**
Lochiel Park - Urban Forest			65	52	90	0	78	**57**
Lochiel Park - Entryway			80	65	89	5	78	**63**
Lochiel Park - Wetland			70	46	27	5	78	**45**
Lochiel Park - Butterfly Garden			90	52	94	0	79	**63**
Meath Ave Drainage reserve	Athelstone, Kildare Ave	1017	20	8	62	0	7	**19**
Meath Avenue Reserve	7A Meath Ave, Athelstone	923	40	17	57	0	27	**28**
Melaleuca Drainage Reserve	ATHELSTONE - Melaleuca Drive	216	70	52	93	5	47	**53**
Peppertree Crescent	ATHELSTONE - Pepper Tree Crescent	N/A	50	25	71	5	13	**33**
Prosperity Way North	ATHELSTONE - Bradbrook Road	989	65	48	83	0	40	**47**
Prosperity Way North	ATHELSTONE - Prosperity Way	989	40	40	40	0	23	**28**
Prosperity Way Southern + Cooinda Crescent	ATHELSTONE - Prosperity Way	989	70	27	87	10	46	**48**
Quandong Avenue East	ATHELSTONE - Quandong Avenue	861	90	52	59	15	19	**47**
Quandong Avenue West	ATHELSTONE - Quandong Avenue	862	50	60	95	0	50	**51**
Sheoak (or Tatiara) Reserve	ATHELSTONE - Banksia Crescent	292	85	35	69	60	21	**54**
Shepherdson Avenue Reserve	ATHELSTONE - Highview Road	926	88	56	84	10	39	**55**
The Gums	TRANMERE - Shakespeare & Moore Streets	848	25	48	99	0	63	**47**
The Gums	TRANMERE - Shakespeare & Moore Streets	999	60	56	29	5	75	**45**

Common Name	Property Address	MI PRINX REF	Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
Third Creek 1	Magill Rd to St Bernards Rd		50	31	29	5	57	**34**
Third Creek 2	University of SA Magill Campus		80	35	56	5	36	**42**
Third Creek 3	Lorne Ave to Fourth st		35	15	61	0	13	**25**
Third Creek 5	Freeman Ave to Glynburn Rd		40	23	2	0	41	**21**
Wadmore Park			100	77	57	100	97	**86**

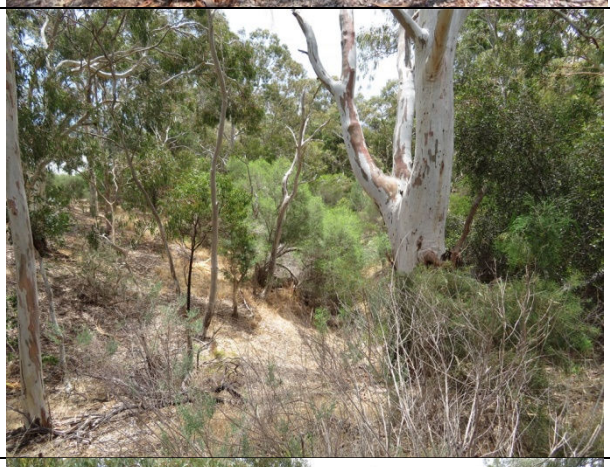
APPENDIX 4: SUMMARY DESCRIPTION FOR 2017 SURVEY SITESS

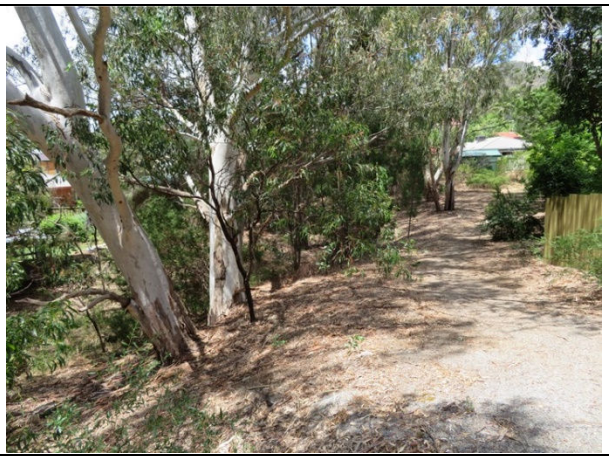
The following are summary descriptions of the reserves surveyed for the Biodiversity Condition Mapping project, for descriptions of the creek sites see Miles (2016, 2017a,b).

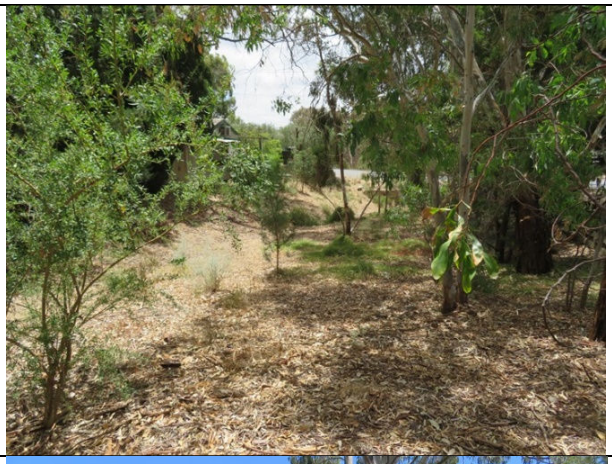
Reserve name: Biodiversity Park Vegetation Association (2017): E. camaldulensis camaldulensis +/- E. leucoxylon leucoxylon +/- C. gracilis woodland over diverse native shrubs, grasses and groundcovers Comments and description: Remnant River Red gums over species and structurally diverse revegetation with an excellent cover of groundcovers and high natural regeneration of these High threat weeds: none	
Reserve name: Cooinda Crescent Reserve (allotments 81, 14 + 17 plus Prosperity Way Southern lot 17) Vegetation Association (2017): E. leucoxylon leucoxylon +/- E. camldulensis camaldulensis woodland over planted shrubs Comments and description: A couple of nest boxes at downstream end, revegetation along most of the watercourse, older revegetation includes A. saligna which is spreading; some roos observed, browing of shrubs; regenerated A. pycnantha has been marked with sticks, garden encroachment High threat weeds: Galenia, Boneseed and African Daisy are all only found in the Prosperity Way Sth part, A. saligna planted in mid section	
Reserve name: Demeter / Roy Reserve Vegetation Association (2017): E. leucoxylon +/- fasciculosa over A. paradoxa, A. pycnantha and native grasses Comments and description: small reserve in very good condition with no high threat weeds observed, good cover of native grasses High threat weeds: None	

Reserve name: Fox Avenue Vegetation Association (2017): E. leucoxylon woodland Comments and description: Plantings of local native shrubs around the base of remnant trees, good cover and diversity of native grasses in open areas, small playground, seasonal creek High threat weeds: Ash (1), Casuarina (suckering), Galenia	
Reserve name: Gladys Crescent Vegetation Association (2017): E. camaldulensis over A. saligna and non-local natives and exotics Comments and description: Weedy creekline dominated by non-local natives and exotic species, planted fruit trees on the eastern side of the creek. Large and small Olives and Ash, many suckering A. saligna, some Palms have been cut High threat weeds: A. saligna, Palm, Casuarina, Dense Flat-sedge, Umbrella Sedge, Ash, White Cedar, Olive, Rose, Athel Pine, Willow	
Reserve name: Glen Stuart Road Vegetation Association (2017): E. camaldulensis camaldulensis woodland over revegetated shrubs Comments and description: Large old River Red gums, revegetetated local native shrubs and small trees, small number of groundlayer species. Ash and Olive stumps in the creek have some re-growth High threat weeds: Ash and Olives, both have been cut but some re-growth	
Reserve name: Gorge Road Drainage Vegetation Association (2017): E. camaldulensis +/- E. leucoxylon Comments and description: Concreted shallow drainage / walkway with mulched edges and a mix of native and exotics planted High threat weeds: Olives, Peppertree, English Ivy	

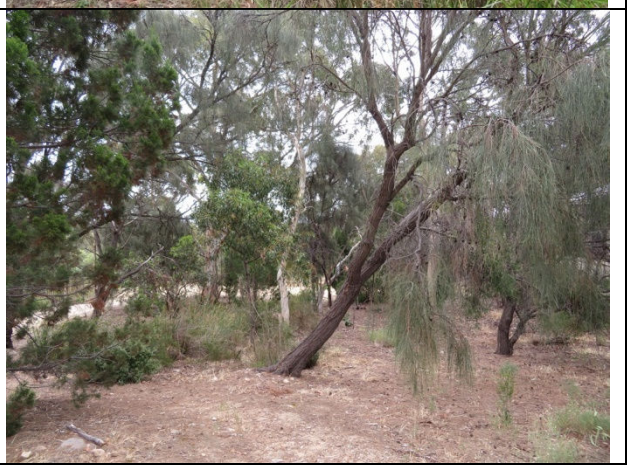
Reserve name: Greenbank 101 Vegetation Association (2017): E. camaldulensis over mixed local and non-local plantings Comments and description: Drainage line, lots of E. camaldulensis approximately 2 y.o., small ash trees and cyperus weeds in creek, older non-local native plantings around perimeter, 1 old River Red Gum. The native trees and shrubs have all been planted except the River Red Gums, which may be naturaly regeneration or plantings High threat weeds: Ash, Dense Flat-sedge, Umbrella Sedge, Palm, Olive, Rhamnus, Casuarina, Ivy	
Reserve name: Greenbank Reserve 103 Vegetation Association (2017): E. camaldulensis camaldulensis and E. leucoxylon ssp. leucoxylon woodland over Acacia rupicola and open lawns Comments and description: Reserve with drainage line with a flood control dam; mulched and planted areas with mown lawns either side. Some dead trees, 1 with an old nest box. Most native trees and shrubs planted; plantings comprise 3 cohorts approximatly 20 yrs, 10 yrs and 1 yr old; regeneration of A. pycnantha, D. viscosa and A. verticillata. High threat weeds: Palms, Olive, Dense Flat-sedge, Casuarina (planted around edge), Robinia suckering, Ash	
Reserve name: Greenbank Reserve 873a Vegetation Association (2017): E. camaldulensis camaldulensis over non-local natives and exotic species Comments and description: Weedy creekline with older non-local native trees and exotic species; plantings of exotic fruit trees and flower species. Site includes Allotment 119 and 56 (note is lot 58 on Naturemaps) High threat weeds: Golden Wreath Wattle, Palm, Cape Ivy, Ash, Olive, Peppercorn,	

Reserve name: Greenbank Reserve 873b Vegetation Association (2017): Open woodland of local native, non-local native species over open shrubland Comments and description: Mixed exotic, local and non-local native plantings. Re-growth of Ash trees High threat weeds: Casuarina, NZ Mirro-bush, Cape Ivy, Desert Ash, Rose, Myrtle-leaf Milkwort	
Reserve name: Hakea Drainage Reserve (lot 149) Vegetation Association (2017): E. camaldulensis camaldulensis +/- E. leucoxylon leucoxylon open woodland over shrubland of Melaleuca spp. Comments and description: Remnant and regenerating eucalypts over non-local native shrubs and groundlayer of exotic grasses and native species; riparian High threat weeds: Olives (few), Acacia saligna, Watsonia, Pussytails	
Reserve name: Hakea Drainage Reserve (lot 150) Vegetation Association (2017): E. fasciculosa +/- E. camaldulensis camaldulensis open woodland Comments and description: Remnant trees and scattered understorey over exotic annual grasses High threat weeds: Pussytails	
Reserve name: Hakea Drainage Reserve (west) (lots 288, 227, 229) Vegetation Association (2017): E. fasciculosa +/- E. camaldulensis open woodland over dense A. paradoxa Comments and description: Remnant vegetation with good native groundcover, did not include the part of lot 227 running north in this section; High threat weeds: Pussytails (patches), Palms (seedlings in creek), Bridal creeper, African Daisy	

Reserve name: Hakea Drainage, (lot 147 and 148) Vegetation Association (2017): E. camaldulensis camaldulensis + E. leucoxylon leucoxylon open woodland over local and non-local shrubs and exotic grasses Comments and description: Remnant native overstorey and some grasses and shrubs with plantings of non-local natives and exotic grasses; Mistletoe bird and koalas. Did not include the part of lot 147 running north in this section High threat weeds: A. saligna, Olives, Kikuyu, Galenia, Ash, Casuarina, Blackberry, Gazania, Rose	
Reserve name: Hakea West Vegetation Association (2017): E. camaldulensis camaldulensis +/- E. leucoxylon leucoxylon woodland over revegetated shrubs Comments and description: Remnant eucalypts over natural or planted shrubs and groundlayer; echidna diggings Plantings of non-local natives in the SE corner, garden encroachment on NE side High threat weeds: Casuarina, A. saligna (seedling) and Watsonia	
Reserve name: Hockley Reserve (254) Vegetation Association (2017): E. camaldulensis riparian woodland over A. pycnantha and C. vaginatus. Comments and description: Small site with low diversity but good cover of sedges in the creek and few weeds High threat weeds: Ash seedlings in the creek	

Reserve name: Hockley Reserve (906) Vegetation Association (2017): E. camaldulensis +/- E. leucoxylon woodland +/- domestic fruit trees Comments and description: Narrow riparian reserve; massive E. camaldulensis at upstream end as well as several large trees; some erosion in the creek Garden encroachment on both banks, some of the reserve may be fenced into an adjacent property, fruit trees in reserve have been netted High threat weeds: Ash seedlings in creek and Willows (3 trees, 1 near dead)	
Reserve name: Kirkvue Avenue Vegetation Association (2017): E. camaldulensis +/- E. leucoxylon woodland Comments and description: Small riparian reserve with some revegetation High threat weeds: Olive seedlings	
Reserve name: Meath Avenue Drainage Vegetation Association (2017): E. camaldulensis over exotic shrubsComments and description: Narrow walkway mostly paved with plantings down one side and two medium sized E. camaldulensis High threat weeds: Rhamnus, Olive, Peppertree, Veldt Daisy	

Reserve name: Meath Avenue Reserve Vegetation Association (2017): E. camaldulensis +/- E. leucoxylon +/- Casuarina glauca open woodland Comments and description: Plantings of local and non-local natives with grassed areas between, and a playground, some Eucalypts are remnant High threat weeds: A. saligna, Casuarina, Ash, Olive, Peppercorn	
Reserve name: Melaleuca Drainage Reserve Vegetation Association (2017): E. leucoxylon ssp. leucoxylon +/- E. camaldulensis, C. gracilis and A. verticillata woodland over D. viscosa, C. vaginatus Comments and description: Remnant eucalypts, difficult to determine if other native species are planted or remnant High threat weeds: Olives (some seedlings in creek), Gazania	
Reserve name: Peppertree Cresecent Vegetation Association (2017): Casuarina and non-local Eucalypt woodland over A. paradoxa Comments and description: Tiny reserve in middle of road, older non-local overstorey over newer local native revegetation High threat weeds: Casuarina	
Reserve name: Prosperity Way North (Allotment 16) Vegetation Association (2017): E. leucoxylon woodland Comments and description: Remnant and regenerated E. leucoxylon over A pycnantha and recent plantings, site appears over-grazed and kangaroos seen on site, echidna diggings; erosion from road uphill; some seedlings have branches placed over them to protect them from grazing High threat weeds: Galenia (1 patch), Pentameris, Olive (large + seedlings), Ash (few seedlings), African	

Daisy (1)	
Reserve name: Prosperity Way North (Allotment 71) Vegetation Association (2017): E. leucoxylon woodland Comments and description: Remnant and regenerated E. leucoxylon ssp. leucoxylon over a mix of planted native and exotic species. Site is contiguous with allotment 16 which is contiguous with Black Hill CP High threat weeds: Rhamnus, Casuarina	
Reserve name: Quandong Avenue East Vegetation Association (2017): E. fasciculosa +/- E. camaldulensis +/- A. verticillata open woodland over A. paradoxa and D. viscosa Comments and description: Predominantly remnant riparian and terrestrial woodland, some shrubs may be revegetation High threat weeds: Pussytails Grass, Desert Ash (few small seedlings), Gazania (2 plants), Bridal Creeper (tubers), Olive (1 seedling pulled)	
Reserve name: Quandong Avenue West Vegetation Association (2017): E. fasciculosa +/- A. verticillata +/- E. camaldulensis woodland over dense shrubby revegetation Comments and description: Remnant Eucalypts over low diversity shrub revegetation High threat weeds: Olive (few seedlings)	

Reserve name: Sheoak or Tatiara Reserve Vegetation Association (2017): Callitris gracillis +/- E. leucoxylon leucoxylon, E. camaldulensis camaldulensis woodland over open shrubs and native grasses Comments and description: Good condition site appears to be managed, mostly remnant with some revegetation; echidna diggings. Classed as C. gracillis +/- E. leucoxylon grassy low woodland which is rated as vulnerable for SA; notable that Brewer didn't include E. cam which were large, (E. euc planted) High threat weeds: Pussytails grass, Bridal Creeper	
Reserve name: Shepherdson Avenue Vegetation Association (2017): E. leucoxylon +/- E. fasciculosa, C. gracillis open woodland over diverse native shrubs and grasses Comments and description: Included Allotment 39 with this and merged A64 and A18-20 as 1/. Woodland of E. leucoxylon leucoxylon and C. gracilis over diverse native shrubs and grasses, some open mown areas, incised creekline with minor erosion. Echidna diggings. Adjacent landholder says was a cow paddock, Eucs and Callitris look remnant. Some Callitris have been cut down (se photo 1127). Potentially could be classified as C. gracillis E. leucoxylon woodland which is rare for SA High threat weeds: Galenia, Ash, Casuarina (suckering), Olive, Flat-sedge	
Reserve name: The Gums (playground) Vegetation Association (2017): E. camaldulensis camaldulensis over kikuyu and clumped shrubs Comments and description: Large remnant E. camldulensis, some younger trees over clumped plantings and lawn High threat weeds: None	

Reserve name: The Gums (riparian) Vegetation Association (2017): E. camaldulensis +/- E. leucoxylon woodland over moderately diverse revegetated shrubs Comments and description: Riparian reserve with large old E. camaldulensis over revegetation. Brewer survey includes playground site; this is creek only based on 4th Creek survey; Data based on 3rd creek survey; section 4 High threat weeds: Desert Ash, Olive, Feather Grass, Caster Oil Plant, Peppercorn Tree, Periwinkle	

APPENDIX 5: SUMMARY DESCRIPTION FOR ADDITIONAL SITES

Lochiel Park was surveyed on the 31st of October 2018 using the same method as for the 2017 surveys; see map below table for delineation of zones. Wadmore Park was assigned a biodiversity condition score based on a brief walk through of the site and existing survey data[1].

Reserve name: Wadmore Park

Vegetation Association: E. leucoxylon leucoxylon +/-E. camaldulensis camaldulensis woodland over diverse native shrubs, grasses and groundcovers

Comments and description: Remnant SA Blue Gums and River Red gums over diverse mix of native shrubs and groundlayer species. There is a notable lack of large old remnant trees.

High threat weeds: Pussytails grass abundant over large areas; occasional Bridal Creeper; Sparaxis, Soursobs and Cape Tulip

Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
100	77	57	50	97	76

Reserve name: Lochiel Park – Urban Forest

Vegetation Association: E. camaldulensis ssp. camaldulensis and E. leucoxylon ssp. woodland over Acacia spp.

Comments and description: Revegetation area of local and non-local native trees and shrubs of approximately 10 – 15 years old. Lacking in groundlayer species.

High threat weeds: A small number of Aleppo Pines, a Peppercorn Tree and Rhamnus

Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
65	52	90	0	78	57

Reserve name: Lochiel Park – Entryway Friends Planting

Vegetation Association: E. camaldulensis camaldulensis +/- E. leucoxylon ssp. leucoxylon over native groundcovers and shrubs

Comments and description: Large old remnant trees with revegetation of local native shrubs and groundlayer species collected from Wadmore Park

High threat weeds: Golden Wreath Wattle, Peppercorn Tree, Flinders Ranges Wattle

Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
80	65	89	2	78	63

[1] KH Brewer (2015) Wadmore Park Campbelltown Council Vegetation Integrity Report, South Australian Indigenous Flora; Campbelltown City Council (2013) Wadmore Park/Pulyonna Wirra Management Plan 2013-2018. Brewer K (2005) Vegetation Management Action Plan Wadmore Park. Produced by South Australian Indigenous Flora for the City of Campbelltown.

Reserve name: Lochiel Park - Wetland

Vegetation Association: *Baumea articulata* sedgeland on perimeter of waterbody with planted *E. camaldulensis ssp. camaldulensis* and shrubs up-slope.

Comments and description: Artificial wetland with well-established sedges and rushes around perimeter; upper slopes are planted with local native trees and shrubs.

High threat weeds: Non-local Bottlebrush is regenerating prolifically around the wetland, large areas of Dense Flat-sedge, some patches of Galenia, small number of Desert Ash, Golden Wreath Wattle, Casuarina, Western Coast Wattle and Peppercorn Tree.

Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
70	46	27	2	78	44

Reserve name: Lochiel Park – Butterfly Garden

Vegetation Association: *E. camaldulensis camaldulensis* over native groundcovers and shrubs

Comments and description: Diverse mix of local native plantings with regeneration of many species and few weeds.

High threat weeds: large Aleppo Pines adjacent to the Butterfly Garden with a few small seedlings in this area.

Vegetation condition	Habitat values	Threats score	Conservation Value	Landscape Context	Total Biodiversity Score
90	52	94	0	79	63

Map showing Lochiel Park Zones:

Blue = Urban Forest Red = Entryway Friend Planting Green = Wetland Purple = Butterfly Garden