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Flora and Fauna Report 2016:

Six parks in Ryde Local Government Area
Bell Park, Brush Farm Park, Darvall Park, Field of Mars Reserve, Lambert Park and Outlook Park.

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Preamble

This report consists of three sections:

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Section A: Background information, including environmental setting

A1.0 Introduction

The aim of the current report is to replicate and reconcile the flora and fauna studies of 2006 to 2008 using the same methodology and include a number of new sites. Stage 1 of the City of Ryde Flora and Fauna Studies focuses on the first six sites. The report was prepared at the request of the City of Ryde.

This report assesses the vegetation of these six sites (park locations shown in Figure 1a on the 1:25 000 topographic map and Figure 1b on the aerial photograph). The total area of these six parks is approximately 62 ha (Figures 1a-1, 1a-2, 1a-3 show the park locations on the 1:25 000 topographic map and Figure 1b-1, 1b-2, 1b-3 on the aerial photographs). The parks vary in size from 0.456 ha to 46.7 ha (details in Appendix 1), namely:

Park name	Suburb	Area (m^2)
Bell Park	West Ryde	4,560
Brush Farm Park	Eastwood	53,614
Darvall Park	West Ryde	60,886
Field of Mars Reserve	North Ryde	467,246
Lambert Park	Eastwood	25,936
Outlook Park	Eastwood	6,978

In addition to required field surveys, the climate differences at time of sampling, zoning, landform, geology and soil landscape and historic land uses of the six parks have been reviewed as part of the environmental setting.

A1.1 Zoning of the parks

Under the Ryde Local Environment Plan 2014 (LEP 2014) (Figures 2a, 2b, 2c), the zoning of the six parks is as follows:

- All of the areas with tree canopy in the six parks have been zoned E2 Environmental Conservation, and in Brush Farm Park includes an area of SP2 Infrastructure (Classified Road); and

- Four of the six parks include an area of RE1 Public Recreation (not in Lambert and Outlook Parks). The area/s zoned RE1 Public Recreation in three of these four parks is on level fill with batter slopes upslope of the E2 zoning, with:

Park	Fill location
Brush Farm Park	Large lobe protruding from Lawson Street boundary to about 150 m south, with extensive mown areas including playing field, the surrounding batter slopes beneath tree canopy; other batter slopes around park perimeter, e.g. below bowling club.
Darvall Park	Playing fields and sports clubs in south end of park are on fill placed on creek flat, adjoining belt of planted trees also partly on fill. Some fill created by playground construction on north side of Kinson Crescent. Some narrow batter slopes below backyards of Chatham Road properties where they fall into the headwater gully.
Bell Park	Gully with tree canopy in the north partially filled with batter slopes below adjacent roads and residential backyards.
Field of Mars Reserve	Upslope in Cemetery site, with fill in elevated area near south-west edge but also in north-east and south-east edges; extensive batter slopes beneath tree canopy below south-west edge of Cemetery;

Park	Fill location
	fill evident in denuded area south-west of Wellington Road extension and deeper fill with warning signs due to contamination in gully to south-east of denuded area ground. Mown picnic areas on fill placed on flats on both banks of Buffalo Creek in eastern edge of the Reserve.

- All of the six parks have edge (perimeter) impacts, indicated by zoning of land along the perimeters, with length of perimeter adjoining each zone and percentage of total perimeter length as follows:

Park	Zoning on perimeter						
	E2	RE1	RE2	R2	B4	SP1	SP2
Bell Park	10% (105 m)	15% (165 m)	-	75% (830 m)	-	-	-
Brush Farm Park	-	-	15% (180 m)	25% (290 m)	-	-	Road 60% (720 m)
Darvall Park	8% (270 m)	19% (600 m)	3% (100 m)	49% (1580 m)	2% (65 m)	-	Rail 17% (560 m); Telephone 1% (40 m)
Lambert Park	25% (330 m)	-	-	65% (800 m)	-	-	Road 10% (140 m)
Outlook Park	5% (20 m)	-	-	95% (490 m)	-	-	-
Field of Mars Reserve	5% (240 m)	15% (840 m)	-	60% (3040 m)	-	Cemetery 20% (1190 m)	-

Zoning along park edges:
E2 Environmental Conservation
RE1 Public Recreation
RE2 Private Recreation
R2 Low Density Residential
B4 Mixed Use
SP1 Special Activities (Cemetery)
SP2 Infrastructure (Classified Road, Railways. Telephone Exchange)

- In the case of Field of Mars Reserve, the Field of Mars Cemetery occupies 20% of its perimeter to the northwest. The access road mapped as Wellington Road and the northwestern ends of Cressy Road and Westminster Road, zoned as RE1 Public Recreation, occupy 15% of the perimeter to the southwest, northwest and southeast respectively. Wellington Road adjoins the cemetery and provides a buffer to nutrient downwash from the cemetery to the northeast. There are some edge effects from the road, with the most obvious being the weedy road batters.

Edge-to-area ratios are high for all parks, except Brush Farm Park and Field of Mars Reserve, namely:

Park name	Edge (m) – E2 Environmental Conservation (m)	Area (m^2)	Area (ha)	Edge-to-area ratio (m/ha)
Bell Park	1000	4,560	0.46	2,173
Brush Farm Park	1,180	81,600	8.16	145
Darvall Park	2,940	90,930	9.09	323
Field of Mars Reserve	5,070	467,246	46.73	109

Park name	Edge (m) – E2 Environmental Conservation (m)	Area (m^2)	Area (ha)	Edge-to-area ratio (m/ha)
Lambert Park	950	25,936	2.59	367
Outlook Park	490	6,978	0.70	700

A2.0 Environmental Setting

Ryde Local Government Area (LGA) is mapped on the Parramatta River 1:25,000 topographic map (Figure 1a). Ryde LGA is within the Sydney Basin Bioregion.

The landform of most of the parks includes gullies and adjoining slopes that historically have been too steep for low-cost residential development (Figures 1a-1 to 1a-3, 2a, 2b, 2c).

There are two mapped creeks, Buffalo Creek and Strangers Creek, in the Field of Mars Reserve and unmapped ephemeral watercourses in the gullies of the parks (Figures 1a-1 to 1a-3). The unmapped ephemeral watercourses in Brush Farm Park, Bell Park and Lambert Park are headwaters of Archer Creek, while the one in Darvall Park is a headwater of Smalls Creek.

In many of the parks there has been dumping of fill in earlier years, often followed by creation of playing fields and other recreation spaces on the resulting levelled surfaces. Batter slopes on the fill edges have spilled down into adjoining gullies beneath existing tree canopy, or the canopy of subsequent tree plantings.

A2.1 Climate

The rainfall records from two nearby meteorological stations, Macquarie Park (Willandra Village, Station No. 66156) and Parramatta North (Masons Drive, Station No. 66124) (Bureau of Meteorology website, www.bom.gov.au, accessed November 2016), are consistent with the general trend of decreasing rainfall with increasing distance from the coast. The mean annual rainfall at Parramatta North is lower than that at Macquarie Park, namely:

Station	Distance inland	Mean annual rainfall	Opened	Operational
Macquarie Park	17 km	1156 mm	1970	45 years
Parramatta North	25 km	971 mm	1965	50 years

From the climate statistics, the lowest monthly rainfall recorded at both stations was less than 10 mm and highest monthly rainfall greater than 200 mm, hence expected drought stress during low rain and potential erosion risk during high rain events.

Rainfall data for Macquarie Park (Willandra Village)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	126	140	129	114	83	121	56	61	60	84	93	88	1156
Lowest	6	17	14	7	2	3	1	0	0.2	0.4	7	11	639
Highest	370	655	339	562	345	430	215	399	219	306	356	274	2011

Rainfall data for Parramatta North (Masons Drive)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	106	121	107	94	70	91	46	57	53	68	87	74	971
Lowest	7	9	8	3	2	5	0	0	0.4	0.2	8	6	513.2
Highest	319	673	311	476	250	374	166	440	324	237	236	271	1713

Prior to and at the times of flora and fauna surveys (Autumn and Spring 2006 and Autumn and Spring 2016), there was:

Time of survey	Rainfall condition
Autumn 2006	More than 20 mm below monthly mean
Spring 2006	Variable
Autumn 2016	More than 20 mm below monthly mean
Spring 2006	Variable

Monthly rainfall data recorded at Macquarie Park (Willandra Village)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
2005	88	104		29	41	87		3		53	141		
2006	95	67	36	7	15	127	75		219	10	63	74	

2015	189	52	78	362	118	69	33	42	55	54	132	69	1253
2016	370	40	84	33	7	346	102	149	60	28			
Mean	**126**	**140**	**129**	**114**	**83**	**121**	**56**	**61**	**60**	**84**	**93**	**88**	**1156**

Monthly rainfall data recorded at Parramatta North (Masons Drive)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
2005	89	141	69	25	36	74	34	3	51	54	146	24	746
2006	110	68	33	4	12	108	64	48	192	8	46	67	761

2015	139	62	41	407	81	60	38	40	34	46	121	65	1133
2016	319	9	47	31	10	324	84	112	56	19			
Mean	**106**	**121**	**107**	**94**	**70**	**91**	**46**	**57**	**53**	**68**	**87**	**74**	**971**

> 20 mm below the monthly average
Within 20 mm of the monthly average
> 20 mm above the monthly average

The 2006 autumn fauna surveys were undertaken by Biosphere Environmental Consultants on 26 to 30 April and 1, 4-9, 11 to 17 May 2006. The 2016 autumn fauna surveys were undertaken on 4 to 8, 11 to 15, 25 to 29 April and 2 May 2016. The daily temperatures and rainfall during the 2016 fauna surveys were higher than during the 2006 fauna surveys (Appendix 2), with:

Climatic conditions recorded during Autumn surveys

Records from Parramatta North (Masons Drive) meteorological station	26 April to 17 May 2006	4 April and 2 May 2016
Temperature		
Daily minimum range	4.6 to 12.4°C	9 to 19°C
Daily maximum range	17.8 to 26.0°C	20 to 35.2
Rainfall		
Mean	0.3 mm	0.8 mm
Range	0 to 2.4 mm	0 to 9.4 mm

The 2006 spring fauna surveys were undertaken on 9 to 14, 19 to 28 October and 1 to 6 November, and the 2016 autumn fauna surveys were undertaken on 19 to 23, 25 to 29 September. The daily temperatures during the 2016 fauna surveys were lower than during the 2006 fauna surveys, and the average daily rainfall similar in 2006 and 2016 (Appendix 2), with:

Climatic conditions recorded during Spring surveys

Records from Parramatta North (Masons Drive) meteorological station	9 October and 6 November 2006	19 and 29 September 2016
Temperature		
Daily minimum range	6.2 to 23.0ºC	5.4 to 14.2ºC
Daily maximum range	16.0 to 37.2ºC	20.0 to 23.0
Rainfall		
Mean	1.8 mm	1.9 mm
Range	0 to 25.5 mm	0 to 15 mm

A2.2 Geology and soil landscape

A2.2.1 Geology

The geology of the Sydney 1:100 000 map sheet was mapped by Herbert and West (1983) (Figure 3a-1), with:

Geological mapping of the parks

Park	Quaternary Alluvial Deposits (map unit Qha)	Hawkesbury Sandstone (map unit Rh)	Wianamatta Group Shales	
			Ashfield Shale (map unit Rwa)	Bringelly Shale (map unit Rwb)
Bell Park			X	
Brush Farm Park			X	X
Darvall Park			X	
Field of Mars Reserve (see Figure 3a-2, 3a-3)	Below 10-20 m AHD	Slopes below approx. 40 m AHD and above 10-20 m AHD	Above approx. 40 m AHD	
Lambert Park			X	
Outlook Park			X	

The geological map units are described by Herbert and West (1983) as follows:

Wianamatta Shales Group
- Ashfield Shale (Rwa): *Black to dark grey shale and laminate;*
- Bringelly Shale (Rwb): *Shale, carbonaceous claystone, laminate, fine to medium-grained lithic sandstone, rare coal*;

Hawkesbury
- Hawkesbury Sandstone (Rh): *Medium to coarse grained quartz sandstone, very minor shale and laminate lenses;* and

Quaternary Deposits
- Quaternary Holocene Alluvium (Qha): *Silty to peaty quartz sand, silt, and clay. Ferruginous and humic cementation in places. Common shell layers.*

A2.2.2 Soil landscape

The soil landscapes of the Sydney 1:100 000 map sheet were mapped by Chapman et al. (1989). The soil landscapes vary in topographic position and parent material (Chapman and Murphy 1989), with:

Soil landscape	Parent material	Landform
Glenorie (gn)	Wianamatta group shales	Undulating to rolling low hills
West Pennant Hills (wp)	Wianamatta group shales and shale colluvium (shale downwash)	Rolling to steep side slopes
Lucas Heights (lh)	Mittagong Formation (alternating bands of shale and fine-grained sandstones	Gently undulating crests and ridges on plateau surfaces
Gymea (gy)	Hawkesbury Sandstone (underlying the Wianamatta group shales)	Undulating to rolling rises and low hills
Hawkesbury (ha)	Hawkesbury Sandstone	Rugged, rolling to very steep hills
Lane Cove (lc)	Alluvial floodplain draining both the Wianamatta Group shales and Hawkesbury Sandstone	Level to gently undulating

Disturbed terrain (xx) occurs on *level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil*.

The parks were mapped (Figures 3b-1, 3b-2) as follows:

Park/ Reserve	Soil landscape map units
Bell Park	Glenorie (gn) on gentle lower slopes, West Pennant Hills (wp) on steeper upper slopes includes the gully
Brush Farm Park	Glenorie (gn) on gentle upper slopes, West Pennant Hills (wp) on steeper slopes includes the gully
Darvall Park	Glenorie (gn) on the gentle slope of most of the park West Pennant Hills (wp) in the upper northern tip Central gully through the park
Field of Mars Reserve	Disturbed terrain (xx) associated with the Field of Mars Cemetery and extending into the reserve Lucas Heights (lh) in northern tip of the reserve Gymea (gy) in the north-west corner of the reserve Hawkesbury (ha) on steep slopes Lane Cove (lc) downslope of slopes
Lambert Park	Glenorie (gn) on gentle lower slopes, West Pennant Hills (wp) on steeper upper slopes includes the gully
Outlook Park	West Pennant Hills (wp) on slopes includes the gully

Most of the soil landscapes in the parks have erosion hazards (Chapman and Murphy 1989). The limitations for Disturbed terrain (xx) are dependant upon the nature of the fill material. Erosion hazards are exacerbated by high rainfall events. The limitations of the soil landscapes are as follows:

Soil landscape	Hazard
Glenorie (gn)	*High soil erosion hazard, localised impermeable highly plastic subsoil, moderately reactive. High soil erosion.*
Gymea (gy)	*Localised steep slopes, high soil erosion hazard, rock outcrop, shallow highly permeable soil, very low soil fertility.*
Hawkesbury (ha)	*Extreme soil erosion hazard, mass movement (rock fall) hazard, steep slopes, rock outcrop, shallow, stony, highly permeable soil, low soil fertility.*
Lane Cove (lc)	*Flooding, high soil erosion hazard, seasonal waterlogging.*
Lucas Heights (lh)	*Stony soil, low soil fertility, low available water capacity.*
West Pennant Hills (wp)	*Mass movement hazard, steep slopes, high soil erosion hazard, localised seasonal waterlogging, impermeable plastic shrink-swell subsoil.*
Disturbed terrain (xx)	*Dependant on nature of fill material. Mass movement hazard, unconsolidated low wet-strength materials, impermeable soil, poor drainage, localised very low fertility and toxic materials.*

A2.2.3 Onsite soil observations

There were clay soils observed in all parks, except for the Field of Mars Reserve. The observed soils are consistent with the geology and soil landscape mappings (Figures 3a-1, 3a-2, 3b-1, 3b-2).

In the Field of Mars Reserve, the soil landscape boundaries were investigated by sampling soils using a 30 mm stainless steel auger to a depth of approximately 300 mm at 10 m intervals along four transects at right angles to the contours and at two additional spot locations GTb, GTc (Figures 3a-4, 3b-3). The soil samples from the auger were separated by colour and depth recorded. The soil samples were analysed by the soil scientist, Dr Pamela Hazelton (recording in Appendix 3).

Soil findings of Dr Pamela Hazelton at the Field of Mars Reserve

Soil sample	Geology mapping	Soil landscape	Observed
Transect 1			
0 m	Ashfield Shale	Disturbed	Ashfield Shale
10 m	Hawkesbury Sandstone	Disturbed	Ashfield Shale
20 m	Hawkesbury Sandstone	Disturbed	Ashfield Shale with Hawkesbury Sandstone
30 m	Hawkesbury Sandstone	Disturbed	Ashfield Shale with Hawkesbury Sandstone
40 m	Hawkesbury Sandstone	Disturbed	Hawkesbury Sandstone
Transect 2			
0 m	Ashfield Shale	Disturbed	Disturbed
10 m	Hawkesbury Sandstone	Disturbed	Disturbed
20 m	Hawkesbury Sandstone	Disturbed	Disturbed
30 m	Hawkesbury Sandstone	Disturbed	Disturbed
40 m	Hawkesbury Sandstone	Disturbed	Disturbed
Transect 3			
0 m	Ashfield Shale	Disturbed	Hawkesbury Sandstone derived
10 m	Ashfield Shale	Disturbed	Hawkesbury Sandstone derived
20 m	Ashfield Shale	Disturbed	Hawkesbury Sandstone derived

Soil sample	Geology mapping	Soil landscape	Observed
30 m	Ashfield Shale	Disturbed	Hawkesbury Sandstone derived
40 m	Ashfield Shale	Disturbed	Hawkesbury Sandstone derived
Transect 4			
0 m	Ashfield Shale	Lane Cove	Minimal topsoil, shale fragments
10 m	Ashfield Shale	Lane Cove	Hawkesbury Sandstone derived
20 m	Ashfield Shale	Lane Cove	Hawkesbury Sandstone derived
30 m	Ashfield Shale	Lane Cove	Hawkesbury Sandstone rock
40 m	Hawkesbury Sandstone	Lane Cove	Hawkesbury Sandstone derived
50 m	Hawkesbury Sandstone	Lane Cove	Hawkesbury Sandstone rock
GTb	Hawkesbury Sandstone	Lane Cove	Disturbed
GTc	Ashfield Shale	Disturbed	Disturbed. Subsoil with no topsoil

The mapping of Lane Cove soil landscape in Transect 4 and Spot location GTb is unlikely to be correct as the landform for the Lane Cove soil landscape for this soil is *level to gentle undulating Alluvial floodplain.* Transect 4 and Spot location GTb were on a hillslope. The likely soil landscape is either Hawkesbury (map unit ha) which occurs on *rugged to very steep on Hawkesbury Sandstone*, or possibly Gymea soil landscape.

A2.3 Land use

A2.3.1 Historic land use

The Ryde LGA is the traditional land of the Wallumedegal people (Smith 2005).

The land uses of Brush Farm Park, Darvall Park, Lambert Park and the Field of Mars Reserve are as follows.

Brush Farm Park was formally established as a park in 1914. The original land grants that covered the park area date from 1794. The park is part of the former “Brush Farm Estate”. From 1806, the land was being used for cattle and viniculture.

In 1834 Baron Charles von Hugel (Clark 1994) concerning the vegetation of Brush Farm, noted:

> *Near the house, there is a deep valley with a type of vegetation all its own, containing a number of plants which I found only in the Illawarra.*

Benson and Howell (1990, p124, 125) described the vegetation of Brush Farm Park as:

> *Remnants of the higher rainfall Blue Gum High Forest can be seen in Darvall Park in Denistone and in Brush Farm Park at Eastwood. These are situated in parts of the municipality where the shale soils are deep… At Brush Farm Park, similar trees grow on the upper slope* [as at Darvall Park]*, but in the steep-sided sheltered gully, fertile shale-derived and high rainfall support a rainforest vegetation with species not found together in other sheltered sandstone gullies or on Wianamatta Shale soils of northern Sydney. Named Brush Farm by early settlers because of this rainforest brush its species included trees of* Cryptocarya glaucescens, Euodia micrococca, Guioa semiglauca, Schizomeria ovata, *shrubs of* Alectryon subcinereus *and* Eupomatia laurina, and *the*

climber Aphanopetalum resinosum. *There is a very large* Trochocarpa laurina *12 m high. The moist fertile gully has been particularly susceptible to weed invasion.*

Darvall Park
A comprehensive account of this park's history is provided in the State Heritage Register website at http://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2340177

The park represents a residue of the 19th-century Darvall Estate after nearly all the estate was subdivided and sold in the early 20th century. The park land was acquired by Ryde Council between 1926 and 1929. Its listing on the State Heritage Register was mainly on account of its historical association with Major Edward Darvall, also because there is preserved in it the endangered ecological community Turpentine-Ironbark Forest [in the Sydney Basin Bioregion].

In the Friends of Darvall Park website (http://friendsofdarvallpark.weebly.com/park-history.html, accessed 9 November 2016), it is stated that:

> *In the late 1850s Edward Darvall built Ryedale house and surrounded it with 20 ha of orange orchards. The rest of the land was used for growing vegetables, some cereals, corn, potatoes and steeper sections were used as pastures.*
>
> *Major Darvall died in 1869. … The Ryedale estate was left to Jane* [his wife] *who remained at the house till her death in 1899. … she sold of parcels of land to the Commissioner of railways in 1885, Eastwood public school in 1889 and the West Ryde Masonic Temple in 1898. Just before her death she made a gift of Ryedale house and the remaining land to her son Anthony William Darvall.*
>
> *Although Darvall Park was known as a park since 1923, not until 1936 the council could be persuaded to buy the 18 acres, which at first it thought of calling "Kings Park." … It was partly bush partly open space. The lower flatter section was and still is used for sport and recreation. At the time of inception it was considered to be sports ground for girls.*

Benson and Howell (1990, p124) described the vegetation of Darvall Park as:

> *Remnants of the higher rainfall Blue Gum High Forest can be seen in Darvall Park in Denistone and in Brush Farm Park at Eastwood. These are situated in parts of the municipality where the shale soils are deep. At Darvall Park near Denistone station, there are tall trees of smooth-barked* Eucalyptus saligna*, along with the rough-barked* Eucalyptus pilularis*,* Eucalyptus paniculata*,* Eucalyptus resinifera*,* Eucalyptus acmenoides *(near its southern limit here) and* Syncarpia glomulifera*. Much of the understorey has been replaced with grass patches, but amongst the woody shrubs and trees (*Ligustrum*,* Lantana*,* Salix*,* Erythrina *and* Cinnamomum*), many native understorey species are present, and their growth is being encouraged in areas by log barriers from mowing and trampling. Small trees of* Backhousia myrtifolia *and* Glochidion ferdinandi*, shrubs of* Bursaria spinosa*,* Helichrysum diosmifolium [now *Ozothamnus diosmifolius*]*, at least four species of* Acacia*, and moisture-loving vines including* Morinda jasminoides *and* Celastrus subspicatus*,* Cissus antarctica *and* Cissus hypoglauca *are amongst the native plants present in these regenerating areas.*

Lambert Park
From the Brush Farm Park and Lambert Park Plan of Management (City of Ryde, 2009):

Brush Farm Park has been established since 1914 and Lambert Park since 1984. … Significant works have been undertaken within both Parks including bush regeneration, sports ground maintenance and creek line rehabilitation works. …

Lambert Park forms a continuation of the natural area from Brush Farm Park. …

Lambert Park is characterised in the western upper area by fill material with a crushed sandstone capping and revegetation. There are small pockets of local vegetation on the upper slopes and in the southern area where the original soil layer still persists. …

Both Parks are important historically as they formed part of the Brush Farm House Estate with Brush Farm House immediately to the north of Brush Farm Park. The earliest European occupancy of the land dates back to 1794.

Field of Mars Reserve:

From the Plan of Management (City of Ryde 2009), it is stated that:

The Field of Mars is the largest reserve under the care, control and management of the City of Ryde. The reserve is dedicated for public recreation and promotion of the study and the preservation of native flora and fauna and accordingly it is used for environmental education and passive recreation, involving walking and appreciation of the natural environment. This has been the major focus of management for recreation within the Reserve since the 1960's.

The history of the reserve is summarised as follows (City of Ryde 2009):

Prior to European settlement, the area was occupied by the Wallumedegal people, with:

- creeks and estuary providing a major food source;
- moist gullies providing fruits such as figs, lillypilly and berries;
- drier areas providing nectar from flowers such as banksia and waratah; and small animals such as bandicoots, bush rats and possums;
- tall forests of the shale ridges with their grassy and bracken understorey were areas which attracted larger mammals such as kangaroos and wallabies.

The first land grant in the Ryde area was along the northern bank of the river between Sydney and Parramatta in January 1792. The area was named by Governor Phillip the 'Field of Mars', because part of it was reserved for use as an army encampment.

In 1804 a large area of public land for use by local inhabitants was set aside. Six commons were gazetted, including The Field of Mars Common, an area of approximately 5,050 acres located north of the Field of Mars and the Eastern Farms, and which covered most of the Ryde Municipality.

In 1874, the Common, by then a reported place of undesirables, was resumed as Crown land and subsequently cleared for the laying out of allotments and streets.

In 1884 25 acres were allocated for the Field of Mars Cemetery.

In the Government Gazette of 3 December 1887, 85 acres were proclaimed for Public recreation. This is the origin of today's Field of Mars Reserve. Ryde Council became trustee of the land in 1889.

The reserve remained a source of building and domestic materials for local residents, provided grazing land for cattle, a refuge during the depression years and a popular place for swimming, fishing and prawning until 1954.

In response to a waste disposal problem as residential development grew, the Field of Mars was identified as a location for a major putrescible waste tip in 1965. This was to prove the catalyst for significant resident mobilisation in relation to wildlife conservation.

The Ryde-Hunter's Hill Flora and Fauna Preservation Society was formed in February 1966 to advocate wildlife conservation and to specifically preserve, manage and develop the Field of Mars Reserve as a flora and fauna sanctuary.

On 9 May 1975, the reserve was proclaimed a "Wildlife Refuge" under the National Parks and Wildlife Act, 1974. *(Field of Mars Wildlife Refuge No.339).*

A2.3.2 Heritage item zoning

Under Part 1 of Schedule 5 of the Ryde Local Environment Plan 2014 (LEP 2014), three of the six parks are listed as heritage items of local significance, and are mapped as follows:

- Brush Farm Park: 'C1' Conservation Area – General, and Item – General (Figure 4a);
- Darvall Park: Item – General (Figure 4a); and
- The Field of Mars Reserve: Item – General (Figure 4b).

Heritage conservation area is defined in the Ryde LEP (2014) as follows:

> *… an area of land of heritage significance:*
> *(a) shown on the Heritage Map as a heritage conservation area, and*
> *(b) the location and nature of which is described in Schedule 5,*
> *and includes any heritage items situated on or within that area.*

A heritage item is defined in the Ryde LEP (2014) as follows:

> *… a building, work, place, relic, tree, object or archaeological site the location and nature of which is described in Schedule 5.*

Heritage significance is defined in the Ryde LEP (2014) as follows:

> *… historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic value.*

A2.3.3 Land use changes since earliest available aerial photograph

From a comparison with the 1943 aerial photographs (Figures 5a, 5b, 5c) with the 2016 aerial photographs (Figures 1b-1, 1b-2, 1b-3), it was observed that:

Park	Land use in 1943	Land use in 2016
Bell Park	Cleared with trees along Winbourne Street to the east, in rural environment.	Area of canopy trees in north and scattered trees in southern 2/3, surrounded by residential.
Brush Farm Park	Rural cleared land upslope with scattered canopy trees in gullies and on the perimeter. Urban development to the east and	Canopy trees throughout, except raised recreational grounds to the northwest and in the central north, as well as a carpark and Scout Hall.

Park	Land use in 1943	Land use in 2016
	rural to north and west. Canopy in the gully to the south separating the park from Lambert Park.	 Surrounded by urban development, with canopy to the south separating the park from Lambert Park.
Darvall Park	Cleared along boundary with railway, and in southern half, with canopy coverage in northern half and scattered trees in south.	Canopy trees, except in mown recreation field in the south.
Field of Mars Reserve	Fully vegetated, except for: - the cleared agricultural land on the alluvial flats adjoining Buffalo Creek; - the cleared upper slopes in the south and south-west. There are tracks through the canopy vegetation, providing access to the alluvial flats. There is a narrow band of vegetation along Buffalo Creek. Surrounded to northwest and northeast by vegetation, to the southwest and north by rural land use, and to the south by urban development. Field of Mars Cemetery was established in central area to north west of the Reserve.	Remains fully vegetated, with: - scattered trees and mown grass on the formerly cleared agricultural land on the alluvial flats adjoining Buffalo Creek; - grass growth and rehabilitation being undertaken on the formerly cleared upper slopes in the south and southwest. Track less visible than in 1943. Growth along the creekline. Dense canopy coverage with scattered clearing to southeast and at the end of Wellington Road. Surrounded by urban development with the Lane Cove National Park to the east and Pidding Park and canopy trees to the northwest. Field of Mars Cemetery expanded in central area to north west, with graves and tombs extending on level fill to boundary with the Reserve.
Lambert Park	Cleared in the southern third with canopy cover in the northern two thirds. Dense canopy along the gully. Surrounded by rural to the south, west with urban development to the east and by canopy cover to the north separating the park from Brush Farm Park.	Similar to 1943, except the cleared southern third now supporting canopy cover. The former rural to the south, west now urban development. The gully appears to have been filled.
Outlook Park	Canopy cover throughout and surrounded by urban development with scattered canopy trees.	Similar to 1943.

A2.4 General observations within the parks

Bell Park slopes to the south, with a children's playground and an old fig tree (*Ficus rubiginosa*) in the southernmost section. The vegetation of Bell Park consists mostly of mown grass recreational area, with dense belts of planted and weedy tree and shrub vegetation following the line of a gully.

Brush Farm Park slopes to the southeast, and includes a mown oval on the central ridge extending into areas of more roughly mown grass to the south. The north-western edge of the park is occupied by a car park and netball courts. The vegetation of this park consists of native bushland except for some large mown or paved areas fronting onto Lawson Street, including the Scout Hall and its grounds.

A broad belt of bushland occupies the long gully head between the oval and Brush Road. The south-flowing gully joins another gully from the northwest, with their confluence being outside the park's southern boundary.

The broad gully to the northwest is densely forested, with large, mature eucalypts dominating the south-facing slopes behind the Scout Hall and netball courts, most of them *E. paniculata* (Grey Ironbark). Deeper in the gully the forest becomes more mesic, approaching a true rainforest except for the persistence of emergent mature eucalypts. Towards the southwest on the slope running up to the bowling club there is disturbance possibly from deposition of fill and mature canopy trees are absent; rather, there are stands of even-aged eucalypts that appear to have been planted in recent decades. Examination of fallen fruits revealed that all or most of the planted eucalypts are *E. grandis* (Flooded Gum), a North Coast species of very similar appearance to *E. saligna* and often confused with it.

Darvall Park occupies the head of a gully running south from near Eastwood station on the west side of the Main Northern Railway. It is irregular in shape, with the northern half tapering into a point where Chatham Road converges with the railway. It is broadest in the middle, south from which it diverges from the railway with housing around Kinson Crescent and Anthony Road intervening. Further south it narrows to a strip along the creek, which in this part is low-lying and swampy. The final 500 m to the southern extremity is largely cleared with mown grass for sporting activities, though with an interrupted fringe of trees in parts. The highest-quality bushland is concentrated in the central, broadest part and features quite a number of impressively large and mature eucalypts, many with hollow branch stubs currently sheltering a variety of birds including king parrots, corellas and white cockatoos. Most frequent of the large eucalypts is *E. saligna* (Sydney Blue Gum) followed by *E. acmenoides* (White Mahogany) and *E. paniculata* (Grey Ironbark). Further north and south much of the forest is degraded and very weedy, with large trees much sparser. The low-lying parts of the creek support large swathes of wetland weeds, with massive weed growth extending up the banks. At both northern and southern ends of the bushland area there is evidence of tree planting in recent decades, dominated by eucalypt species inappropriate to the Sydney region, namely *Eucalyptus grandis* (Flooded Gum) and *E. microcorys* (Tallowwood).

Field of Mars Reserve
The bushland, now Field of Mars Reserve, wraps around Field of Mars Cemetery on three sides. The cemetery occupies the broad flat end of the ridge system, further flattened by deposition of fill in parts, with the reserve falling away from its boundaries into gullies. There are two creeks in the reserve, Strangers Creek in the north-east and Buffalo Creek in the south.

By far the largest part of the reserve is on Hawkesbury sandstone with many low rock ledges and boulders outcropping, exceptions being some narrow fringes adjacent to the cemetery which are on sediments transitional between shale and sandstone, and alluvial deposits along the lower reaches of Buffalo Creek and Strangers Creek.

The vegetation of the reserve is largely remnant and in many parts in almost pristine condition. However the creeklines are generally weedy due to eutrophication from neighbouring residential areas upslope and to a lesser degree from the cemetery.

Southwest of the cemetery on the slope between Wellington Road and Buffalo Creek, there are some very weedy areas of bushland, in particular in a gully below the end of Wellington Road. The parcels of land at 2-14 Wellington Road have been used for a variety of residential, commercial and industrial purposes since the 1920s. A former electrical factory built in the 1960s was occupied by Council from 1975 as their works depot. Remediation works to deal with soil contamination at the site included removal of primary contamination sources, capping with clean soil and rock, and revegetation in 2009.past land use and disturbance has led to the weed infestations downslope from this area. (See details at http://www.ryde.nsw.gov.au/Environment-and-Waste/Remediation-Projects). The revegetation plantings in this area are an assortment of native trees and shrubs, many of them not local native species. Past land use and disturbance has led to weed infestations downslope from this area. Areas in the south-east of the reserve have been slashed and mown

Apart from the widespread sandstone slopes forest/woodland communities characteristic of Hawkesbury Sandstone, there are narrow zones of several other vegetation communities present, namely:

- mangroves and saltmarsh along the lowest part of Buffalo Creek in the eastern corner; representing the upstream limit of these communities which are much more extensive closer to Lane Cove River on the opposite side of Pittwater Road;
- warm-temperate rainforest dominated by *Ceratopetalum apetalum* (Coachwood) and *Tristaniopsis* laurina (Water Gum) in a very narrow zone along rocky bank of Buffalo Creek, a short distance upstream from the limit of its alluvial flat; also on Strangers Creek though there Coachwood and Red Cedar appear possibly to have been planted;
- a narrow fringe of forest on transitional soils along Wellington Road, dominated by *Eucalyptus resinifera, E. paniculata* and *Syncarpia glomulifera*; and
- riparian vegetation along Buffalo Creek beyond upstream limit of mangroves and related salinity tolerant vegetation, but below the first rock bars; this vegetation is exceptionally weedy but appears to have included paperbark *Melaleuca* spp. and *Casuarina glauca.*

As with most such bushland reserves surrounded by residential development, the creeklines have had sewer mains constructed in or beside their beds in the mid-20th century. The sewers have contributed greatly to weed invasion.

Lambert Park

The park is effectively a southern extension of Brush Farm Park running downstream along the same gully. Technically the two parks are not contiguous, being separated by a road reserve (a never-built western extension of Rutledge Street) but the road reserve is managed by Council as part of its bushland. The gully is not very steep-sided except toward the northern end (the road reserve) where the creekline is more deeply incised into the broader valley profile. Like Brush Farm Park, Lambert Park is located entirely on Wianamatta Group shales, which have given rise to gentler slopes than the Hawkesbury Sandstone.

An unmapped creek, apparently semi-permanent with shallow pools, runs through the lower part of the park. It is one of the headwaters of Archer Creek which joins Parramatta River at Meadowbank. There is a Girl Guides building in the edge of the park about 50 metres north-west of the junction of Brush Road and Warrawong Street. South of this point, the park flattens out and the creek winds between tall trees, nearly all of which appear to be of planted origin, dating from within about the last 40 years judging by their trunk diameters. Around the west and north sides of the Girl Guides building there is a patch of remnant rainforest, dominated by mature trees of *Acmena smithii* (Lilly-pilly) and some large (but not necessarily old) trees of *Ficus rubiginosa* (Port Jackson Fig). Some smaller local rainforest trees, shrubs and climbers survive despite the moderately abundant weeds here. North from the Girl Guides building and up to the road reserve most of the vegetation is highly disturbed and trees more widely spaced, nearly all apparently of planted origin; the groundlayer is mostly weed species and there are various exotic shrubs, small trees and climbers closer to the creekline.

Outlook Park
This small park, descends steeply from an entrance on Trelawney Street, then broadens in the centre into a shallow gully flanked by a flatter bench, narrowing again to an entrance on Chatham Road. Apart from the road entrances it is bordered entirely by private house blocks, though many of these have large gardens containing remnant trees. A staircase descends through the steep upper section.

Remnant native vegetation survives mainly in the form of some very large, mature trees of *Eucalyptus acmenoides* (White Mahogany), *E. saligna* (Sydney Blue Gum) and *Syncarpia* glomulifera (Turpentine). The occurrence of *Eucalyptus acmenoides* here (and in nearby Darvall Park), represents the species virtually at its southern limit of natural occurrence. The groundlayer is mown in parts though with the native grass *Microlaena stipoides* abundant, but above the central bench there is a large patch of tall, dense exotic weeds, notably *Hedychium gardnerianum* (Yellow Ginger).

Section B: Flora assessment

B1.0 Introduction

The main aim of this 2016 survey is to replicate and reconcile previous studies using the same methodologies, and to undertake ground truthing of vegetation communities through on-site analysis.

The specific methods include:

- Survey in Autumn and Spring 2016 using the same methodology and quadrats set up for the previous studies [Biosphere 2006].
- Representative of mapped vegetation communities and using the same methodologies in the previous studies.
- Flora and fauna studies must be carried out in accordance with OEH guidelines
- Survey data of species recorded (species lists) is to be presented in an Access database
- Ground truthing of the vegetation communities, reviewing previous assessments by Biosphere and current Office of Environment and Heritage (OEH) mapping.
- Methodology should be in accordance with the Native Vegetation Interim Type Standard (DECCW 2009).
- GIS data is to be provided for individual threatened species, and rare or significant species.

B2.0 Existing mappings

Office of Environment and Heritage (OEH) mapped the vegetation of the Sydney Metropolitan Area (OEH 2013, VIS_ID 3817). The six parks were mapped with differing accuracy, with some mapped polygons visited by the mappers, and others assessed using aerial photographs.

The six parks are mapped by OEH (2013) (Figures 6a-1, 6a-2, 6a-3), namely:

OEH (2013) mapping of the parks

Park / reserve	Vegetation community	Community Code	Accuracy assessment	VEGCODE
Bell Park	Blue Gum High Forest	S_WSF01	2: High: Not visited, photo pattern consistent	190210244, 190220314
Brush Farm Park	Blue Gum High Forest	S_WSF01	1: Very high: Site visited by mappers	190110203
			2: High: Not visited, photo pattern consistent	190220204
	Coastal Warm Temperate Rainforest	S_RF03	1: Very high: Site visited by mappers	253113203
			4: Low: Not visited, photo pattern unexplained	253413204
	Sydney Turpentine-Ironbark Forest	S_WSF09	1: Very high: Site visited by mappers	250110132
			2: High: Not visited, photo pattern consistent	250210133
Darvall Park	Blue Gum High Forest	S_WSF01	1: Very high: Site visited by mappers	190111132
			2: High: Not visited, photo pattern consistent	190224244

Park / reserve	Vegetation community	Community Code	Accuracy assessment	VEGCODE
Lambert Park	Blue Gum High Forest	S_WSF01	2: High: Not visited, photo pattern consistent	190210244, 190220204, 253113203
	Coastal Warm Temperate Rainforest	S_RF03	4: Low: Not visited, photo pattern unexplained	253413204
Field of Mars Reserve	Coastal Enriched Sandstone Dry Forest	S_DSF04	2: High: Not visited, photo pattern consistent	183212132, 189212131, 189212203, 199212203
			3: Medium: Not visited, photo pattern reasonable	183311243, 199312131
	Coastal Enriched Sandstone Moist Forest	S_WSF02	2: High: Not visited, photo pattern consistent	164210132, 182210132, 189210131, 189210152
			3: Medium: Not visited, photo pattern reasonable	182310134
	Coastal Sandstone Gallery Rainforest	S_RF02	1: Very high: Site visited by mappers	157110132
	Coastal Shale-Sandstone Forest	S_WSF06	1: Very high: Site visited by mappers	199111131
			2: High: Not visited, photo pattern consistent	199211203, 199212132, 199213203
			3: Medium: Not visited, photo pattern reasonable	199212132
	Estuarine Mangrove Forest	S_SW01	1: Very high: Site visited by mappers	180100000
	Estuarine Reedland	S_FrW06	4: Low: Not visited, photo pattern unexplained	120433134
	Estuarine Swamp Oak Forest	S_FoW08	0: Not assessed	181000000
			5: Very high: Site visited by others	119500000
	Sydney Turpentine-Ironbark Forest	S_WSF09	2: High: Not visited, photo pattern consistent	189211143
			4: Low: Not visited, photo pattern unexplained	189411132
	Weeds and Exotics	Weed_Ex	0: Not assessed	902000000
			1: Very high: Site visited by mappers	902100000
Outlook Park	Blue Gum High Forest	S_WSF01	2: High: Not visited, photo pattern consistent	190210241, 190210243

Biosphere Environmental Consultants (2006) used the following methods:

> *Vegetation communities were determined by assessing colour aerial photographs supplied by Council and then ground-truthed. Geology and soil types were also determined. It was stipulated by Council that the methods used for this biodiversity survey were to be the same as used by the National Parks and Wildlife Service (NSW). The model for this survey was taken from Tozer (2003). Quadrats were to be 400 m^2*

(0.04ha) in area. In most cases this was achievable with 20m x 20m quadrats except in two sites where 40m x 10m quadrats were necessary, either due to the narrowness of the vegetation community or the reserve. One extra 10 X 10m quadrat was set up in a small native remnant in Lambert Park. Quadrats were placed in areas of highest diversity of local native plants with consideration of the required size of the quadrat and the narrowness of the reserves. In order to assess abundance a Braun-Blanquet scale was used. While this method involves a subjective or qualitative description, it also provides for a quantitative, or measurable documentation for comparison of plant community characteristics, especially species richness. Therefore, an inventory of plant species and approximate species numbers was completed for each quadrat then each species was assigned a Braun-Blanquet Cover Class. In order to adequately assess the foliage projective cover of tree species, which may have a dominant effect on other plants within the quadrat, the diameter at breast height (dbh) of the dominant tree species as well as an assessment of the Specht Vegetation Structure (Table 6.1 in Recher, Lunney & Dunn, 1986) is also provided.

Finally, species contained in the quadrats were compared to species listed in the map units described by Tozer (2003) for classification purposes.

The Biosphere (2006) quadrat data has been supplied to OEH and is present on the VIS database.

Biosphere (2006) mapped the vegetation of four of the six parks, as follows (Figures 6b-1, 6b-2, 6b-3), which is not consistent with OEH (2013) mapping. The common map units between the two mapping are highlighted in **blue**.

Comparison of mapping by Biosphere (2006) and by OEH (2013) of the parks

Park/ Reserve	Native vegetation (Appendix 5, Biosphere 2006)	OEH 2013 map units
Bell Park	Not part of the 2006 study area	
Brush Farm Park	**Sydney Turpentine Ironbark Forest** (entire park)	Coastal Warm Temperate Rainforest Blue Gum High Forest **Sydney Turpentine-Ironbark Forest** Urban Exotic/Native
Darvall Park	**Sydney Turpentine Ironbark Forest** (entire park)	Blue Gum High Forest Urban Exotic/Native
Field of Mars Reserve	**Estuarine Complex** HSS Gully Forest HSS Ridgetop Woodland Shale-Sandstone Transition Forest (high SS influence) Turpentine Ironbark Margin Forest disturbed soils/weeds	Coastal Enriched Sandstone Dry Forest Coastal Enriched Sandstone Moist Forest Coastal Sandstone Gallery Rainforest Coastal Shale-Sandstone Forest **Estuarine Reedland** **Estuarine Mangrove Forest** **Estuarine Swamp Oak Forest** Sydney Turpentine-Ironbark Forest Urban Exotic/Native Weeds and Exotics
Lambert Park	Sydney Turpentine Ironbark Forest	Coastal Warm Temperate Rainforest Blue Gum High Forest Urban Exotic/Native
Outlook Park	Not part of the 2006 study area	Blue Gum High Forest

B3.0 The 2016 survey

The 2016 flora survey replicated and reconciled the flora survey of Biosphere (2006), using the same methodology. In addition to re-surveying of the Biosphere (2006) quadrats, two additional parks, Bell Park and Outlook Park, were surveyed (Figures 7a, 7b, 7c). The data recorded by Biosphere (2006) are on the OEH VIS dataset, with the re-surveyed 2016 quadrats as follows:

Park / reserve	Biosphere 2006		OEH VIS Data (Biosphere 2006)	ACA 2016
	Quadrat	Name	Code	Quadrat
Bell Park	-	-	-	BP#1
Brush Farm	1	Sydney Blue Gum	RYDESBG1	BF#1
Brush Farm	2	Schizomeria	RYDE_S1	BF#2
Brush Farm	3	Turpentine	RYDE_TI1	BF#3
Brush Farm	4	Turpentine-Cassine	RYDE_TC1	BF#4
Darvall	6	Darvall	RYDE_DP1	DP#1
Field of Mars	7	Estuarine	RYDE_E1	FoM#1
Field of Mars	8	Scribbly Gum	RYDE_SG1	FoM#4
Field of Mars	9	Wellington Road	RYDE_WR1	FoM#2
Field of Mars	10	Coachwood	RYDE_C1	FoM#3
Field of Mars	11	Burnt Sclerophyll	RYDE_BS1	FoM#5
Lambert	5	Lilli Pilly	RYDE_LP1	LP#1
Outlook Park	-	-	-	OP#1

The 2016 survey data were used to verify the previous vegetation mapping with additional data recorded from four extra ground truthing (GT) quadrats in Field of Mars Reserve (Quadrat FoM GTQA, FoM GTQB, FoM GTQC, FoM GTQD) and extra spot locations in the parks.

A total of 354 species (233 local native, 28 non-local native and 93 exotic) were recorded in the six parks (Tables 1, 4a to 4f) by Tony Rodd, Jessica Gardner, Dr AnneMarie Clements, Ruth Palsson and Lucy Bonanno. From the percentage of local native to total species recorded in 0.04 ha quadrats, the species composition of the parks varied from:

- predominantly local native composition (>75% local native) in Brush Farm Park and Field of Mars Reserve; to
- predominately exotic and/or non-local native species recorded (<25% local native) in Bell Park.

The remainder of the 0.04 ha quadrats had between 52 to 73% of the species recorded being local native, namely:

2016 sampling locations	2016 survey date	Total number of species recorded	Number of local native species recorded	Number of exotic species recorded	Number of non-local native species recorded	% Local native to total recorded	% Exotic to total recorded	% Non-local native to total recorded
Bell Park								
Quadrat BP#1	15/04	20	3	11	6	15	55	30
Spot location A	15/04	11	3	7	1	27	64	9
Spot location B	15/04	16	3	9	4	19	56	25
Spot BP GTa	15/04	20	11	5	4	55	25	20
Spot BP GTb	15/04	16	3	10	3	19	63	19
Total		**59**	**18**	**28**	**13**	**31**	**48**	**22**
Brush Farm Park								
Quadrat BF#1	8/04	54	32	18	4	59	33	7
Quadrat BF#2	13/04, 20/05	38	29	7	2	76	18	5
Quadrat BF#3	13/04	29	20	6	3	69	21	10
Quadrat BF#4	19/04	48	32	15	1	67	31	2
Spot BF GTa	15/04	34	26	6	2	77	18	6
Spot BF GTb	15/04	23	15	5	3	65	22	13
Spot BF GTc	20/05	30	26	0	4	87	0	13
Total		**116**	**75**	**32**	**9**	**65**	**28**	**8**
Darvall Park								
Quadrat DP#1	19/04	51	31	18	2	61	35	4
Spot DP GTa	29/07	19	11	3	5	58	16	26
Spot DP GTb	29/07	11	9	2	0	82	18	0
Spot DP GTc	29/07	14	10	4	0	71	29	0
Spot DP GTd	29/07	16	11	4	1	69	25	6
Spot DP GTe	29/07	33	29	3	1	88	9	3
Spot DP GTf	29/07	16	11	3	2	69	19	13
Spot DP GTg	29/07	13	4	9	0	31	69	0
Total		**91**	**56**	**28**	**7**	**62**	**31**	**8**
Field of Mars Reserve								
Quadrat FoM#1	30/03	31	16	15	0	52	48	0
Quadrat FoM#2	30/03	46	33	12	1	72	26	2
Quadrat FoM#3	30/03	37	27	10	0	73	27	0
Quadrat FoM#4	7/04	53	47	6	0	89	11	0
Quadrat FoM#5	7/04	65	60	5	0	92	8	0
Quadrat FoM GTQA	6/10	54	42	10	2	78	19	4
Quadrat FoM GTQB	5/10	56	53	3	0	95	5	0
Quadrat FoM GTQC	5/10	51	49	2	0	96	4	0
Quadrat FoM GTQD	6/10	61	53	8	0	87	13	0
Spot location FoM A	5/10	13	4	9	0	31	69	0
Spot location FoM B	5/10	4	2	1	1	50	25	25
Spot FoM GTa	5/10	2	2	0	0	100	0	0
Spot FoM GTb	6/10	23	13	9	1	57	39	4
Spot FoM GTc	6/10	16	10	6	0	63	38	0
Total		**217**	**171**	**42**	**4**	**79**	**19**	**2**

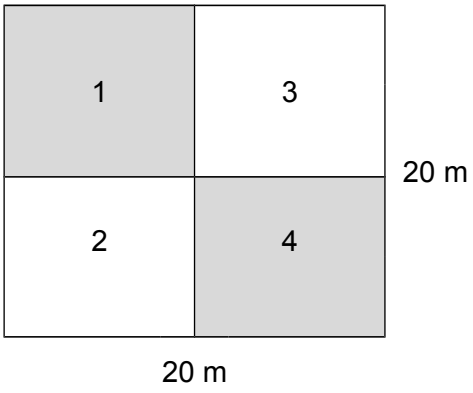
2016 sampling locations	2016 survey date	Total number of species recorded	Number of local native species recorded	Number of exotic species recorded	Number of non-local native species recorded	% Local native to total recorded	% Exotic to total recorded	% Non-local native to total recorded
Lambert Park								
Quadrat LP#1	7/04	48	25	17	6	52	35	13
Spot LP GTa	29/07	13	10	2	1	77	15	8
Spot LP GTb	29/07	14	7	6	1	50	43	7
Spot LP GTc	29/07	9	6	3	0	67	33	0
Spot LP GTd	29/07	11	9	2	0	82	18	0
Spot LP GTe	29/07	21	13	4	4	62	19	19
Spot LP GTf	29/07	21	15	3	3	71	14	14
Total		**85**	**47**	**28**	**10**	**55**	**33**	**12**
Outlook Park								
Quadrat OP#1	22/04	50	33	11	6	66	22	12
Spot OP GTa	22/04	37	24	9	4	65	24	11
Spot OP GTb	22/04	5	3	2	0	60	40	0
Spot OP GTc	22/04	5	4	1	0	80	20	0
Total		**70**	**44**	**18**	**8**	**63**	**26**	**11**

Note: GT = Ground truthing

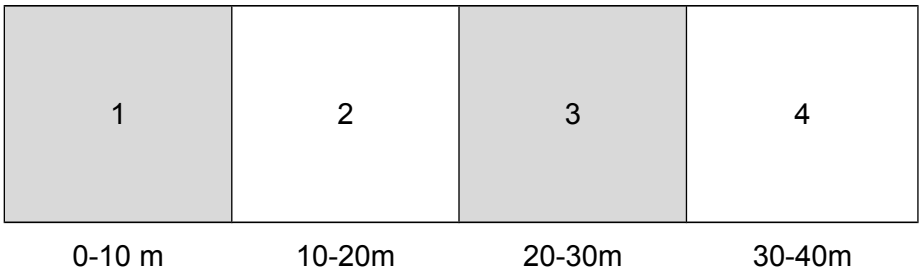
B3.1 Methods

The flora methods used in the 2016 survey are consistent with Biosphere (2006) with the locations of the 2006 quadrats relocated from the GIS registered figures in Biosphere (2006).

The 0.04 ha quadrats (Figures 7a, 7b, 7c) consisted of four contiguous 10 m x 10 m sub-quadrats. The quadrats and sub-quadrats were laid out as follows:



In Darvall Park Quadrat DP#1, and Field of Mars FoM#3, the 0.04 ha quadrats were laid out as follows:



Supplementary species data consisted of species present in an approximately 10 m radius of Spot locations being recorded (Tables 4a to 4f). During the ground truthing of the vegetation communities, the dominant species in the strata were recorded in Ground Truthing Spots (see Figures 8a, 8b-1, 8b-2, 8c, Tables 4a to 4f).

Biosphere (2006) used a 7-stage Braun-Blanquet scale technique for species abundance in each quadrat, namely:

> *While this method involves a subjective or qualitative description, it also provides for a quantitative, or measurable documentation for comparison of plant community characteristics, especially species richness.*

Cover abundance scores (1 to 7) for the Braun-Blanquet Cover Classes are given in Biosphere (2006, page 16) and interpreted in the 2016 survey as follows:

Cover Class	**Biosphere (2006)**		**Interpreted in 2016 as**
1	*Rare*	*few individuals (three or less) and cover <5%*	≤ 3 individuals AND <5% cover
2	*Uncommon*	*more than three but not consistently throughout the plot) and cover <5%*	>3 individuals AND cover <5%
3	*Common*	*consistent throughout the plot and cover <5%*	cover <5% throughout the quadrat
4		*Very abundant cover <5% OR cover >5% but <20%*	6–19% cover in quadrat
5		*Cover >20% but <50%*	21% – 49% cover in quadrat
6		*Cover >50% but <75%*	51% – 74% cover in quadrat
7		*Cover >75% but <100%*	76% – 99% cover in quadrat

The Braun-Blanquet Cover Classes score for the 11 re-surveyed quadrats in 2016 are given in Table 3.

Given the subjective estimates of the Braun-Blanquet abundance scores, the statistician Dr Margaret Donald advised that for the 2016 dataset the percent projected foliage cover for each species be recorded in the four 10 m x 10 m sub-quadrats in the quadrats. The Braun-Blanquet abundance scores were estimated in 2016 survey (Table 3) but not used in the statistical analyses.

In addition, for each quadrat the maximum height and number of individuals for each species greater than 2 m high being recorded in each of the 10 m x 10 m sub-quadrats (Tables 2, 5).

Ground truthing methods were consistent with the Native Vegetation Interim Standard (DECCW 2009). The field work consisted of an inspection, additional Ground Truth (GT) quadrats and Rapid survey at Ground Truth (GT) spot locations (as required) of each of the OEH (2013) mapped vegetation communities (Figures 8a, 8b-1, 8b-2, 8c).

In the Field of Mars Reserve, there were additional quadrats along with soil transects (Figures 3a-4, 3b-3) to assist in confirming consistency of the soil with the soil descriptions in the Final Determination of the vegetation communities.

Sampling locations were photographed at the time of survey (Appendix 4) and GPS co-ordinates were recorded using a hand held *Garmin GPSMAP® 78* unit.

A targeted search for rare plants known to flower in Spring was undertaken in the Spring survey.

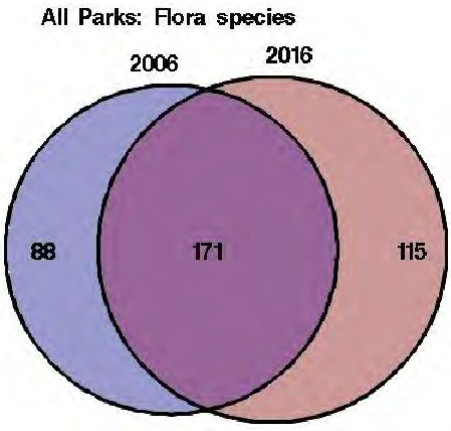
Nomenclature is consistent with Harden (1990, 1992, 1993, 2002), Harden and Murray (2000) and subsequent taxonomic changes as published in *Telopea*, the Sydney Royal Botanic Gardens' journal of systematic botany, and in other Australian taxonomic literature. The Royal Botanic Gardens' PlantNet website (plantnet.rbgsyd.nsw.gov.au) incorporating Flora Online is the major source for updated taxonomy.

B3.2 Observations/ Findings

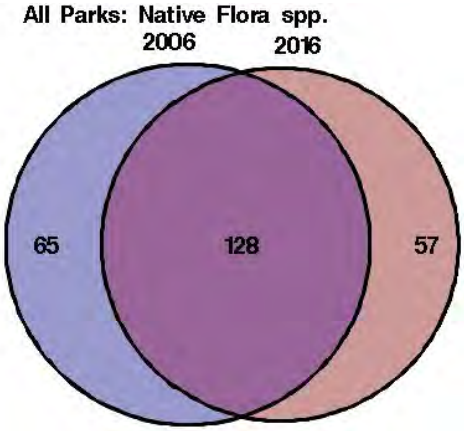
B3.2.1 Comparison of 2006 and 2016 surveys

In terms of species composition recorded in 2006 and 2016 surveyed quadrats in four of the six parks (statistician report in Appendix 5, data summary table Appendix 6), it was found that:

- The Venn diagrams for "all parks" show the numbers of species in common between the 2006 and 2016 surveys with 171 of the 374 species recorded common to both 2006 and 2016, and more species recorded in 2016 than in 2006. The difference between years in the four parks may be a response by the exotic species to better rainfall prior to the 2016 Autumn survey.

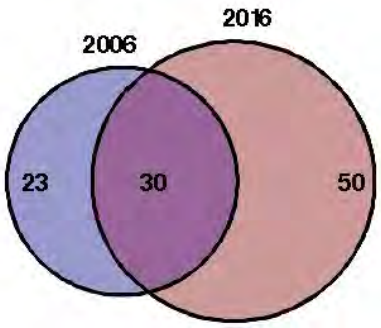


All flora species across the four parks



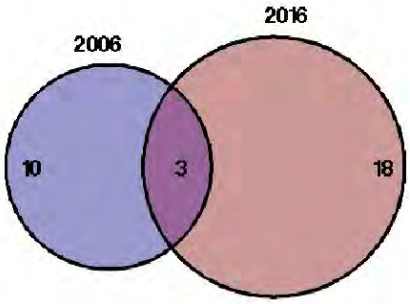
All **native** flora species across the four parks

All Parks: Exotic Flora spp.



All **exotic** flora species across the four parks

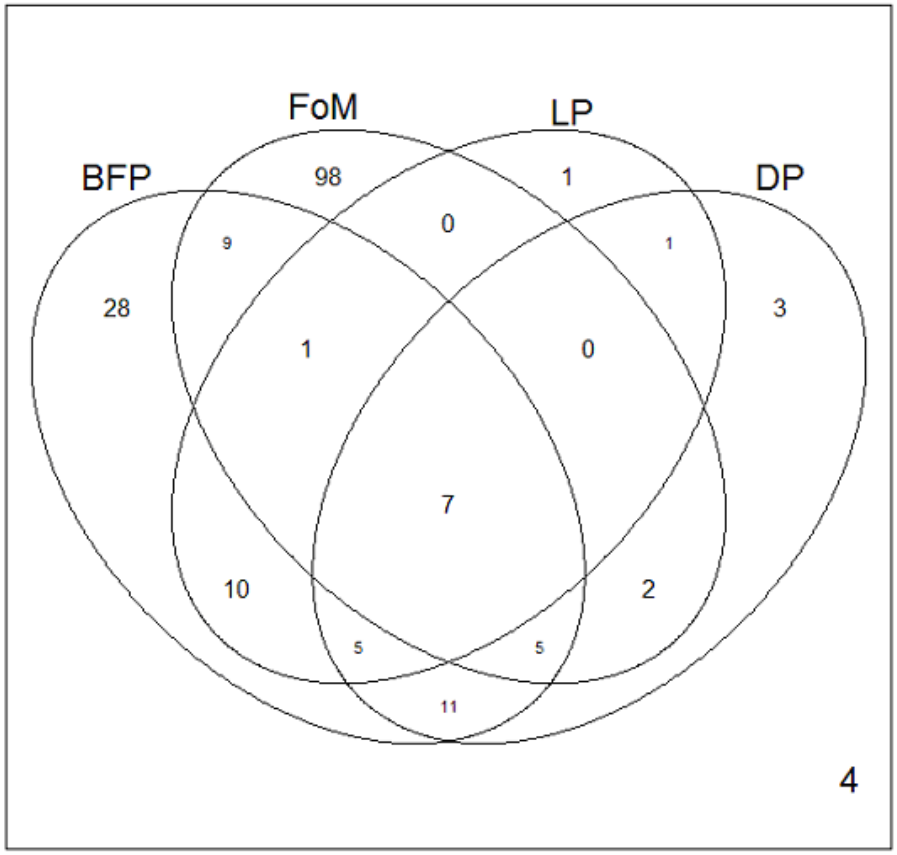
All Parks: NLN Flora spp.



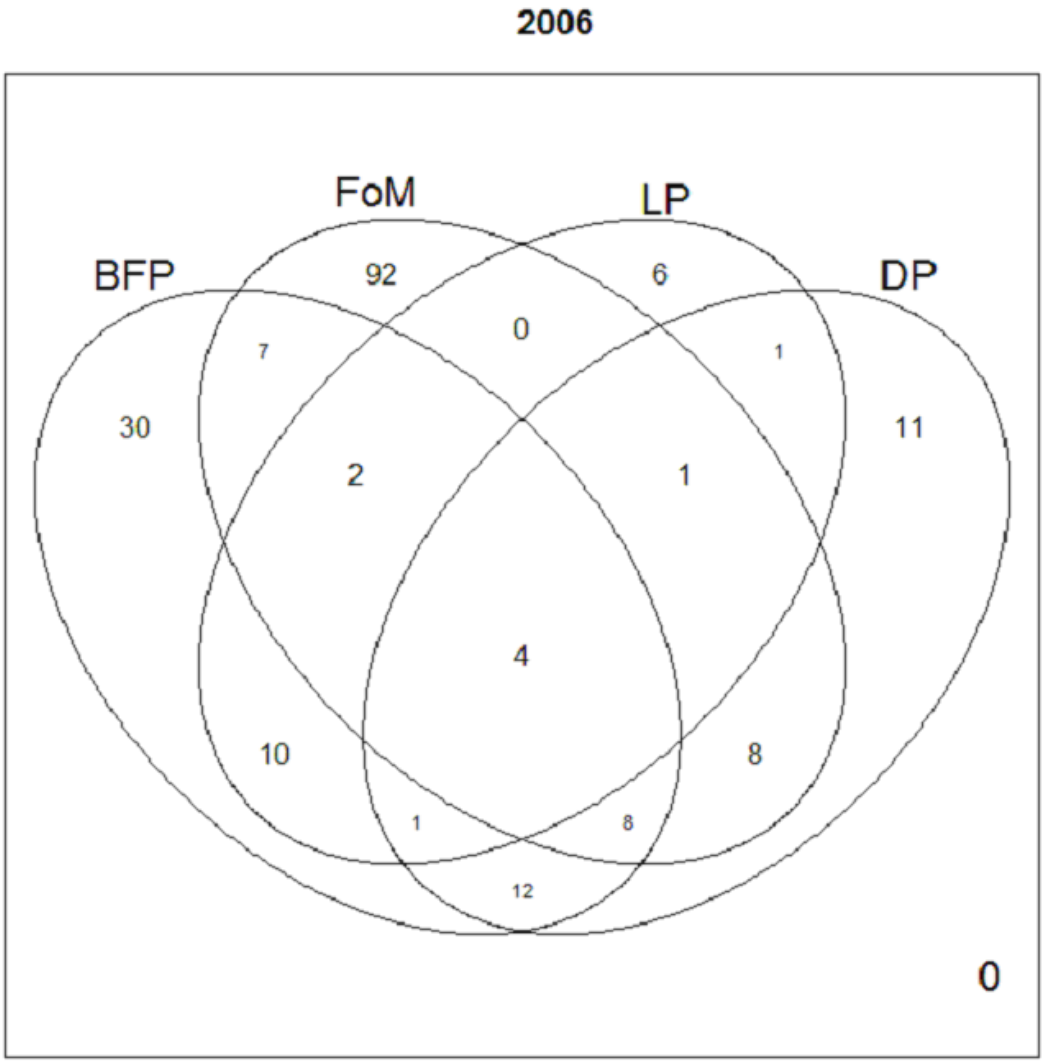
All **non-local native** flora species across the four parks

The Venn diagrams below overlapping native species between the four parks in 2006 and 2016 show that Field of Mars Reserve is clearly distinct from the other parks on Wianamatta Shale derived soil in its native species composition. There were 98 species unique to Field of Mars Reserve in 2016, related to the presence of species associated with low nutrient Hawkesbury Sandstone derived soils on rugged sandstone slopes and of estuarine species.

2016



Venn diagram 2016, with BFP = Brush Farm Park, FoM = Field of Mars, LP = Lambert Park, DP = Darvall Park.



Venn diagram 2006, with BFP = Brush Farm Park, FoM = Field of Mars, LP = Lambert Park, DP = Darvall Park.

For the four parks in the 2006 and 2016 surveyed quadrats the species composition was as follows:

Comparison of number of species recorded in 2006 and 2016 in the parks

	Only 2006	2006 and 2016	Only 2016
All parks			
Total number of species	88	171	115
Number of local native species	65	128	57
Number of non-local	10	3	18
Number of exotic	23	30	50
Brush Farm Park			
Total number of species	28	79	38
Number of local native species	21	53	23

	Only 2006	2006 and 2016	Only 2016
Number of non-local	7	3	6
Number of exotic	8	15	17
Darvall Park			
Total number of species	49	30	24
Number of local native species	29	17	17
Number of non-local	6	0	2
Number of exotic	19	8	10
Field of Mars Reserve			
Total number of species	55	97	58
Number of local native species	44	78	44
Number of non-local	5	1	0
Number of exotic	11	13	19
Lambert Park			
Total number of species	22	24	24
Number of local native species	13	12	13
Number of non-local	2	0	6
Number of exotic	9	10	7

In order to statistically compare the flora composition in the 2006 quadrats and 2016 re-surveyed quadrats, the subjective estimates of the Braun-Blanquet abundance scores (class covers) were converted to percent projected foliage covers.

Of the four parks surveyed in both 2006 and 2016, only Brush Farm Park (four quadrats) and the Field of Mars Reserve (five quadrats) had sufficient quadrats to enable comparison between the two years in the parks, resulting in following comparisons being undertaken:

2006	vs.	2016
Brush Farm Park (four quadrats)	vs.	Brush Farm Park (four quadrats)
Field of Mars Reserve (five quadrats)	vs.	Field of Mars Reserve (five quadrats)
All parks (11 quadrats): Brush Farm Park (4 quadrats) Darvall Park (1 quadrat) Field of Mars Reserve (5 quadrats) Lambert Park (1 quadrat)	vs.	**All parks (11 quadrats):** Brush Farm Park (4 quadrats) Darvall Park (1 quadrat) Field of Mars Reserve (5 quadrats) Lambert Park (1 quadrat)

At the 5% significance level, it was found that:

Analysis	Parks compared		
	Brush Farm Park	Field of Mars Reserve	"All parks"
% projected foliage of native cover between 2006 and 2016	No statistically significant difference	No statistically significant difference	No statistically significant differences
% projected foliage of exotic cover between 2006 and 2016	No statistically significant difference	No statistically significant difference	A statistically significant difference indicating a decrease in exotic cover

Overall, when comparing the data from 2006 to 2016, the cover of native species has remained constant, and the cover by exotic species has declined.

B3.2.2 Exotic and non-local native species

From the 2016 recorded data for the six parks, the extent of planting and subsequent colonisation by non-local native species and the infestation by exotic species varied between the parks. The Blue Gum High Forest mapping by OEH (2013) was affected by the extent of planting of non-local native species *Eucalyptus grandis*, leading to over mapping of the extent of the Blue Gum High Forest mapping.

In the tables below, (*) denotes exotic and (#) denotes non-local native species. Values for quadrats (BP#1, BF#1 etc.) are the average percent (%) projected foliage cover for each quadrat (calculated from the percent (%) projected foliage cover recorded for each sub-quadrat). Only those species with an average percent projected foliage cover greater than or equal to 1% (≥1%) are listed. Species are listed in order from highest to lowest average percent (%) projected foliage cover ≥1%.

Bell Park is extensively colonised by non-local trees including *Corymbia citriodora*, *Eucalyptus botryoides*, *Eucalyptus grandis* and *Eucalyptus microcorys*. This park was not found to support Blue Gum High Forest as mapped by OEH (2013), but planted non-local native *Eucalyptus grandis* rather than naturally occurring *Eucalyptus saligna* and *Eucalyptus pilularis.*

The percent projected foliage cover for *Lantana camara* in patches of this park is above the 75% weed cover threshold (Gooden *et al.* 2009a, 2009b). Gooden *et al.* (2009b) found that the number of native species declined rapidly at locations where Lantana percent projected foliage cover exceeded 75%.

Bell Park average percent projected foliage cover (≥1% only) per species in the surveyed quadrat

Exotic/ NLN	Species	Common names	Percentage cover BP#1
*	***Lantana camara***	Lantana	**77.5**
#	*Eucalyptus grandis*	Flooded Gum	17.5
*	*Ipomoea indica*	Morning Glory	9.5
*	*Jasminum polyanthum*	Jasmine	7.0
#	*Eucalyptus botryoides*	Bangalay	6.3
#	*Corymbia citriodora*	Lemon-scented Gum	5.0
*	*Ligustrum lucidum*	Broad-leaved Privet	3.0
#	*Eucalyptus scoparia*	Wallangarra White Gum	2.5
#	*Grevillea robusta*	Silky Oak	1.3
#	*Melaleuca armillaris*	Bracelet Honey-myrtle	1.3
*	*Delairea odorata*	Cape Ivy	1.0

Brush Farm Park has had some planting and subsequent colonisation by non-local native species *Eucalyptus grandis* and *Eucalyptus microcorys*, but not as extensive as in Bell Park.

The recorded vegetation is consistent with the OEH (2013) mapping. The mapped occurrence of Temperate Rainforest is predominantly the weedy native species *Pittosporum undulatum*

(Clements 1983, Gleadow and Ashton 1981, Gleadow 1982, Gleadow and Rowan 1982, Gleadow *et al.* 1983, Gleadow and Narayan 2007).

Brush Farm Park average percent projected foliage cover (≥1% only) per species in the surveyed quadrats

Exotic / NLN	Species	Common name	Percentage cover			
			BF#1	BF#2	BF#3	BF#4
*	*Ehrharta erecta*	Panic Veldgrass	15	1.3	2	47.5
*	*Tradescantia fluminensis*	Wandering Jew	45	7.5	-	0.5
*	*Chlorophytum comosum*	Spider Plant	-	-	-	11.8
#	*Eucalyptus microcorys*	Tallowwood	5	-	-	-
*	*Lantana camara*	Lantana	-	-	-	4.8
#	*Brachychiton acerifolius*	Illawarra Flame Tree	0.5	2	2.3	1.3
*	*Passiflora suberosa*	Cork Passionflower	-	-	-	1.8
*	*Ochna serrulata*	Micky Mouse Plant	-	1.5	-	0.025
#	*Eucalyptus grandis*	Flooded Gum	1.3	-	-	-
*	*Hedera helix*	English Ivy	0.025	-	1.3	-
*	*Jacaranda mimosifolia*	Jacaranda	1.3	-	-	-

Darvall Park has also been planted with *Eucalyptus grandis* and *Eucalyptus microcorys* in the northern part of the park nearest the railway. The most frequently occurring weed recorded in this park is the understorey cover of *Tradescantia fluminensis* (Wandering Jew), followed by *Ehrharta erecta* (Panic Veld-grass). Outside the quadrats, there was extensive infestations of *Lantana camara* in the central and southern areas.

Despite the planting of *Eucalyptus grandis*, there are large remnant trees of *Eucalyptus saligna* and the park is found to be relatively accurately mapped by OEH (2013) as Blue Gum High Forest. It could equally be mapped as Sydney Turpentine Ironbark Forest or an intergrade of the two map units.

Darvall Park average percent projected foliage cover (≥1% only) per species in the surveyed quadrat

Exotic / NLN	Species	Common name	Percentage cover DP#1
*	*Tradescantia fluminensis*	Wandering Jew	42.5
*	*Ehrharta erecta*	Panic Veldgrass	9.3
#	*Eucalyptus grandis*	Flooded Gum	2.5
*	*Cardiospermum grandiflorum*	Balloon Vine	1.3
#	*Eucalyptus microcorys*	Tallowwood	1.3
*	*Megathyrsus maximus*	Guinea Grass	1.3
*	*Rubus laudatus*	Plains Blackberry	1.0

Field of Mars Reserve has little or no planting of non-local native species, except in the former depot site, the edge of the Field of Mars Cemetery and in the mown areas in the south eastern part of the reserve.

The extent of exotic species is concentrated in the south-west, especially downslope of the former depot and the cemetery, as well as at the rear of adjoining houses. The occurrence of *Lantana camara* is generally infrequent within the sandstone vegetation. The bird drop weeds (especially *Lantana camara*, *Ligustrum* spp.) pose a major risk in areas with nutrient enrichment.

The vegetation data recorded are consistent with the OEH (2013) mapping.

Field of Mars Reserve average percent projected foliage cover (≥1% only) per species in the surveyed quadrats

Exotic/ NLN	Species	Common name	Percentage cover								
			FoM #1	FoM# 2	FoM# 3	FoM# 4	FoM# 5	FoM GTQ A	FoM GTQ B	FoM GTQ C	FoM GTQ D
*	*Ligustrum lucidum*	Broad-leaved Privet	-	0.08	2	-	-	0.26	-	-	0.25
#	*Cyathea cooperi*	Straw Tree-fern	-	-	-	-	-	1.75	-	-	-
*	*Ligustrum sinense*	Chinese Privet	-	0.05	1.5	0.3	0.05	1.5	-	-	0.75
*	*Ochna serrulata*	Micky Mouse Plant	-	0.1	0.28	0.05	0.05	1.25	0.05	0.03	0.3
*	*Lantana camara*	Lantana	-	0.05	-	0.03	0.05	1	-	-	0.75

Lambert Park has been planted and colonised by *Eucalyptus grandis* and *Casuarina cunninghamiana.*

The vegetation data recorded was not consistent with the OEH (2013) mapping of Blue Gum High Forest, as there are no naturally occurring *Eucalyptus saligna* but extensive plantings.

Lambert Park average percent projected foliage cover (≥1% only) per species in the surveyed quadrat

Exotic/ NLN	Species	Common name	Percentage cover LP#1
*	*Tradescantia fluminensis*	Wandering Jew	8
#	*Eucalyptus grandis*	Flooded Gum	3.8
#	*Casuarina cunninghamiana*	River Oak	2.5
*	*Ehrharta erecta*	Panic Veldgrass	2.0

Outlook Park has been extensively planted with *Eucalyptus microcorys* in the west of the park.

The vegetation data recorded was not consistent with the OEH (2013) mapping of Blue Gum High Forest as there were only two remnant *Eucalyptus saligna* in the park (recorded in Quadrat OP#1) and extensive planting.

Outlook Park average percent projected foliage cover (≥1% only) per species in the surveyed quadrat

Exotic/ NLN	Species	Common name	Percentage cover OP#1
#	*Grevillea robusta*		2.5
#	*Brachychiton acerifolius*		1.5

B3.3 Ground truthing confirmation of the previous mapping

The Biosphere 2006 and OEH (2013) mapping has been assessed (see section B3.1 for ground truthing methodology) using the 2016 survey data .

Park/ Reserve	Native vegetation (Appendix 5, Biosphere 2006)	OEH 2013 map units	Finding of the 2016 survey data
Bell Park	Not part of the 2006 study area	Blue Gum High Forest	NOT confirmed as Blue Gum High Forest.
		Urban Exotic/Native	Confirmed as Urban Exotic/Native.
Brush Farm Park	Sydney Turpentine Ironbark Forest (entire park)	Coastal Warm Temperate Rainforest	Predominantly the weedy native *Pittosporum undulatum.*
		Blue Gum High Forest	Confirmed as Blue Gum High Forest with remnant *Eucalyptus saligna.*
		Sydney Turpentine-Ironbark Forest	Confirmed Sydney Turpentine-Ironbark Forest.
		Urban Exotic/Native	Confirmed as Urban Exotic/Native associated with Sportsground and Scout Hall.
Darvall Park	Sydney Turpentine Ironbark Forest (entire park)	Blue Gum High Forest	Confirmed as Blue Gum High Forest but with plantings and weed dominated close to property boundaries and swampy depression.
		Urban Exotic/Native	Confirmed as Urban Exotic/Native.
Field of Mars Reserve	Estuarine Complex HSS Gully Forest HSS Ridgetop Woodland Shale-Sandstone Transition Forest (high SS influence) Turpentine Ironbark Margin Forest disturbed soils/weeds	Coastal Enriched Sandstone Dry Forest Coastal Enriched Sandstone Moist Forest Coastal Sandstone Gallery Rainforest Coastal Shale-Sandstone Forest Estuarine Reedland Estuarine Mangrove Forest Estuarine Swamp Oak Forest Sydney Turpentine-Ironbark Forest Urban Exotic/Native	Confirmed.

Park/ Reserve	Native vegetation (Appendix 5, Biosphere 2006)	OEH 2013 map units	Finding of the 2016 survey data
		Weeds and Exotics	
Lambert Park	Sydney Turpentine Ironbark Forest	Coastal Warm Temperate Rainforest	Confirmed as Coastal Warm Temperate Rainforest, but with high occurrence of *Pittosporum undulatum.*
		Blue Gum High Forest	Not confirmed. Only *Eucalyptus saligna* planted in south.
		Urban Exotic/Native	Confirmed as Urban Exotic/Native.
Outlook Park	Not part of the 2006 study area	Blue Gum High Forest	Not confirmed as Blue Gum High Forest, but planted canopy with only two remnant *Eucalyptus saligna.*

B3.4 Targeted threatened species searches

The conservation significance of species that may be present in the parks were assessed at a:

1. National level against the schedules of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
2. State level against the schedules of the *Threatened Species Conservation Act 1995* (TSC Act).

B3.4.1 Database searches

Database searches were undertaken to determine the possible threatened species in the Ryde LGA, with:

- 19 plant species listed in the Protected Matters Search (EPBC Act 1999) (https://www.environment.gov.au/epbc/protected-matters-search-tool, accessed 30 November 2016), and
- 46 plant species listed under the NSW *Threatened Species Conservation Act 1995* are recorded within the Ryde LGA (NSW Office of Environment and Heritage Bionet - Atlas of NSW Wildlife, http://www.bionet.nsw.gov.au, accessed 30 November 2016).

Species	Status under EPBC Act	Status under TSC Act
Acacia bynoeana	Vulnerable	Endangered
Acacia pubescens	Vulnerable	Vulnerable
Acacia terminalis subsp. *terminalis*	Endangered	Endangered
Allocasuarina glareicola	Endangered	-
Allocasuarina portuensis	-	Endangered
Asterolasia elegans	Endangered	-
Caladenia tessellata	Vulnerable	Endangered
Callistemon linearifolius	-	Vulnerable
Chamaesyce psammogeton	-	Endangered

Species	Status under EPBC Act	Status under TSC Act
Cryptostylis hunteriana	Vulnerable	Vulnerable
Cynanchum elegans	-	Endangered
Darwinia biflora	Vulnerable	Vulnerable
Deyeuxia appressa	Endangered	Endangered
Dillwynia tenuifolia	-	Vulnerable
Epacris purpurascens var. *purpurascens*	-	Vulnerable
Eucalyptus camfieldii	-	Vulnerable
Eucalyptus nicholii	-	Vulnerable
Genoplesium baueri	Endangered	Endangered
Grammitis stenophylla	-	Endangered
Grevillea caleyi	-	Critically Endangered
Grevillea parviflora subsp. *parviflora*	-	Vulnerable
Gyrostemon thesioides	-	Endangered
Haloragodendron lucasii	-	Endangered
Hibbertia puberula	-	Endangered
Hibbertia sp. Bankstown	-	Critically Endangered
Hibbertia spanantha	-	Critically Endangered
Hibbertia superans	-	Endangered
Leptospermum deanei	Vulnerable	Vulnerable
Leucopogon exolasius	-	Vulnerable
Maundia triglochinoides	-	Vulnerable
Melaleuca biconvexa	Vulnerable	-
Melaleuca deanei	Vulnerable	Vulnerable
Microtis angusii	-	Endangered
Pelargonium sp. Striatellum (G.W.Carr 10345)	Endangered	-
Persoonia hirsuta	-	Endangered
Persoonia nutans	-	Endangered
Pimelea curviflora var. *curviflora*	Vulnerable	Vulnerable
Pimelea spicata	Endangered	Endangered
Pomaderris prunifolia	-	Endangered Population
Prasophyllum fuscum	-	Critically Endangered
Prostanthera marifolia	-	Critically Endangered
Pterostylis saxicola	Endangered	Endangered
Pterostylis sp. Botany Bay	-	Endangered
Pultenaea pedunculata	-	Endangered
Senecio spathulatus	-	Endangered
Syzygium paniculatum	Vulnerable	Endangered
Tetratheca glandulosa	-	Vulnerable
Thesium australe	Vulnerable	-
Wahlenbergia multicaulis	-	Endangered Population
Wilsonia backhousei	-	Vulnerable
Zannichellia palustris	-	Endangered

From the searches of Australia's Virtual Herbarium (specimens held in herbaria in Australia, website http://avh.ala.org.au/, accessed 30 November 2016), the records for Ryde LGA of listed threatened species are as follows:

Species	Record location	Collection date	Collector	Comm. status	NSW status
Callistemon linearifolius	Lane Cove in Ryde LGA	Not given	Fletcher, J.J.		Vulnerable
Darwinia biflora	Hunters Hill	*Supplied date "1892-08"*	Andrew	Vulnerable	Vulnerable
	SE corner of Riverside Corporate Park, North Ryde, beside Epping Road	*Supplied date "1998-09"*	Rodd, A.N., Moore, R.; Clements, A.		
Epacris purpurascens var. *purpurascens*	Field of Mars Reserve, Ryde Municipality	1989-01-05	Gibson, C.		Vulnerable
Genoplesium baueri	Not specified, but in Ryde LGA	*Supplied date "1884-04"*	Deane, H.	Endangered	Endangered
	Not specified, but in Ryde LGA	*Supplied date "1884-05"*	Deane, H.		
	Not specified, but in Ryde LGA	*Supplied date "1885-03"*	Deane, H.		
	Not specified, but in Ryde LGA	*Supplied date "1887-01"*	Deane, H.		
	Not specified, but in Ryde LGA	*Supplied date "1887-02"*	Deane, H.		
	Not specified, but in Ryde LGA	*Supplied date "1986-03-30"*	Clements, M.A.		
Grammitis stenophylla	Field of Mars [NB - this name applied to most of Ryde LGA plus Epping in 1884!]	*Supplied date "1884-04"*	Deane, H.		Endangered
Melaleuca deanei	Not specified, but in Ryde LGA	1930-10-07	*Supplied as "[unknown]"*	Vulnerable	Vulnerable
Pimelea curviflora var. *curviflora*	Not specified, but in Ryde LGA	*Supplied date "1884-05"*	Deane, H.	Vulnerable	Vulnerable
	Hunters Hill	*Supplied date "1914-12"*	Musson, C.T.		
	Gladesville	*Supplied date "1883-08"*	Deane, H.		
Prostanthera marifolia	Not specified, but in Ryde LGA	*Supplied date "1903-11"*	Dixon, W.A.	Critically Endangered	Critically Endangered
	Not specified, but in Ryde LGA	*Supplied date "1906-09"*	Hamilton, A.A.		

Species	Record location	Collection date	Collector	Comm. status	NSW status
Wilsonia backhousei	Ermington, Spurway St. Edge of Parramatta river	1986-10-19	Bishop, W.		Vulnerable
	RAN Armaments Depot, Parramatta River, W of Homebush Bay, c. 3 miles E of Parramatta	1964-11-17	Constable, E.F.		

B3.4.2 Target searches in the parks

Despite extensive survey in the five parks, only one of the listed threatened species from the database search was recorded:

Species	Status under EPBC Act	Status under TSC Act	Location found
# *Syzygium paniculatum*	Vulnerable	Endangered	OP#1 BP GTa

* These values are approximate only as BP GTa is a ground truthing location, and does not have a fixed area.

As *Syzygium paniculatum* is a non-local native species, it is highly likely that the individuals recorded in the parks were planted.

The more intact Field of Mars Reserve was searched (see Figures 9a, 9b). None of the listed threatened species from the database searches were recorded in the quadrats, spot location or search in the 2016 surveys, though it is considered likely that there may habitat for the following species, namely:

Species	Habitat from PlantNET
Callistemon linearifolius	*Grows in dry sclerophyll forest on the coast and adjacent ranges, chiefly from Georges R. to the Hawkesbury R.*
Darwinia biflora	*Grows in heath on sandstone or in the understorey of woodland on shale-capped ridges; Cheltenham to Hawkesbury R., rare.*
Epacris purpurascens var. *purpurascens*	*Grows in sclerophyll forest, scrubs and swamps on sandstone from Gosford and Sydney districts.*
Genoplesium baueri	*Grows in sparse sclerophyll forest and moss gardens over sandstone; from the Hunter Valley to Nowra district.*
Grammitis stenophylla	*Grows on rocks in rainforest and in wet sclerophyll forest.*
Melaleuca deanei	*Grows in wet heath on sandstone; uncommon, in coastal districts from Berowra to Nowra.*
Pimelea curviflora var. *curviflora*	*Confined to coastal areas around Sydney on sandstone.*
Prostanthera marifolia	*Woodland dominated by Eucalyptus sieberi and Corymbia gummifera. In deeply weathered clay soil with ironstone nodules.*
Wilsonia backhousei	*Grows in coastal saltmarshes; chiefly in the Sydney district, also common at Jervis Bay.*

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Section C: Fauna assessment

C1.0 Introduction

The fauna survey replicated biodiversity surveys conducted by Biosphere in 2006 consisting of replicated survey Autumn and Spring in four parks and 2016 Autumn and Spring in two additional parks.

The 2016 surveys were conducted by the following ecologists:

Ecologist	Expertise
Damian Lettoof	Project fauna manager, herpetofauna surveys, nocturnal surveys, bird surveys, hair tubing
David Martin	Nocturnal surveys
Henry Cook	Bird surveys, fish surveys
Dr James Schlunke	Invertebrate surveys
Glenn Hoye	Bat surveys (ANABAT analysis)
Barbara Triggs	Mammal hair analysis

C1.1 Sampling methods

C1.1.1 Reptiles

Reptiles were actively and visually searched for on warm, dry days. The 2016 replicated flora quadrats of each park were surveyed for 20 minutes each. In addition, in the parks all walking tracks and potential shelter sites were also surveyed, and opportunistic sightings from the bushland regeneration contractors included. Each park was surveyed for two hours one morning and one afternoon per season.

C1.1.2 Frogs

Frog surveys were conducted for 20 minutes per quadrat during the nocturnal surveys if there was recent rain, otherwise on specific raining nights. Calling frogs were identified aurally; non-calling frogs were identified by visual inspection. Searches of the area were carried out using head torches. During daylight hours, hand-netting was carried out to search for tadpoles.

C1.1.3 Mammals

For small ground mammals, single entrance, baited hair tubes were used in the remnant bushland areas of each park. The tubes were installed and remained on site for a five days before being collected and hair samples analysed by Barbara Triggs. The number of hair tubes used at each site depended on the size of the reserve, with 5 hair tubes used in eastern bushland of the 0.7 ha Outlook Park to 125 hair tubes in the 46.7 ha Field of Mars Reserve, namely:

Hair tube numbers and location

Park	Size of park	No. of hair tubes	Location of tubes
Bell Park	0.46 ha	10	Scattered in northern bushland and alongside riparian zone of the park
Brush Farm Park	5.4 ha	50	Alongside all walking tracks in park
Darvall Park	6.1 ha	25	Set in a line running from north to south through centre of the park

Park	Size of park	No. of hair tubes	Location of tubes
Field of Mars Reserve	46.7 ha	125	25 traps set around each survey quadrat site
Lambert Park	2.6 ha	15	Around the outer boundaries of the park
Outlook Park	0.7 ha	5	Scattered in the eastern bushland of park

Animal tracks, diggings, burrows were searched for, and shed fur/feathers and scats collected opportunistically, sometimes with the assistance of bush regeneration contractors.

Arboreal mammals were detected by nocturnal spotlighting surveys, conducted during the first three hours after dark, over two nights per park. Generally, all of the walking tracks and open areas of the parks were slowly walked by two ecologists, panning spotlights into the trees canopies but also all surrounding areas. If an animal was detected, it was approached until it could be identified visually. Calling species (e.g. flying foxes) were identified by call. In addition, diurnal examinations of trees for scratch marks and drays were conducted.

Bats
Flying foxes were detected by spotlighting at night whereas insectivorous bats were detected using ultra-sonic (ANABAT SD1) bat recorders. The recorders are hand-held and carried through the reserves at night while spotlighting was in progress. Recorded bat calls were later analysed using ANABAT 5.0 software.

C1.1.4 Birds

Diurnal birds (birds active during the day) were surveyed in the early mornings using the survey quadrat areas. Two mornings of twenty minutes survey time (in each survey period) was devoted to recording the birds that were seen or heard. In addition, other bird species detected opportunistically outside the quadrat were also recorded.

Owls and nocturnal birds
Owl surveys were conducted at night during nocturnal surveys by spotlighting and using a small portable amplifier. Owl calls were broadcast at night for the two local owl species: boobook owls and powerful owls, calls were also played for potential other owls including: sooty owls, masked owls and barn owls. Calls were played at suitable sites each night and the amplifier was aimed away from nearby residences before the sounds were played. A listening period of 2 minutes followed the playing of each tape. If it was possible to visually identify the responding owl, all attempts were made to do so. Other night birds, such as tawny frogmouths were also spotlighted during night surveys.

C1.1.5 Fish

Small hand nets were used to sample for fish in the drainage lines in Lambert Park, the creeklines in Darvall Park, Bell Park and Field of Mars Reserve. Due to the ephemeral nature of Archer Creek in Brush Farm Park and piped creekline in Outlook Park, there were no water bodies to survey for fish.

C1.1.6 Invertebrate fauna

Invertebrates were surveyed within the quadrats (two mornings of twenty minutes search effort per season) as well as habitat specific searches. This involved sweep-netting creeks, searching leaf-litter and beneath rocks/logs for spiders, insects and other soft-bodied creatures and using

small battery operated night lights for two evenings per park to collect nocturnal insects. Invertebrates were identified to genus if possible, otherwise class or order. The number of different species within each group collected was also recorded.

C1.2 Comparisons between the 2006 and 2016 surveys

Fauna records have been separated and listed per taxa instead of per park. This is to give an overall insight as to species preference of each park and due to the available habitat. Most species detected should be present across all parks.

The park species lists presented in the Biosphere 2006 report appeared to contain species detected during primary surveys, yet also species historically recorded in a several km radius of the parks. To eliminate confusion of a dramatic drop in diversity we have listed comparative tables of each fauna within each park using only the species detected in the primary surveys (2006/2016), as well as suggesting species likely to be present within the parks yet undetected during the surveys.

The purpose of the 2016 study was to recreate another snap-shot of the fauna present in these parks. We have also listed a maximum number of individuals per species detected on any one day, which portrays a comparison to ten years ago. Microbat counts are not listed as they were detected by call recordings so abundance cannot be confirmed.

Detailed 2016 fauna data was submitted to the City of Ryde in a Microsoft Access database, and subsequently all records submitted to the NSW Office of Environment and Heritage Altas of NSW Wildlife.

C2.0 Fauna findings

The following fauna data has been divided into different taxa (such as reptiles, frogs, mammals, etc.) with tables showing the presence of individual species found in 2006 and/or 2016 surveys, with a summary of each taxa detected across the Ryde reserves. The final column of each table lists maximum number of individuals detected in any 2016 single survey period, representing abundance.

C2.1 Reptiles

Reptile biodiversity across the bushland parks of Ryde surveyed in 2016 has barely changed in the last ten years. All skink species detected are common within urban Sydney and are mostly still present within the parks. Elegant snake-eyed skinks were not detected in several parks during these surveys but are common around brick houses in the area, as these houses have replaced the rocky outcrop habitat once used by these skinks. Weasel skinks and water skinks are common in every park surveyed, and were not previously detected in some parks in 2006. Interestingly, Eastern blue-tongued lizards (*Tiliqua scincoides*) were not detected during any of the surveys, despite persisting in the yards of surrounding suburbia (Koenig *et al*. 2001).

Photographs of a land mullet in Brush Farm Park were submitted by a bush care volunteer in Autumn, but the skink was never detected during surveys. Despite Brush Farm Park providing a suitable rainforest habitat for the skink, their natural populations do not exist south of the Hawkesbury River and it is most certainly an escaped pet or has been released there by a member of the public. It is highly unlikely the individual will survive predation by a dog or cat, or survive the local climate.

Only one dragon species, the Eastern water dragon, persists in the area. Previously, they were present in Brush Farm Park and Field of Mars Reserve, but as this species relies heavily on a permanent water source to avoid predation, the ephemeral nature of Archer Creek has led to the loss of water dragons from Brush Farm Park. Their population appears still healthy in the Field of Mars Reserve, and perhaps they will colonise Darvall Park in the future. The single species of gecko, the broad-tailed gecko, also has a healthy population within the Field of Mars Reserve. This species is another rocky outcrop specialist that has adapted to urbanisation and is found commonly within local houses (Mo 2014), and the abundant outcrops of the Field of Mars Reserve.

Eastern long-necked turtles were detected in the Field of Mars Reserve (as they were previously), but also in Darvall Park. These turtles have been resilient to urbanisation (Stokeld et al. 2013), and populations may continue to grow in the Ryde region if suitable permanent water bodies persist within parks and nest predation from foxes is minimised (Kennett *et al.* 2009).

The red-bellied black snake was the only snake detected during these surveys, another healthy population within the Field of Mars Reserve. However, due to the cryptic nature of snakes and the survey effort (two days/nights per park per season), it is likely that both other species detected in 2006 (the swamp snake and golden-crowned snake) are still present in the larger parks. These small elapids specialise in feeding on lizards which are abundant within all parks, but will probably be in low densities due to frequent predation by cats and dogs (Shine & Koenig 2001). Based on recent records (Rob Ambrose: Sydney Snake Catchers, pers. comm. 2016) several other species are present in the area and likely to be present in the reserves, especially within the Field of Mars Reserve. These include green tree snakes (*Dendrelaphis punctulatus*), diamond pythons (*Morelia spilota*), and yellow-faced whip snakes (*Demansia psammophis*).

Reptiles of Brush Farm Park

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	**X**	**X**	13
Lampropholis guichenoti	Grass skink	**X**	**X**	3
Eulamprus quoyii	Eastern water skink	**X**	**X**	4
Saproscincus mustelinus	Weasel skink	**X**	**X**	10
Cryptoblepharus pulcher	Elegant snake-eyed skink	**X**		-
Intellagama lesueurii	Eastern water dragon	**X**		-
Hemiaspis signata	Swamp snake	**X**		-
Bellatorias major	Land mullet		**X**	1

Reptiles of Lambert Park

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	**X**	**X**	40
Lampropholis guichenoti	Grass skink	**X**	**X**	6
Eulamprus quoyii	Eastern water skink	**X**	**X**	4
Saproscincus mustelinus	Weasel skink		**X**	3
Cryptoblepharus pulcher	Elegant snake-eyed skink	**X**	**X**	2

Reptiles of Darvall Park

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	**X**	**X**	30

Species	Common name	2006	2016	Maximum (2016)
Lampropholis guichenoti	Grass skink	**X**	**X**	4
Eulamprus quoyii	Eastern water skink	**X**	**X**	7
Saproscincus mustelinus	Weasel skink		**X**	10
Cryptoblepharus pulcher	Elegant snake-eyed skink	**X**	**X**	1
Chelodina longicollis	Eastern long-necked turtle		**X**	1

Reptiles of the Field of Mars Reserve

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	**X**	**X**	50
Lampropholis guichenoti	Grass skink	**X**	**X**	50
Eulamprus quoyii	Eastern water skink	**X**	**X**	6
Saproscincus mustelinus	Weasel skink	**X**	**X**	1
Cryptoblepharus pulcher	Elegant snake-eyed skink	**X**	**X**	3
Saiphos equalis	Three-toed skink		**X**	2
Intellagama lesueurii	Eastern water dragon	**X**	**X**	5
Phyllurus platurus	Broad-tailed gecko	**X**	**X**	11
Hemiaspis signata	Swamp snake	**X**		-
Cacophis squammulosus	Golden-crowned snake	**X**		-
Pseudechis porphyriacus	Red-bellied black snake	**X**	**X**	2
Chelodina longicollis	Eastern long-necked turtle		**X**	1

Reptiles of Bell Park

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	N/A	**X**	5
Lampropholis guichenoti	Grass skink	N/A	**X**	13
Eulamprus quoyii	Eastern water skink	N/A	**X**	5
Saproscincus mustelinus	Weasel skink	N/A	**X**	5

Reptiles of Outlook Park

Species	Common name	2006	2016	Maximum (2016)
Lampropholis delicata	Garden skink	N/A	**X**	1
Lampropholis guichenoti	Grass skink	N/A	**X**	3
Eulamprus quoyii	Eastern water skink	N/A	**X**	2
Saproscincus mustelinus	Weasel skink	N/A	**X**	3
Cryptoblepharus pulcher	Elegant snake-eyed skink	N/A	**X**	2

C2.2 Frogs

The frog fauna of the Ryde parks has altered over ten years, but overall has improved. The most noticeable change is the presence of Leaf-green tree frogs in each of the parks, except Brush Farm Park. These small frogs are restricted to creeks lined with vegetation (Hoskin et al. 2015). Although not all parks containing these frogs had active flowing creeks, they still provide adequate habitat for populations of leaf-green tree frogs. In some instances (such as in Bell Park and Lambert Park) the frogs were restricted to the small drains and channels of the parks. The ephemeral nature of these channels may not provide breeding habitat for the frogs as no

tadpoles were found, and they have potentially been washed down to these sites from previous rain events. Archer Creek in Brush Farm Park was completely dry during the survey periods which explain the absence of these frogs from the park, and their presence in the more permanent, vegetated creek downstream in Lambert Park.

Peron's tree frogs are now present in every park. These larger frogs shelter in tree hollows and pipes, and are not as reliant on permanent water bodies except for breeding. They are a common garden species of the area. Striped marsh frogs are also present in all parks except Outlook Park. These frogs are extremely common and live in still water bodies, as small as a bird bath or puddle. As Outlook Park currently has no water bodies, it will not support these frogs.

Interestingly, the presence of common Eastern froglets has declined across all parks except the Field of Mars Reserve. This tiny frog is very common across South-Eastern Australian bushland and farmland, but in urban Sydney now appears to be restricted to parks with adjacent bushland. They also live in still water bodies and will breed in puddles. One theory is they may desiccate easily and not disperse so easily due to their small size (Grant Webster, pers. comm. 2016).

Previous surveys (Biosphere 2006) detected less frog diversity and density than current surveys, and suggested frogs will struggle to survive within certain parks until water quality and habitat can be improved. Besides the loss of common Eastern froglets, which may be due to location and not direct habitat factors of the park, the frog fauna has improved in the last ten years.

Frogs of Brush Farm Park

Species	Common name	2006	2016	Maximum (2016)
Limnodynastes peronii	Striped marsh frog	**X**	**X**	2
Crinia signifera	Common Eastern froglet	**X**		-
Litoria peronii	Peron's tree frog		**X**	1
Litoria phyllochroa	Leaf-green tree frog	**X**		-

Frogs of Lambert Park

Species	Common name	2006	2016	Maximum (2016)
Limnodynastes peronii	Striped marsh frog	**X**	**X**	1
Crinia signifera	Common Eastern froglet	**X**		-
Litoria peronii	Peron's tree frog		**X**	1
Litoria phyllochroa	Leaf-green tree frog		**X**	3

Frogs of Darvall Park

Species	Common name	2006	2016	Maximum (2016)
Limnodynastes peronii	Striped marsh frog	**X**	**X**	2
Crinia signifera	Common Eastern froglet	**X**		-
Litoria peronii	Peron's tree frog		**X**	1
Litoria phyllochroa	Leaf-green tree frog		**X**	-

Frogs of Field of Mars Reserve

Species	Common name	2006	2016	Maximum (2016)
Limnodynastes peronii	Striped marsh frog	**X**	**X**	1

Species	Common name	2006	2016	Maximum (2016)
Crinia signifera	Common Eastern froglet	**X**	**X**	5
Litoria peronii	Peron's tree frog	**X**	**X**	2
Litoria phyllochroa	Leaf-green tree frog	**X**	**X**	20

Frogs of Bell Park

Species	Common name	2006	2016	Maximum (2016)
Limnodynastes peronii	Striped marsh frog	**N/A**	**X**	5
Litoria peronii	Peron's tree frog	**N/A**	**X**	1
Litoria phyllochroa	Leaf-green tree frog	**N/A**	**X**	1

Frogs of Outlook Park

Species	Common name	2006	2016	Maximum (2016)
Litoria peronii	Peron's tree frog	**N/A**	**X**	2

C2.3 Mammals

The mammal biodiversity of the parks of Ryde has seen some interesting changes in the last ten years. One of the noticeable differences is the substantial increase in ring-tailed possum abundance. Previous surveys detected on average two to three possums of each species per park, yet current surveys indicate at least four times the amount of ring-tailed compared to brush-tailed, and most parks containing upwards of 15 individual ringtails. Ring-tailed possums may have an advantage over brush-tailed possums by living communally, being smaller and therefore requiring less food, and will make their own dreys (nests), not being completely reliant on hollows (Inions 1989). Although ring-tail density has increased in these reserves both possum species densities generally have decreased across their natural range (Friedlander 2007), it would be interesting to see if this is a common trend across Sydney urban remnant bushland parks. Generally brush-tailed possums have been the common urban invader (Matthews et al. 2003), but perhaps it has just taken some more time for ringtails to exploit human resources.

The second noticeable difference is the decline of feral mammal detections. Black rats and dogs were the only species still detected within every park, however all dogs were pets walked by owners and are not residents of the parks and thus would likely have very little impact on resident fauna. Interestingly no house mice were detected at all in 2016. This may be due to their preference for urban habitat and not dense bushland (Lunney 1987). They are probably still present in all of the parks but at low densities. Cats were also detected in only a handful of parks, but are likely present in all parks and not detected due to their cryptic nature. The main decline of feral species has been rabbits and foxes. While both species can be cryptic their evidence is not, diggings and scats are very easy to detect. Rabbits are now only residents in a couple of parks and foxes appear to now be restricted to the Field of Mars Reserve.

Long-nosed bandicoots have now returned to the Field of Mars Reserve and appear to be wide spread across the entire bushland area of the reserve. Despite foxes being a main threat to bandicoot populations (Dexter & Murray 2009; Scott et al. 1999) and being present in the park, the coordinated approach to fox control across Sydney has caused the bandicoot populations to rise, and start to spread back into their former historic range (Chen 2013).

The Field of Mars Reserve contains the highest mammal (and all taxa) diversity not only due to its size and complex of habitats, but also its connectivity to Lane Cove National Park. Although

no other novel native mammals were detected in the Field of Mars Reserve besides a swamp wallaby, it has the most potential to support populations of native bush rats (*Rattus fuscipes*), brown antechinus (*Antechinus stuartii*), Eastern pygmy possums (*Cercertetus nanus*) and sugar gliders (*Petards crevices*).

Generally the bat diversity has increased in the last ten years, including five new species utilising the parks. Common bat species detected in almost every park were grey-headed flying foxes, Eastern bent-wing bats (both threatened species) and Gould's wattled bat. Flying foxes key threatening processes are loss of roosting and foraging sites and conflict with humans. This species was found to be foraging on every site surveyed hence the parks are providing stable resources for the population. Eastern bent-wing bats are cave roosting specialists which have begun to utilise stormwater tunnels/bridges and other human structures, and hunt in forested areas above the canopy. Primary threats to their populations are loss of quality roosting sites and productive foraging habitat.

Unfortunately two species of microbat appear to no longer exist in this area of Ryde, the lesser long-eared bat and the mouse-eared fishing bat. Lesser long-eared bats may not have been detected due to surveys being conducted at a less active time of year but they may also be regionally extinct, their presence was previously very low (Glenn Hoye, pers. comm. 2016). Fishing bats are a threatened species due to loss or disturbance of roosting sites, and a reduction of stream water quality and fish. Only a single fishing bat was detected ten years ago appearing to be resident of the Lane Cove River valley, foraging occasionally in the Field of Mars Reserve.

Mormopterus ridei and *Vespadelus darlingtoni* calls were possibly/probably detected at each park in 2016, however due to their calls being too weak to confidently identify they were not included in the tables. Both species are present in the North Sydney region.

Mammals of Brush Farm Park

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**X**	**X**	4
Pseudocheirus peregrinus	Ring-tailed possum	**X**	**X**	18
Rattus rattus	Black rat*	**X**	**X**	4
Mus musculus	House mouse*	**X**		-
Canis lupis familiaris	Domestic dog*	**X**	**X**	2
Vulpes vulpes	European red fox*	**X**		-
Felis catus	Domestic cat*	**X**		-
Oryctolagus cuniculus	European rabbit*	**X**		-
Pteropus poliocephalus	Grey-headed flying fox	**X**	**X**	3
Chalinolobus gouldii	Gould's wattled bat	**X**	**X**	-
Nyctophilus geoffroyi	Lesser long-eared bat	**X**		-
Nyctinomus australis	White-striped mastiff bat	**X**	**X**	-
Miniopterus oceanensis	Eastern bent-wing bat		**X**	-

* exotic species

Mammals of Lambert Park

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**X**	**X**	3
Pseudocheirus peregrinus	Ring-tailed possum		**X**	7
Rattus rattus	Black rat*	**X**	**X**	5

Species	Common name	2006	2016	Maximum (2016)
Canis lupis familiaris	Domestic dog*	**X**	**X**	1
Felis catus	Domestic cat*	**X**	**X**	1
Oryctolagus cuniculus	European rabbit*		**X**	1
Pteropus poliocephalus	Grey-headed flying fox	**X**	**X**	5
Chalinolobus gouldii	Gould's wattled bat	**X**		-

* exotic species

Mammals of Darvall Park

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**X**	**X**	3
Pseudocheirus peregrinus	Ring-tailed possum		**X**	15
Rattus rattus	Black rat*	**X**	**X**	2
Mus musculus	House mouse*	**X**		-
Canis lupis familiaris	Domestic dog*	**X**	**X**	3
Felis catus	Domestic cat*	**X**		-
Oryctolagus cuniculus	European rabbit*		**X**	1
Pteropus poliocephalus	Grey-headed flying fox	**X**	**X**	2
Chalinolobus gouldii	Gould's wattled bat	**X**	**X**	-
Nyctinomus australis	White-striped mastiff bat	**X**		-
Miniopterus oceanensis	Eastern bent-wing bat		**X**	-

* exotic species

Mammals of Field of Mars Reserve

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**X**	**X**	5
Pseudocheirus peregrinus	Ring-tailed possum	**X**	**X**	15
Petards crevices	Sugar glider	**X**		-
Perameles nasuta	Long-nosed bandicoot		**X**	2
Wallabia bicolor	Swamp Wallaby		**X**	1
Ornithorhynchus anatinus	Short-beaked echidna	**X**		-
Rattus rattus	Black rat*	**X**	**X**	6
Mus musculus	House mouse*	**X**		-
Canis lupis familiaris	Domestic dog*			3
Vulpes vulpes	European red fox*	**X**	**X**	1
Felis catus	Domestic cat*	**X**	**X**	1
Oryctolagus cuniculus	European rabbit*	**X**	**X**	2
Pteropus poliocephalus	Grey-headed flying fox	**X**	**X**	2
Chalinolobus gouldii	Gould's wattled bat	**X**	**X**	-
Chalinolobus morio	Chocolate wattled bat		**X**	-
Nyctophilus geoffroyi	Lesser long-eared bat	**X**		-
Nyctinomus australis	White-striped mastiff bat	**X**	**X**	-
Miniopterus oceanensis	Eastern bent-wing bat		**X**	-
Myotis adversus	Mouse-eared fishing bat	**X**		-
Vespadelus regulus	Southern forest bat*		**X**	-
Vespadelus vulturnus	Little forest bat*		**X**	-

* exotic species

Mammals of Bell Park

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**N/A**	**X**	3

Species	Common name	2006	2016	Maximum (2016)
Pseudocheirus peregrinus	Ring-tailed possum	**N/A**	**X**	16
Rattus rattus	Black rat*	**N/A**	**X**	1
Canis lupis familiaris	Domestic dog*	**N/A**	**X**	2
Felis catus	Domestic cat*	**N/A**	**X**	1
Pteropus poliocephalus	Grey-headed flying fox	**N/A**	**X**	2
Chalinolobus gouldii	Gould's wattled bat	**N/A**	**X**	-
Miniopterus oceanensis	Eastern bent-wing bat	**N/A**	**X**	-
Nyctinomus australis	White-striped mastiff bat	**N/A**	**X**	-

* exotic species

Mammals of Outlook Park

Species	Common name	2006	2016	Maximum (2016)
Trichosurus vulpecula	Brush-tailed possum	**N/A**	**X**	2
Pseudocheirus peregrinus	Ring-tailed possum	**N/A**	**X**	6
Rattus rattus	Black rat*	**N/A**	**X**	5
Canis lupis familiaris	Domestic dog*	**N/A**	**X**	2
Pteropus poliocephalus	Grey-headed flying fox	**N/A**	**X**	1
Chalinolobus gouldii	Gould's wattled bat	**N/A**	**X**	-
Miniopterus oceanensis	Eastern bent-wing bat	**N/A**	**X**	-
Nyctinomus australis	White-striped mastiff bat	**N/A**	**X**	-

* exotic species

C2.4 Birds

Over the past ten years the bird diversity and density of the Ryde reserves has seen some noticeable changes, but overall have increased. A total of 76 bird species were detected across all parks in 2016. This is an increase from the 51 species detected during surveys in 2006. Individual birds may be permanent residents of each park, or may move across the parks depending on the size of the park, the habitat structure and flora species, and particular species of bird in question. Although it is safe to assume that almost every bird species detected across the entire area would use each park at some point in the year, with the exception of short-range habitat specialists such as whipbirds and wrens.

There are particular species which well and truly may be gone from the area, such as crested shrike-tits, white-plumed honeyeaters, and the smaller cuckoo species.

There is a definite increase in the number of resident bird species with some permanent new additions. The possible absence of certain species could be due to a change in habitat structure over ten years due to bush regeneration, or more vegetation growth and thus becoming denser (in particular the Field of Mars Reserve), or the presence of two now-abundant aggressive species; the rainbow lorikeet, and the noisy miner . These two species populations have grown significantly in the past couple of decades due to open woodland habitat preference (noisy miner) and increase in urban planting of flowering trees (Smith & Lill 2008; Oldland & Clarke 2007; Hastings & Beattie 2006; White et al. 2005; Grey et al. 1998; Veerman 1991). They live communally, are hyper-aggressive to other small bird species and lorikeets exclude other hollow-nesting birds from all available hollows.

Although the birds detected probably use each park across the area, certain species for preferred particular parks. Darvall Park is full of large old growth Eucalypts offering a wide range

of hollows, thus the canopy is dominated by an abundance of parrots and contains species not detected in the other parks. The southern end of Lambert Park contains a variety of fruiting rainforest trees which provide a food source to support the local bowerbirds, and migrating figbirds, orioles and topknot pigeons. The Field of Mars Reserve depicts a similar trend with bird diversity as it does with all other fauna taxa, due to its size and variety of habitats it supports the most bird diversity and density, as well as providing a corridor for migratory summer species moving across the state.

Another significant trend across the parks is also happening across all of North Sydney; the increase in brush-turkeys. These large birds are slowly recolonising their former historic range due to an increase of fox management, improved bushland and a transition from exotic to native urban gardens (Hoh 2016; Meacham 2015).

Besides the increase in a variety of native species there has also been a noticeable decrease in feral species. Common starlings and house sparrows were not detected at all, and only one Indian myna was detected on the outskirts of a single park. In addition to the sighting of a single blackbird and several red-whiskered bulbuls, feral birds were only found in the smallest and most disturbed parks, as they prefer to live in the urban habitat as opposed to bushland.

Finally, five predatory birds were detected across the reserves. The three diurnal raptors were the brown goshawk, collared sparrowhawk and pacific baza. The south-eastern region of Ryde can easily support these species as the goshawk and sparrowhawk are bird specialists (the dominant food source in the area) and the baza's diet consists primarily of large invertebrates, another well represented food source. The two nocturnal owls were the boobook and the powerful owl. Powerful owls are a threatened species and their population size in Sydney is unknown despite an increase in recent records. The loss of large breeding hollows is a main reason for their decline, yet perhaps with an increase of their primary food source the ring-tailed possum, their offspring survival and population recruitment is increasing around Sydney.

From comparison of number of species recorded in Autumn and Spring, there was a total of 92 species record, with:

- more recorded in Spring (83) than in Autumn (65);
- 57 recorded in Autumn and Spring;
- 9 recorded in Autumn and not Spring; and
- 26 recorded in Spring and not in Autumn.

Comparison of species detected in Autumn and Spring

		Spring		
		Absent	**Present**	**Total**
Autumn	**Absent**	0	26	26
	Present	9	57	65
	Total	9	83	92

Comparison of number of species recorded in 2006 and 2016, of the 92 species recorded, there were:

- more recorded in 2016 (83) than in Autumn (65);
- 37 recorded in 2006 and 2016;
- 17 recorded in 2006 and not in 2016; and
- 38 recorded in 2016 and not in 2006.

Comparison of species detected in 2006 and 2016

		2016		
		Absent	**Present**	**Total**
2006	**Absent**	0	38	38
	Present	17	37	65
	Total	17	83	92

Birds of Brush Farm Park

Species	Common name	2006	2016	Maximum (2016)
Alectura lathami	Australian brush-turkey		X	3
Cracticus tibicen tibicen	Australian magpie	X	X	3
Corvus coronoides	Australian raven	X	X	4
Coracina novaehollandiae	Black-faced cuckoo-shrike	X	X	2
Ninox novaeseelandiae boobook	Boobook	X	X	1
Gerygone mouki	Brown gerygone		X	3
Acanthiza pusilla	Brown thornbill	X		-
Scythrops novaehollandiae	Channel-billed cuckoo		X	1
Accipiter cirrocephalus	Collared sparrowhawk		X	1
Falcunculus frontatus	Crested Shrike-tit	X		-
Platycercus elegans	Crimson rosella	X		-
Eopsaltria australis	Eastern yellow robin	X		-
Eudynamys orientalis	Eastern koel	X	X	1
Pachycephala pectoralis	Golden whistler		X	2
Cracticus torquatus	Grey butcherbird	X	X	2
Rhipidura albiscapa	Grey fantail		X	2
Chrysococcyx basalis	Horsfield's bronze-cuckoo	X		-
Microeca fascinans	Jacky winter	X		-
Alisterus scapularis	King parrot		X	2
Dacelo novaeguineae	Laughing kookaburra	X	X	3
Meliphaga lewinii	Lewin's honeyeater		X	1
Anthochaera chrysoptera	Little wattlebird		X	1
Glossopsitta concinna	Musk lorikeet		X	4
Manorina melanocephala melanocephala	Noisy miner	X	X	11
Phylidonyris novaehollandiae	New-Holland honeyeater	X		-
Oriolus sagittatus	Olive-backed oriole	X		-
Grallina cyanoleuca	Peewee		X	2
Strepera graculina	Pied currawong	X	X	3
Ninox strenua	Powerful owl	X	X	2
Trichoglossus haematodus	Rainbow lorikeet		X	10
Pachycephala rufiventris	Rufous whistler	X		-
Anthochaera carunculata	Red wattlebird	X	X	2
Rhipidura rufifrons	Rufous fantail		X	2
Ptilonorhynchus violaceus	Satin bowerbird		X	1
Zosterops lateralis westernensis	Silvereye		X	6
Pardalotus punctatus	Spotted pardalote	X	X	5
Acanthiza lineata	Striated thornbill	X		-
Malurus cyaneus cyanochlamys	Superb fairy-wren		X	4
Podargus strigoides strigoides	Tawny frogmouth		X	1
Hirundo neoxena	Welcome swallow		X	2

Species	Common name	2006	2016	Maximum (2016)
Rhipidura leucophrys	Willy wagtail	X		-
Sericornis frontalis frontalis	White-browed scrubwren	X	X	8

Birds of Lambert Park

Species	Common name	2006	2016	Maximum (2016)
Alectura lathami	Australian brush-turkey		X	5
Cracticus tibicen tibicen	Australian magpie	X	X	4
Corvus coronoides	Australian raven	X	X	3
Sphecotheres vieilloti	Australasian figbird		X	2
Scythrops novaehollandiae	Channel-billed cuckoo		X	1
Ocyphaps lophotes	Crested pigeon	X		-
Sturnus vulgaris	Common starling*	X		-
Gallus gallus	Domestic chicken*		X	4
Eopsaltria australis	Eastern yellow robin			-
Platycercus eximius	Eastern rosella	X		-
Eudynamys orientalis	Eastern Koel		X	1
Eolophus roseicapillus	Galah		X	2
Pachycephala pectoralis	Golden whistler		X	1
Cracticus torquatus	Grey butcherbird	X	X	2
Passer domesticus	House sparrow*	X		-
Sturnus tristis	Indian myna*	X		-
Alisterus scapularis	King parrot		X	3
Dacelo novaeguineae	Laughing kookaburra	X	X	2
Glossopsitta concinna	Musk lorikeet		X	2
Manorina melanocephala melanocephala	Noisy miner	X	X	5
Oriolus sagittatus	Olive-backed oriole		X	5
Grallina cyanoleuca	Peewee		X	1
Strepera graculina	Pied currawong	X		4
Trichoglossus haematodus	Rainbow lorikeet	X		7
Anthochaera carunculata	Red wattlebird	X	X	1
Pycnonotus jocosus	Red-whiskered bulbul*	X		-
Rhipidura rufifrons	Rufous fantail		X	2
Ptilonorhynchus violaceus	Satin bowerbird		X	1
Zosterops lateralis westernensis	Silvereye		X	2
Pardalotus punctatus	Spotted pardalote		X	2
Cacatua galerita	Sulphur-crested cockatoo		X	1
Podargus strigoides strigoides	Tawny frogmouth	X	X	2
Lopholaimus antarcticus	Topknot pigeon		X	1
Rhipidura leucophrys	Willy wagtail		X	1
Sericornis frontalis frontalis	White-browed scrubwren		X	4
Ptilotula penicillata	White-plumed honeyeater	X		-

* feral species

Birds of Darvall Park

Species	Common name	2006	2016	Maximum (2016)
Corvus coronoides	Australian raven	X	X	3
Cracticus tibicen tibicen	Australian magpie	X	X	3
Threskiornis molucca	Australian white ibis		X	1
Turdus merula	Common blackbird*		X	1
Platycercus elegans	Crimson rosella	X	X	2
Sturnus vulgaris	Common starling*	X		-
Chalcophaps indica	Emerald dove		X	1
Psophodes olivaceus	Eastern whipbird	X	X	1
Platycercus eximius	Eastern rosella	X	X	4
Eudynamys orientalis	Eastern koel		X	1
Acanthorhynchus tenuirostris	Eastern spinebill	X		-
Eolophus roseicapillus	Galah		X	4
Cracticus torquatus	Grey butcherbird		X	4
Alisterus scapularis	King parrot		X	2
Dacelo novaeguineae	Laughing kookaburra		X	4
Cacatua sanguinea	Little corella		X	3
Manorina melanocephala melanocephala	Noisy miner	X	X	25
Oriolus sagittatus	Olive-backed oriole		X	1
Anas superciliosa	Pacific black duck		X	2
Strepera graculina	Pied currawong	X	X	3
Trichoglossus haematodus	Rainbow lorikeet	X	X	50
Zosterops lateralis westernensis	Silvereye		X	5
Cacatua galerita	Sulphur-crested cockatoo	X	X	15
Malurus cyaneus cyanochlamys	Superb fairy-wren		X	4
Podargus strigoides strigoides	Tawny frogmouth		X	2
Sericornis frontalis frontalis	White-browed scrubwren		X	6

* feral species

Birds of Field of Mars Reserve

Species	Common name	2006	2016	Maximum (2016)
Alectura lathami	Australian brush-turkey		X	1
Corvus coronoides	Australian raven	X	X	4
Threskiornis molucca	Australian white ibis	X	X	10
Anhinga novaehollandiae	Australian darter	X		-
Coracina novaehollandiae	Black-faced cuckoo-shrike	X	X	2
Monarcha melanopsis	Black-faced monarch		X	4
Ninox novaeseelandiae boobook	Boobook	X	X	1
Gerygone mouki	Brown gerygone		X	2
Accipiter fasciatus	Brown goshawk		X	1
Acanthiza pusilla	Brown thornbill		X	4
Scythrops novaehollandiae	Channel-billed cuckoo	X	X	3
Anas castanea	Chestnut teal	X	X	2
Platycercus elegans	Crimson rosella		X	2
Ocyphaps lophotes	Crested pigeon		X	3
Sturnus vulgaris	Common starling*	X		-
Gallinula tenebrosa	Dusky moorhen		X	2
Eopsaltria australis	Eastern yellow robin	X	X	1

Species	Common name	2006	2016	Maximum (2016)
Acanthorhynchus tenuirostris	Eastern spinebill	X	X	3
Eudynamys orientalis	Eastern koel		X	1
Cacomantis flabelliformis	Fan-tailed cuckoo	X	X	1
Pachycephala pectoralis	Golden whistler		X	2
Cracticus torquatus	Grey butcherbird	X	X	2
Rhipidura albiscapa	Grey fantail	X	X	5
Chrysococcyx basalis	Horsfield's bronze-cuckoo			-
Sturnus tristis	Indian myna*	X		-
Ardea intermedia	Intermediate egret	X		-
Microeca fascinans	Jacky winter	X		-
Alisterus scapularis	King parrot		X	2
Dacelo novaeguineae	Laughing kookaburra		X	3
Myiagra rubecula	Leaden flycatcher		X	1
Cacatua sanguinea	Little corella		X	2
Anthochaera chrysoptera	Little wattlebird		X	1
Phalacrocorax sulcirostris	Little black cormorant	X		-
Microcarbo melanoleucos	Little pied cormorant	X		-
Cracticus tibicen tibicen	Australian magpie	X	X	3
Glossopsitta concinna	Musk lorikeet		X	4
Nycticorax caledonicus	Nankeen night-heron	X		-
Manorina melanocephala melanocephala	Noisy miner	X	X	25
Philemon corniculatus	Noisy Friarbird	X		-
Phylidonyris novaehollandiae	New-Holland honeyeater	X		-
Oriolus sagittatus	Olive-backed oriole		X	1
Aegotheles cristatus	Owlet nightjar	X		-
Grallina cyanoleuca	Peewee	X	X	1
Aviceda subcristata	Pacific baza		X	1
Anas superciliosa	Pacific black duck	X	X	4
Strepera graculina	Pied currawong	X	X	3
Ninox strenua	Powerful owl	X	X	1
Trichoglossus haematodus	Rainbow lorikeet	X	X	8
Pachycephala rufiventris	Rufous whistler	X		-
Rhipidura rufifrons	Rufous fantail		X	1
Anthochaera carunculata	Red wattlebird	X	X	4
Neochmia temporalis	Red-browed finch	X	X	3
Pycnonotus jocosus	Red-whiskered bulbul	X	X	3
Todiramphus sanctus	Sacred kingfisher	X	X	1
Myzomela sanguinolenta	Scarlet honeyeater		X	1
Zosterops lateralis westernensis	Silvereye		X	20
Ptilonorhynchus violaceus	Satin bowerbird		X	2
Pardalotus punctatus	Spotted pardalote		X	8
Streptopelia chinensis	Spotted turtledove*	X		-
Acanthiza lineata	Striated thornbill		X	3
Malurus cyaneus cyanochlamys	Superb fairy-wren	X	X	5
Cacatua galerita	Sulphur-crested cockatoo	X	X	2
Podargus strigoides strigoides	Tawny frogmouth		X	2
Zosterops lateralis lateralis	Tasmanian silvereye		X	6
Lopholaimus antarcticus	Topknot pigeon		X	3
Malurus lamberti lamberti	Variegated fairy-wren		X	8

Species	Common name	2006	2016	Maximum (2016)
Hirundo neoxena	Welcome swallow	**X**	**X**	1
Rhipidura leucophrys	Willy wagtail	**X**		-
Sericornis frontalis frontalis	White-browed scrubwren	**X**	**X**	4
Ptilotula penicillata	White-plumed honeyeater	**X**		-
Egretta novaehollandiae	White-faced heron	**X**		-
Phylidonyris niger	White-cheeked honeyeater		**X**	2
Melithreptus lunatus	White-naped honeyeater		**X**	2
Cormobates leucophaea	White-throated treecreeper		**X**	2
Chenonetta jubata	Wood duck		**X**	20
Acanthiza nana	Yellow thornbill		**X**	3
Caligavis chrysops	Yellow-faced honeyeater		**X**	3
Calyptorhynchus funereus	Yellow-tailed black cockatoo		**X**	1

* exotic species

Birds of Bell Park

Species	Common name	2006	2016	Maximum (2016)
Alectura lathami	Australian brush-turkey	**N/A**	**X**	1
Cracticus tibicen tibicen	Australian magpie	**N/A**	**X**	2
Corvus coronoides	Australian raven	**N/A**	**X**	4
Gallus gallus	Domestic chicken*	**N/A**	**X**	3
Eudynamys orientalis	Eastern koel	**N/A**	**X**	1
Cracticus torquatus	Grey butcherbird	**N/A**	**X**	5
Sturnus tristis	Indian myna*	**N/A**	**X**	2
Alisterus scapularis	King parrot	**N/A**	**X**	2
Dacelo novaeguineae	Laughing kookaburra	**N/A**	**X**	2
Glossopsitta concinna	Musk lorikeet	**N/A**	**X**	2
Manorina melanocephala melanocephala	Noisy miner	**N/A**	**X**	12
Grallina cyanoleuca	Peewee	**N/A**	**X**	2
Strepera graculina	Pied currawong	**N/A**	**X**	3
Ninox strenua	Powerful owl	**N/A**	**X**	1
Trichoglossus haematodus	Rainbow lorikeet	**N/A**	**X**	8
Anthochaera carunculata	Red wattlebird	**N/A**	**X**	1
Columba livia	Rock dove*	**N/A**	**X**	10
Zosterops lateralis westernensis	Silvereye	**N/A**	**X**	3
Cacatua galerita	Sulphur-crested cockatoo	**N/A**	**X**	3
Podargus strigoides strigoides	Tawny frogmouth	**N/A**	**X**	1
Sericornis frontalis frontalis	White-browed scrubwren	**N/A**	**X**	3
Egretta novaehollandiae	White-faced heron	**N/A**	**X**	1

* exotic species

Birds of Outlook Park

Species	Common name	2006	2016	Maximum (2016)
Alectura lathami	Australian brush-turkey	**N/A**	**X**	1

Species	Common name	2006	2016	Maximum (2016)
Corvus coronoides	Australian raven	**N/A**	**X**	1
Cracticus tibicen tibicen	Australian magpie	**N/A**	**X**	1
Eolophus roseicapillus	Galah	**N/A**	**X**	3
Cracticus torquatus	Grey butcherbird	**N/A**	**X**	1
Alisterus scapularis	King parrot	**N/A**	**X**	2
Dacelo novaeguineae	Laughing kookaburra	**N/A**	**X**	2
Manorina melanocephala melanocephala	Noisy miner	**N/A**	**X**	5
Strepera graculina	Pied currawong	**N/A**	**X**	2
Trichoglossus haematodus	Rainbow lorikeet	**N/A**	**X**	12
Columba livia	Rock dove*	**N/A**	**X**	3
Cacatua galerita	Sulphur-crested cockatoo	**N/A**	**X**	2
Malurus cyaneus cyanochlamys	Superb fairy-wren	**N/A**	**X**	1
Podargus strigoides strigoides	Tawny frogmouth	**N/A**	**X**	1
Sericornis frontalis frontalis	White-browed scrubwren	**N/A**	**X**	2

* exotic species

C2.5 Fish

Fish diversity of the parks has slightly increased compared to ten years ago. All the same fresh and brackish water fish are still present within the Field of Mars Reserve, and a new species the common galaxias was detected. The Field of Mars Reserve is the only site surveyed which has a permanent freshwater and estuary ecosystem, thus supporting stable populations of fish. The only other site with adequate water bodies is Darvall Park, yet no fish were detected at all. The introduced plague minnow was previously the only fish detected in Darvall Park, yet now the park may not support any fish species. The reason for this is unknown as the water quality is good enough to support healthy frog populations and turtles.

The most significant detections from the fish surveys were the presence of short-finned eels in Brush Farm Park and Lambert Park. Two individuals in each park, both sub-adult and juvenile stage were detected in the only water bodies within the parks, next to the eastern concrete culvert of Brush Farm Park and the southern culvert of Lambert Park. Although relatively common in freshwater habitats of East-coast Australia, the presence of a predator in these water bodies indicates a supportable ecosystem and adequate food source.

Fish of Brush Farm Park

Species	Common name	2006	2016	Maximum (2016)
Anguilla australis	Short-finned eel		**X**	2 elvers

Fish of Lambert Park

Species	Common name	2006	2016	Maximum (2016)
Anguilla australis	Short-finned eel		**X**	2 sub-adults

Fish of Darvall Park

Species	Common name	2006	2016	Maximum (2016)
Gambusia holbrooki	Plague minnow*	**X**		-

* exotic species

Fish of the Field of Mars Reserve

Species	Common name	2006	2016	Maximum (2016)
Gambusia holbrooki	Plague minnow*	**X**	**X**	7
Gobiomorphus australis	Striped gudgeon	**X**	**X**	2
Hypseleotris galii	Firetail gudgeon	**X**	**X**	2
Philypnodon macrostomus	Dwarf flathead gudgeon	**X**	**X**	2
Trachystoma petardi	Freshwater mullet	**X**	**X**	6
Galaxias maculatus	Common galaxias		**X**	4
Anguilla australis	Short-finned eel	**X**	**X**	1

* exotic species

C2.6 Invertebrate fauna

C2.6.1 Comparability with previous (Biosphere 2006) results

While a variety of invertebrate fauna were detected across the reserves in the 2006 survey, the level of taxonomic resolution provided in this previous survey (identification only to family or higher levels of taxonomic hierarchy) means that comparison between survey periods is difficult. Additionally, the identification of each group as either occurring or not occurring provides little information on the diversity of species within each group. As such, making conclusions regarding the extent or trajectory of change over time since 2006 is not possible.
It should be noted that the total diversity of invertebrates within a reserve will in all cases be much larger than can be detected in a single survey. It is likely that a very large number of invertebrate groups are represented within all of the reserves, and that the total number of species within each group is much larger than what was detected in both the 2006 and 2016 surveys. Detecting a greater portion of these species would require employing a range of group-specific survey techniques, for example pitfall trapping for ant, spider or other ground-dwelling invertebrate species or yellow pan trapping for diurnal flying insects. While these additional techniques would yield a greater diversity of detected species, they are beyond the scope of the previous (Biosphere 2006) investigation upon which this current survey is based.

C2.6.2 Habitat availability in Ryde reserves

Overall, the greatest diversity of invertebrate species was found in Brush Farm Park and Field of Mars reserves, largely due to the broad range of different habitats available for invertebrate species, and the overall larger areas of these reserves. Invertebrate species generally show strong reliance on the particular narrow suite of microhabitat traits that they are adapted for, and a broad range of these specific habitats are available within the surveyed reserves. The specific habitat values of some of these different microhabitat habitat elements are discussed below.

C2.6.2.1 Ground-layer vegetation

A variety of low habitats were present across the reserves. Of these, native grasslands of Basket Grass (*Oplismenus aemulus* and *O. imbecilis*) and Weeping Grass (*Microlaena stipoides*) supported a great diversity of species. These areas provide ideal habitat for active hunting spiders such as Lynx Spiders (family Oxyopidae) and Jumping Spiders (family Salticidae). Also, a large diversity of moth species was present within these low grasslands, even during diurnal sampling. This grassland habitat was available in all reserves; however the greatest extents were found in Brush Farm Park, Darvall Park and the Field of Mars reserve.

Other low vegetation provides habitat for invertebrate species. For example, flowering shrubs and forbs provide nectar resources for butterflies and other nectar feeding insect species such as bees (family Apidae) and hover flies (family Syrphidae). In turn, these floral resources provide ideal locations for sit-and-wait predators such as Crab Spiders and Flower Spiders (family Thomsidae).

C2.6.2.2 Shrubs and mid-storey vegetation

Habitat complexity in the mid-storey and lower canopy provides locations for web-building spiders. Particularly, a variety of Orb-weaving Spiders in the family Araneidae (particularly *Araneus* sp. and *Eriophora* sp.), Leaf-curling Spiders (*Phonognatha* sp.) and Net-casting spiders (family Deinopidae) were abundant in these habitats across all Ryde reserves at the time of survey.

C2.6.2.3 Leaf litter and debris

Leaf litter and other ground-layer debris provide a range of habitat, particularly wetter areas under dense Eucalyptus canopy. Species supported by this microhabitat type include Springtails (families Isotomidae and Smtihuridae), Earthworms (Order Megadrilaceae), Scolopendran Centipedes (family Scolopendridae), Slaters (family Oniscidea), Amphipods (family Taltridae), Mites (family Trombidiidae), Ground beetles (family Carabidae), Termites (family Termitidae), and Cockroaches (Family Blattidae). A range of more generalised ground-dwelling groups such as ants (family Formicidae), Wolf Spiders (family Lycosidae) and Ant-hunting Spiders (family Zodariidae) are also abundant within leaf litter. All Ryde reserves sampled provided some areas of leaf litter habitat.

C2.6.2.4 Aquatic habitats

The availability of aquatic habitat within the reserves during the current investigation was low overall, with dry conditions prior to the survey reducing the extent of available sampling sites. However, a number of invertebrate groups were still detected, including larvae of Dragonflies and/or Damselflies (Odonata), Water Treaders (Hemiptera – Veliidae) and Back Swimmers (Hemiptera – Notonectidae).

C2.6.2.5 *Eucalyptus* and *Acacia* spp. foliage

The availability of low foliage of *Acacia* and *Eucalyptus* species provided habitat for a diverse range of herbivorous and sap-sucking insects. Particularly, a variety of Leaf Beetles (family Chrysomelidae), Lady Beetles (*Cocinella* sp.), Leaf Hoppers (family Cicadellidae), Aphids (family Aphidae) and a variety of Scale Insects (superfamily Coccoidea) are abundant in this microhabitat type, particularly when fresh growth is available. Other groups associated with these habitats include 'Wattle Pig' (*Leptopius* sp.) and other Weevils in the family Circulionidae), Scarab Beetles (family Scarabidae), Clerid Beetles (family Cleridae) and Long Horned Beetles (family Cerambicidae). Additionally, ant species in the subfamily Dolichoderinae (*Anonychomyrma* sp. and *Iridomyrmex* sp.) are associated with this habitat as they provide tending services to Scale Insects and Aphids.

The presence of low *Acacia* sp. and *Eucalyptus* sp. allowed for easy hand collection of a variety of the above mentioned groups. While all reserves provided *Eucalyptus* spp. habitat, this was not always readily sampled as it was in some cases above the reach of the surveyor. Overall, these habitats were most abundant in Brush Farm Park, Darvall Park and Field of Mars reserve.

C2.6.2.6 Tree trunks

Tree species, particularly those with flaking bark such as Sydney Blue Gum (*Eucalyptus saligna*), Flooded Gum (*Eucalyptus grandis*) or Blackbutt (*E. pilularis*), provide important habitat for a range of species. Particularly, Bark Hoppers (family Eurybrachyidae, especially *Platybachrys* sp.), Bark Cockroaches (family Blaberidae), arboreal ants such as *Crematogaster* sp., and a range of predatory spiders are associated with these habitats.

C2.6.3 Invertebrates recorded in the parks

Invertebrates recorded in Brush Farm Park

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
Annelida - Clitellata						
	Hirudinea			Leeches	X	
Annelida - Oligochaeta						
	Megadrilacea			Earthworms	X	1
Arthropoda - Arachnida						
	Araneae					
		Araneidae	*Argiope keyserlingi*	St Andrew's Cross Spider		1
		Araneidae	*Demadiana* sp.	Orb-weaving Spiders		1
		Araneidae	*Eriophora* sp.	Orb-weaving Spiders		1
		Araneidae	*Phonognatha* sp.	Leaf Curling Spiders		1
		Araneidae		orb-weavers	X	6
		Lycosidae		wolf spiders	X	
		Nephidae	*Nephila plumipes*	Golden Orb-weaving Spiders		1
		Oxyopidae	*Oxyopes* sp.	Lynx Spiders		3
		Salticidae		Jumping Spiders		3
		Tetragnathidae		Long-jawed spiders	X	
		Theridiidae		Scaffold Web Weavers		1
		Thomsidae	*Diaea* sp.	Flower Spiders		1
		Thomsidae	*Diaea* sp.	Flower Spiders		1
		Thomsidae	*Tmarus* sp.	Crab Spiders		1
		Thomsidae		Crab Spiders		4
	Trombidiformes					
		Trombidiidae		Mites	X	1
Arthropoda - Chilopoda						
	Scolopendromorpha					
		Scolopendridae		Centipedes	X	
		Scolopendridae	*Scolopendra* sp.	Centipedes		1
Arthropoda - Diplopoda						
				Millipedes	X	
	Polydesmida			Polydesmid Millipedes		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
Arthropoda - Entognatha						
				Springtails	X	
	Entomobryomorpha					
		Isotomidae		Springtails		1
	Symphypleona					
		Smithuridae		Springtails		1
Arthropoda - Insecta						
	Blattodea					
		Blattidae		Cockroaches	X	1
		Blaberidae	*Laxta* sp.	Bark Cockroaches		1
		Blaberidae - Panesthiinae		Wood Cockroaches		1
		Blattellidae	*Ellipsidon* sp.	Bush Cockroaches		1
		Blattidae	*Polyzosteria* sp.	Coackroaches		1
		Termitidae		Termites	X	
	Coleoptera					
		Buprestidae		Jewel Beetles	X	
		Carabidae		Ground Beetles	X	1
		Cerambycidae		Long-horned beetles	X	
		Chrysomelidae		Leaf Blisters	X	
		Chrysomelidae - Chrysomelinae	*Calomera ruficeps*	Metallic Green Acacia Beetle		1
		Chrysomelidae - Chrysomelinae	*Dicranosterna* sp.	Acacia Leaf Beetle		1
		Chrysomelidae - Chrysomelinae	*Lamprolina* sp.	Pittosporum Beetles		1
		Chrysomelidae - Criocerinae		Narrow-necked Leaf Beetles		1
		Chrysomelidae - Cryptocephalinae		Leaf Cylinder Beetles		2
		Cincindelidae		Tiger Beetles	X	
		Circulionidae	*Leptopius* sp.	Wattle Pig Weevils		1
		Cleridae		Clerid Beetles		1
		Coccinellidae		Labybirds	X	
		Coccinellidae	*Cocinella* sp.	Ladybirds		1
		Dytiscidae		Diving Beetles	X	
		Elateridae		Click Beetles	X	
		Scarabaeidae		Scarab Beetles	X	
		Staphylinidae		Rove Beetles	X	
	Dermaptera					
				Earwigs	X	
	Diptera					
		Assilidae		Robber Flies	X	
		Calliphoridae		Blow Flies	X	1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Culicidae		Mosquitoes	X	
		Culicidae	*Culex* sp.	Mosquitoes		3
		Lauxaniidaae		Lauxaniid Flies		1
		Muscidae		House Flies	X	1
		Mycetophilidae		Fungus Gnats		1
		Sciaridae		Fungus Gnats		1
		Syrphidae		Hover Flies	X	1
		Tabanidae		March Flies	X	
		Tipulidae	*Tipula* sp.	Crane Flies		2
		Tipulidae		Crane Flies	X	
				Flies		2
	Diptera - Nematocera					
				Fungus Gnats and Midges		3
	Ephemeroptera					
				Mayflies	X	
	Hemiptera					
		Alydidae	*Melanacanthus scutellaris*	Small Brown Bean Bug		1
		Aphididae		Aphids	X	2
		Cicadellidae		Leaf Hoppers	X	
		Cicadellidae		Leafhoppers		3
		Cicadidae		Cicadas	X	
		Coccoidea	*Ceroplastes* sp.	Scale Insects		1
		Coccoidea		Scale Insects	X	3
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers		1
		Flatidae		Plant Hoppers		1
		Gerridae		Water Striders	X	
		Lygaeidae		Ground Bugs	X	
		Miridae		Mirid Bugs		1
		Notonectidae		Backswimmers	X	
		Pentatomidae		Shield Bugs	X	
		Pentatomidae	*Poecilometis patruelis*	Common Gum Tree Shield Bug		1
		Reduviidae		Assassin Bugs	X	
		Reduviidae	*Pristhesancus plagipennis*	Common Assassin Bug		1
	Hymenoptera					
		Apidae		Bees	X	
		Formicidae		Ants	X	
		Formicidae - Dolichoderinae	*Iridomyrmex* sp.	Tyrant Ants		1
		Formicidae - Ectatominae	*Rhytidoponera metallica*	Greed-headed Ant		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Formicidae - Formicinae	*Polyrachis* sp.	Ants		1
		Formicidae - Myrmicinae	*Crematogaster sp.*	Ants		2
		Formicidae - Myrmicinae	*Monomorium* sp.	Ants		1
		Formicidae - Myrmiicinae	*Myrmecia* sp.	Bull Ants		1
		Ichneumonidae		Ichneumonid Wasps		2
		Ichneumonoidea (superfamily)		Parasitic Wasps	X	
		Mymaridae		Fairy Flies		3
		Pergidae		Sawflies		2
		Sphecidae		Sphecid Wasps	X	
		Vespidae		Vespid Wasps	X	
	Lepidoptera					
		Arctidae		Tiger Moths	X	
		Danainae (subfamily)		Milkweed Butterflies	X	
		Geometridae		Geometer Moths	X	
		Hesperidae		Skippers	X	
		Lycaenidae		Ant Blue Butterflies	X	
		Nymphalidae		Swallowtail Butterflies	X	
		Psyshidae		Case Moths		1
		Sesiidae		Clearwing Moths	X	
		Sphingigae		Hawk Moths	X	
				Moths		11
	Mantodea					
		Mantidae		Praying Mantis	X	1
	Neuroptera					
				Lace Wings	X	1
	Odonata					
		Anisoptera (suborder)		Dragonflies	X	
		Zygoptera		Damselflies	X	
	Orthoptera					
		Acrididae		Grasshoppers	X	1
		Gryllacridae		Tree Crickets	X	
		Gryllidae		Crickets	X	
		Gryllotalpidae		Mole Crickets	X	
		Tettigoniidae		Katydids	X	
	Plecoptera					
		Plecoptera (order)		Stoneflies	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Trichoptera			Caddisflies		1
Arthropoda - Malacostraca						
	Amphipoda					
		Taltridae		Amphipods		1
	Isopoda					
		Oniscidea (suborder)		Slaters	X	1
		Oniscidea	*Armadillidium vulgare*	Slaters		1
		Oniscidea	*Porcellio scaber*	Slaters		1
Molusca - Gastropoda						
	Helicoidea					
		Helicidae		Snails	X	
	Parmacelloidea					
		Milacidae		Slugs	X	
	Pulmonata					
				Land Snails		1

Invertebrates recorded in Lambert Park

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
Annelida - Oligochaeta						
	Megadrilacea					
				Earthworms	X	1
Arthropoda - Arachnida						
	Araneae					
		Araneidae		Orb-weavers	X	
		Araneidae	*Araneus* sp.	Angulate Orb-weaving Spiders		4
		Araneidae	*Argiope keyserlingi*	St Andrew's Cross Spider		1
		Araneidae	*Eriophora* sp.	Orb-weaving Spiders		1
		Araneidae	*Phonognatha* sp.	Leaf Curling Spiders		1
		Deinopidae	*Deinopis* sp.	Net-casting Spiders		1
		Lycosidae		Wolf spiders	X	
		Miturgidae		Prowling Spiders		2
		Oxyopidae	*Oxyopes* sp.	Lynx Spiders		1
		Salticidae		Jumping Spiders		2
		Theridiidae	*Argyroides* sp.	Jewdrop Spiders		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Thomisidae	*Diaea* sp.	Crap Spiders		1
		Thomisidae	*Sidymella* sp.	Crap Spiders		1
				Spiders		2
	Trombidiformes					
		Trombidiidae		Mites, ticks	X	
Arthropoda - Chilopoda						
	Scolopendromorpha					
		Scolopendridae		Centipedes	X	
		Scolopendridae	*Scolopendra* sp.	Centipedes		1
Arthropoda - Diplopoda						
	Polydesmida					
				Polydesmid Millipedes		1
Arthropoda - Entognatha						
				Springtails	X	
	Entomobryomorpha					
		Isotomidae		Springtails		1
	Symphypleona					
		Smithuridae		Springtails		1
Arthropoda - Insecta						
	Blattodea					
		Blattidae		Cockroaches	X	1
		Termitidae		Termites	X	
	Coleoptera					
		Carabidae		Ground Beetles	X	
		Cerambycidae		Long-horned beetles	X	
		Chrysomelidae - Chrysomelinae		Leaf Beetles		1
		Cleridae		Clerid Beetles		1
		Coccinellidae		Labybirds	X	
		Coccinellidae	*Cocinella* sp.	Ladybirds		1
		Cryptophagidae		Fungus Beetles		1
		Dytiscidae		Diving Beetles	X	
		Elateridae		Click Beetles	X	
		Scarabaeidae		Scarab Beetles	X	
		Staphylinidae		Rove Bettles		1
	Diptera					
		Calliphoridae		Blow Flies	X	1
		Culicidae		Mosquitoes	X	
		Culicidae	*Culex* sp.	Mosquitoes		2
		Muscidae		House Flies	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Mycetophilidae		Fungus Gnats		1
		Phoridae		Phorid Flies		1
		Pipunculidae		Big-headed Flies		1
		Syrphidae		Hover Flies	X	
		Tipulidae		Crane Flies	X	
		Tipulidae	*Tipula* sp.	Crane Flies		1
				Flies		3
	Hemiptera					
		Aphididae		Aphids	X	1
		Cicadellidae		Leaf Hoppers	X	
		Cicadidae		Cicadas	X	
		Coccoidea		Scale Bugs	X	1
		Coccoidea	*Ceroplastes* sp.	Scale Insects		1
		Derbidae		Plant Hoppers		1
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers		1
		Flatidae		Plant Hoppers		1
		Gerridae		Water Striders	X	
		Pentatomidae		Shield Bugs	X	
		Pentatomidae	*Alcaeus* sp.	Shield Bugs		1
		Pentatomidae	*Theseus* sp.	Shield Bugs		1
		Reduviidae		Assassin Bugs	X	
		Reduviidae	*Pristhesancus plagipennis*	Common Assassin Bug		1
	Hymenoptera					
		Apidae		Bees	X	
		Formicidae		Ants	X	
		Formicidae - Dolichoderinae	*Ochetellus* sp.	Ants		1
		Formicidae - Formicinae	*Notoncus capitatus*	Ants		1
		Formicidae - Formicinae	*Nylanderia* sp.	Ants		1
		Formicidae - Formicinae	*Polyrachis* sp.	Ants		1
		Formicidae - Myrmicinae	*Crematogaster* sp.	Ants		1
		Ichneumonidae		Ichneumonid Wasps		1
		Vespidae		Vespid Wasps	X	1
	Lepidoptera					
		Nymphalidae - Danainae		Milkweed Butterflies	X	
		Hesperidae		Skippers	X	
		Lycaenidae		Ant Blue	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
				Butterflies		
		Notodontidae - Thaumetopoeinae		Processionary Caterpillars		1
		Nymphalidae	*Euploea core*	Common Crow Butterfly		1
		Nymphalidae	*Vanessa kershawi*	Australian Painted Lady Butterfly		1
		Psyshidae		Case Moths		1
		Sphingigae		Hawk Moths	X	
				Moths		6
	Mantodea					
		Mantidae		Praying mantis		1
	Neuroptera					
				Lacewings		1
	Odonata					
		Anisoptera (suborder)		Dragonflies	X	
	Orthoptera					
		Acrididae		Grasshoppers	X	1
		Gryllacridae		Tree Crickets	X	
		Gryllidae		Crickets	X	
		Gryllidae		True Crickets		1
		Gryllotalpidae		Mole Crickets	X	
		Tettigoniidae		Katydids		1
	Trichoptera					
				Caddisflies		2
Arthropoda - Malacostraca						
	Amphipoda					
		Taltridae		Amphipods		1
	Isopoda					
		Oniscidea	*Armadillidium vulgare*	Slaters		1
				Slaters		1
Molusca - Gastropoda						
	Helicoidea					
		Helicidae		Snails	X	1
	Parmacelloidea					
		Milacidae		Slugs	X	

Invertebrates recorded in Darvall Park

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
Annelida - Oligochaeta						

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Megadrilacea			Earthworms	X	1
Arthropoda - Arachnida						
	Araneae					
		Araneidae		orb-weavers	X	
		Araneidae	*Araneus* sp.	Orb-weaving Spiders		1
		Araneidae	*Argiope keyserlingi*	St Andrew's Cross Spider		1
		Araneidae	*Phonognatha* sp.	Leaf Curling Spiders		1
		Deinopidae	*Deinopis* sp.	Net-casting Spiders		1
		Lycosidae		wolf spiders	X	
		Oxypodidae	*Oxyopes* sp.	Lynx Spiders		3
		Salticidae		Jumping Spiders		3
		Tetragnathidae		Stretch Spiders		1
		Theridiidae		Scaffold-web Weavers		1
		Thomisidae		Crab Spiders		1
		Zodariidae	*Storena* sp.	Ant-hunting Spiders		1
	Trombidiformes					
		Trombidiidae		Mites	X	1
Arthropoda - Chilopoda						
	Scolopendromorpha					
		Scolopendridae		Centipedes	X	
		Scolopendridae	*Scolopendra* sp.	Centipedes		1
Arthropoda - Entognatha						
				Springtails	X	
	Symphypleona					
		Smithuridae		Springtails		1
Arthropoda - Insecta						
	Blattodea					
		Blattidae		Coackroaches	X	1
		Termitidae		Termites	X	
	Coleoptera					
		Carabidae		Ground Beetles	X	1
		Cerambycidae		Long-horned beetles	X	
		Chrysomelidae - Chrysomelinae	*Calomera ruficeps*	Metallic Green Acacia Beetle		1
		Coccinellidae		Labybirds	X	
		Coccinellidae	*Cocinella* sp.	Ladybirds		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Dytiscidae		Diving Beetles	X	
		Elateridae		Click Beetles	X	
		Scarabaeidae		Scarab Beetles	X	
		Staphylinidae		Rove Beetles	X	1
	Dermaptera					
				Earwigs	X	
	Diptera					
		Assilidae		Robber Flies	X	
		Calliphoridae		Blow Flies	X	
		Culicidae	*Culex* sp.	Mosquitoes		1
		Culicidae	*Culex* sp.	Mosquitoes		1
		Culicidae	*Culex* sp.	Mosquitoes		1
		Culicidae	*Culex* sp.	Mosquitoes		1
		Culicidae		Mosquitoes	X	
		Muscidae		House Flies	X	
		Syrphidae		Hover Flies	X	
		Tabanidae		March Flies	X	
		Tipulidae (larvae)		Crane Flies		1
	Diptera - Nematocera					
				Fungus Gnats and Midges		5
	Hemiptera					
		Alydidae	*Noliphus* sp.	Board-headed Bugs		1
		Aphididae		Aphids	X	1
		Cicadellidae		Leaf Hoppers	X	
		Cicadellidae		Leafhoppers		2
		Cicadellidae		Treehoppers		2
		Cicadidae		Cicadas	X	
		Cixiidae		Cixiid Planthoppers		1
		Coccoidea		Scale Insects	X	3
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers		1
		Gerridae		Water Striders	X	
		Lygaeidae		Ground Bugs	X	
		Membracidae	*Sextius* sp.	Horned Treehoppers		1
		Miridae		Mirid Bugs		1
		Notonectidae		Backswimmers	X	
		Pentatomidae		Shield Bugs	X	
		Pentatomidae	*Poecilometis patruelis*	Common Gum Tree Shield Bug		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Reduviidae		Assassin Bugs	X	
		Reduviidae	*Pristhesancus plagipennis*	Common Assassin Bug		1
		Scutteleridae		Shield Backed Bugs		1
		Veliidae		Water Treaders		1
	Hymenoptera					
		Apidae		Bees	X	
		Apidae - Apinae	*Apis mellifera*	European Honey Bee		1
		Braconidae		Braconid Wasps		1
		Formicidae		Ants	X	
		Formicidae - Dolichoderinae	*Anonychromyrma sp.*	Ants		1
		Formicidae - Dolichoderinae	*Iridomyrmex chasei*	Tyrant Ants		1
		Formicidae - Dolichoderinae	*Leptomyrmex* sp.	Spider Ants		1
		Formicidae - Ectatominae	*Rhytidoponera metallica*	Greed-headed Ant		1
		Formicidae - Formicinae	*Notoncus capitatus*	Ants		1
		Formicidae - Formicinae	*Nylanderia* sp.	Ants		1
		Formicidae - Formicinae	*Polyrachis* sp.	Ants		1
		Formicidae - Myrmiicinae	*Myrmecia* sp.	Jumping Ants		1
		Ichneumonoidea (superfamily)		Parasitic Wasps	X	
		Ichneumonidae - Ichneumoninae		Ichneumon Wasps		1
		Mymaridae		Fairy Flies		2
		Pergidae		Sawflies		2
		Vespidae		Vespid Wasps	X	
	Lepidoptera					
		Danainae (subfamily)		Milkweed Butterflies	X	
		Geometridae		Geometer Moths	X	
		Hesperidae		Skippers	X	1
		Nymphalidae		Swallowtail Butterflies	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Nymphalidae	*Euploea core*	Common Crow Butterfly		1
		Psyshidae		Case Moths		1
		Sesiidae		Clearwing Moths	X	
		Sphingigae		Hawk Moths	X	
				Moths		18
	Mantodea					
		Mantidae		Praying Mantis	X	
	Neuroptera					
				Lacewings		1
	Odonata - Anisoptera					
				Dragonflies	X	1
	Orthoptera					
		Acrididae		Grasshoppers	X	
		Gryllacridae		Tree Crickets	X	
		Gryllidae		True Crickets	X	1
		Gryllotalpidae		Mole Crickets	X	
		Tettigoniidae		Katydids	X	1
	Plecoptera					
				Stoneflies	X	
	Trichoptera					
				Caddisflies		1
Arthropoda - Malacostraca						
	Amphipoda					
		Taltridae		Amphipods		1
	Isopoda					
		Oniscidea	*Armadillidium vulgare*	Slaters		1
Molusca - Gastropoda						
	Helicoidea					
		Helicidae		Snails	X	
	Parmacelloidea					
		Milacidae		Slugs	X	
	Pulmonata					
		Planorbidae		Planorbid Snails		2

Invertebrates recorded in the Field of Mars Reserve

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
Annelida - Clitellata						
	Hirudinea					
				Leeches	X	
Annelida - Oligochaeta						

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Megadrilacea			Earthworms	X	1
Arthropoda - Arachnida						
	Araneae					
		Araneidae		Orb-weaving Spiders	X	5
		Araneidae	*Araneus* sp.	Orb-weaving Spiders		3
		Araneidae	*Argiope keyserlingi*	St Andrew's Cross Spider		1
		Araneidae	*Eriophora* sp.	Orb-weaving Spiders		1
		Araneidae	*Phonognatha* sp.	Leaf Curling Spiders		1
		Deinopidae	*Deinopis* sp.	Net-casting Spiders		1
		Lycosidae		Wolf spiders	X	1
		Oxypodidae	*Oxyopes* sp.	Lynx Spiders		3
		Salticidae		Jumping Spiders		7
		Tetragnathidae	*Leucage granulata*	Silver Orb Spider		1
		Tetragnathidae		Stretch Spiders	X	2
		Theridiidae	*Argyrodes* sp.	Scaffold-web Weavers		1
		Theridiidae		Scaffold-web Weavers		1
		Thomisidae	*Phrynarachne* sp.	Crab Spiders		1
		Thomisidae	*Sidymella* sp.	Crab Spiders		1
		Thomisidae		Crab Spiders		3
		Zodariidae	*Storena* sp.	Ant-hunting Spiders		1
		Zodariidae		Ant-hunting Spiders		2
	Araneae - Mygalophae					
		Idiopidae		Trapdoor Spiders		1
	Trombidiformes					
		Trombidiidae		Mites	X	2
Arthropoda - Chilopoda						
	Scolopendromorpha					
		Scolopendridae		Centipedes	X	
		Scolopendridae	*Scolopendra* sp.	Centipedes		1
Arthropoda - Diplopoda						
				Millipedes	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Polydesmida					
				Polydesmid Millipedes		1
	Spirobolida					
				Spirobolid millipede		1
Arthropoda - Entognatha						
				Springtails	X	
	Entomobryomorpha					
		Isotomidae		Springtails		3
	Symphypleona					
		Smithuridae		Springtails		4
Arthropoda - Insecta						
	Blattodea					
		Blaberidae		Bark Cockroaches		1
		Blattidae		Cockroaches	X	4
		Termitidae	*Nasutitermes* sp.	Termites		1
		Termitidae		Termites	X	
	Coleoptera					
		Buprestidae		Jewel Beetles	X	
		Carabidae		Ground Beetles	X	2
		Cerambycidae		Long-horned beetles	X	
		Chrysomelidae		Leaf Blisters	X	
		Chrysomelidae - Cryptocephalinae		Leaf Cylinder Beetles		2
		Cincindelidae		Tiger Beetles	X	
		Cleridae		Clerid Beetles		1
		Coccinellidae		Labybirds	X	
		Coccinellidae	*Cocinella* sp.	Ladybirds		3
		Curculionidae		Weevils	X	
		Dytiscidae		Diving Beetles	X	
		Elateridae		Click Beetles	X	
		Gyrrinidae		Whirligig beetles	X	
		Scarabaeidae		Scarab Beetles	X	
		Scarabaeidae		Cockchafers		3
		Silphidae		Carrion Beetles	X	
		Staphylinidae		Rove Beetles	X	
		Zophoridae		Ironbark beetles	X	
	Dermaptera					
				Earwigs	X	1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Diptera					
		Asilidae		Robber Flies	X	
		Asilidae - Ommatiinae	*Ommatius* sp.	Feathery Antennae Robber Flies		1
		Athericidae		Water Snipe Flies		1
		Calliphoridae		Blow Flies	X	
		Calliphoridae	*Calliphora* sp.	Blowflies		1
		Ceratopogonidae		Biting Midges		4
		Chironomidae		Midges	X	
		Culicidae		Mosquitoes	X	
		Empididae		Balloon Flies		2
		Muscidae		Bush Flies	X	3
		Mycetophilidae		Fungus Gnats		4
		Stratiomyidae		Soldier Flies		2
		Syrphidae		Hover Flies	X	
		Tabanidae		March Flies	X	
		Tephritidae		Fruit Flies		1
		Tipulidae		Crane Flies	X	1
				Flies		1
	Diptera - Nematocera					
				Fungus Gnats and Midges		9
	Ephemeroptera					
				Mayflies	X	
	Hemiptera					
		Alydidae	*Noliphus* sp.	Board-headed Bugs		1
		Aphididae		Aphids	X	
		Cicadellidae		Leaf Hoppers	X	
		Cicadellidae		Leafhoppers and Treehoppers		8
		Cicadellidae		Leafhoppers		1
		Cicadidae - Cicadinae		Cicadas	X	1
		Cixiidae		Cixiid Planthoppers		2
		Coccoidea		Scale Bugs	X	
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers		1
		Flatidae		Plant Hoppers		1
		Fulgoridae	*Eurinopsyche* sp.	Fulorid Planthopper		1
		Gerridae		Water Striders	X	
		Lygaeidae		Ground Bugs	X	

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Margarodidae		Mealy Bugs		1
		Membracidae	*Sextius* sp.	Horned Treehoppers		1
		Notonectidae		Backswimmers	X	2
		Pentatomidae		Stink Bugs	X	
		Reduviidae		Assassin Bugs	X	
		Reduviidae	*Pristhesancus plagipennis*	Common Assassin Bug		1
		Ricaniidae		Ricaniid Planthopper		1
	Hymenoptera					
		Apidae		Bees	X	
		Apidae	*Xylocopa bombylans*	Metallic Carpenter Bee		1
		Apidae	*Amegilla* sp.	Blue-banded Bees		1
		Braconidae		Braconid Wasps		1
		Formicidae		Ants	X	
		Formicidae - Dolichoderinae	*Anonychromyrma* sp.	Ants		1
		Formicidae - Dolichoderinae	*Iridomyrmex chasei*	Tyrant Ants		1
		Formicidae - Ectatominae	*Rhytidoponera metallica*	Greed-headed Ant		1
		Formicidae - Formicinae	*Camponotus consobrinus*	Ants		1
		Formicidae - Formicinae	*Camponotus nigriceps*	Ants		1
		Formicidae - Formicinae	*Notoncus capitatus*	Ants		1
		Formicidae - Formicinae	*Nylanderia* sp.	Ants		2
		Formicidae - Formicinae	*Paraparatrechina* sp.	Ants		1
		Formicidae - Formicinae	*Polyrachis sp.*	Ants		2
		Formicidae - Myrmicinae	*Aphenogaster longiceps*	Ants		1
		Formicidae - Myrmicinae	*Crematogaster* sp.	Ants		2
		Formicidae - Myrmicinae	*Monomorium* sp.	Ants		1
		Formicidae - Myrmicinae	*Pheidole* sp.	Ants		1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
		Formicidae - Myrmicinae	*Tetramorium* sp.	Ants		1
		Formicidae - Myrmiicinae	*Myrmecia* sp.	Bull Ants		1
		Formicidae - Myrmiicinae	*Myrmecia* sp.	Jumping Ants		1
		Ichneumonoidea (superfamily)		Parasitic Wasps	X	
		Ichneumonidae - Banchinae		Mottled Ichneumon Wasps		1
		Ichneumonidae - Ichneumoninae		Orange Ichneumon Wasps		1
		Sphecidae		Sphecid Wasps	X	
		Tiphiidae		Tiphiid Wasps		1
		Vespidae		Vespid Wasps	X	
		Vespidae	*Polistes* sp.	Paper Nest Wasps		1
	Lepidoptera					
		Arctidae		Tiger Moths	X	
		Danainae (subfamily)		Milkweed Butterflies	X	
		Geometridae		Geometer Moths	X	2
		Hesperidae		Skippers	X	1
		Lycaenidae		Ant Blue Butterflies	X	
		Notodontidae - Thaumetopoeinae		Processionary Caterpillars		1
		Nymphalidae	*Euploea core*	Common Crow Butterfly		1
		Nymphalidae		Swallowtail Butterflies	X	
		Sesiidae		Clearwing Moths	X	
		Sphingigae		Hawk Moths	X	
				Moths		31
	Mantodea					
		Mantidae		Praying Mantis	X	2
	Neuroptera					
				Lace Wings	X	
	Odonata					
		Lestidae		Damselflies		3
		Zygoptera		Damselflies	X	
		Anisoptera		Dragonflies	X	4

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	Biosphere 2006 (pres/abs)	ACA 2016 (# species)
	Orthoptera					
		Acrididae		Grasshoppers	X	3
		Gryllacridae		Tree Crickets	X	
		Gryllidae		True Crickets	X	2
		Gryllotalpidae		Mole Crickets	X	
		Tettigoniidae		Katydids	X	
	Plecoptera					
				Stoneflies	X	
	Trichoptera					
				Caddisflies		1
Arthropoda - Malacostraca						
	Amphipoda					
		Taltridae		Amphipods		1
Arthropoda - Malacostraca						
	Isopoda					
		Oniscidea	*Armadillidium vulgare*	Slaters		1
		Oniscidea	*Porcellio scaber*	Slaters		1
Molusca - Gastropoda						
	Helicoidea					
		Helicidae		Snails	X	
	Parmacelloidea					
		Milacidae		Slugs	X	
	Pulmonata					
		Planorbidae		Planorbid Snails		1
				Land Snails		1
	Sigmurethra					
		Milacidae		Slugs		1

Invertebrates recorded in Bell Park

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
Annelida - Oligochaeta					
	Megadrilacea			Earthworms	1
Arthropoda - Arachnida					
	Araneae				
		Araneidae	*Araneus* sp.	Orb-weaving Spiders	1
		Araneidae	*Dolophones* sp.	Orb-weaving Spiders	1
		Araneidae	*Eriophora* sp.	Orb-weaving Spiders	1
		Araneidae		Orb-weaving Spiders	4
		Miturgidae		Prowling Spiders	1
		Oxypodidae	*Oxyopes* sp.	Lynx Spiders	1
		Salticidae		Jumping Spiders	1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
		Sparassidae		Huntsman Spiders	1
		Tetragnathidae	*Leucage granulata*	Silver Orb Spider	1
		Uloboridae		Uloborid Spiders	1
	Trombidiformes				
		Trombidiidae		Mites	1
Arthropoda - Diplopoda					
	Polydesmida			Polydesmid Millipedes	2
Arthropoda - Entognatha					
	Entomobryomorpha				
		Isotomidae		Springtails	1
	Symphypleona				
		Smithuridae		Springtails	2
Arthropoda - Insecta					
	Blattodea				
		Blaberidae		Bark Cockroaches	1
	Coleoptera				
		Carabidae		Ground Beetles	1
		Chrysomelidae - Chrysomelinae		Leaf Beetles	1
		Staphylinidae		Rove Beetles	1
	Diptera				
		Culicidae	*Culex* sp.	Mosquitoes	3
		Muscidae		Bush Flies	2
		Mycetophilidae		Fungus Gnats	2
		Sciaridae		Fungus Gnats	2
		Stratiomyidae		Soldier Flies	1
		Syrphidae		Hover Flies	1
		Tipulidae		Crane Flies	1
	Diptera - Nematocera				
				Fungus Gnats and Midges	2
	Hemiptera				
		Aphididae		Aphids	2
		Cicadellidae		Leafhoppers and Treehoppers	2
		Cicadellidae		Leafhoppers	1
		Coccoidea		Scale Insects	3
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers	1
		Miridae	*Trilaccus* sp.	Mirid Bugs	1
		Miridae		Mirid Bugs	1
		Reduviidae		Assassin Bug	1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
	Hymenoptera				
		Apidae - Apinae	*Apis mellifera*	European Honey Bee	1
		Formicidae - Dolichoderinae	*Anonychromyrma* sp.	Ants	1
		Formicidae - Dolichoderinae	*Iridomyrmex chasei*	Tyrant Ants	1
		Formicidae - Dolichoderinae	*Iridomyrmex* sp.	Tyrant Ants	1
		Formicidae - Ectatominae	*Rhytidoponera metallica*	Greed-headed Ant	1
		Formicidae - Formicinae	*Notoncus capitatus*	Ants	1
		Formicidae - Myrmicinae	*Crematogaster* sp.	Ants	2
		Formicidae - Myrmicinae	*Pheidole* sp.	Ants	1
		Ichneumonidae - Ichneumoninae		Orange Ichneumon Wasps	1
	Lepidoptera				
		Psyshidae		Case Moths	1
				Moths	21
	Neuroptera			Lacewings	1
	Trichoptera			Caddisflies	2
Arthropoda - Malacostraca					
	Amphipoda				
		Taltridae		Amphipods	2
	Isopoda				
		Oniscidea	*Armadillidium vulgare*	Slaters	1
		Oniscidea	*Porcellio scaber*	Slaters	1

Invertebrates recorded in Outlook Park

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
Arthropoda - Arachnida					
	Araneae				
		Araneidae	*Argiope keyserlingi*	St Andrew's Cross Spider	1
		Araneidae	*Phonognatha* sp.	Leaf Curling Spiders	1
		Araneidae		Orb-weaving Spiders	3
		Clubionidae	*Clubionia* sp.	Sac Spiders	1
		Lycosidae		Wolf Spiders	1
		Oxypodidae	*Oxyopes* sp.	Lynx Spiders	2
		Salticidae		Jumping Spiders	2

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
		Sparassidae		Huntsman Spiders	1
		Tetragnathidae	*Leucage granulata*	Silver Orb Spider	1
		Theridiidae		Scaffold-web Weavers	3
		Thomsidae	*Diaea* sp.	Flower Spiders	2
		Thomsidae		Crab Spiders	1
Arthropoda - Diplopoda					
	Polydesmida				
				Polydesmid Millipedes	2
	Spirostreptida				
				Spirostrepid Millipedes	1
Arthropoda - Entognatha					
	Entomobryomorpha				
		Isotomidae		Springtails	2
Arthropoda - Insecta					
	Blattodea				
		Blaberidae		Bark Cockroaches	1
		Blattidae	*Polyzosteria* sp.	Coackroaches	1
		Blattidae		Coackroaches	2
	Coleoptera				
		Carabidae		Ground Beetles	1
		Chrysomelidae - Chrysomelinae		Leaf Beetles	1
		Elateridae		Click Beetles	1
		Scarabidae		Cockchafers	2
	Diptera				
		Calliphoridae	*Calliphora* sp.	Blowflies	1
		Culicidae	*Culex* sp.	Mosquitoes	5
		Muscidae		Bush Flies	1
		Mycetophilidae		Fungus Gnats	2
		Sciaridae		Fungus Gnats	3
		Stratiomyidae		Soldier Flies	1
		Tipulidae		Crane Flies	2
				Flies	2
	Diptera - Nematocera				
				Fungus Gnats and Midges	6
	Hemiptera				
		Cicadellidae			
				Leafhoppers and Treehoppers	2
		Cicadellidae		Leafhoppers	1
		Cicadidae - Cicadinae		Cicadas	1

Phylum - Class	Order	Family - Subfamily	Genus/species	Common name	ACA 2016 (# species)
		Cixiidae		Cixiid Planthoppers	1
		Eurybrachyidae	*Platybrachys* sp.	Bark Hoppers	1
		Reduviidae		Assassin Bug	1
	Hymenoptera				
		Formicidae - Dolichoderinae	*Iridomyrmex* sp.	Tyrant Ants	1
		Formicidae - Ectatominae	*Rhytidoponera metallica*	Greed-headed Ant	1
		Formicidae - Formicinae	*Paraparatrechina* sp.	Ants	1
		Formicidae - Myrmicinae	*Crematogaster* sp.	Ants	2
		Formicidae - Myrmiicinae	*Myrmecia* sp.	Bull Ants	1
		Ichneumonidae		Ichneumon Wasps	1
	Lepidoptera				
		Nymphalidae	*Euploea core*	Common Crow Butterfly	1
		Psyshidae		Case Moths	1
				Moths	19
	Psocoptera				
				Booklice	3
	Trichoptera				
				Caddisflies	3
Arthropoda - Malacostraca					
	Amphipoda				
		Taltridae		Amphipods	2
	Isopoda				

Reference for Section C

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Appendix C1. Method details

Spotlighting
The head torches used for nocturnal surveys were Ledlenser H14.

Reptile identification
Reptiles were identified visually using:
Wilson, S. and Swan, G., 2013. A complete guide to Reptiles of Australia. 4th edition.

Frog identification
Frogs were identified visually and aurally using the mobile application:
Hoskin, C.J., Grigg, G.C., Stewart, D. A. & Macdonald, S.L., 2015. Frogs of Australia (1.0.2 / 4210) [Mobile application software]. Retrieved from http://www.ugmedia.com.au.

Mammals
Mammals were identified in the field visually using:
Menkhorst, P. and Knight, F., 2010. A field guide to the mammals of Australia. 3rd edition.

Tracks, diggings and scats were visually identified using:
Triggs, B., 2004. Tracks, scats and other traces: a field guide to Australian mammals. Revised edition.

Hair tubes were used for small mammals in preference to cage traps as they are less stressful on fauna, require less handling time, cause less concern with the public and usually aren't interfered with. This technique proved very successful for surveys conducted in other council areas by Biosphere (Kogarah Bushland Reserves: 1997; Rockdale LGA: 1999, Ryde City Council: 2006). This method was used as a repeat from 2006, as per council requirements. The hair tubes used were standard single entrance baited PVC tubes hired from Bernview Environmental Consulting (http://bernviewenviro.com.au/) the same as 2006.
Although hair tubing was once a successful non-invasive sampling technique for small mammals, it has its limitations (Claridge et al. 2010; Paull 2011). Tube placement can influence success rates, and in open public parks there are restrictions to where tubes can be installed. Regardless of how well hidden the tubes were we still found that 12 tubes were moved from their original placement and a further nine were completely missing, presumably stolen by the public or pet dogs. We also found that they required a large amount of handling time, and their detections weren't very substantial. Only black rat (*Rattus rattus*) and brush-tailed possum (*Trichosurus vulpecula*) hair was 'trapped' and both these species were easily detected during active searches. Our recommendations for future small mammal surveys would be a number of infrared digital camera traps with baits. If well hidden and chained to trees/stakes baited cameras require a small amount of handling time, are less installation-site specific, and images can be easily identified in the office.

Birds
Birds were surveyed for using a standard point-count method with flora quadrats as the survey points, details of the method can be found:
http://www.environment.nsw.gov.au/resources/howyoucanhelp/09BirdSurveysBaseline.pdf

Birds were identified visually and aurally using the mobile application:
Morcombe, M. and Stewart, D., 2016. eGuide to the birds of Australia (v1.4.2) [mobile application software].

Owl calls were amplified using a Braven BRV-X Bluetooth speaker, on maximum volume.

Fish
Fish were identified in the hand using:
Schmida, G., 2015. A wild Australia guide to freshwater fishes. 2nd Edition.

Invertebrates
Invertebrates were identified in the hand or under a microscope using:

Nocturnal invertebrates were collected using UV light traps of the following design:
http://www.theskepticalmoth.com/techniques/light-traps/

Acknowledgements

We wish to thank the City of Ryde Environment Unit, Bushcare Volunteers and bush regeneration contractors for their assistance, photographs and anecdotal sightings.

Figures

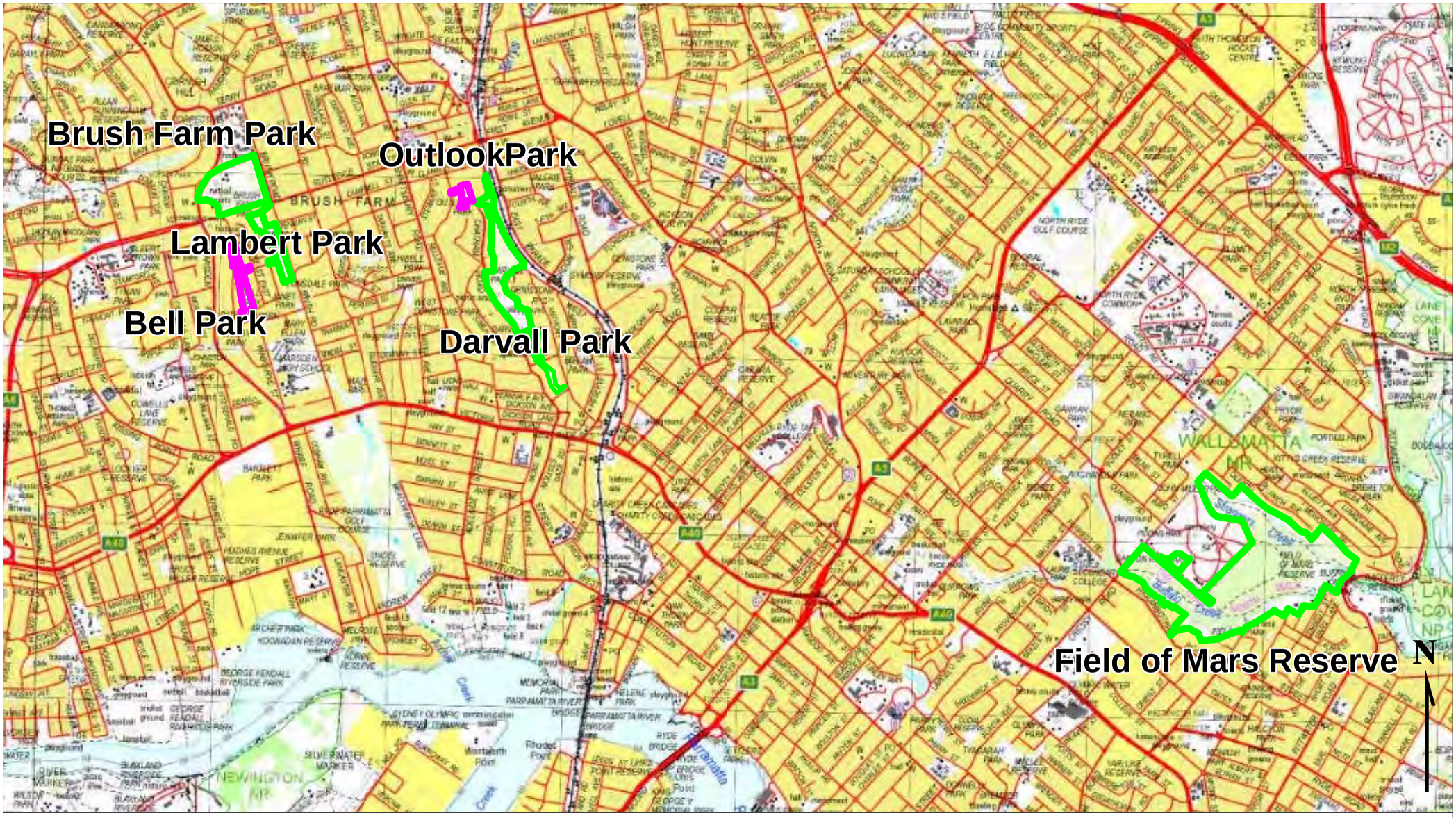
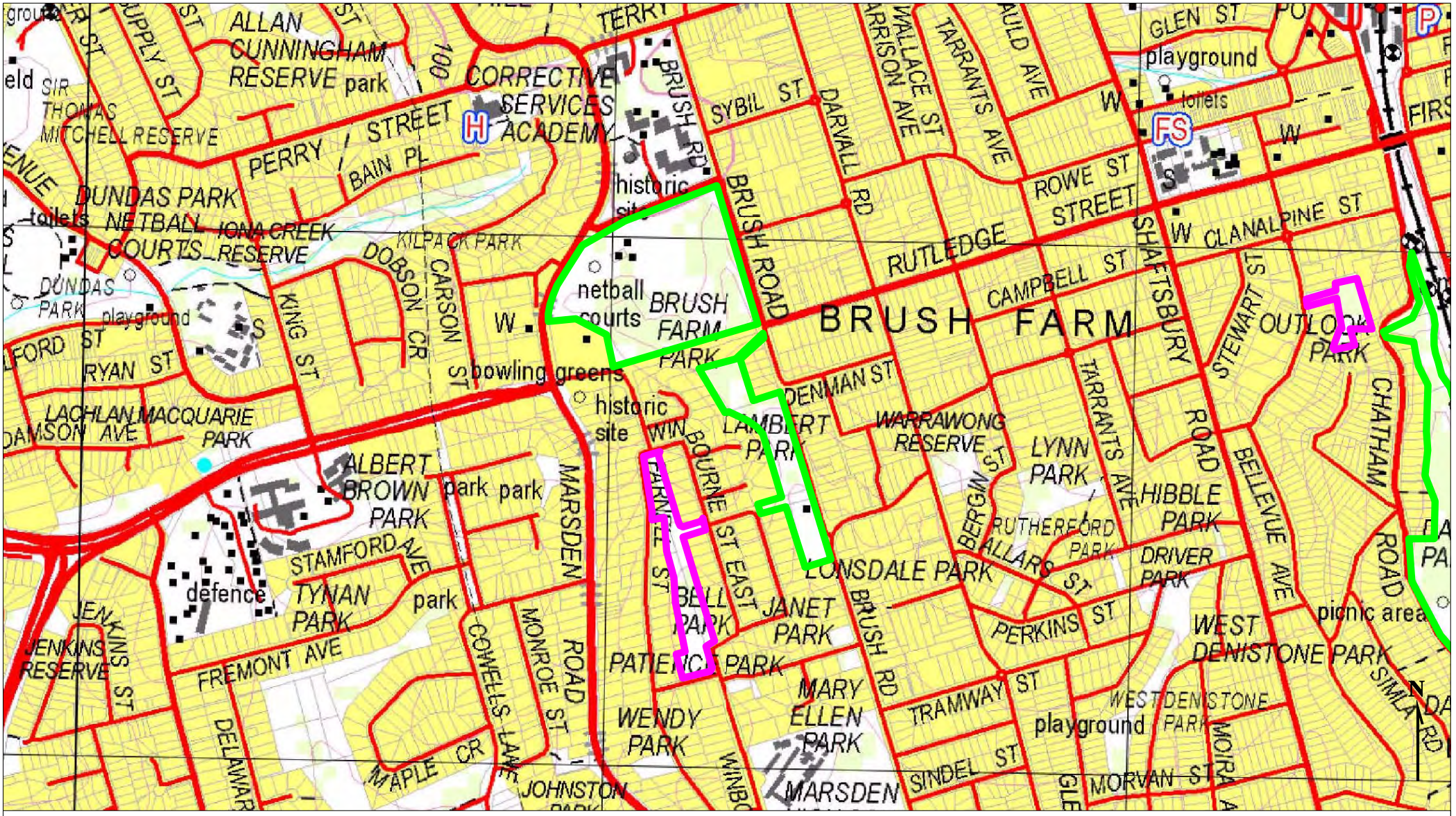


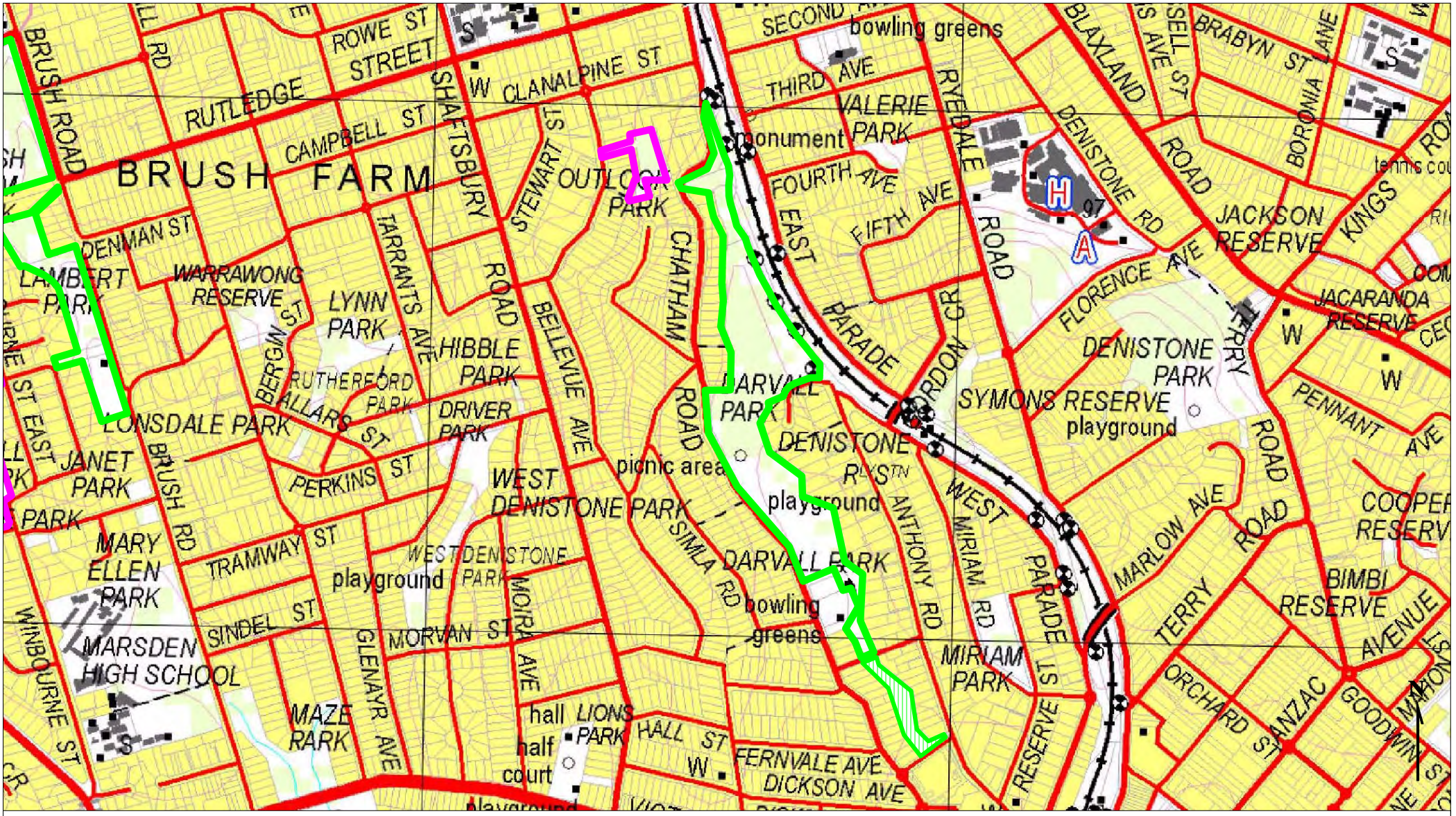
Figure 1a.
Boundaries of the six parks / reserve overlaid on the SIX Maps 1:25 000 topographic map



Site boundary (surveyed in 2006 and 2016)

Site boundary (surveyed in 2016 only)

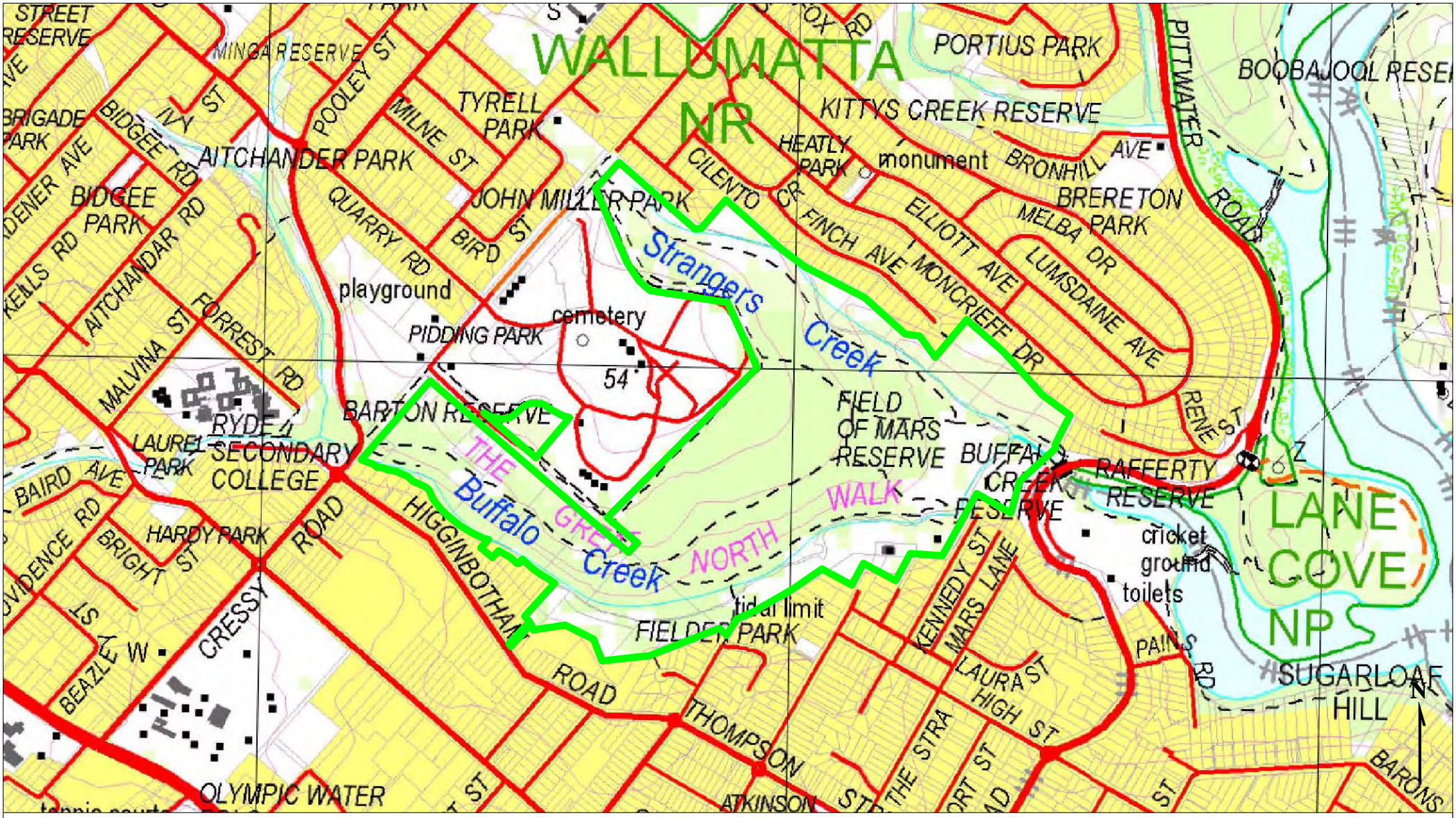
Figure 1a-1.
Boundaries of Bell Park, Brush Farm Park, and Lambert Park, overlaid on the SIX Maps 1:25,000 topographic map



Site boundary (surveyed in 2006 and 2016)

Site boundary (surveyed in 2016 only)

Figure 1a-2.
Boundaries of Darvall Park, and Outlook Park,
overlaid on the SIX Maps 1:25,000 topographic map



Site boundary (surveyed in 2006 and 2016)

Figure 1a-3.
Boundary of the Field of Mars Reserve
overlaid on the SIX Maps 1:25,000 topographic map

Figure 1b.
Boundaries of the six parks / reserve overlaid on the NearMap aerial photograph (dated 19 January 2016)

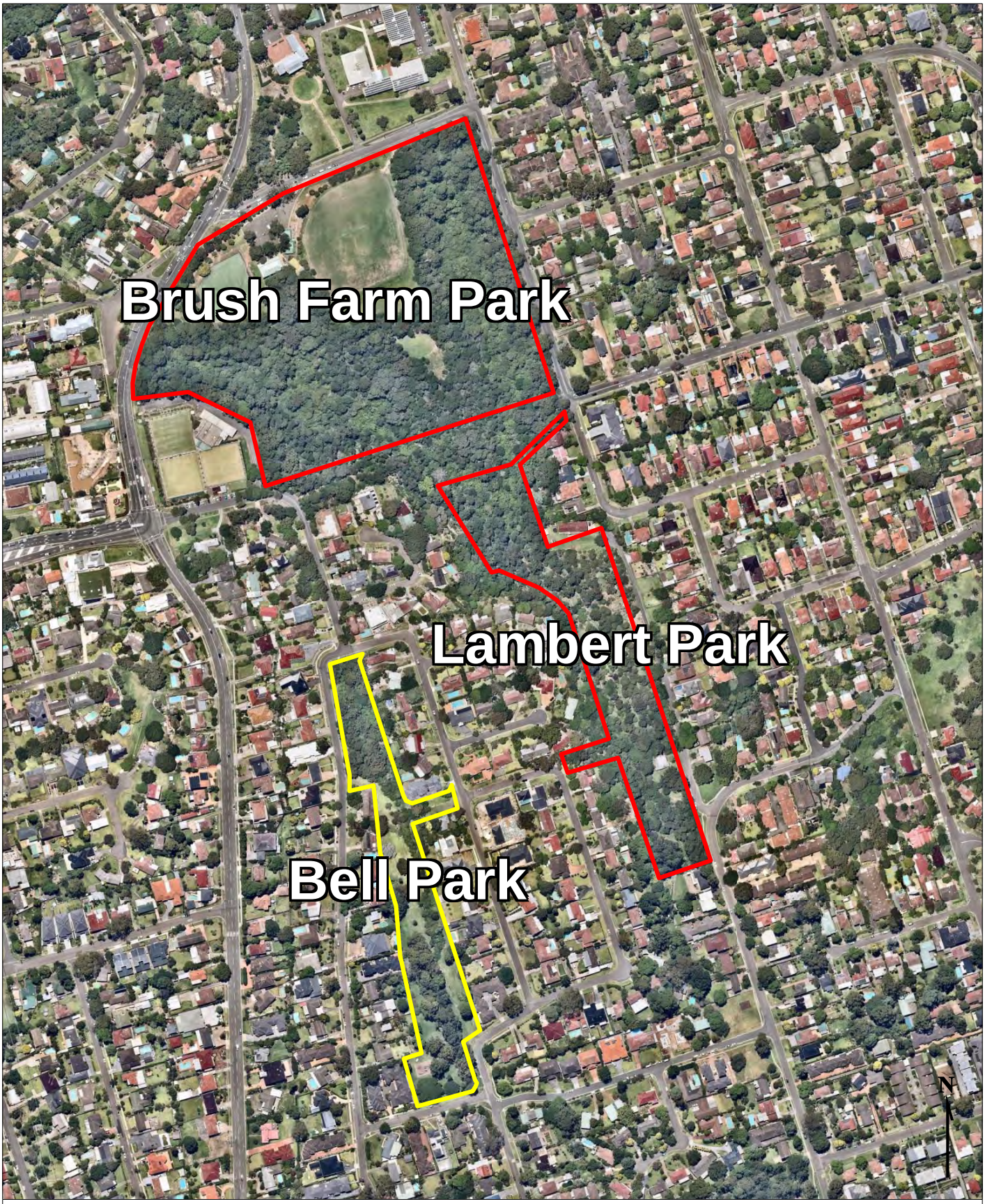
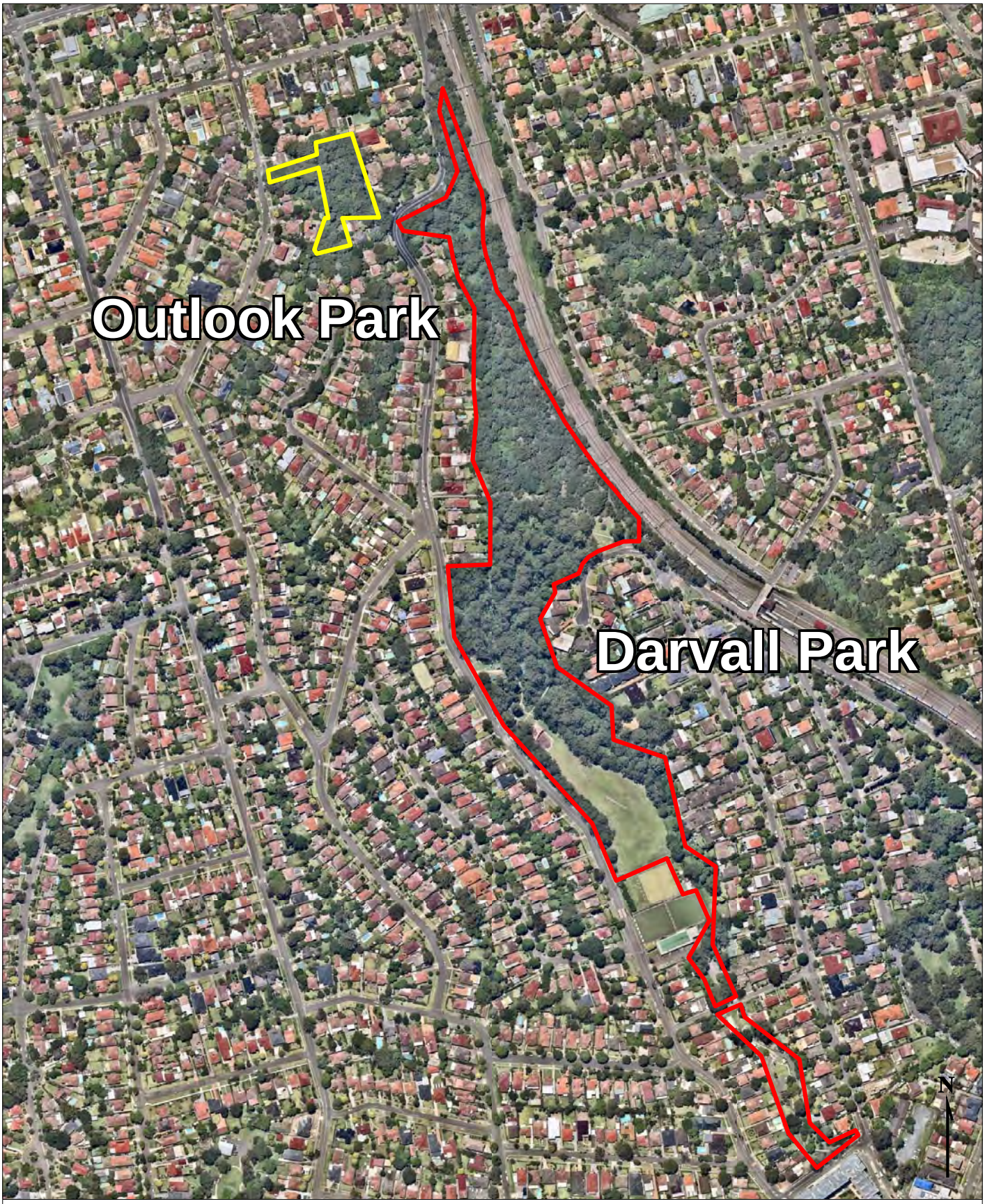


Figure 1b-1.
Boundaries of Brush Farm, Bell Park and Lambert Park overlaid on the NearMap aerial photograph (dated 19 January 2016)

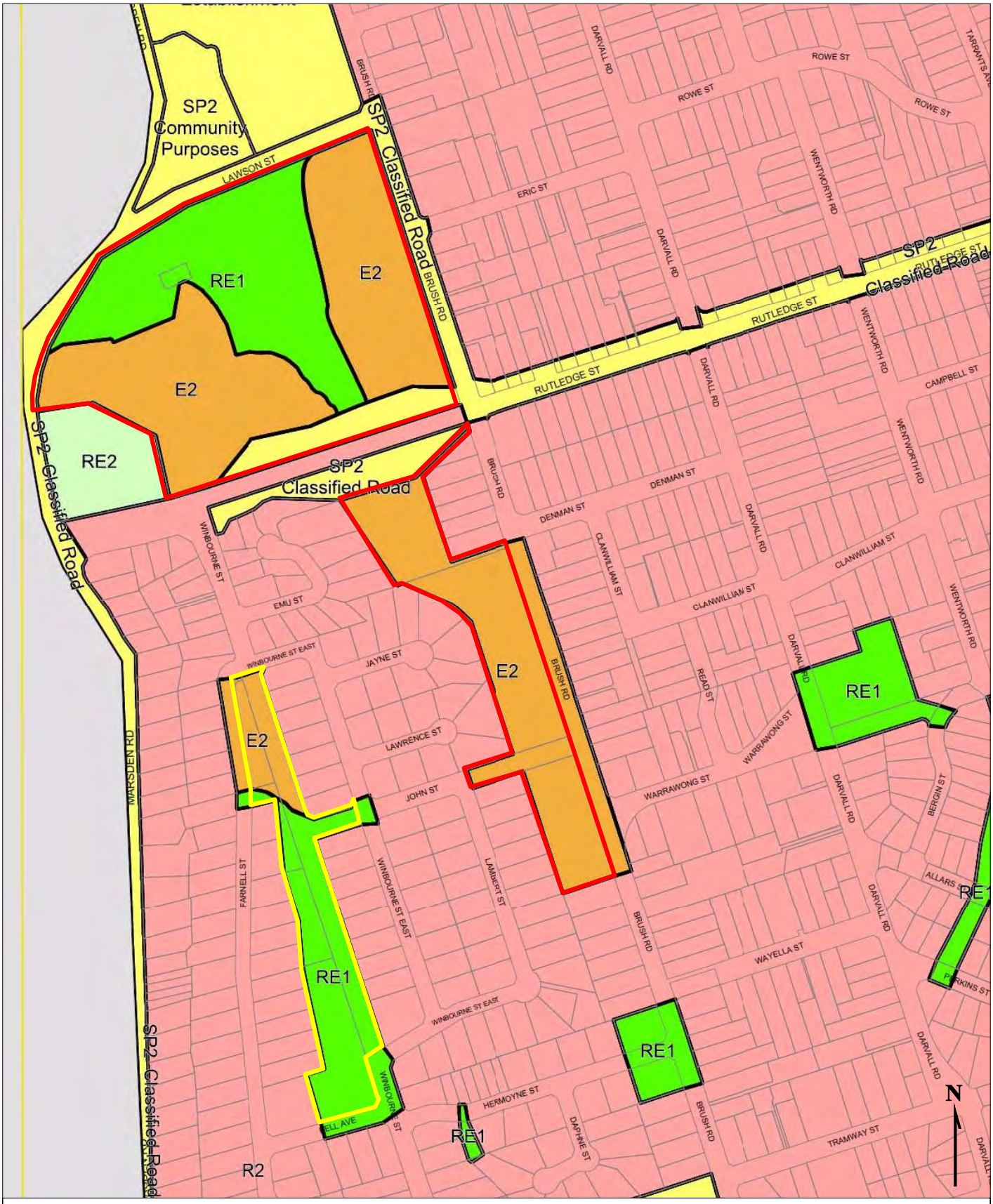


Site boundary (surveyed in 2006 and 2016)
Site boundary (surveyed in 2016 only)

0 120 240
metres

Figure 1b-2.
Boundaries of Darvall and Outlook Park overlaid
on the NearMap aerial photograph (dated 19 January 2016)

Figure 1b-3.
Boundary of the Field of Mars Reserve overlaid on the NearMap aerial photograph (dated 19 January 2016)



- Site boundary (surveyed 2006 and 2016)
- Site boundary (surveyed 2016 only)
- R2 Low Density Residential
- E2 Environmental Conservation
- RE1 Public Recreation
- SP2 Infrastucture
- RE2 Private Recreation

0 100 200
metres

Figure 2a.
Boundaries of Bell Park, Brush Farm Park and Lambert Park overlaid on the Land Zoning map sheet LZN_002 (Ryde LEP 2014)

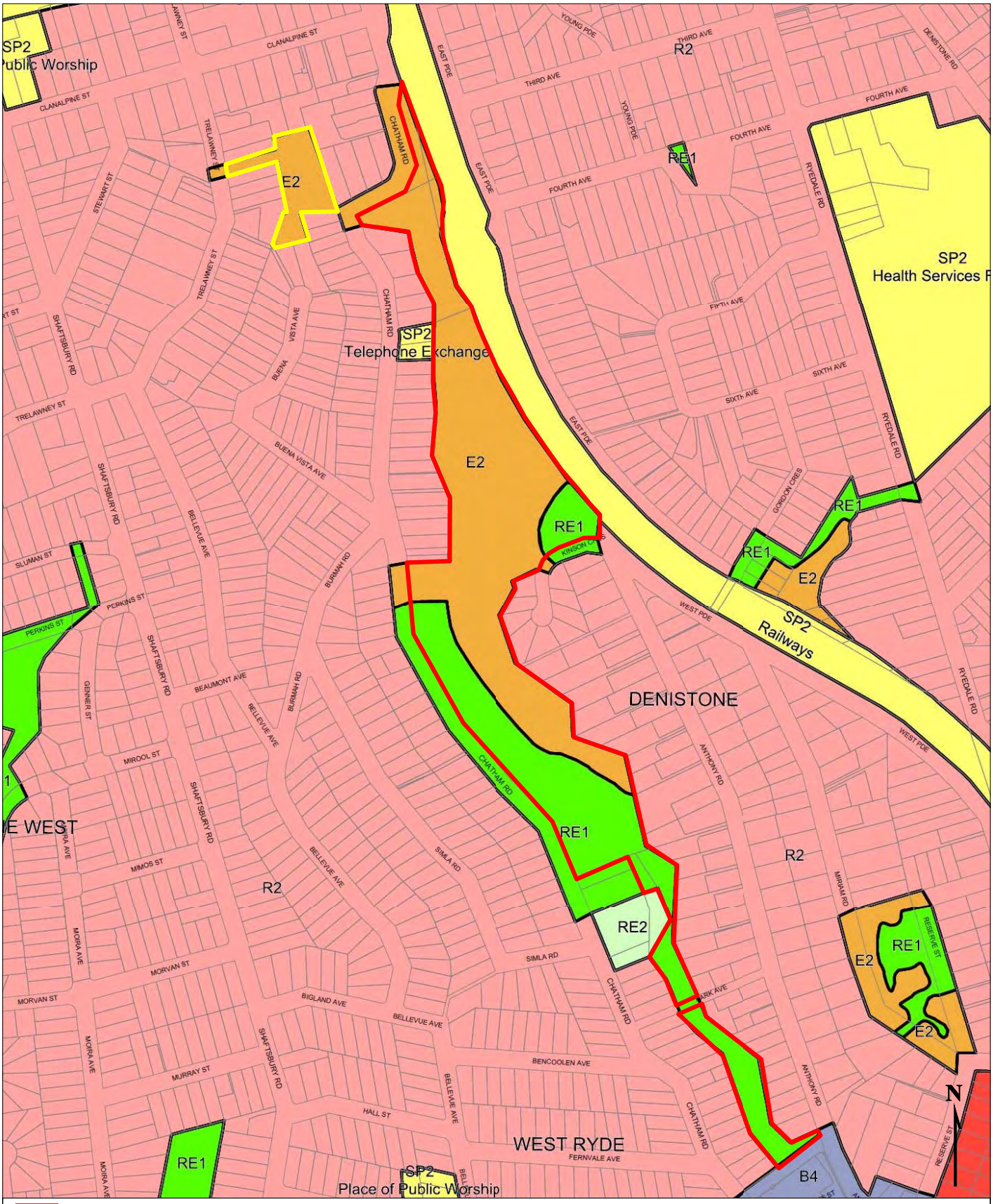


Figure 2b.
Boundaries of Darvall Park and Outlook Park
overlaid on the Land Zoning map sheet LZN_002 (Ryde LEP 2014)

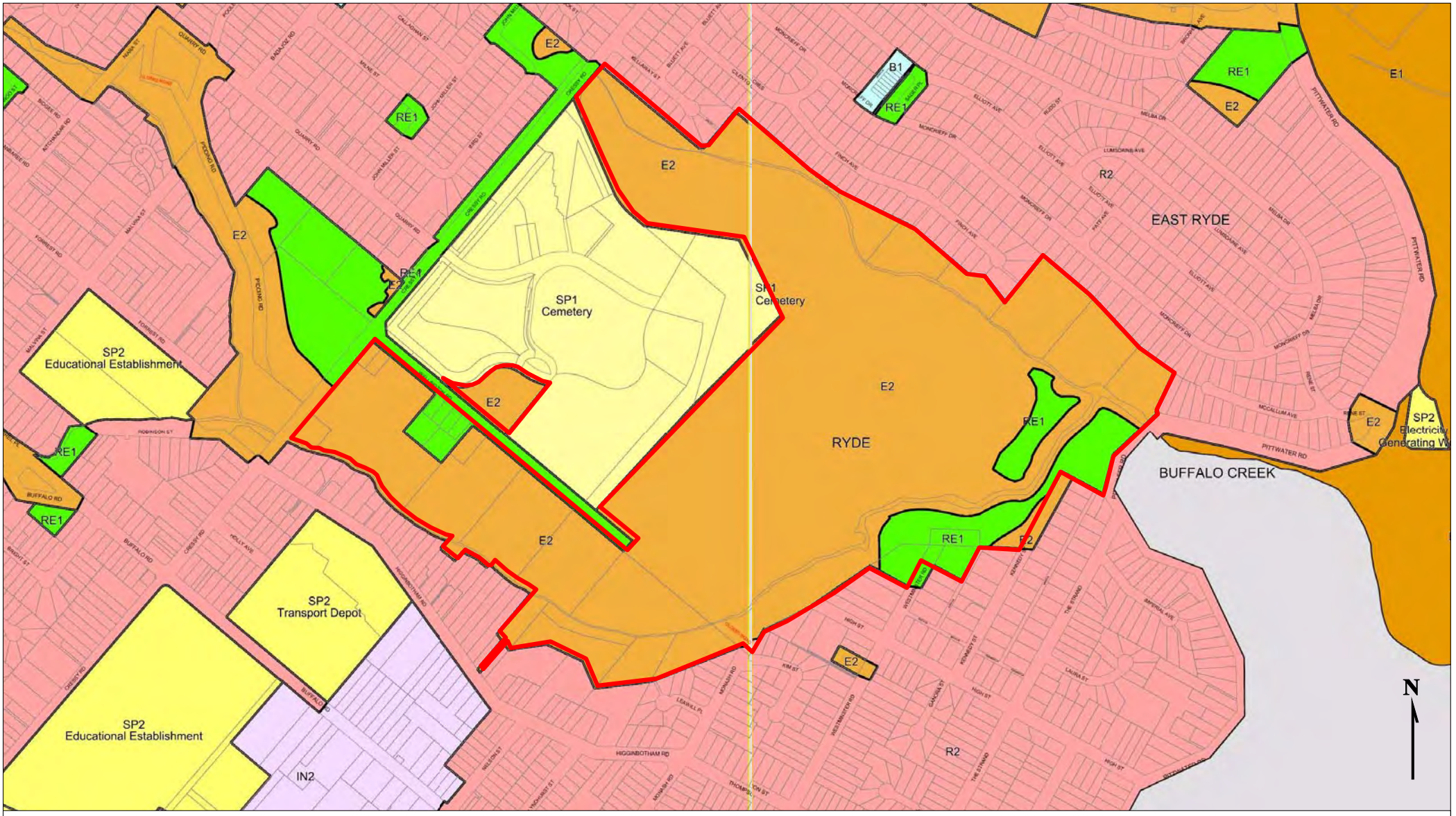


Figure 2c.
Boundary of the Field of Mars Reserve, overlaid on the
Land Zoning map sheets LZN_009 and LZN_010 (Ryde LEP 2014)

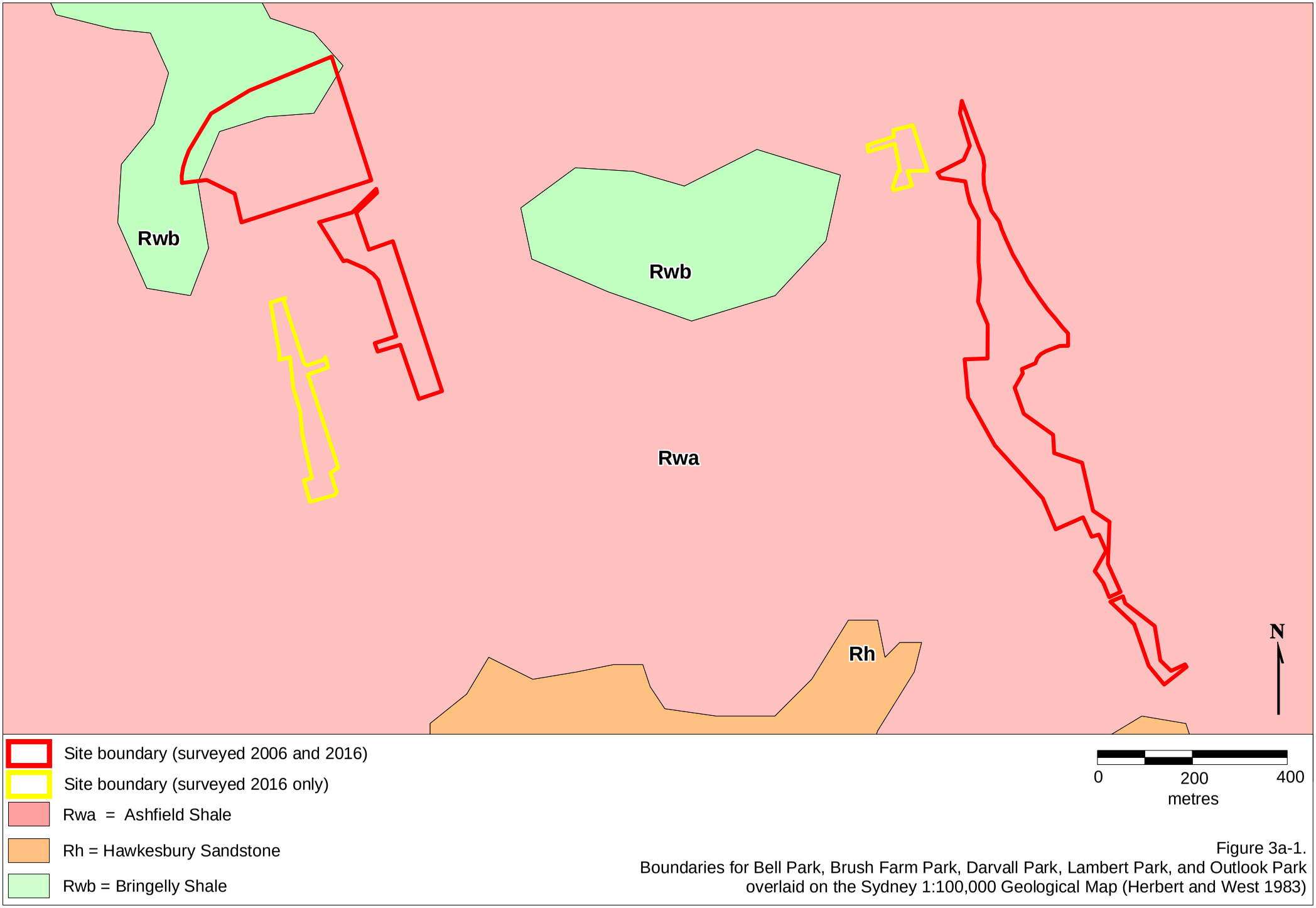


Figure 3a-1.
Boundaries for Bell Park, Brush Farm Park, Darvall Park, Lambert Park, and Outlook Park overlaid on the Sydney 1:100,000 Geological Map (Herbert and West 1983)

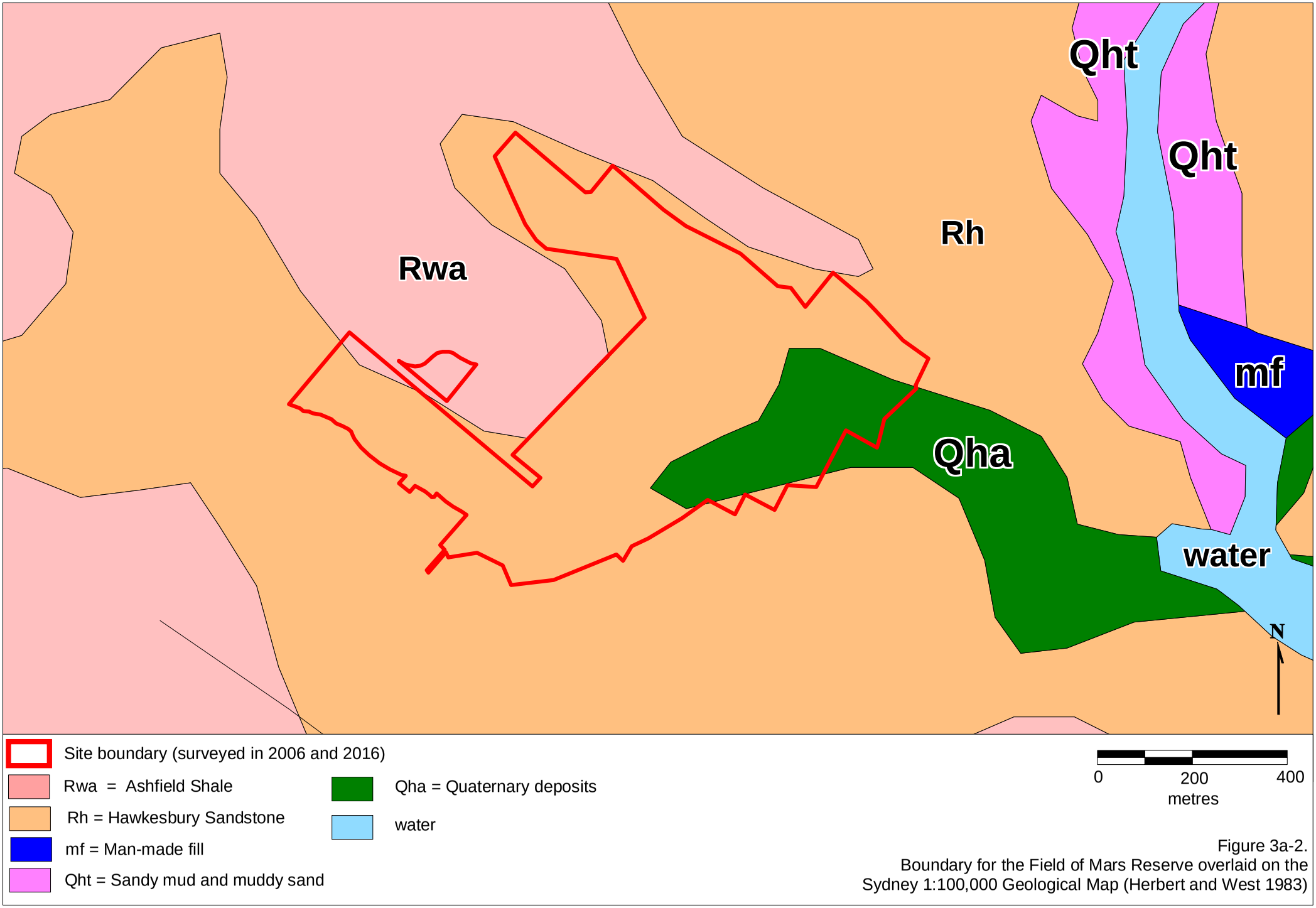


Figure 3a-2.
Boundary for the Field of Mars Reserve overlaid on the Sydney 1:100,000 Geological Map (Herbert and West 1983)

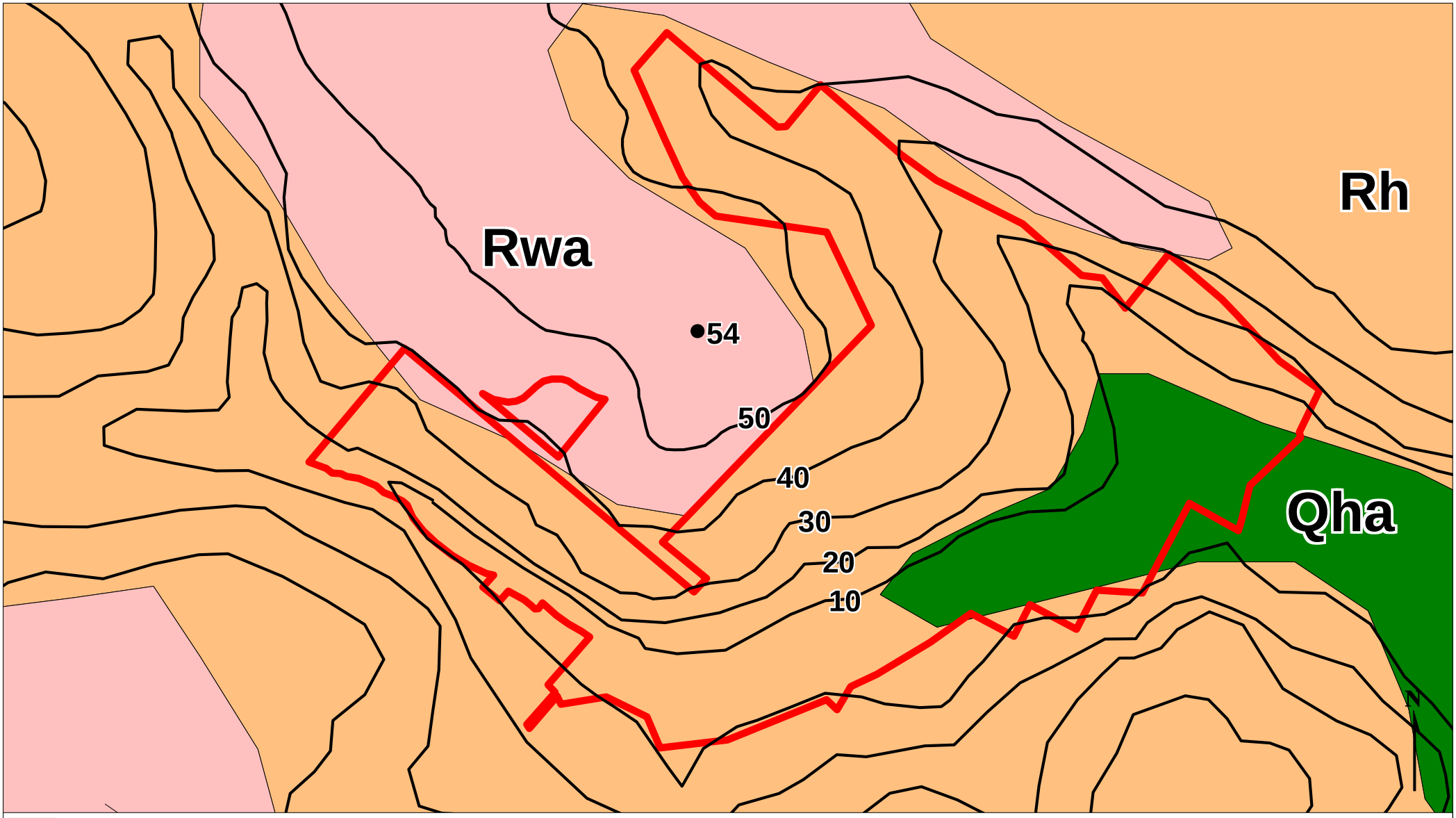


Figure 3a-3.
Boundary for the Field of Mars Reserve overlaid on the Sydney 1:100,000 Geological Map (Herbert and West 1983) with contour lines

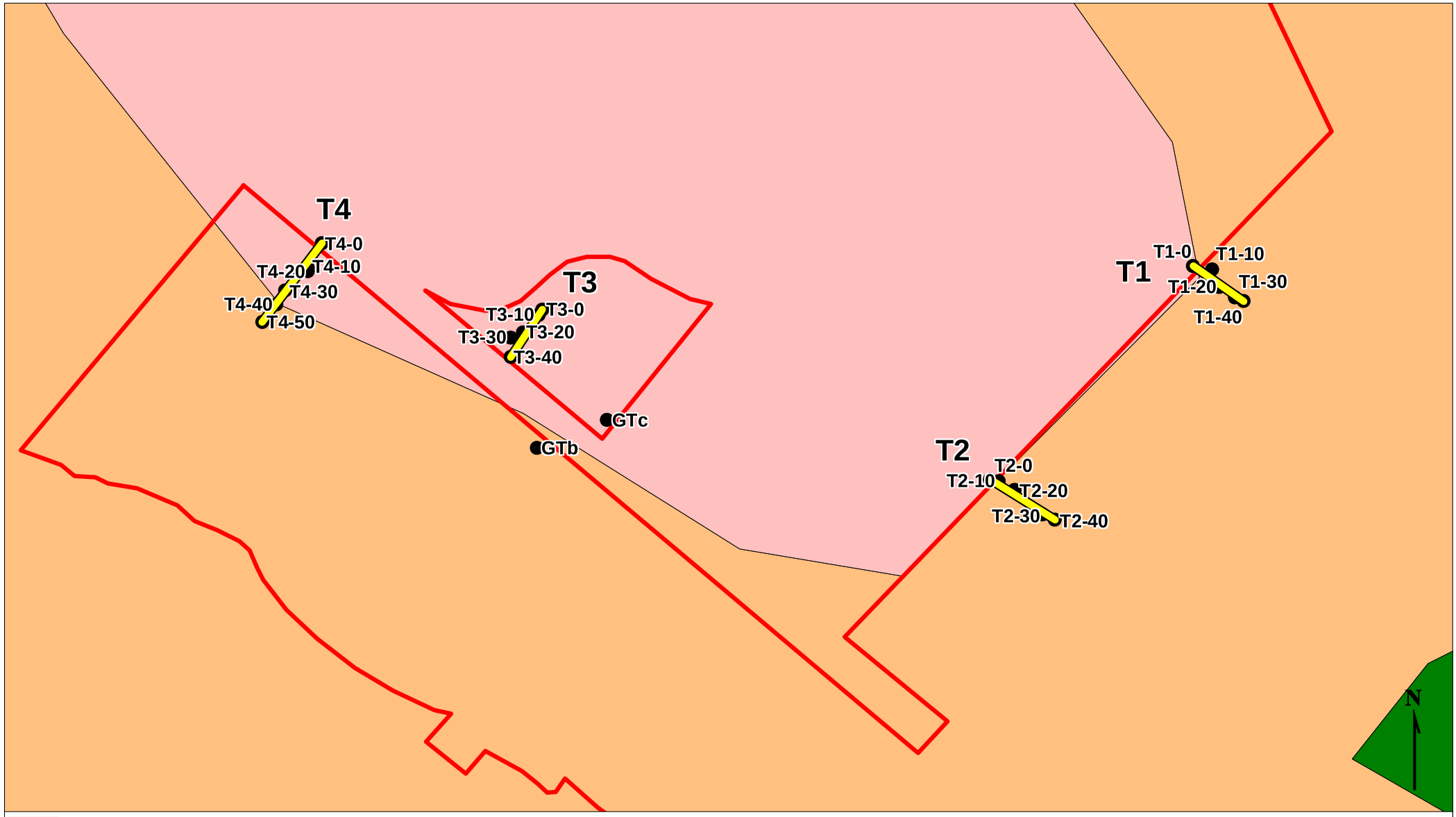


Figure 3a-4.
Soil transects overlaid on the Sydney 1:100,000 Geological Map (Herbert and West 1983)

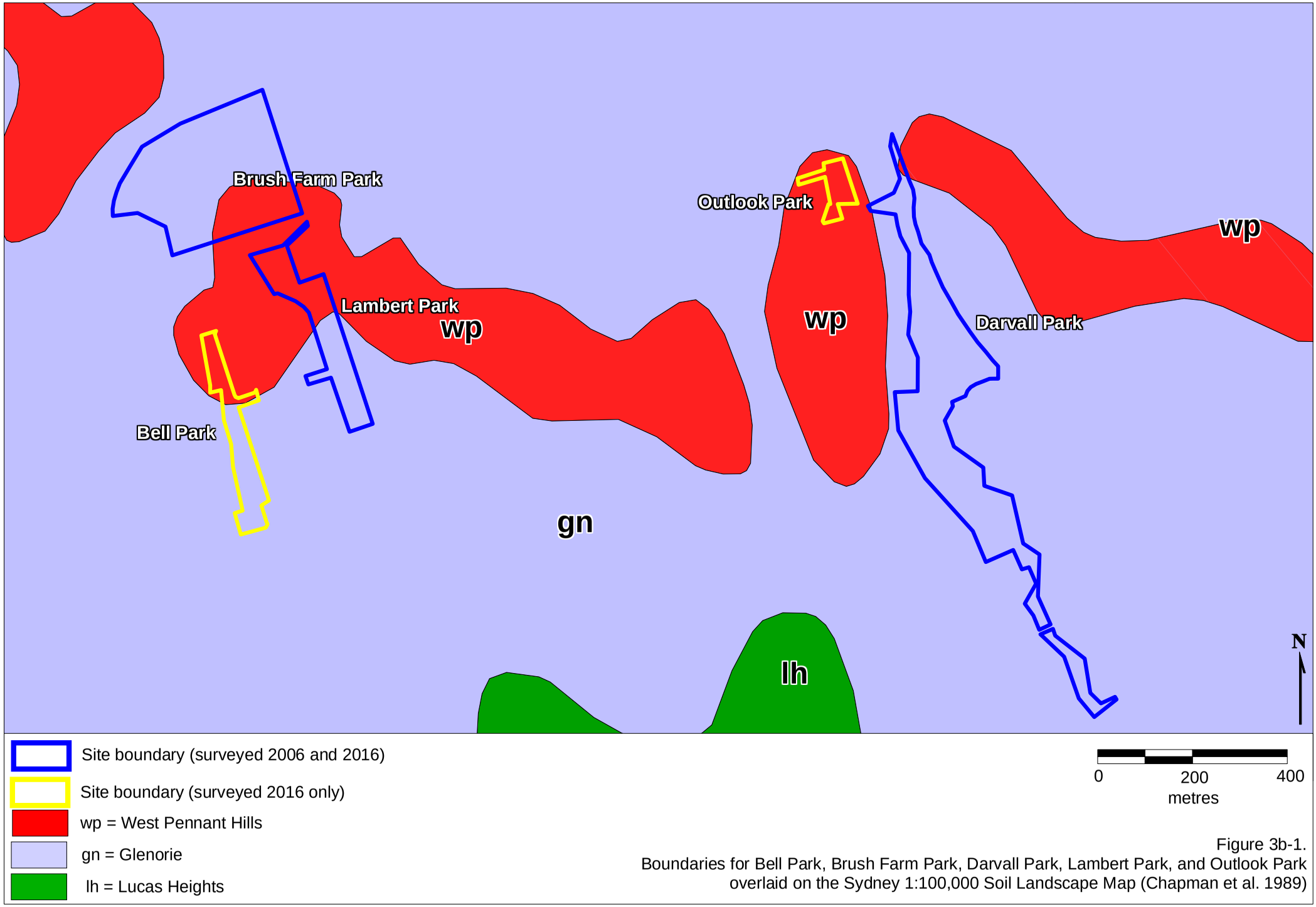


Figure 3b-1.
Boundaries for Bell Park, Brush Farm Park, Darvall Park, Lambert Park, and Outlook Park overlaid on the Sydney 1:100,000 Soil Landscape Map (Chapman et al. 1989)

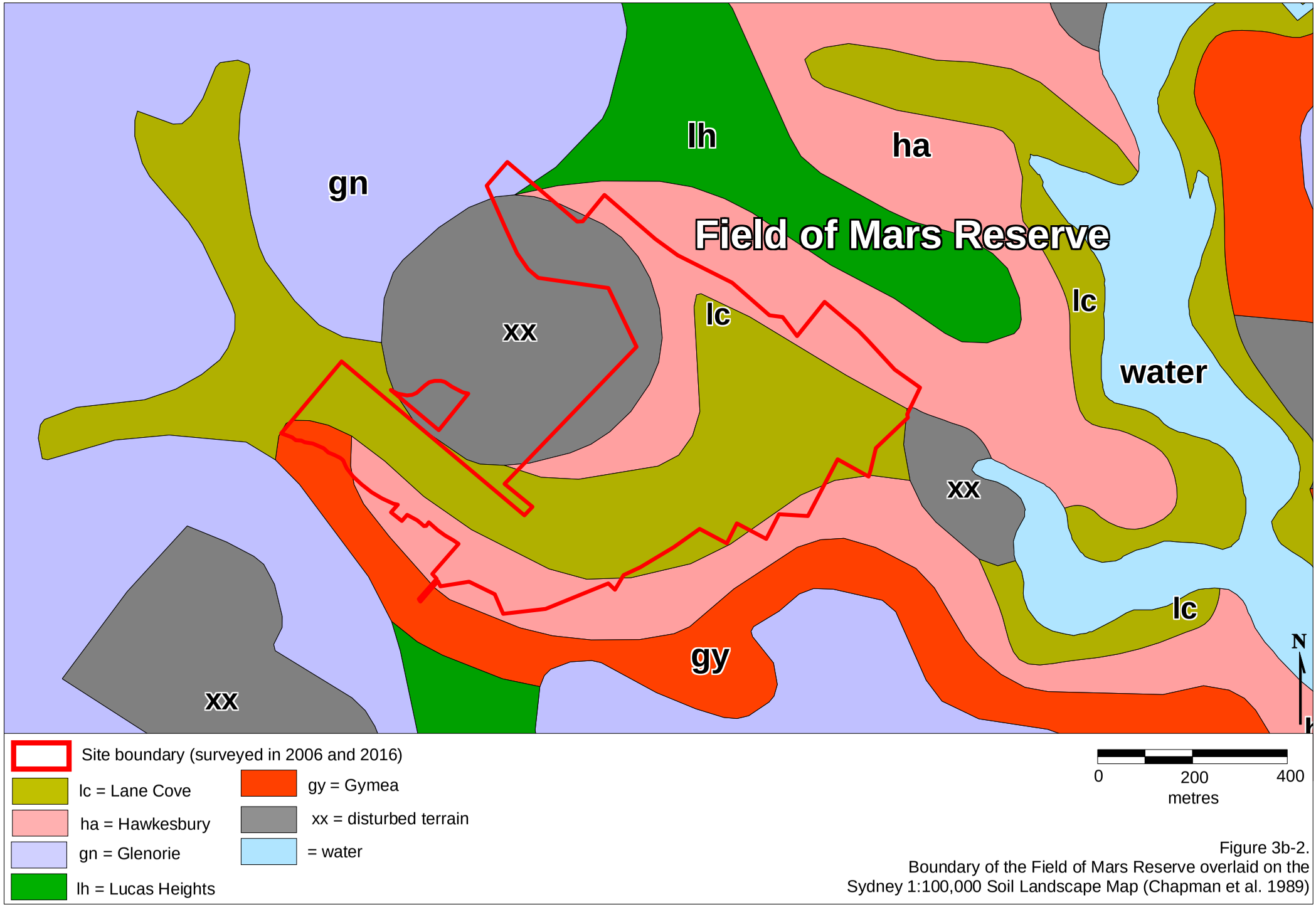


Figure 3b-2.
Boundary of the Field of Mars Reserve overlaid on the Sydney 1:100,000 Soil Landscape Map (Chapman et al. 1989)

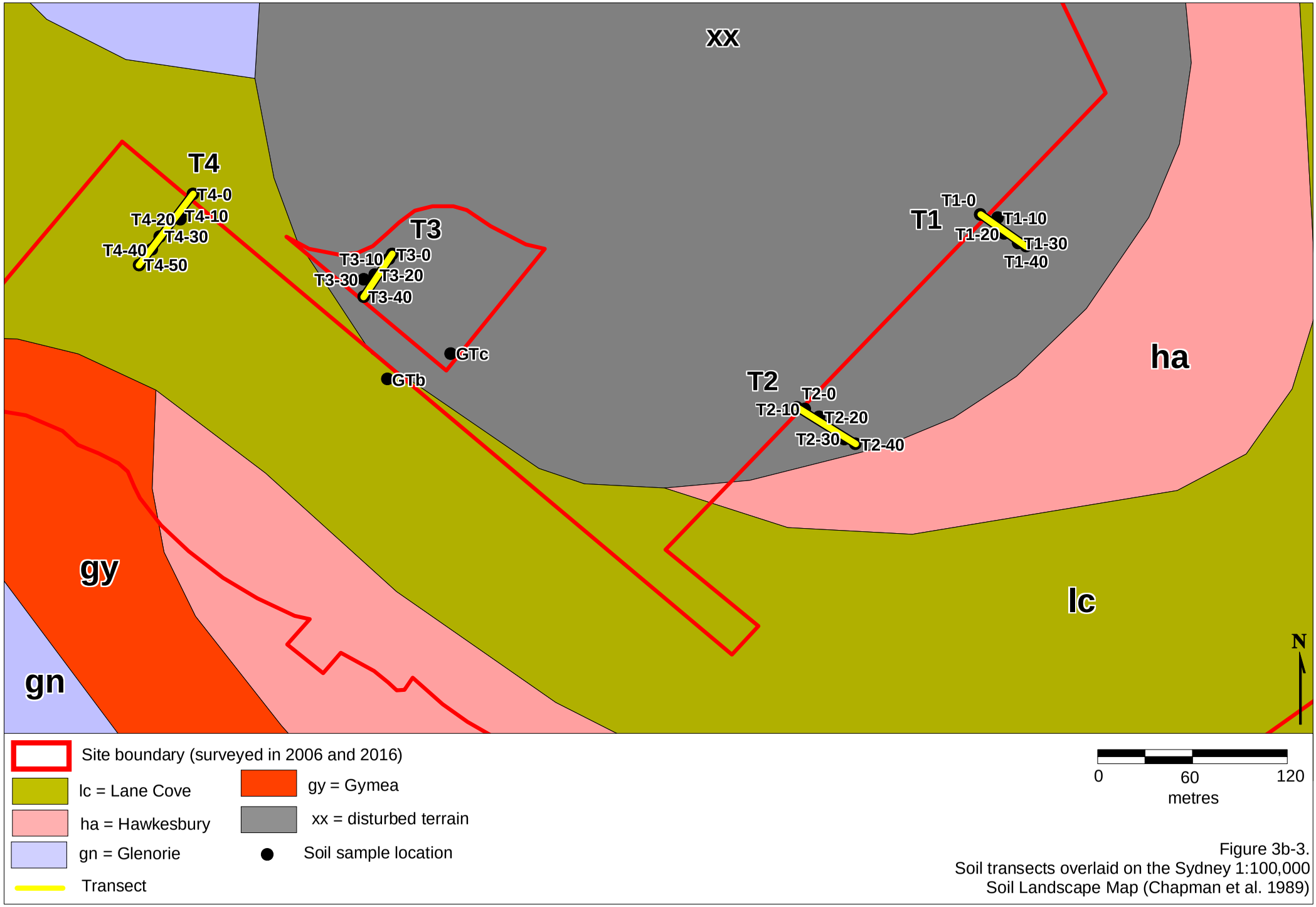


Figure 3b-3.
Soil transects overlaid on the Sydney 1:100,000
Soil Landscape Map (Chapman et al. 1989)

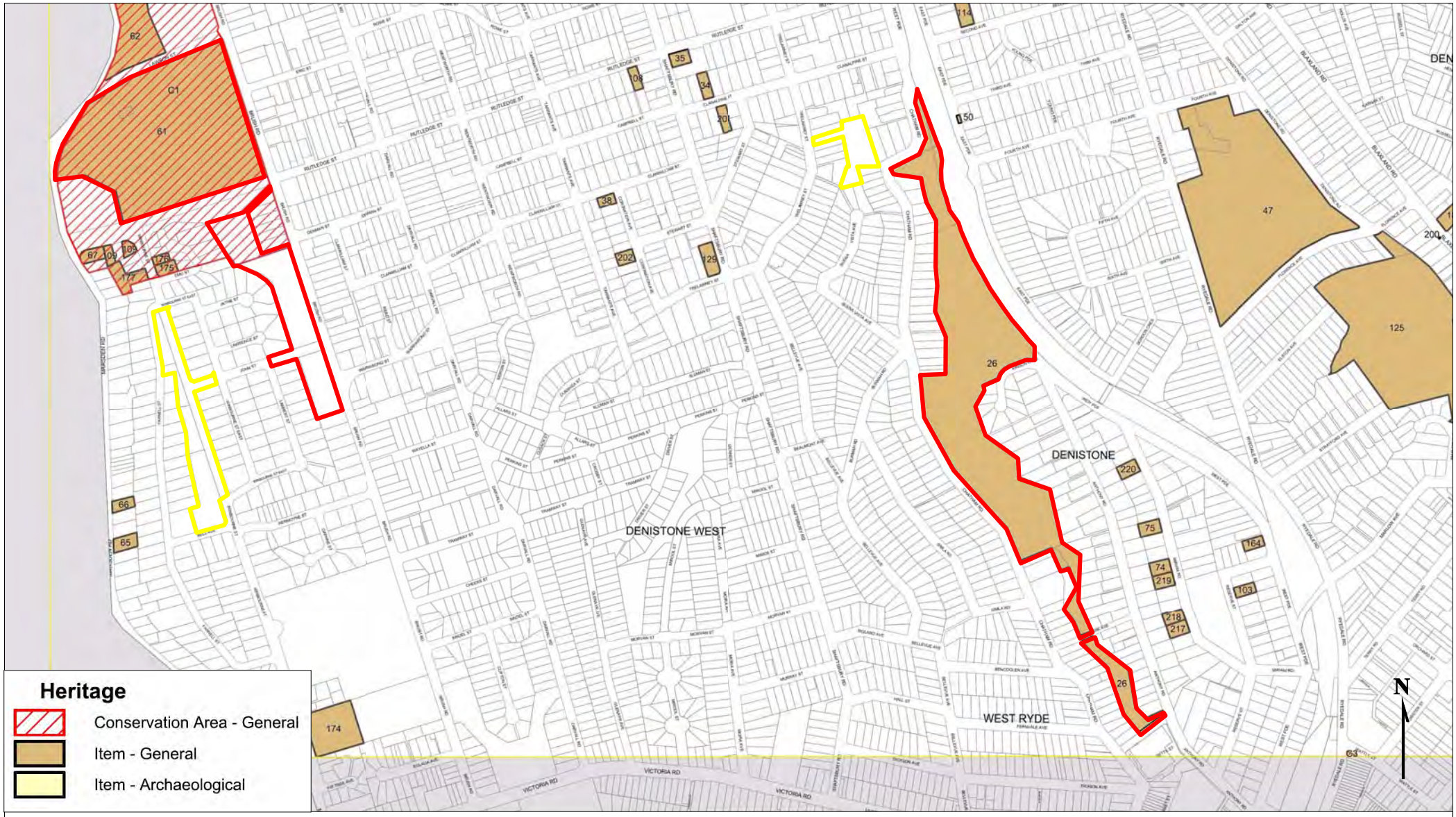


Figure 4a.
Boundaries of Bell Park, Brush Farm Park, Darvall Park, Lambert Park,
and Outlook Park, overlaid on the Heritage Map sheet HER_002 (Ryde LEP 2014)

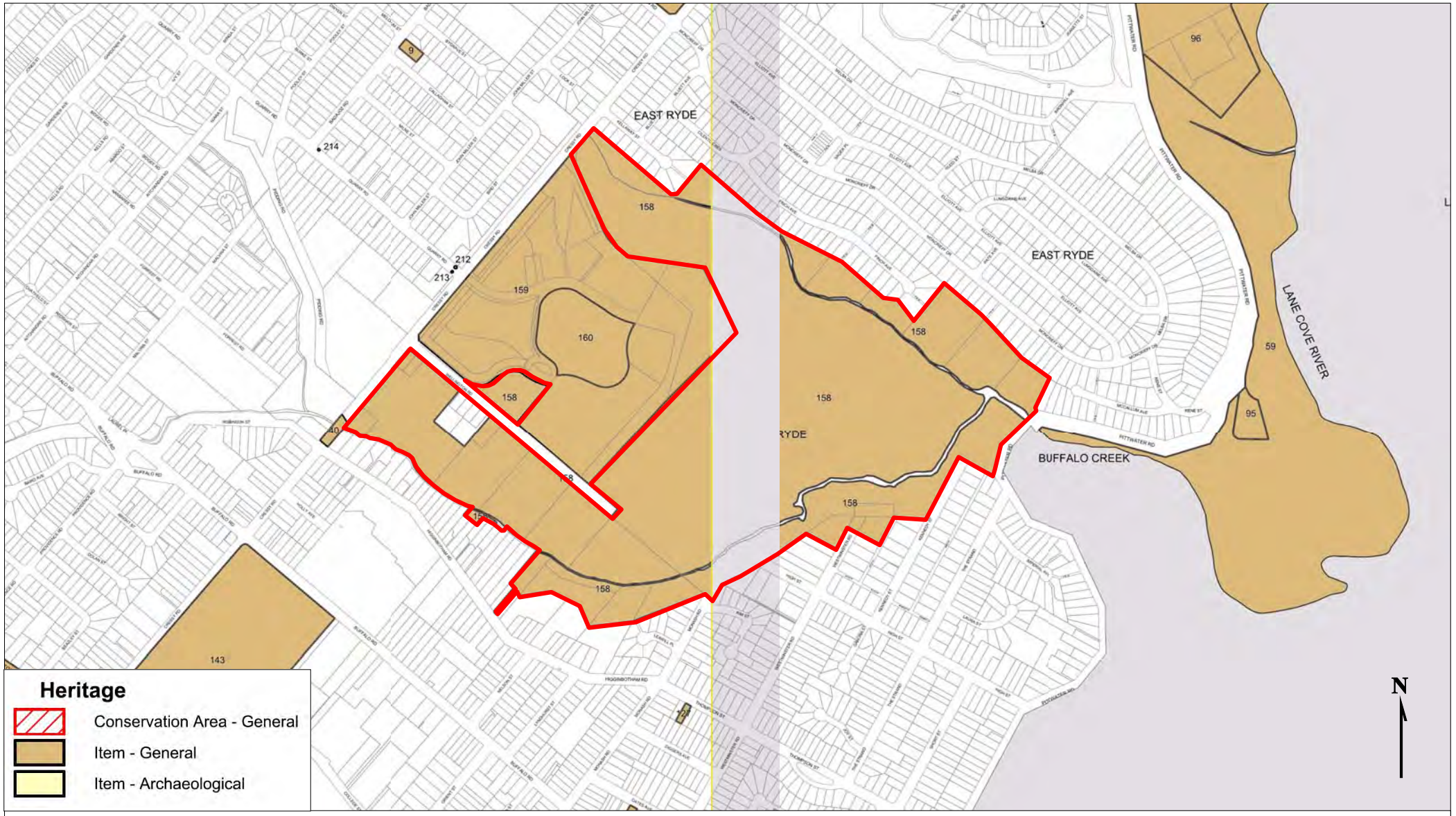


Figure 4b.
Boundary of the Field of Mars Reserve, overlaid on the Heritage Map sheets HER_006, HER_010 (Ryde LEP 2014)

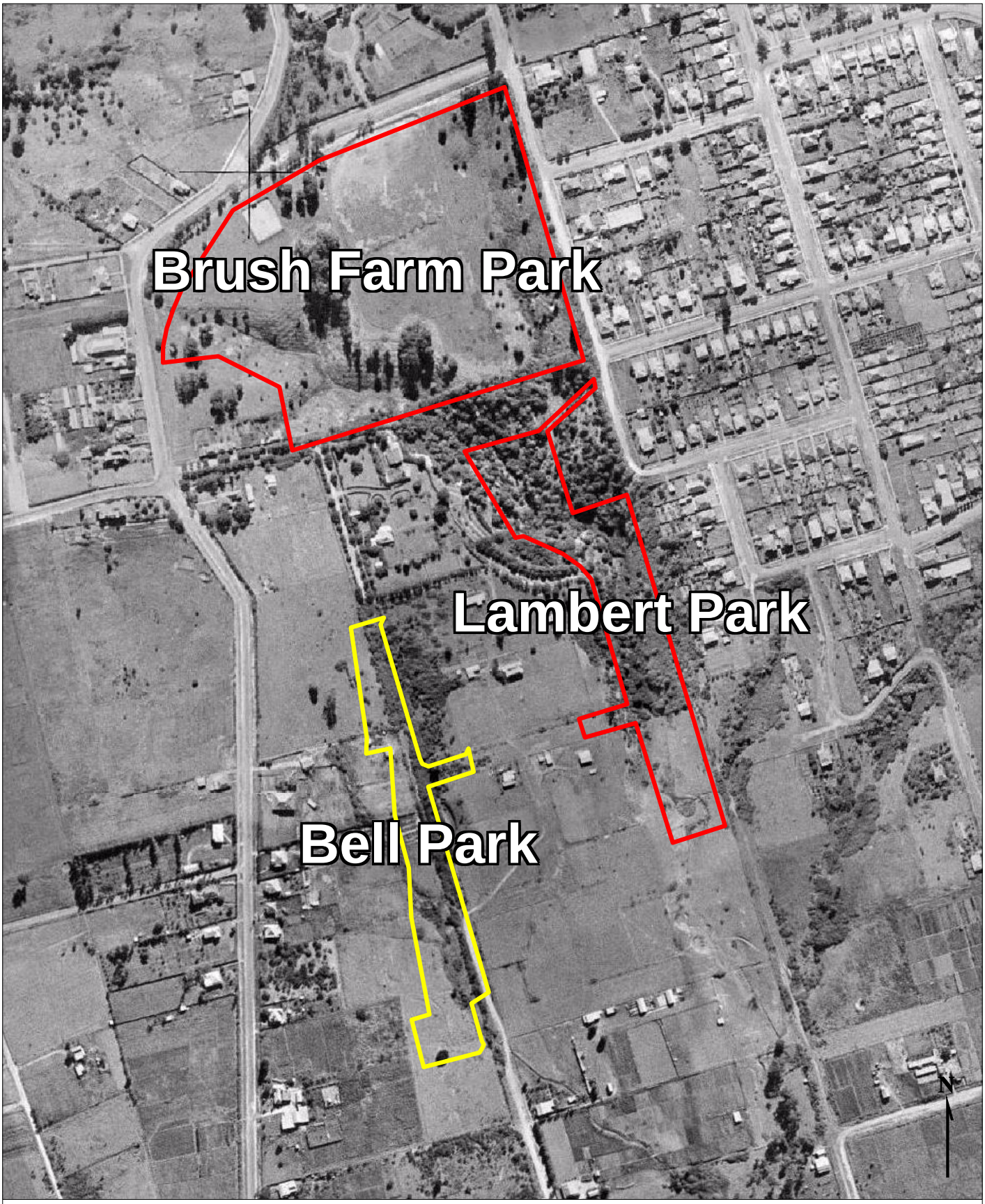


Figure 5a.
Boundaries of Bell Park, Brush Farm Park, and Lambert Park overlaid on SIX Maps historical aerial photograph (dated 1943)

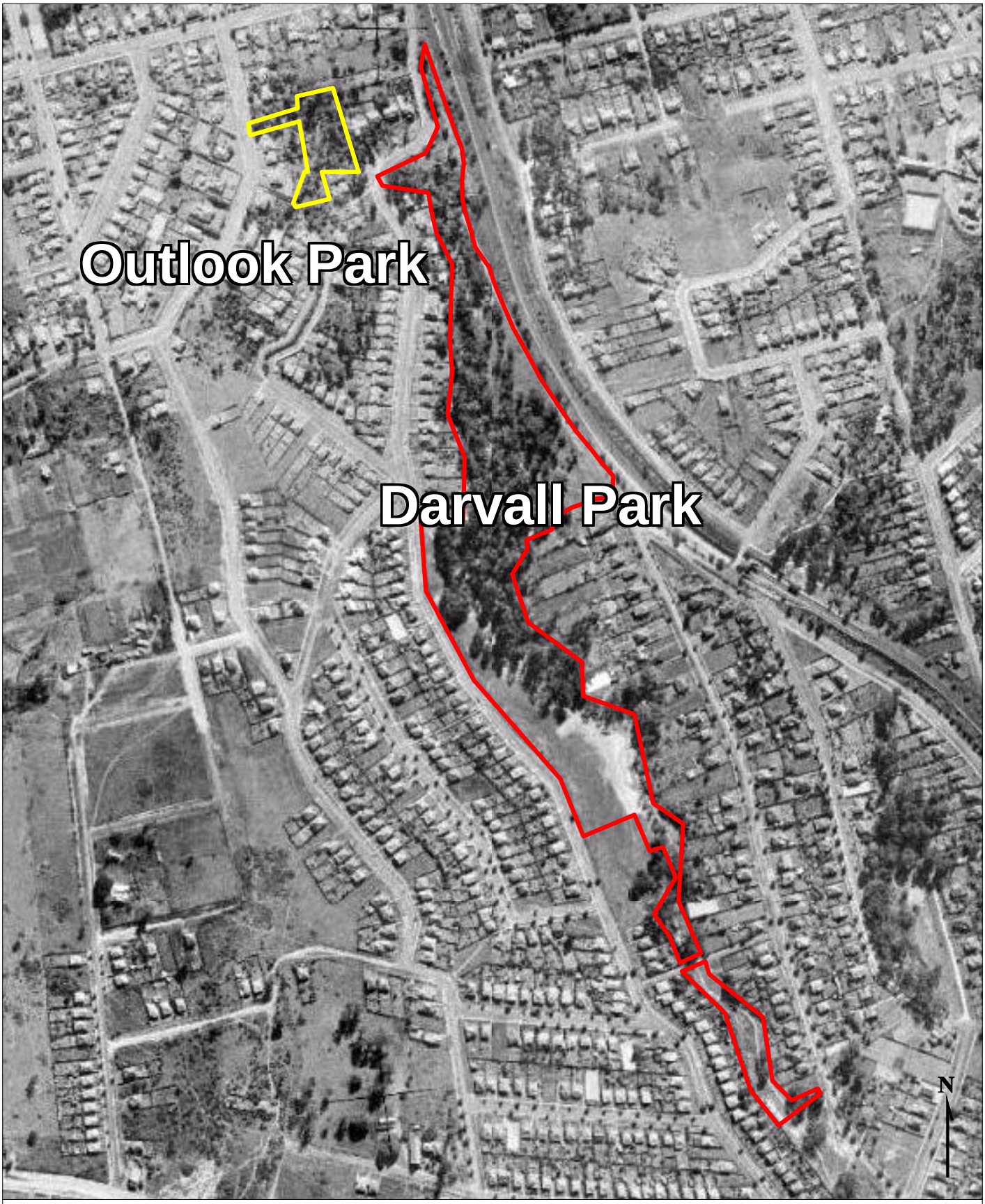


Figure 5b.
Boundaries of Darvall Park and Outlook Park
overlaid on SIX Maps historical aerial photograph (dated 1943)

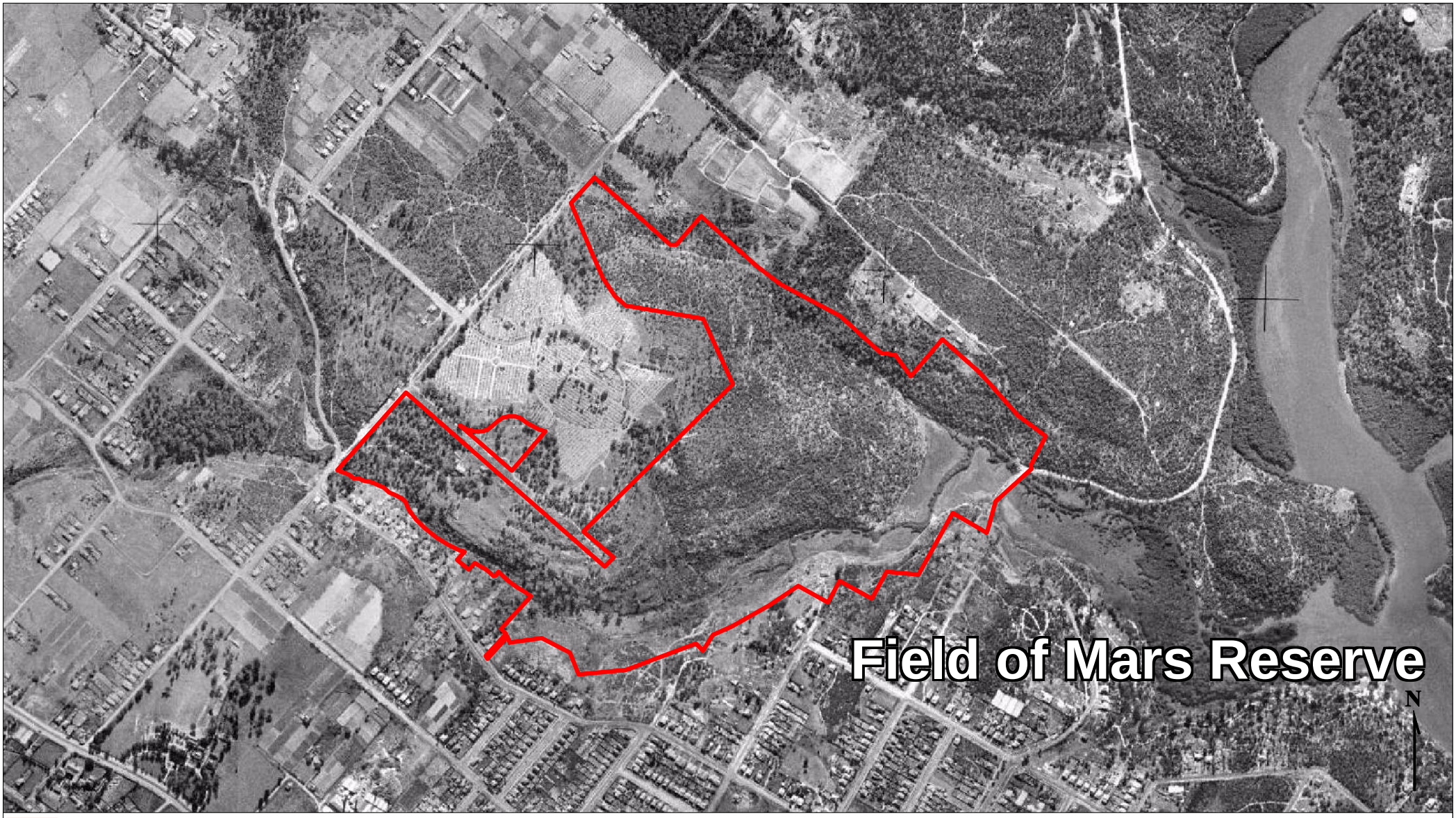


Figure 5c.
Boundary of the Field of Mars Reserve overlaid on the SIX Maps historical aerial photograph (dated 1943)

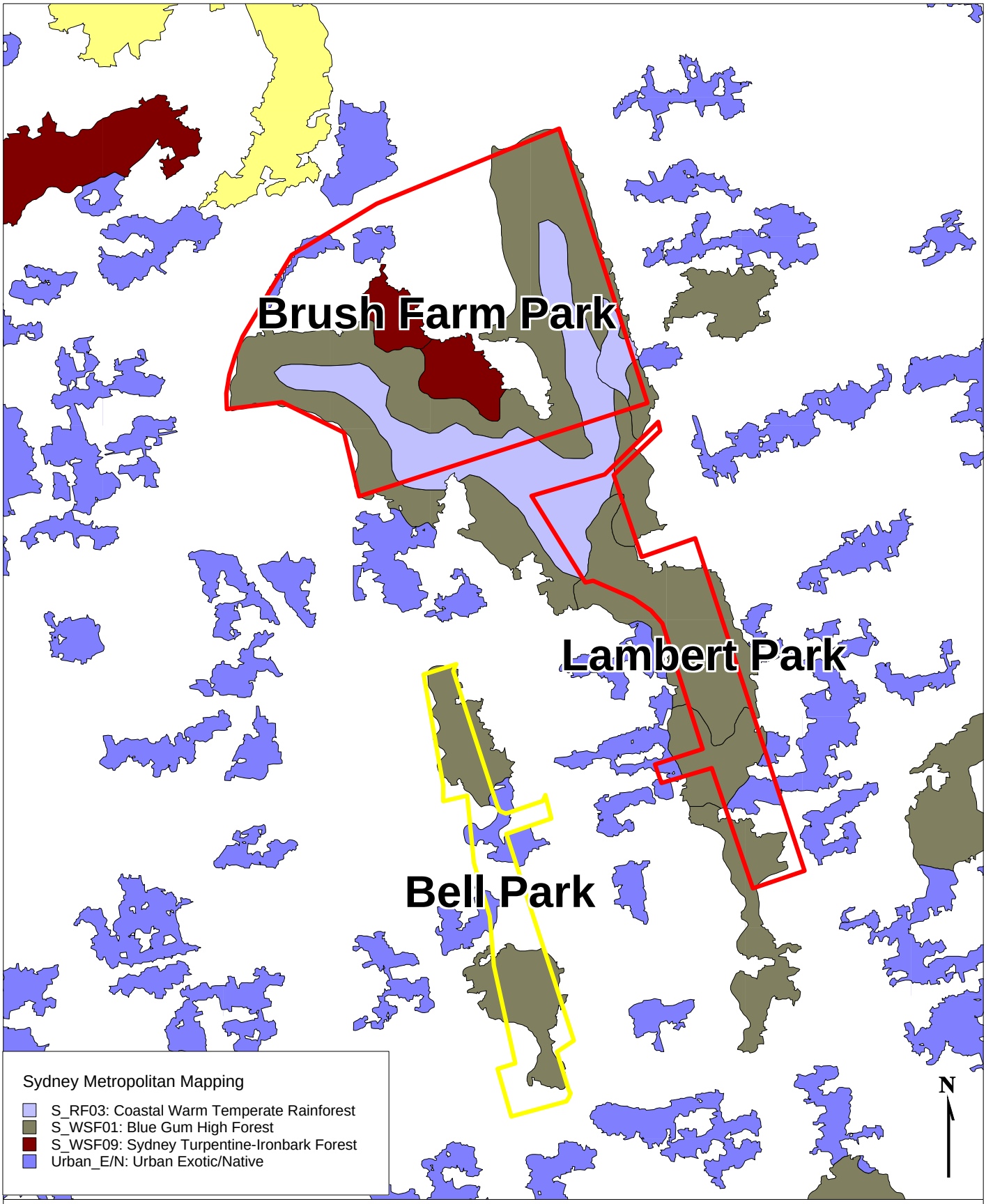


Figure 6a-1.
Boundaries of Bell Park, Brush Farm Park and Lambert Park, overlaid on the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

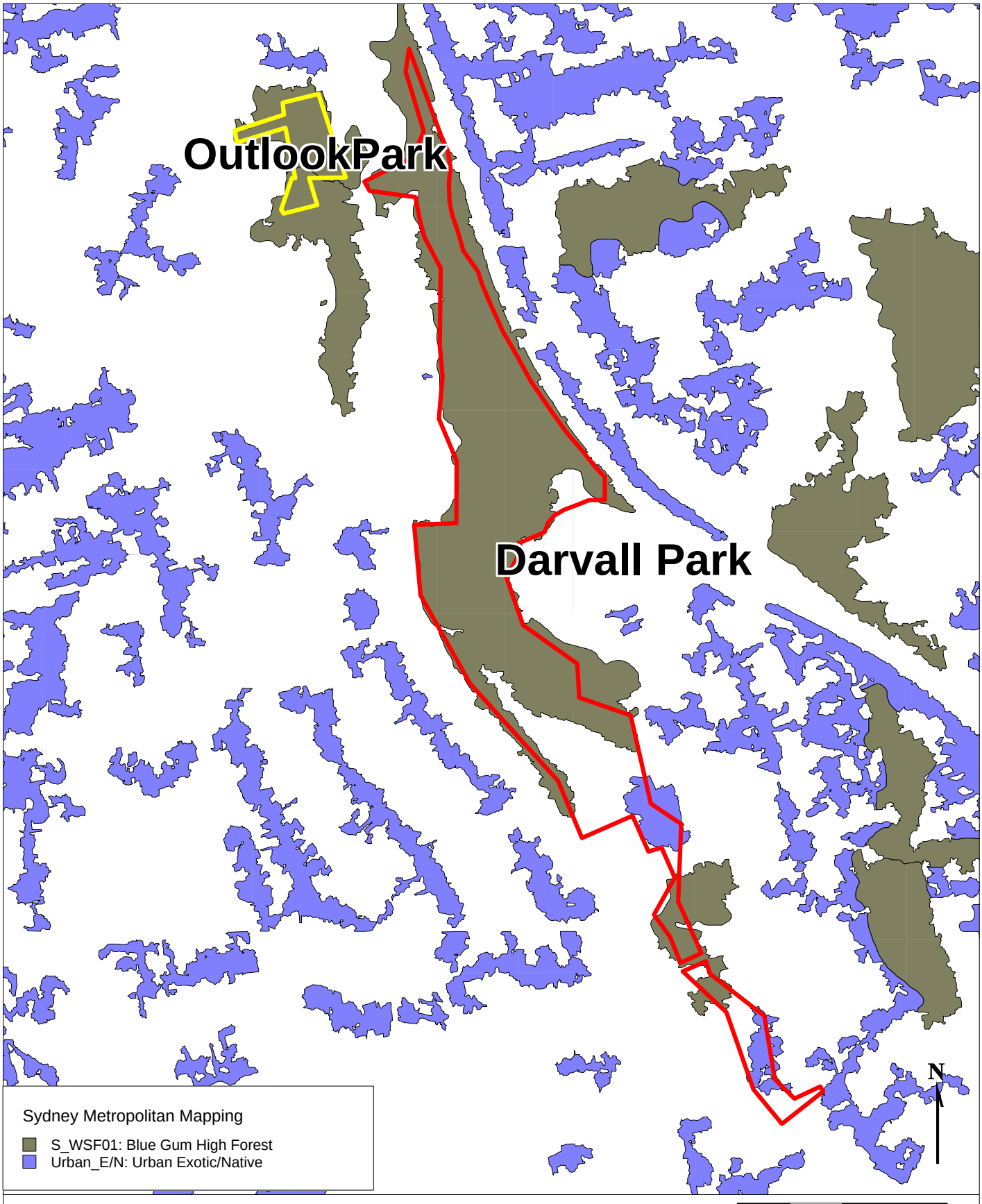


Figure 6a-2.
Boundaries of Darvall Park and Outlook Park, overlaid on the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

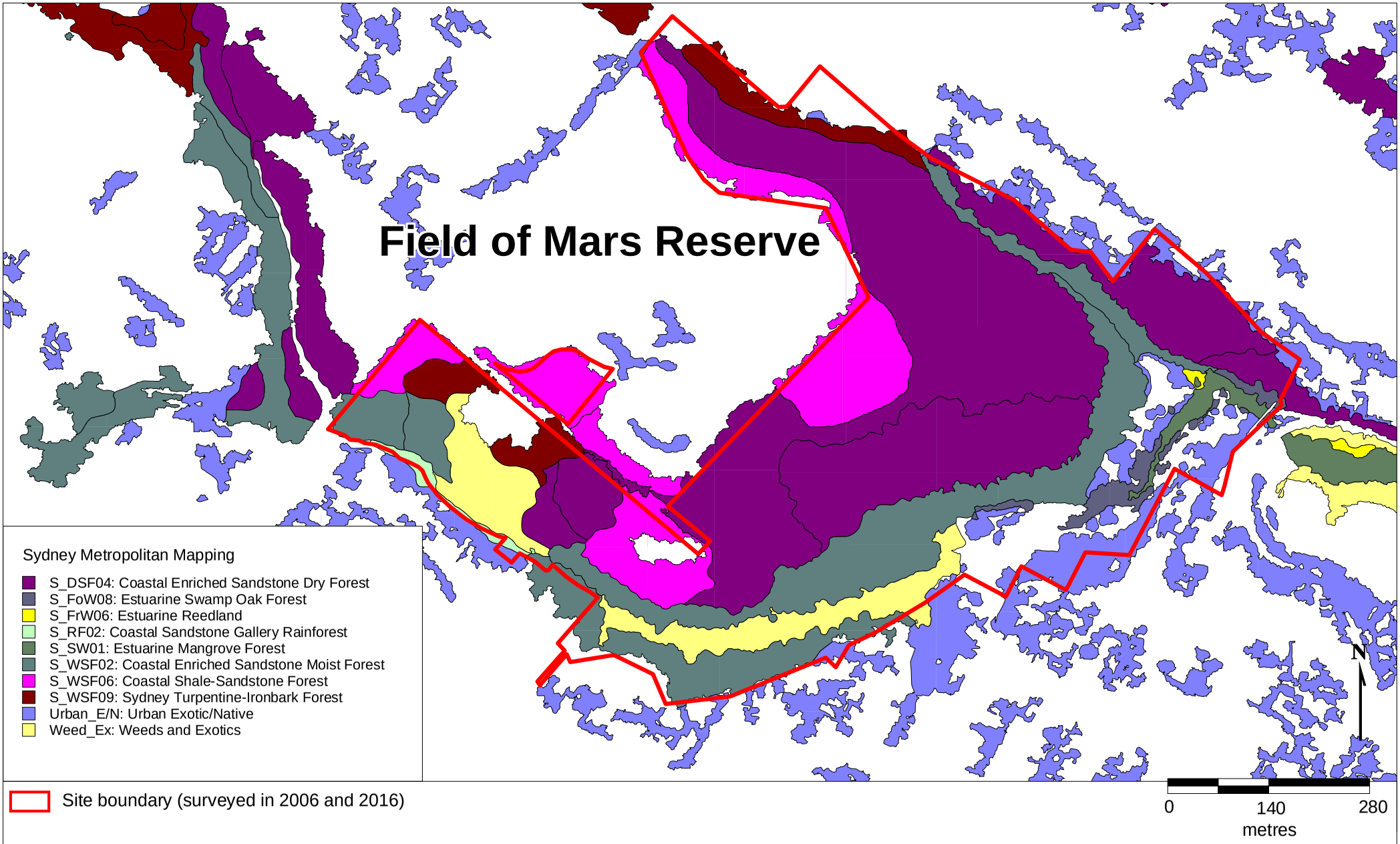


Figure 6a-3.
Boundary of the Field of Mars Reserve overlaid on the
Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

APPENDIX 5:

VEGETATION MAPS
Map 5A: Brush Farm Park and Lambert Park

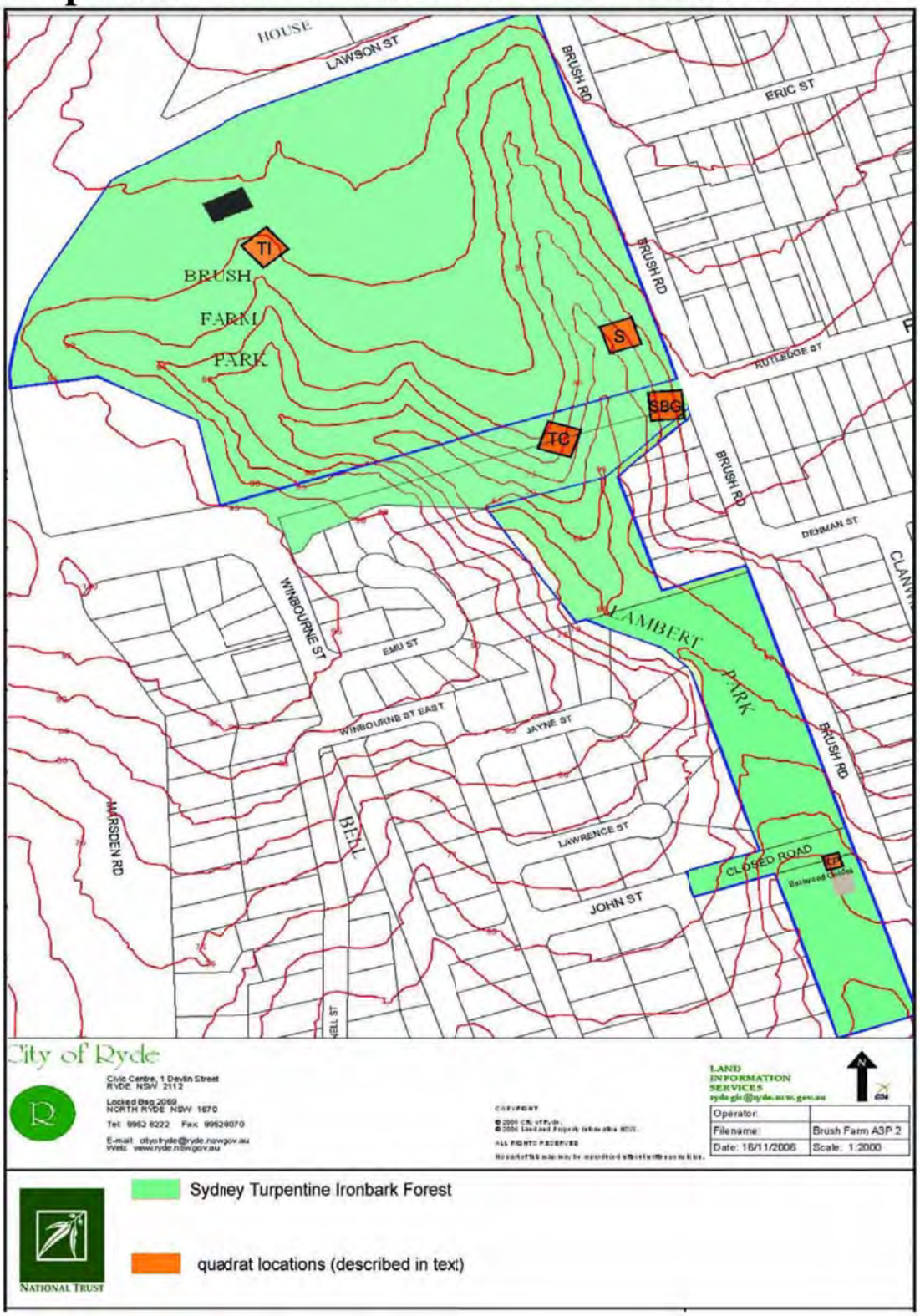


Figure 6b-1.
Native vegetation mapping of Brush Farm Park and Lambert Park (Map 5A, Appendix 5, Biosphere 2006)

MAP 5B: Darvall Park Vegetation Community

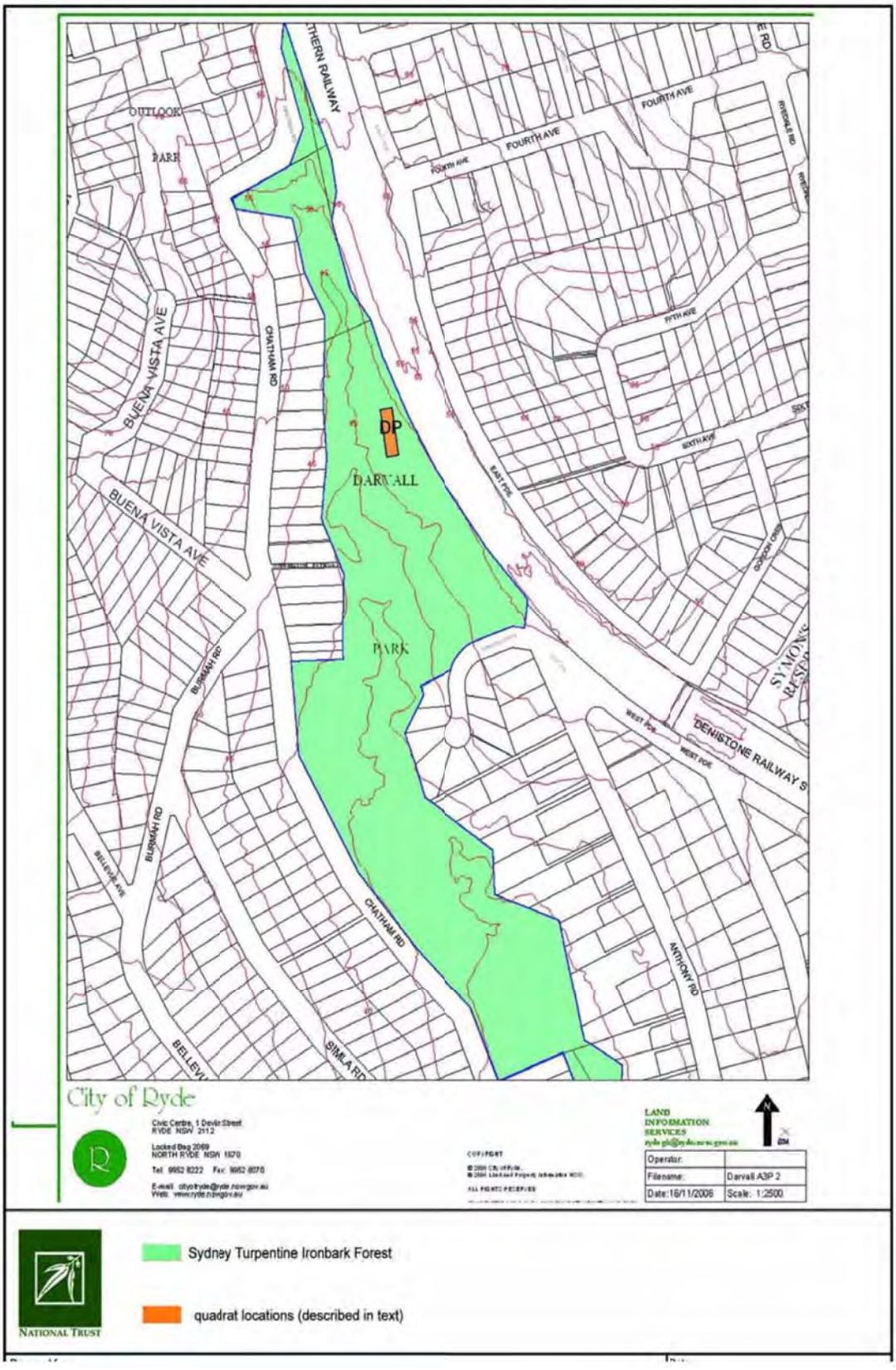


Figure 6b-2.
Native vegetation mapping of Darvall Park (Map 5B, Appendix 5, Biosphere 2006)

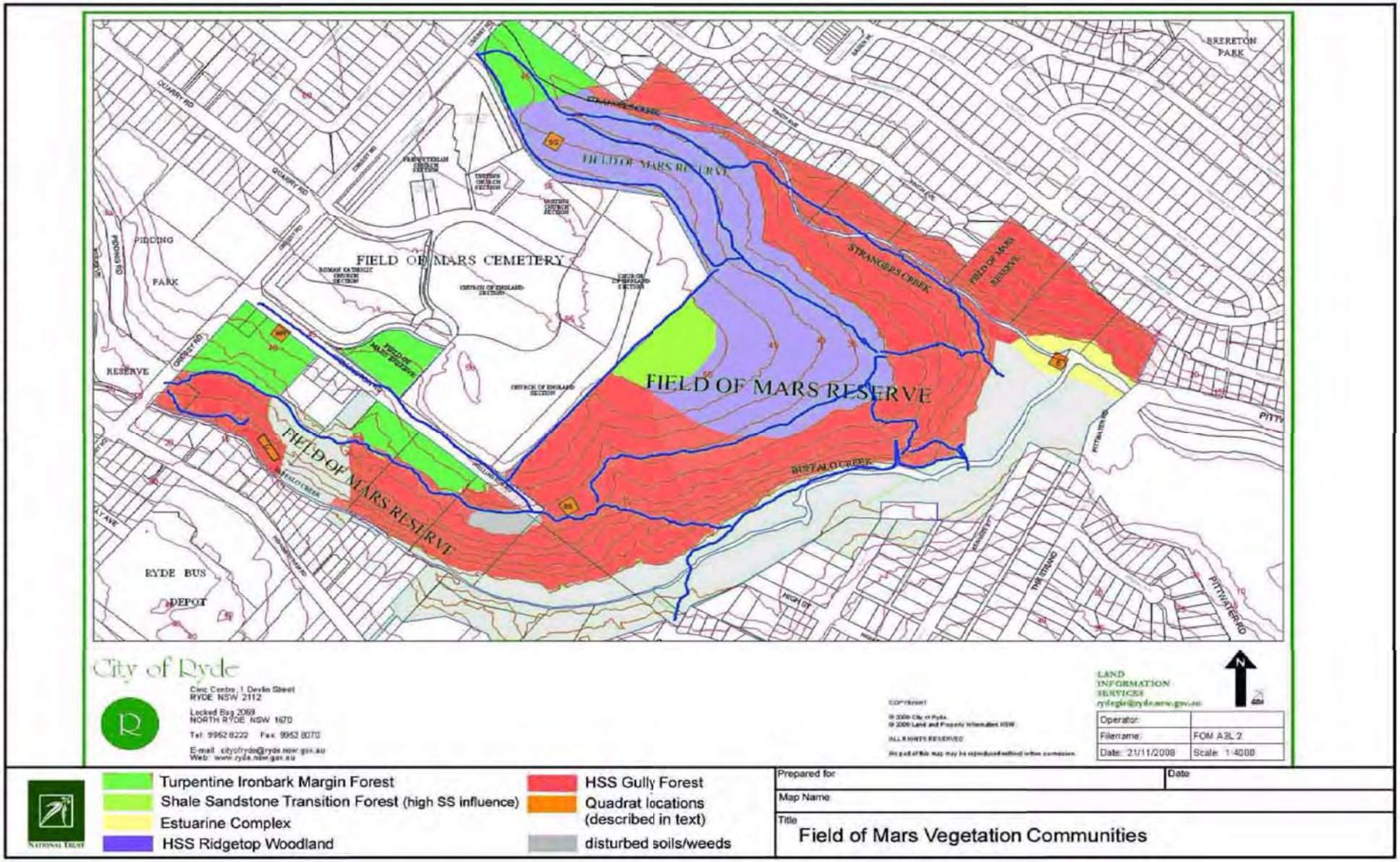


Figure 6b-3.
Native vegetation of the Field of Mars Reserve (Map 5C, Appendix 5, Biosphere 2006)

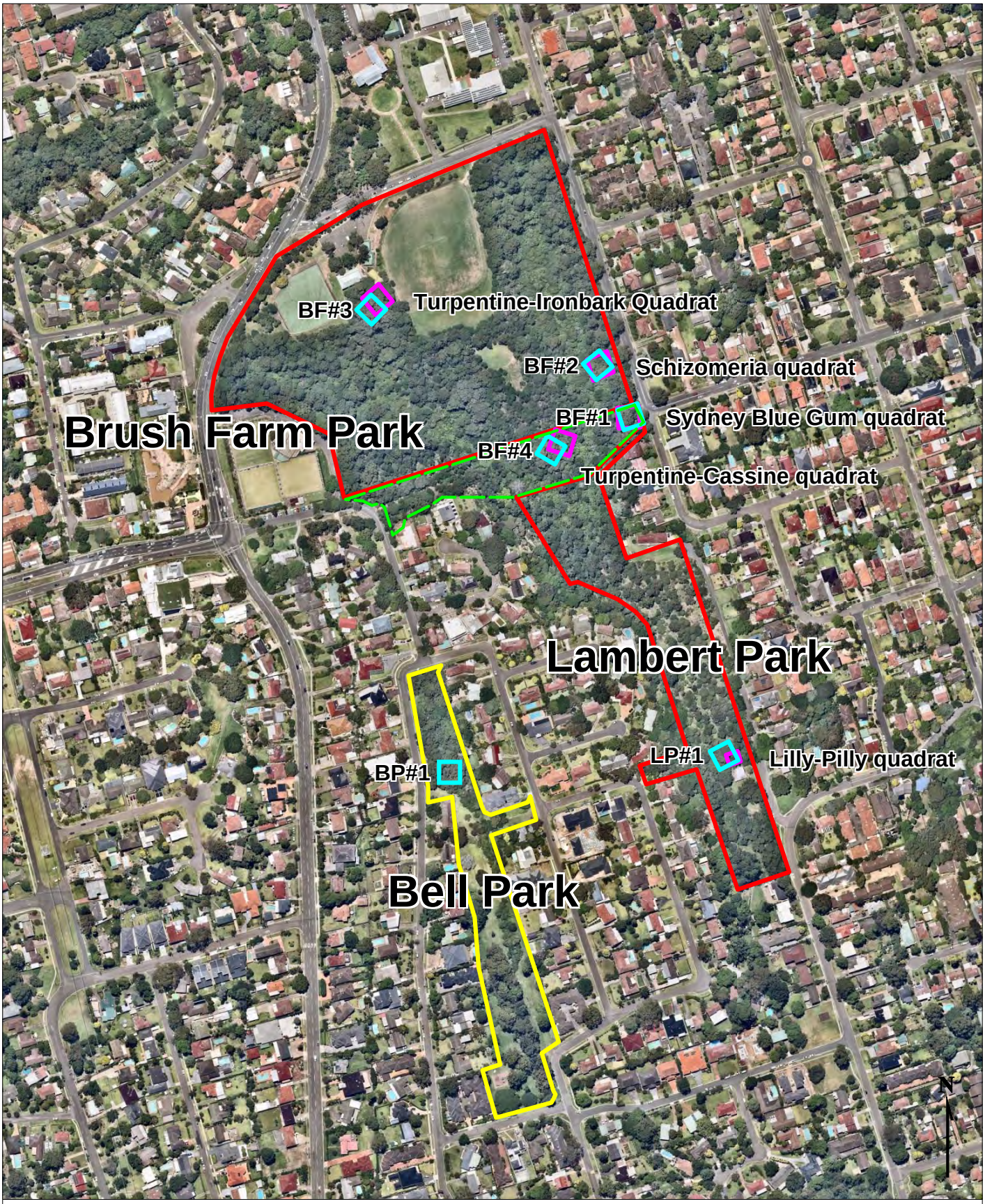


Figure 7a.
Quadrats surveyed in 2006 and 2016 in Bell Park, Brush Farm Park, and Lambert Park overlaid on the NearMap aerial photograph (dated 19 January 2016)

Figure 7b.
Quadrats surveyed in 2006 and 2016 in Darvall Park and Outlook Park overlaid on the NearMap aerial photograph (dated 19 January 2016)

Figure 7c.
Quadrats surveyed in 2006 and 2016 in the Field of Mars Reserve overlaid on the NearMap aerial photograph (dated 19 January 2016)

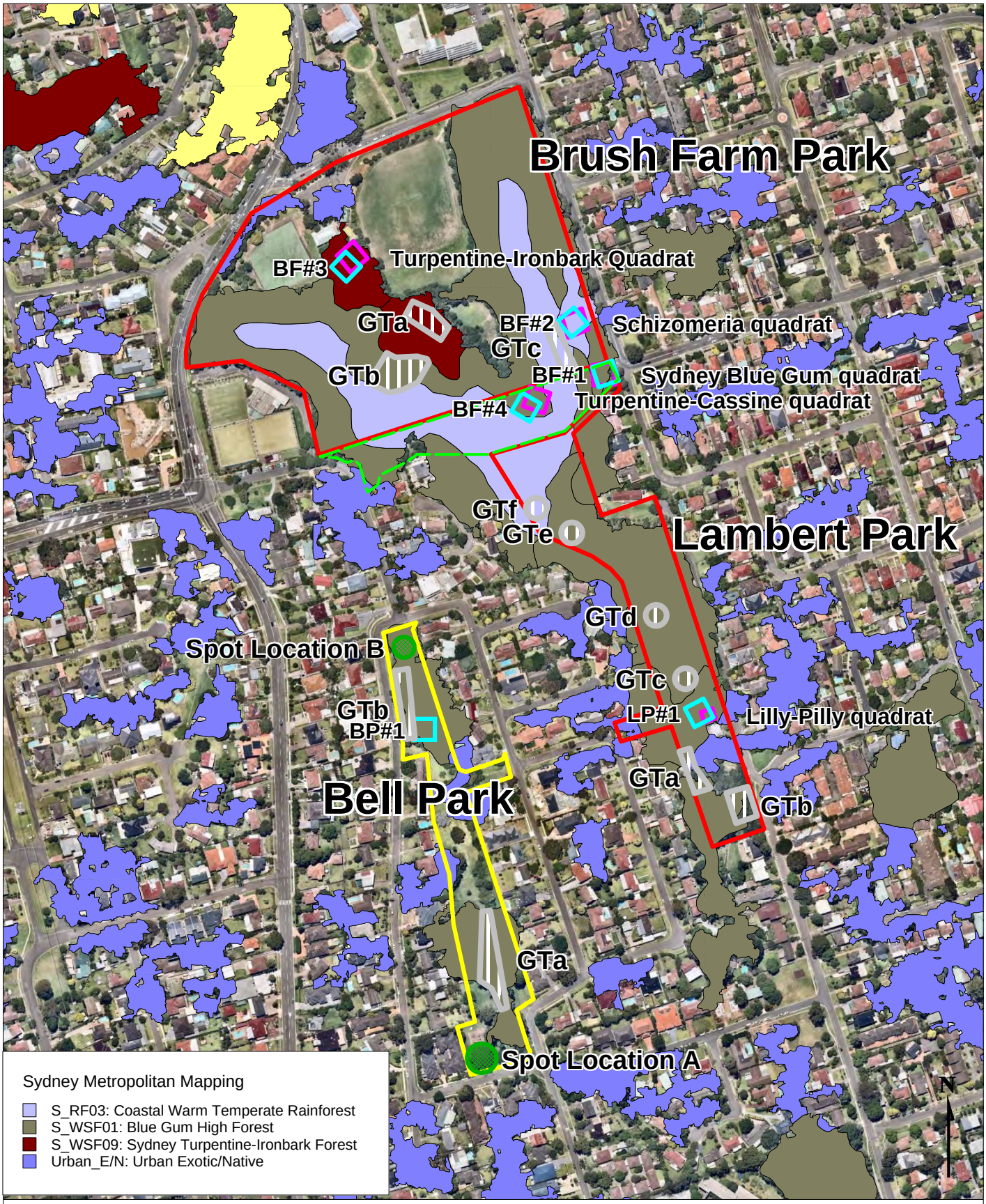


Figure 8a.
Ground truthing locations surveyed in 2016 in Bell Park, Brush Farm Park, and Lambert Park overlaid on the NearMap aerial photograph (dated 19 January 2016) and the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

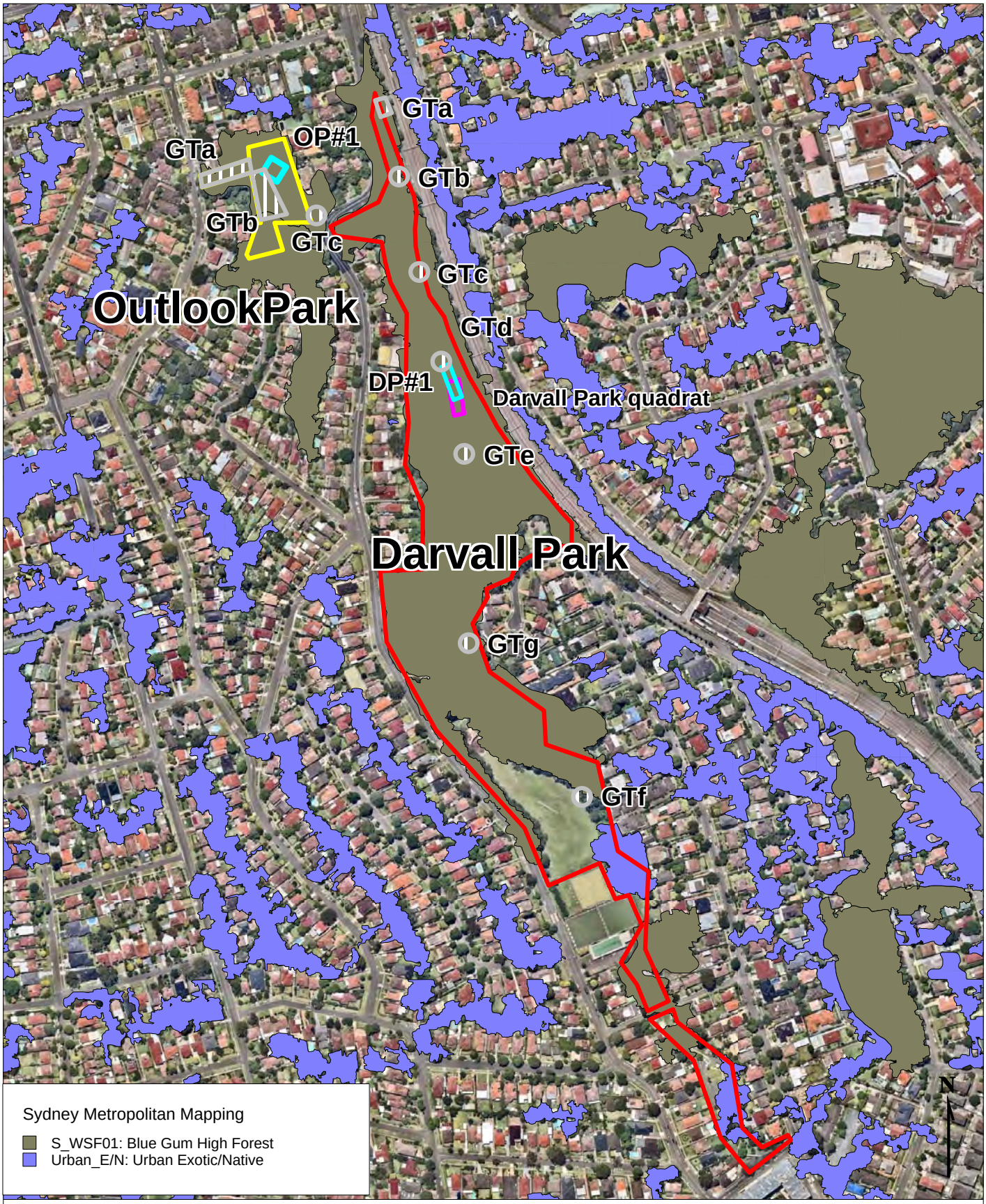


Figure 8b-1.
Ground truthing locations surveyed in 2016 in Darvall Park overlaid on the NearMap aerial photograph (dated 19 January 2016) and the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

Figure 8b-2.
Ground truthing locations surveyed in 2016 in Outlook Park overlaid on the NearMap aerial photograph (dated 19 January 2016) and the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

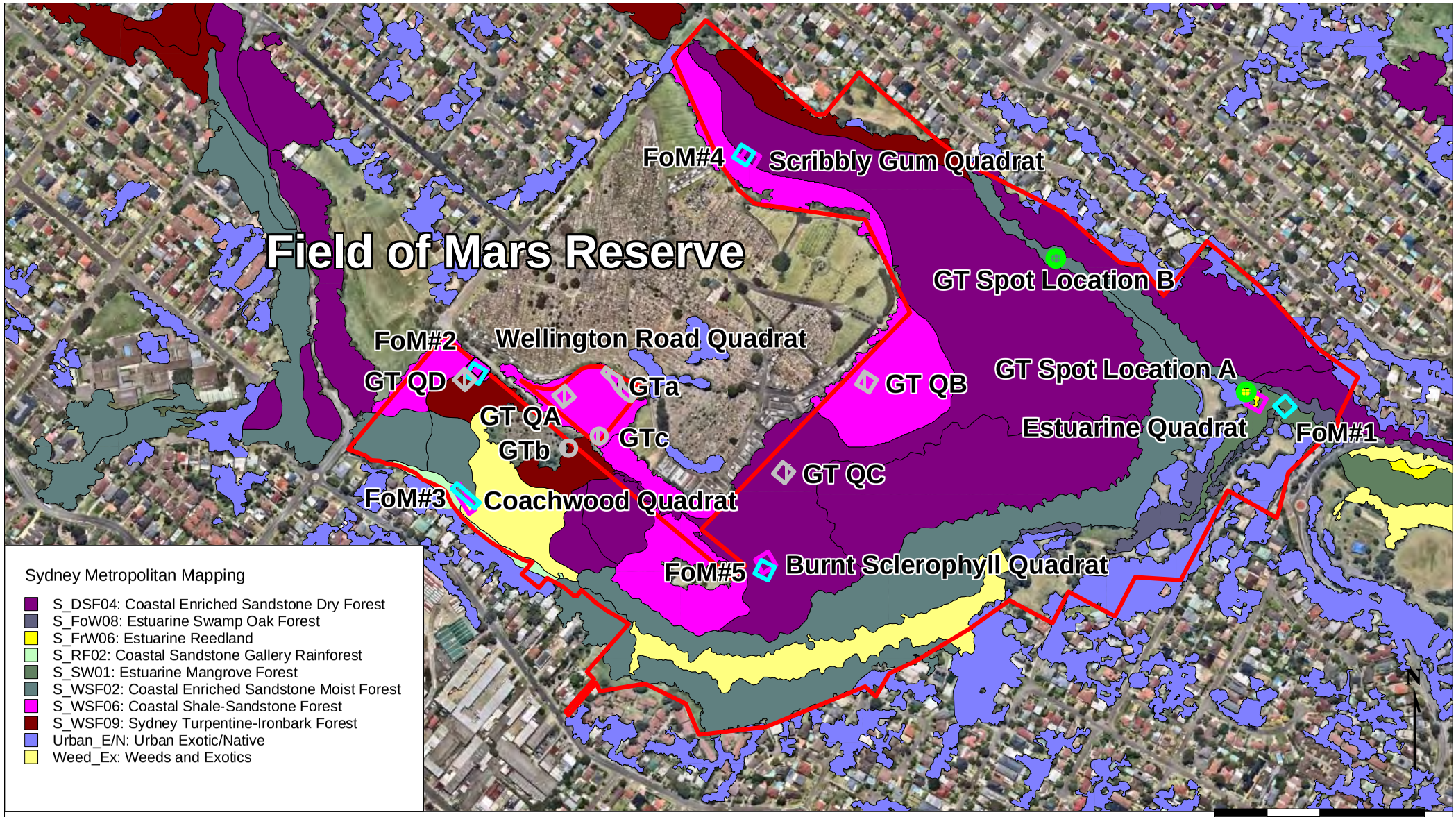


Figure 8c.
Ground truthing locations surveyed in 2016 in the Field of Mars Reserve overlaid on the NearMap aerial photograph (dated 19 January 2016) and the Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013, VIS_ID 3817)

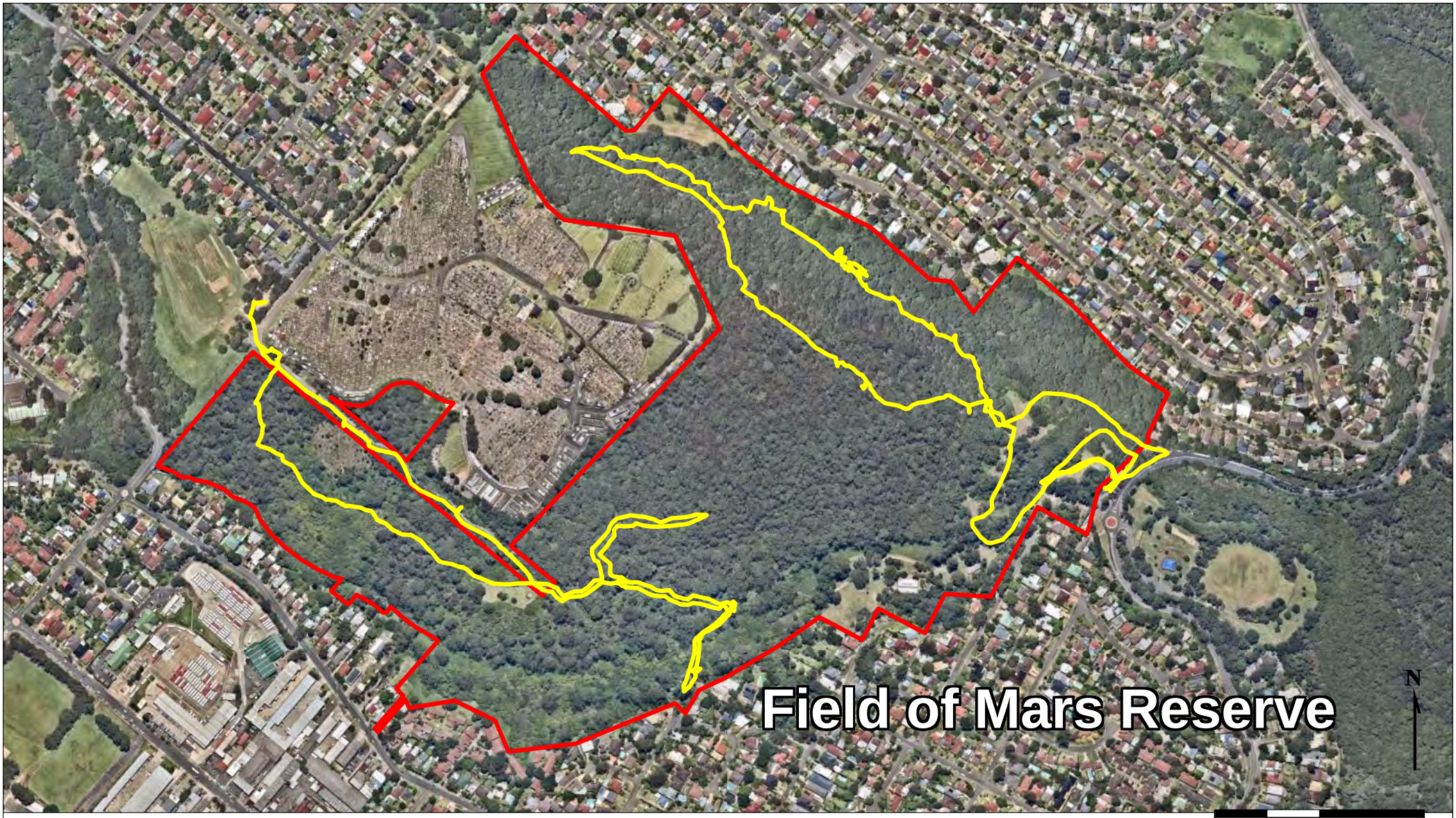


Figure 9a.
GPS tracking for the targeted threatened species search in the Field of Mars Reserve
on the 4 November 2016, overlaid on the NearMap aerial photograph (dated 19 January 2016)

Figure 9b.
GPS tracking for the targeted threatened species search in the Field of Mars Reserve on the 4 November 2016, with ground truthing locations surveyed in 2016, overlaid on the NearMap aerial photograph (dated 19 January 2016)

Tables

Table 1. Species recorded at the 11 re-surveyed quadrats (Brush Farm Park, Darvall Park, Field of Mars Reserve, Lambert Park) and 2 previously unsurveyed quadrats (Bell Park, Outlook Park)

Note: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from these sites.

3. The numbers in the columns denote average percent (%) projected foliage cover for each quadrat, from the percent (%) projected foliage cover recorded in the four sub-quadrats.

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
1. Pteridophytes														
Adiantaceae														
Adiantum hispidulum	Rough Maidenhair Fern			22.5									0.025	
Pellaea nana	Small Sickle Fern									0.025				
Aspleniaceae														
Asplenium australasicum	Birds-nest Fern									0.05				
Asplenium flabellifolium	Necklace Spleenwort, Necklace Fern									0.025				
Blechnaceae														
Doodia aspera	Prickly Rasp Fern										0.025			
Doodia caudata	Small Rasp Fern			0.025						0.025				
Cyatheaceae														
# Cyathea cooperi	Straw Tree-fern, Scaly Tree-Fern												0.25	
Dennstaedtiaceae														
Pteridium esculentum	Bracken									0.025	0.75	1.75		
Dicksoniaceae														
Calochlaena dubia	Rainbow Fern, False Bracken									0.525				
Lindsaeaceae														
Lindsaea linearis	Screw Fern											0.025		
Pteridaceae														
Pteris tremula	Tender Brake				0.075									

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Thelypteridaceae														
Cyclosorus dentatus				0.25									0.05	
2. Gymnosperms														
Araucariaceae														
Araucaria heterophylla	Norfolk Island Pine													0.025
3. Dicotyledons														
Acanthaceae														
Avicennia marina subsp. australasica	Grey Mangrove							31.25						
* Justicia sp.														0.025
Pseuderanthemum variabile	Pastel Flower		0.05	0.025	0.1	1.75	0.025		0.075					0.55
* Thunbergia alata	Black-eyed Susan						0.05							
Aceraceae														
* Acer negundo	Box-elder Maple, Box Elder												0.025	
Aizoaceae														
Tetragonia tetragonioides	New Zealand Spinach, Native Spinach, Warrigal Cabbage							6.275						
Amaranthaceae														
Alternanthera denticulata	Common Joyweed							0.025						
Anacardiaceae														
* Toxicodendron succedaneum	Rhus Tree, Wax Tree						0.5							
Aphanopetalaceae														
Aphanopetalum resinosum	Gum Vine		4.5		0.025								0.75	
Apiaceae														
Apium prostratum	Sea Celery							1.55						
Centella asiatica	Indian Pennywort						0.025							
* Cyclospermum leptophyllum	Slender Celery							0.025						
Platysace lanceolata	Lance-leaf Platysace, Shrubby Platysace											0.025		
Xanthosia pilosa										0.025				

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Xanthosia tridentata	Rock Xanthosia											0.025		
Apocynaceae														
* Araujia sericifera	Moth Vine, Cruel Plant			0.05			0.025			0.025				
Parsonsia straminea	Common Silkpod, Monkey Rope										0.05			
Araliaceae														
* Hedera helix	Ivy, English Ivy		0.025		1.25								0.05	0.025
Polyscias sambucifolia	Elderberry Panax								0.025		2	0.05		
Asteraceae														
* Aster subulatus	Wild Aster							0.05						
* Bidens pilosa	Cobbler's Pegs		0.25			0.075	0.025						0.025	
* Coreopsis lanceolata	Calliopsis, Coreopsis										0.025			
* Delairea odorata	Cape Ivy	1												
* Hypochaeris radicata	Catsear, False Dandelion											0.025		
Ozothamnus diosmifolius	White Dogwood											0.5		
Sigesbeckia orientalis	Indian Weed					0.025	0.3							0.025
* Sonchus oleraceus	Common Sow-thistle, Milk-thistle							0.025						
Basellaceae														
* Anredera cordifolia	Madeira Vine, Lamb's Tail		0.5		0.05			0.025					0.075	
Bignoniaceae														
* Jacaranda mimosifolia	Jacaranda		1.25											0.5
Pandorea pandorana	Wonga Vine					0.55			1.525	0.25		0.075		
Casuarinaceae														
Allocasuarina littoralis	Black She-oak								1.25		2	0.5		
Allocasuarina torulosa	Forest She-oak													0.5
# Casuarina cunninghamiana	River Oak, River She-oak												2.5	
Casuarina glauca	Swamp Oak, Swamp She-oak							7.5						
Celastraceae														
Celastrus australis						0.025								
Denhamia silvestris	Narrow-leaved Orangebark, Orange Bush, Orange Bark					0.25								
Elaeodendron australe	Red Olive-plum			2.75		7.5	0.5							

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Chenopodiaceae														
Atriplex australasica	Prostrate Orache							0.05						
Convolvulaceae														
Calystegia marginata			0.025										0.025	
Dichondra sp. A	Hairy Kidney Weed								1.275					0.25
* Ipomoea indica	Blue Morning Glory	9.5	0.525											
Cunoniaceae														
Callicoma serratifolia	Blackwattle									0.75				
Ceratopetalum apetalum	Coachwood									32.5				1.75
Schizomeria ovata	Crabapple, White Birch			12.5										
Dilleniaceae														
Hibbertia aspera	Rough Guinea-flower								1.25					
Hibbertia dentata	Guinea-flower									0.25				
Elaeocarpaceae														
Elaeocarpus reticulatus	Blueberry Ash								0.25			6.5		1.25
Ericaceae Styphelioideae														
Epacris pulchella	Wallum Heath										0.25	0.025		
Leucopogon ericoides	Beard-heath											0.025		
Leucopogon juniperinus	Long-flowered Beard-heath								1.5		0.025	0.25		
Leucopogon lanceolatus	Lance-leaf Beard-heath											0.25		
Euphorbiaceae														
Breynia oblongifolia	Coffee Bush	0.5	1.25	1.25		0.05			0.775			0.025		
Glochidion ferdinandi	Cheese Tree			0.5					0.75		0.5			0.5
Homalanthus populifolius	Bleeding heart, Native Poplar						0.25	0.025			0.025		3.75	0.25
Micrantheum ericoides											0.775	1.5		
Phyllanthus gunnii	Scrubby Spurge						0.525							
Phyllanthus hirtellus	Thyme Spurge										0.25	0.05		
Eupomatiaceae														
Eupomatia laurina	Bolwarra			4.25										

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Fabaceae Caesalpinioideae														
* Senna pendula var. glabrata	Easter Cassia	0.5	0.25					0.025	0.025	0.025				
Fabaceae Faboideae														
* Crotalaria sp.								0.025						
Glycine clandestina	Twining Glycine					0.025	0.25		0.75			0.025		
Glycine tabacina						0.05	0.25							
Indigofera australis	Native Indigo					0.05								
Kennedia rubicunda	Dusky Coral-pea											0.025		
Platylobium formosum	Handsome Flat-pea											0.275		
Pultenaea tuberculata												0.25		
Fabaceae Mimosoideae														
Acacia decurrens	Black Wattle		0.75											
Acacia linifolia	Flax-leaved Wattle										0.05	0.075		
Acacia longifolia	Sydney Golden Wattle											0.275		
Acacia parramattensis	Parramatta Green Wattle		1.5			5.775	0.05							
Acacia suaveolens	Sweet Wattle											0.025		
Acacia terminalis subsp. angustifolia	Sunshine Wattle											0.525		
Geraniaceae														
Geranium homeanum	Rainforest Cranesbill						6.25							
Goodeniaceae														
Goodenia hederacea	Ivy Goodenia										0.5	0.05		
Haloragaceae														
Gonocarpus teucrioides											0.025	0.025		
Lamiaceae														
Clerodendrum tomentosum	Hairy Clerodendrum		0.25		0.025									
Plectranthus parviflorus	Cockspur Flower		0.275			0.525	2.25							0.025
Lauraceae														
Cassytha pubescens	Devil's Twine, Dodder-laurel										0.1	0.025		
* Cinnamomum camphora	Camphor Laurel		0.05		0.5				0.075	0.25	0.05		0.05	0.025
Cryptocarya glaucescens	Jackwood													0.75

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Lobeliaceae														
Lobelia anceps	Angled Lobelia							0.3						
Pratia purpurascens	Whiteroot						0.275				0.05	0.025		
Malvaceae														
* Pavonia hastata									0.025					
* Sida rhombifolia	Paddy's Lucerne					0.025	0.3							
Meliaceae														
# Melia azedarach	White Cedar, Persian Lilac		0.25						0.025				0.025	0.025
# Toona ciliata	Australian Red Cedar													0.025
Menispermaceae														
Sarcopetalum harveyanum	Pearl Vine		0.025	0.025	0.3									
Stephania japonica var. discolor	Snake Vine		0.025	0.5	1.75	0.05	0.3						0.3	
Moraceae														
Ficus coronata	Creek Sandpaper Fig		1.25	12.5	22.5								3.5	3.25
Ficus rubiginosa	Port Jackson Fig, Rusty Fig		4.5		2.75								26.25	2.5
* Morus alba	Mulberry		0.025											
Myrsinaceae														
Aegiceras corniculatum	River Magrove							1.25						
Myrsine variabilis	Muttonwood			2.5		0.25								
Myrtaceae														
Acmena smithii	Lilly-pilly		0.75	0.75			0.5						37.5	1
Angophora costata	Sydney Red Gum, Smooth-barked Apple										9.75	6.25		
Austromyrtus tenuifolia	Narrow-leaved Midgenberry									0.025				
Backhousia myrtifolia	Grey Myrtle, Ironwood													0.5
Callistemon salignus	White Bottlebrush, Pink-tips		1.25				0.75							
# Corymbia citriodora	Lemon-scented Gum	5												
Corymbia gummifera	Red Bloodwood										8			
Eucalyptus acmenoides	White Mahogany				7.5									
# Eucalyptus botryoides	Bangalay	6.25												
Eucalyptus globoidea	White Stringybark											0.025		
# Eucalyptus grandis	Flooded Gum	17.5	1.25				2.5						3.75	

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
# Eucalyptus microcorys	Tallowwood		5				1.25							
Eucalyptus paniculata	Grey Ironbark				7.5		5							
Eucalyptus pilularis	Blackbutt						2.5							
Eucalyptus piperita	Sydney Peppermint											11.25		
Eucalyptus punctata	Grey Gum								7.5					
Eucalyptus racemosa	Snappy Gum, Scribbly Gum										8.75			
Eucalyptus resinifera subsp. resinifera	Red Mahogany								15		11.25	8		
Eucalyptus saligna	Sydney Blue Gum		6.5		2.5		13.75						8.75	12.5
# Eucalyptus scoparia	Wallangarra White Gum	2.5												
Kunzea ambigua	Tick-bush										3	5.75		
Leptospermum trinervium	Slender Tea-tree										0.025			
# Melaleuca armillaris	Bracelet Honey-myrtle	1.25												
Melaleuca linariifolia	Flax-leaved Paperbark											0.75		
Melaleuca styphelioides	Prickly Paperbark					0.05	1.275							1.5
Syncarpia glomulifera	Turpentine		5.5	3.75	5	25	2.5		17.75					21.25
Syzygium australe	Brush Cherry	3.75												0.5
# Syzygium paniculatum	Brush Cherry													0.5
Tristaniopsis laurina	Water Gum, Kanuka Box									23.75				
Nandinaceae														
* Nandina domestica	Sacred Bamboo												0.025	
Ochnaceae														
* Ochna serrulata	Mickey Mouse Plant			1.525		0.025			0.1	0.275	0.05	0.05	0.025	
Oleaceae														
* Jasminum polyanthum	Jasmine	7												
* Ligustrum lucidum	Broad-leaved Privet, Glossy Privet	3	0.025			0.55			0.075	2			0.025	
* Ligustrum sinense	Small-Leaved Privet, Chinese Privet								0.05	1.5	0.3	0.05	0.025	
Notelaea longifolia	Large Mock-olive		0.75			2	0.275							
* Olea europaea subsp. cuspidata	African Olive					0.05							0.025	
Oxalidaceae														
* Oxalis latifolia														0.05
* Oxalis pes-caprae	Soursob		0.025											

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Passifloraceae														
Passiflora herbertiana	Native Passionfruit			0.025		4							2.5	
* Passiflora suberosa	Corky Passionflower					1.775	0.75							0.025
* Passiflora subpeltata	White Passionfruit	0.25	0.025	0.025		0.275							0.5	
Pittosporaceae														
Billardiera scandens	Hairy Apple Berry, Dumplings										0.075	0.025		
Bursaria spinosa	Australian Boxthorn		0.25											
Pittosporum multiflorum	Orange Thorn		0.525			1.525								
Pittosporum revolutum	Yellow Pittosporum						1.25						0.775	0.25
Pittosporum undulatum	Pittosporum	1.25	14.5	5.75	12	5.75			10	1.275	1.775	1	7.75	5.5
Plantaginaceae														
* Plantago major	Large Plantain							0.025						
Polygonaceae														
* Acetosa sagittata	Rambling Dock, Turkey Rhubarb							0.275						
Persicaria sp.	Knotweed							0.025						
Rumex brownii	Slender Dock							0.3						
Primulaceae														
Samolus repens	Creeping Brookweed							21.75						
Proteaceae														
Banksia spinulosa	Hairpin Banksia										1.025			
# Grevillea robusta	Silky Oak	1.25			0.525									2.5
Grevillea sericea												0.525		
Hakea laevipes											0.25			
Hakea salicifolia	Willow Hakea											1		
Lambertia formosa	Mountain Devil									0.25				
Lomatia silaifolia	Crinkle Bush								0.025	0.025	0.325	0.025		
Persoonia levis	Broad-leaved Geebung											0.25		
# Stenocarpus sinuatus	Firewheel Tree			0.025	0.05									0.025
Ranunculaceae														
Clematis glycinoides	Headache Vine, Traveller's Joy, Old Man's Beard		2			0.325	0.75		2				0.25	

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Rosaceae														
* Eriobotrya japonica	Loquat												0.05	
* Rubus laudatus	Plains Blackberry						1.025							
Rubus rosifolius	Native Raspberry, Rose-leaf Bramble													0.5
Rubiaceae														
* Galium aparine	Cleavers, Goose-grass, Bedstraw							0.025						
Morinda jasminoides	Morinda		0.25	1.75									0.55	
Rutaceae														
Correa reflexa	Native Fuchsia											0.025		
Melicope micrococca	Hairy-leaved Doughwood		0.25	6.5									0.775	0.025
# Murraya paniculata	Jasmine-orange, Cosmetic Bark												0.025	
Zieria smithii	Sandfly Zieria, Stinkwood									0.775				
Sapindaceae														
Alectryon subcinereus	Native Quince		10	1.25										
* Cardiospermum grandiflorum	Balloon Vine						1.25	0.05						
Dodonaea triquetra	Hopbush								0.25		0.05	3.275		0.025
Guioa semiglauca	Guioa		0.5	0.25										
Solanaceae														
* Cestrum nocturnum	Night-scented Jessamine, Lady of the Night						0.25						0.775	
* Physalis peruviana	Cape Gooseberry												0.025	
Solanum aviculare	Kangaroo Apple					0.025								
* Solanum chenopodioides	White-tip Nightshade						0.025							
* Solanum nigrum	Blackberry Nightshade							0.025						
Solanum prinophyllum	Forest Nightshade					0.025								
* Solanum pseudocapsicum	Jerusalem Cherry		0.025	0.25		0.075								0.05
* Solanum seaforthianum	Brazilian Nightshade						0.775							
* Solanum sp.							0.25							
Sterculiaceae														
# Brachychiton acerifolius	Illawarra Flame-tree, Flame Kurrajong		0.5	2	2.25	1.275								1.5
Stylidiaceae														
Stylidium graminifolium	Grass-leaf Triggerplant											0.025		

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Thymelaeaceae														
Pimelea linifolia	Slender Rice Flower										0.05	0.05		
Ulmaceae														
* Celtis occidentalis	American Hackberry				0.5									0.25
* Celtis sinensis	Chinese Hackberry, Chinese Nettle-tree	0.25	0.5											
Trema tomentosa var. aspera	Poison Peach, Peach-leaf Poison Bush		0.525										0.5	0.25
Urticaceae														
* Parietaria judaica	Wall Pellitory, Kirribilli Curse, Stickyweed		0.75											
Verbenaceae														
* Lantana camara	Lantana	77.5				4.75			0.05		0.025	0.05		
Vitaceae														
Cayratia clematidea	Slender Grape		0.05	0.025	0.325	1.5	4.5							0.075
Cissus antarctica	Kangaroo Vine		0.025	4.25	1	0.05	18.75						0.25	
4. Monocotyledons														
Agavaceae														
* Agave attenuata	Agave								0.025					
* Yucca sp.	Yucca	0.025												
Anthericaceae														
* Chlorophytum comosum	Spider Plant					11.75								
Arecaceae														
# Archontophoenix sp.													0.025	
Livistona australis	Cabbage Palm, Cabbage-tree Palm				1.5									0.75
* Phoenix canariensis	Canary Island Date		0.025											
* Syagrus romanzoffiana	Cocos Palm, Queen Palm					0.025			0.05	0.025				
Asparagaceae														
* Asparagus aethiopicus	Asparagus Fern	0.5			0.025	0.775	0.025		0.275	0.275			0.025	
* Asparagus officinalis	Asparagus						0.25							
* Asparagus plumosus	Climbing Asparagus Fern	0.25		0.025										

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Asphodelaceae														
* Aloe arborescens			0.025											
Commelinaceae														
Commelina cyanea	Blue Spiderwort		3	0.025			2.525	0.05						1
* Tradescantia fluminensis	Trad, Wandering Jew		45	7.525		0.5	42.5	0.3		0.025			8	
Cyperaceae														
* Cyperus eragrostis	Drain Flat-sedge, Umbrella Sedge							0.025						
Cyperus imbecillis														0.025
Cyperus tetraphyllus				0.25									0.3	0.275
Gahnia clarkei	Tall Saw-sedge									0.025				
Lepidosperma elatius	Tall Sword-sedge									0.025	0.8			
Lepidosperma laterale	Variable Sword-sedge								0.05			0.05		
Schoenus melanostachys	Black Bog-rush											1		
Iridaceae														
* Dietes grandiflora	Butterfly Iris													0.25
* Dietes iridioides	Butterfly Iris									0.025				
Juncaceae														
Juncus continuus	Rush											0.025		
Juncus kraussii	Sea Rush							8.25						
Lomandraceae														
Lomandra cylindrica	Needle Mat-rush										1			
Lomandra gracilis											0.25			
Lomandra longifolia	Honey Reed, Spike Mat-rush		1			0.05	2.525		1.75	1.25	9.75	10	0.25	0.75
Lomandra multiflora	Many-flowered Mat-rush								0.075		0.25			
Lomandra obliqua											0.025	0.025		
Orchidaceae														
Cryptostylis erecta	Tartan Tongue Orchid										0.025			
Cryptostylis subulata	Large Tongue-orchid, Cow Orchid									0.025				
Philesiaceae														
Eustrephus latifolius	Wombat Berry		0.275	0.55	0.275	0.5			0.5					

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Geitonoplesium cymosum	Scrambling Lily												0.025	
Phormiaceae														
Dianella caerulea	Blue Flax-lily					0.5	0.025		0.3	0.025	0.025	1.25	0.525	0.025
Dianella revoluta	Blue Flax-lily, Spreading Flax-lily										0.075			
Poaceae														
* Andropogon virginicus	Whisky Grass											0.025		
Anisopogon avenaceus	Oat Spear Grass										0.025			
Aristida vagans	Threeawn Speargrass										0.025			
Austrostipa pubescens	Speargrass										0.05	0.025		
Cymbopogon refractus	Barbed-wire Grass								0.025					
Digitaria parviflora	Smallflower Finger Grass											0.05		
* Echinochloa crus-galli	Barnyard Grass							0.25						
Echinopogon caespitosus	Tufted Hedgehog Grass											0.075		
Echinopogon ovatus	Forest Hedgehog Grass								0.05		0.025			
* Ehrharta erecta	Panic Veld-grass		15.025	1.275	2	47.5	9.25		0.5				2.025	0.075
Entolasia marginata	Bordered Panic				0.025	0.05				0.025				0.05
Entolasia stricta	Wiry Panic					0.025			1	0.025	27.5	6.5		
Eragrostis brownii	Brown's Lovegrass											0.025		
Hemarthria uncinata	Mat Grass							16.775						
Imperata cylindrica	Blady Grass								3.5		6.25	10.75		
* Lolium perenne	Perennial Ryegrass							0.275						
* Megathyrsus maximus	Guinea Grass						1.25							
Microlaena stipoides	Weeping Grass, Meadow Rice-grass			0.025		2.525	4		3.25		1.75	2	0.25	
Oplismenus aemulus	Australian Basket Grass, Wavy Beard Grass		0.05		0.05		10	0.025	3.25			0.025	0.05	5.75
Oplismenus imbecillis	Narrow-leaved Basket Grass			0.275		0.3	0.5			0.025			0.05	
* Paspalum dilatatum	Paspalum						0.025				0.025			
Poa affinis										0.5		0.25		
* Setaria parviflora									0.275					
Themeda triandra	Kangaroo Grass								8.25		4.75			
Smilacaceae														
Smilax australis	Lawyer Vine, Wait-a-while, Barbwire Vine			0.275	0.775									
Smilax glyciphylla	Sweet Sarsaparilla								0.25	0.25		1		

Botanical name	Common name	Quadrat												
		BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Xanthorrhoeaceae														
Xanthorrhoea media	Grass Tree										1.25			

Table 2: Species recorded greater than 2 m in height in the 11 re-surveyed quadrats (Brush Farm Park, Darvall Park, Field of Mars Reserve, Lambert Park) and 2 previously unsurveyed quadrats (Bell Park, Outlook Park)

Bell Park

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
*	*Celtis sinensis*					1	3		
#	*Corymbia citriodora*			1	27				
#	*Eucalyptus botryoides*							1	22
#	*Eucalyptus grandis*	2	30			2	20	1	18
#	*Eucalyptus scoparia*			1	20				
#	*Grevillea robusta*					1	14		
*	*Ligustrum lucidum*			3	3	1	3	5	4
	Melaleuca armillaris	2	12						
	Pittosporum undulatum							2	5
	Syzygium australe			1	8				

Brush Farm Park

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia parramattensis			2	12	1	2		
	Acmena smithii					1	4		
	Alectryon subcinereus					1	5	2	8
#	*Brachychiton acerifolius*							1	6
	Breynia oblongifolia			3	2			1	2
	Bursaria spinosa			1	2			1	2
	Callistemon salignus					1	6		
*	*Celtis sinensis*			1	4	1	2		
*	*Cinnamomum camphora*							1	2
	Clerodendrum tomentosum	1	2						
#	*Eucalyptus grandis*	2	15	1	12	1	12		
#	*Eucalyptus microcorys*	3	10						
	Eucalyptus saligna					1	28		
	Ficus coronata							1	4
	Ficus rubiginosa			1	10				
*	*Jacaranda mimosifolia*							1	18
#	*Melia azedarach*			1	3				
	Notelaea longifolia			1	2				
	Pittosporum undulatum	2	2	6	6	4	6	4	3
	Senna pendula var. *glabrata*					1	3		
	Syncarpia glomulifera	1	3	1	3	1	12	1	20

Brush Farm Park

		2-1		2-2		2-3		2-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acmena smithii			4	10	2	12		
	Alectryon subcinereus	3	4					1	5
#	*Brachychiton acerifolius*							3	6
	Breynia oblongifolia					2	3		
	Elaeodendron australe	5	8	1	2				
	Eupomatia laurina	1	7	5	6				
	Ficus coronata	6	8	5	8	2	4	7	7
	Melicope micrococca	1	3	4	7	1	10		
	Myrsine variabilis							5	4
	Pittosporum undulatum					3	10		
	Schizomeria ovata			1	13				
	Syncarpia glomulifera					2	6	1	6

		3-1		3-2		3-3		3-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
#	*Brachychiton acerifolius*	1	6			1	7		
*	*Celtis occidentalis*	1	3						
*	*Cinnamomum camphora*	2	5						
	Eucalyptus acmenoides	1	22						
	Eucalyptus paniculata	1	23						
	Eucalyptus saligna							2	14
	Ficus coronata			1	8	4	8	1	6
	Ficus rubiginosa			1	6				
	Grevillea robusta			1	10			1	12
	Pittosporum undulatum	8	6	7	6	1	3	4	4
	Syncarpia glomulifera					1	16		

Brush Farm Park

		4-1		4-2		4-3		4-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia parramattensis	7	10	4	10			1	5
#	*Brachychiton acerifolius*	1	5						
	Breynia oblongifolia	1	2						
	Elaeodendron australe			3	10			10	6
	Eucalyptus sp.			2	6				
*	*Ligustrum lucidum*					2	5	1	5
#	*Melaleuca styphelioides*			1	2				
	Notelaea longifolia	1	2	3	3			2	3
	Pittosporum undulatum			1	2	2	3	2	4
	Syncarpia glomulifera	1	17	2	18	4	19		
*	*Tecomaria capensis*					1	7		

Darvall Park

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acmena smithii							1	6
	Callistemon salignus					1	4	1	?
	Elaeodendron australe							1	5
#	*Eucalyptus grandis*	1	20						
#	*Eucalyptus microcorys*					2	13		
	Eucalyptus paniculata	1	20					1	12
	Eucalyptus pilularis	2	20						
	Eucalyptus saligna			4	20	2	25	1	?
	Homalanthus populifolius	1	2						
#	*Melaleuca styphelioides*			4	6				
	Pittosporum revolutum			1	3				
	Syncarpia glomulifera			2	6			2	7

Field of Mars Reserve

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Aegiceras corniculatum			1	3				
	Avicennia marina subsp. *australasica*	1	10			2	10		
	Casuarina glauca	11	14	6	15			9	12

		2-1		2-2		2-3		2-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Angophora costata	5	13	1	13		1	18	
	Allocasuarina littoralis	2	4	3	10			2	6
	Breynia oblongifolia			1	2				
	Elaeocarpus reticulatus	1	3						
	Eucalyptus punctata					1	25		
	Eucalyptus resinifera subsp. *resinifera*	2	16	1	20	1	25		
	Pittosporum undulatum	1	3	3	5			5	4
	Syncarpia glomulifera	1	15	5	15	4	10		

		3-1		3-2		3-3		3-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Ceratopetalum apetalum	5	11	3	12	10	15	5	4
*	*Ligustrum lucidum*					1	6	4	4
*	*Ligustrum sinense*					3	6		
	Pittosporum undulatum	1	3	2	10	3	12		
	Tristaniopsis laurina	1	14	2	13	2	10	3	8

Field of Mars Reserve

		4-1		4-2		4-3		4-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Allocasuarina littoralis	1	4	3	8	2	4	4	4
	Angophora costata	3	14	1	10	3	18	3	20
	Corymbia gummifera			1	9	2	16	2	18
	Eucalyptus resinifera subsp. *resinifera*	3	18	3	18	1	20		
	Eucalyptus racemosa	2	18	4	18	3	20	2	20
	Glochidion ferdinandi					1	4		
	Kunzea ambigua	3	5	2	5				
	Pittosporum undulatum	1	2	1	3			1	2
	Polyscias sambucifolia	1	3			1	2		

		5-1		5-2		5-3		5-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia linifolia	2	2			1	2		
	Acacia longifolia					1	2		
	Acacia terminalis subsp. *angustifolia*	2	2	1	2	3	2	1	2
	Allocasuarina littoralis					1	6	1	9
	Angophora costata			4	20			1	12
	Corymbia gummifera							2	16
	Dodonaea triquetra	1	2	1	2	12	3		
	Elaeocarpus reticulatus	3	5	8	5	3	4	12	6
	Eucalyptus piperita	1	18						
	Eucalyptus resinifera subsp. *resinifera*	1	6	1	16	2	20		
	Grevillea sericea					1	2		
	Hakea salicifolia			1	8				
	Kunzea ambigua	7	5	13	5	4	6	11	5
	Melaleuca linariifolia	1	7						
	Ozothamnus diosmifolius					1	2		
	Persoonia levis					1	2		

Lambert Park

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acmena smithii	1	20					3	12
#	*Casuarina cunninghamiana*			2	25				
	Cestrum nocturnum			1	3				
#	*Eucalyptus grandis*							1	25
	Eucalyptus saligna			1	20			1	25
	Ficus coronata	1	2			1	2	2	8
	Ficus rubiginosa			4	20	1	20	1	15
	Homalanthus populifolius	5	8						
	Melicope micrococca			1	5				
	Pittosporum revolutum			20	3				
	Pittosporum undulatum	1	4		1	2			

Outlook Park

		1-1		1-2		1-3		1-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acmena smithii	1	2	1	4				
	Allocasuarina torulosa					3	13		
*	*Araucaria heterophylla*			1	5				
#	*Brachychiton acerifolius*	3	6	1	3	1	2	2	2
	Ceratopetalum apetalum	1	13						
	Cryptocarya glaucescens	1	2			1	2		
	Elaeocarpus reticulatus							2	8
	Eucalyptus saligna	1	35	1	25			1	35
	Ficus coronata	2	6					1	6
	Ficus rubiginosa	1	14						
	Glochidion ferdinandi	1	3						
#	*Grevillea robusta*					1	18		
	Homalanthus populifolius			1	2				
*	*Jacaranda mimosifolia*			1	7				
	Melaleuca styphelioides			1	3	2	11		
	Pittosporum undulatum			2	9	1	2	2	8
#	*Stenocarpus sinuatus*					1	3		
	Syncarpia glomulifera			1	25			1	20
#	*Syzygium paniculatum*			1	5				

Table 3 - Braun-Blanquet cover class scores for species recorded at the 11 re-surveyed quadrats (Brush Farm Park, Darvall Park, Field of Mars Reserve, Lambert Park) and 2 previously unsurveyed quadrats (Bell Park, Outlook Park)

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for quadrats denote Braun-Blanquet cover class score for each of the 20 m x 20 m or 10 m x 40 m quadrats.

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
1. Pteridophytes													
Adiantaceae													
Adiantum hispidulum			5									1	
Blechnaceae													
Doodia aspera										2			
Cyatheaceae													
# Cyathea cooperi												1	
Dennstaedtiaceae													
Pteridium esculentum										3	4		
Lindsaeaceae													
Lindsaea linearis											1		
Pteridaceae													
Pteris tremula				2									
Thelypteridaceae													
Cyclosorus dentatus												2	
2. Gymnosperms													
Araucariaceae													
Araucaria heterophylla													1
3. Dicotyledons													
Acanthaceae													
Avicennia marina subsp. australasica							5						
* Justicia sp.													1
Pseuderanthemum variabile		2		2		1							3
* Thunbergia alata						2							
Aceraceae													
* Acer negundo												1	
Aizoaceae													
Tetragonia tetragonioides							3						
Amaranthaceae													
Alternanthera denticulata							1						
Anacardiaceae													
* Toxicodendron succedaneum						1							
Aphanopetalaceae													
Aphanopetalum resinosum		4		1								3	

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Apiaceae													
Apium prostratum							4						
Centella asiatica						1							
* Cyclospermum leptophyllum							1						
Platysace lanceolata											1		
Xanthosia tridentata											1		
Apocynaceae													
* Araujia sericifera			1			1							
Parsonsia straminea										1			
Araliaceae													
* Hedera helix		1		2								1	1
Polyscias sambucifolia										3	2		
Asteraceae													
* Aster subulatus							2						
* Bidens pilosa		1				1						1	
* Conyza sumatrensis			1										
* Coreopsis lanceolata										1			
* Delairea odorata	3												
* Hypochaeris radicata											1		
Ozothamnus diosmifolius											2		
Sigesbeckia orientalis						2							1
* Sonchus oleraceus							1						
Basellaceae													
* Anredera cordifolia		3		1			1					3	
Bignoniaceae													
* Jacaranda mimosifolia		1											1
Pandorea pandorana											1		
Casuarinaceae													
Allocasuarina littoralis										3	3		
Allocasuarina torulosa													1
# Casuarina cunninghamiana												4	
Casuarina glauca							4						
Celastraceae													
Elaeodendron australe						1							
Chenopodiaceae													
Atriplex australasica							2						
Convolvulaceae													
Calystegia marginata		1										1	
Dichondra sp. A													1
* Ipomoea indica	4	3											
Cunoniaceae													
Ceratopetalum apetalum													2
Elaeocarpaceae													
Elaeocarpus reticulatus											4		1
Ericaceae Styphelioideae													
Epacris pulchella										1	1		
Leucopogon ericoides											1		
Leucopogon juniperinus										1	1		
Leucopogon lanceolatus											1		
Euphorbiaceae													
Breynia oblongifolia		2	3								1		
Glochidion ferdinandi										1			1

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Homalanthus populifolius						1	1			1		4	1
Micrantheum ericoides										3	3		
Phyllanthus gunnii						3							
Phyllanthus hirtellus										1	2		
Fabaceae Caesalpinioideae													
* Senna pendula var. glabrata	2	1					1						
Fabaceae Faboideae													
* Crotalaria sp.							1						
Glycine clandestina						2					1		
Glycine tabacina						1							
Kennedia rubicunda											1		
Platylobium formosum											2		
Pultenaea tuberculata											1		
Fabaceae Mimosoideae													
Acacia decurrens		1	1										
Acacia fimbriata			1										
Acacia linifolia										1	3		
Acacia longifolia											3		
Acacia parramattensis		2				1							
Acacia suaveolens											1		
Acacia terminalis subsp. angustifolia											3		
Geraniaceae													
Geranium homeanum						4							
Goodeniaceae													
Goodenia hederacea										2	2		
Haloragaceae													
Gonocarpus teucrioides										1	1		
Lamiaceae													
Clerodendrum tomentosum		1		1									
Plectranthus parviflorus		2	1			3							1
Lauraceae													
Cassytha pubescens										2	1		
* Cinnamomum camphora		2		1						1		1	1
Cryptocarya glaucescens													2
Lobeliaceae													
Lobelia anceps							3						
Pratia purpurascens						1				2	1		
Malvaceae													
Hibiscus heterophyllus			1										
* Sida rhombifolia						2							
Meliaceae													
# Melia azedarach		1										1	1
# Toona ciliata													1
Menispermaceae													
Sarcopetalum harveyanum		1	1	2									
Stephania japonica var. discolor		2	2	3		2						3	
Moraceae													
Ficus coronata		1	4	5								3	4
Ficus rubiginosa		4										5	2
* Morus alba		1											
Myrsinaceae													
Aegiceras corniculatum							2						

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Myrsine variabilis			2										
Myrtaceae													
Acmena smithii		1				1						6	2
Angophora costata										4	4		
Backhousia myrtifolia													1
Callistemon salignus		1	1			1							
# Corymbia citriodora	4												
Corymbia gummifera										4			
# Eucalyptus botryoides	5												
Eucalyptus globoidea											1		
# Eucalyptus grandis	5	4				5						4	
# Eucalyptus microcorys		3				1							
Eucalyptus paniculata				4		4							
Eucalyptus pilularis						5							
Eucalyptus piperita											5		
Eucalyptus racemosa										4			
Eucalyptus resinifera subsp. resinifera										4	5		
Eucalyptus saligna		4				4						4	4
# Eucalyptus scoparia	4												
Kunzea ambigua										3	4		
Leptospermum trinervium										1			
Melaleuca linariifolia											1		
Melaleuca styphelioides						2							2
Syncarpia glomulifera		5	4	5		4							5
Syzygium australe	4												1
# Syzygium paniculatum													1
Nandinaceae													
* Nandina domestica												1	
Ochnaceae													
* Ochna serrulata			2							1	2	2	
Oleaceae													
* Jasminum polyanthum	4												
* Ligustrum lucidum	4	1										2	
* Ligustrum sinense										3	2	1	
Notelaea longifolia		1				1							
* Olea europaea subsp. cuspidata												1	
Oxalidaceae													
* Oxalis latifolia													2
* Oxalis pes-caprae		1											
Passifloraceae													
Passiflora herbertiana			2									4	
* Passiflora suberosa						1							1
* Passiflora subpeltata	1	1	2									3	
Pittosporaceae													
Billardiera scandens										2	2		
Bursaria spinosa		1											
Pittosporum multiflorum		1											
Pittosporum revolutum						1						3	1
Pittosporum undulatum	1	5	4	5						3	3	4	4
Plantaginaceae													
* Plantago major							1						
Polygonaceae													
* Acetosa sagittata							2						
Persicaria sp.							1						
Rumex brownii							3						

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Primulaceae													
Samolus repens							5						
Proteaceae													
Banksia spinulosa										3			
# Grevillea robusta	1			2									1
Grevillea sericea											3		
Hakea laevipes										1			
Hakea salicifolia											3		
Lomatia silaifolia										2	3		
Persoonia levis											1		
# Stenocarpus sinuatus				1									1
Ranunculaceae													
Clematis glycinoides		3	1			3						2	
Rosaceae													
* Eriobotrya japonica												1	
* Rubus laudatus						3							
Rubus rosifolius													1
Rubiaceae													
* Galium aparine							1						
Morinda jasminoides		2	2									4	
Rutaceae													
Correa reflexa											1		
Melicope micrococca		1	4									1	1
# Murraya paniculata												1	
Sapindaceae													
Alectryon subcinereus		4	2										
* Cardiospermum grandiflorum						4	2						
Dodonaea triquetra										2	4		1
Guioa semiglauca		1	1										
Solanaceae													
* Cestrum nocturnum						2						3	
* Physalis peruviana												1	
* Solanum chenopodioides						1							
* Solanum nigrum							1						
* Solanum pseudocapsicum		1											1
* Solanum seaforthianum						2							
* Solanum sp.						1							
Sterculiaceae													
# Brachychiton acerifolius		1	3	2									2
Thymelaeaceae													
Pimelea linifolia										2	2		
Ulmaceae													
* Celtis occidentalis				1									1
* Celtis sinensis	1	1											
Trema tomentosa var. aspera		2	1									2	1
Urticaceae													
* Parietaria judaica		3											
Verbenaceae													
* Lantana camara	7									1	1		
Vitaceae													
Cayratia clematidea		3	1	2		4							3
Cissus antarctica		1	4	2		5						1	

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
4. Monocotyledons													
Agavaceae													
* Yucca sp.	1												
Arecaceae													
# Archontophoenix sp.												1	
Livistona australis				2									1
* Phoenix canariensis		1											
Asparagaceae													
* Asparagus aethiopicus	2			1		1						1	
* Asparagus officinalis						2							
* Asparagus plumosus	1		1										
Asphodelaceae													
* Aloe arborescens		1											
Commelinaceae													
Commelina cyanea		3	1			3	2						3
* Tradescantia fluminensis		6	6			6	3					4	
Cyperaceae													
* Cyperus eragrostis							1						
Cyperus imbecillis													1
Cyperus tetraphyllus												2	2
Lepidosperma elatius										4			
Lepidosperma laterale											2		
Schoenus melanostachys											2		
Iridaceae													
* Dietes grandiflora													1
Juncaceae													
Juncus continuus											1		
Juncus kraussii							4						
Lomandraceae													
Lomandra cylindrica										3			
Lomandra gracilis										1			
Lomandra longifolia		2	1			1				4	4	3	2
Lomandra multiflora										2			
Lomandra obliqua										1	2		
Orchidaceae													
Cryptostylis erecta										1			
Philesiaceae													
Eustrephus latifolius		1	2	1									
Geitonoplesium cymosum												1	
Phormiaceae													
Dianella caerulea			2			1				1	3	3	2
Dianella revoluta										2			
Poaceae													
* Andropogon virginicus											1		
Anisopogon avenaceus										1			
Aristida vagans										1			
Austrostipa pubescens										2	1		
Digitaria parviflora											2		
* Echinochloa crus-galli							2						
Echinopogon caespitosus											1		
Echinopogon ovatus										1			
* Ehrharta erecta		4	3	2		4						3	2

Botanical name	Quadrats												
	BP#1	BF#1	BF#2	BF#3	BF#4	DP#1	FoM#1	FoM#2	FoM#3	FoM#4	FoM#5	LP#1	OP#1
Entolasia marginata													1
Entolasia stricta										5	4		
Eragrostis brownii											2		
Hemarthria uncinata							5						
Imperata cylindrica										4	4		
* Lolium perenne							2						
* Megathyrsus maximus						3							
Microlaena stipoides			1			4				3	3	3	
Oplismenus aemulus		2		2		4	1				1	3	4
Oplismenus imbecillis			1			1						3	
* Paspalum dilatatum						2				1			
Poa affinis											1		
Themeda triandra										4			
Smilacaceae													
Smilax australis				2									
Smilax glyciphylla											3		
Xanthorrhoeaceae													
Xanthorrhoea media										3			

Table 4a - Species recorded in sub-quadrats and at supplementary sampling locations in Bell Park

Notes:

1. **Asterisk before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised species.**
2. **Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.**
3. **The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the spot locations and ground truthing locations, presence only is indicated (X).**
4. **'Spot locs.' = Spot Locations. 'GT locs.' = Ground truthing locations.**

Botanical name	Common name	Sub-quadrats				Spot locs.		GT locs.	
		1-1	1-2	1-3	1-4	A	B	GTa	GTb
1. Pteridophytes									
Davalliaceae									
# Nephrolepis cordifolia	Fishbone Fern						X		
2. Gymnosperms									
Araucariaceae									
# Araucaria bidwillii	Bunya Pine, Bunya Bunya								X
3. Dicotyledons									
Araliaceae									
* Hedera helix	Ivy, English Ivy								X
Asteraceae									
* Conyza sumatrensis	Tall Fleabane					X			
* Delairea odorata	Cape Ivy		1	2	1		X		
Basellaceae									
* Anredera cordifolia	Madeira Vine, Lamb's Tail						X		
Bignoniaceae									
* Jacaranda mimosifolia	Jacaranda						X		X
* Tecoma capensis	Cape Honeysuckle								X
Caryophyllaceae									
* Stellaria media	Chickweed					X			
Casuarinaceae									
Casuarina glauca	Swamp Oak, Swamp She-oak							X	
Convolvulaceae									
* Ipomoea indica	Blue Morning Glory	3	10	15	10		X		X
Cunoniaceae									
Ceratopetalum apetalum	Coachwood							X	
Euphorbiaceae									
Breynia oblongifolia	Coffee Bush	2							
Fabaceae Caesalpinioideae									
* Senna pendula var. glabrata	Easter Cassia			1	1				
Fabaceae Mimosoideae									
Acacia parramattensis	Parramatta Green Wattle							X	

Botanical name	Common name	Sub-quadrats				Spot locs.		GT locs.	
		1-1	1-2	1-3	1-4	A	B	GTa	GTb
Fagaceae									
* Quercus robur	English Oak, Pedunculate Oak								X
Lauraceae									
* Cinnamomum camphora	Camphor Laurel					X	X		
Meliaceae									
# Toona ciliata	Australian Red Cedar							X	
Moraceae									
Ficus rubiginosa	Port Jackson Fig, Rusty Fig					X			
Myrtaceae									
Acmena smithii	Lilly-pilly							X	
Angophora costata	Sydney Red Gum, Smooth-barked App							X	
Angophora floribunda	Rough-barked Apple							X	
# Corymbia citriodora	Lemon-scented Gum		20						
# Eucalyptus botryoides	Bangalay				25				
# Eucalyptus grandis	Flooded Gum	35		25	10				X
# Eucalyptus microcorys	Tallowwood					X	X	X	X
Eucalyptus paniculata	Grey Ironbark								X
Eucalyptus pilularis	Blackbutt						X	X	X
# Eucalyptus robusta	Swamp Mahogany						X		
Eucalyptus saligna	Sydney Blue Gum								X
# Eucalyptus scoparia	Wallangarra White Gum		10					X	
# Melaleuca armillaris	Bracelet Honey-myrtle	5							
Melaleuca styphelioides	Prickly Paperbark						X		
Syzygium australe	Brush Cherry		15						
# Syzygium paniculatum	Brush Cherry							X	
Tristaniopsis laurina	Water Gum, Kanuka Box							X	
Ochnaceae									
* Ochna serrulata	Mickey Mouse Plant					X			
Oleaceae									
* Jasminum polyanthum	Jasmine	2	1	5	20		X		
* Ligustrum lucidum	Broad-leaved Privet, Glossy Privet		2		10		X	X	
* Ligustrum sinense	Small-Leaved Privet, Chinese Privet							X	
* Olea europaea subsp. cuspidata	African Olive					X			
Passifloraceae									
* Passiflora suberosa	Corky Passionflower								X
* Passiflora subpeltata	White Passionfruit				1				
Pittosporaceae									
Pittosporum undulatum	Pittosporum				5		X	X	
Proteaceae									
# Grevillea robusta	Silky Oak			5					
Rubiaceae									
* Rothmannia globosa	Tree Gardenia								X
Solanaceae									
Solanum aviculare	Kangaroo Apple					X			
Sterculiaceae									
# Brachychiton acerifolius	Illawarra Flame-tree, Flame Kurrajong						X		
Ulmaceae									
* Celtis occidentalis	American Hackberry					X			
* Celtis sinensis	Chinese Hackberry, Chinese Nettle-tre			1					
Verbenaceae									
* Lantana camara	Lantana	60	90	80	80		X	X	

Botanical name	Common name	Sub-quadrats				Spot locs.		GT locs.	
		1-1	1-2	1-3	1-4	A	B	GTa	GTb
Vitaceae									
Cissus antarctica	Kangaroo Vine					X		X	
4. Monocotyledons									
Agavaceae									
* Yucca sp.	Yucca				0.1				
Arecaceae									
* Phoenix canariensis	Canary Island Date								X
Asparagaceae									
* Asparagus aethiopicus	Asparagus Fern			1	1				X
* Asparagus plumosus	Climbing Asparagus Fern			1				X	
Commelinaceae									
* Tradescantia fluminensis	Trad, Wandering Jew						X	X	X
Lomandraceae									
Lomandra longifolia	Honey Reed, Spike Mat-rush							X	
Poaceae									
* Ehrharta erecta	Panic Veld-grass					X			

Table 4b - Species recorded in sub-quadrats and at supplementary sampling locations in Brush Farm Park

Note **1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.**

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the spot locations and ground truthing locations, presence only is indicated (X).

4. 'GT locs.' = Ground truthing locations.

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
1. Pteridophytes																			
Adiantaceae																			
Adiantum hispidulum					15	20	15	40									X		X
Pellaea falcata																			X
Blechnaceae																			
Doodia aspera																	X		X
Doodia caudata						0.1													X
Cyatheaceae																			
# Cyathea cooperi																	X		X
Dicksoniaceae																			
Dicksonia antarctica																			X.
Pteridaceae																			
Pteris tremula										0.1	0.1	0.1					X	X	
Thelypteridaceae																			
Cyclosorus dentatus					1														X
3. Dicotyledons																			
Acanthaceae																			
Pseuderanthemum variabile		0.1	0.1		0.1				0.1	0.1	0.1	0.1	1	5		1			X

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Aphanopetalaceae																			
Aphanopetalum resinosum	3		5	10							0.1								
Apocynaceae																			
* Araujia sericifera							0.1	0.1											
Araliaceae																			
* Hedera helix		0.1								5									
Asteraceae																			
* Bidens pilosa	1												0.1	0.1	0.1				
Sigesbeckia orientalis														0.1					
Basellaceae																			
* Anredera cordifolia	1	1							0.1	0.1								X	
Bignoniaceae																			
* Jacaranda mimosifolia				5															
Pandorea pandorana													0.1	2	0.1		X		
Celastraceae																			
Celastrus australis															0.1		X		
Denhamia silvestris																1			
Elaeodendron australe					10	1										30			X
Convolvulaceae																			
Calystegia marginata			0.1															X	
* Ipomoea indica	2		0.1															X	
Cunoniaceae																			
Schizomeria ovata						50													X
Euphorbiaceae																			
Breynia oblongifolia		4		1			5						0.1	0.1			X		
Glochidion ferdinandi					1	1													X
Homalanthus populifolius																	X	X	
Phyllanthus gunnii																		X	

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Eupomatiaceae																			
Eupomatia laurina					2	15													X
Fabaceae Caesalpinioideae																			
* Senna pendula var. glabrata			1																
Fabaceae Faboideae																			
Glycine clandestina													0.1						
Glycine tabacina													0.1	0.1					
Indigofera australis													0.1	0.1					
Fabaceae Mimosoideae																			
Acacia decurrens		3																	
Acacia parramattensis		5	1										8	10	0.1	5		X	
Lamiaceae																			
Clerodendrum tomentosum	1								0.1										
Plectranthus parviflorus		1	0.1										1	1		0.1		X	
Lauraceae																			
* Cinnamomum camphora	0.1			0.1					2										
Cryptocarya glaucescens																	X		X
Malvaceae																			
Hibiscus heterophyllus																		X	
* Sida rhombifolia													0.1						
Meliaceae																			
# Melia azedarach		1																	X
Synoum glandulosum																	X		
# Toona ciliata																		X	X
Menispermaceae																			
Sarcopetalum harveyanum				0.1	0.1				1		0.1	0.1							X
Stephania japonica var. discolor		0.1					2		2		3	2	0.1	0.1					
Moraceae																			
Ficus coronata				5	30	10	10		10	20	40	20					X	X	X

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Ficus rubiginosa	15	3							1	10									
* Morus alba		0.1																	
Myrsinaceae																			
Myrsine variabilis						5	2	3								1			X
Myrtaceae																			
Acmena smithii			3			3											X		X
Backhousia myrtifolia																		X	
Callistemon salignus	1		4															X	
Eucalyptus acmenoides									30										
# Eucalyptus grandis	5																	X	
# Eucalyptus microcorys	10		10																
Eucalyptus paniculata									30								X		
Eucalyptus saligna	3	3	20									10							
Melaleuca styphelioides													0.1	0.1					
Syncarpia glomulifera	1	1		20			10	5			20		20	20	60		X		
Syzygium australe																	X		
Ochnaceae																			
* Ochna serrulata					1	0.1	3	2							0.1				
Oleaceae																			
* Ligustrum lucidum			0.1										0.1	0.1		2	X		
Notelaea longifolia		1		2									1	5		2			
* Olea europaea subsp. cuspidata															0.1	0.1	X		
Oxalidaceae																			
* Oxalis pes-caprae		0.1																	
Passifloraceae																			
Passiflora herbertiana							0.1						3	10	2	1	X		
* Passiflora suberosa													0.1	5		2			
* Passiflora subpeltata		0.1					0.1						0.1		1				
Pittosporaceae																			
Bursaria spinosa		1																	
Pittosporum multiflorum		0.1		2									3	3	0.1				

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Pittosporum undulatum	3	40	10	5	5		15	3	20	3	5	20	3	5	5	10	X	X	X
Proteaceae																			
# Grevillea robusta									0.1		2								
# Stenocarpus sinuatus					0.1				0.1	0.1									X
Ranunculaceae																			
Clematis glycinoides	3	2	3										0.1	0.1	0.1	1			
Rosaceae																			
Rubus rosifolius																	X		
* Rubus sp.																		X	
Rubiaceae																			
Morinda jasminoides		1			2		2	3											X
Rutaceae																			
Melicope micrococca		1			1	15	10										X		X
Sapindaceae																			
Alectryon subcinereus				40	2			3											X
Guioa semiglauca				2				1											
Solanaceae																			
Solanum aviculare															0.1				
* Solanum mauritianum																	X		
Solanum prinophyllum																0.1			
* Solanum pseudocapsicum				0.1		1							0.1		0.1	0.1	X		
Sterculiaceae																			
# Brachychiton acerifolius				2			3	5	4		5		2	2	1	0.1	X		
Ulmaceae																			
* Celtis occidentalis									2										
* Celtis sinensis			2																
Trema tomentosa var. aspera		2	0.1														X	X	
Urticaceae																			
* Parietaria judaica	3																		

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Verbenaceae																			
* Lantana camara															4	15			
Vitaceae																			
Cayratia clematidea	0.1	0.1					0.1		0.1	0.1	1	0.1	1	2	2	1		X	
Cissus antarctica			0.1			2	10	5	2		2		0.1	0.1			X		X
4. Monocotyledons																			
Anthericaceae																			
* Chlorophytum comosum														2	5	40			
Araceae																			
Alocasia brisbanensis																	X		
Arecaceae																			
Livistona australis										1		5					X	X	X
* Phoenix canariensis		0.1																	
* Syagrus romanzoffiana															0.1				
Asparagaceae																			
* Asparagus aethiopicus									0.1				0.1	1	1	1			
* Asparagus plumosus							0.1												
Asphodelaceae																			
* Aloe arborescens		0.1																	
Commelinaceae																			
Commelina cyanea	2	10					0.1											X	
* Tradescantia fluminensis	30	40	80	30			0.1	30							2		X	X	
Cyperaceae																			
Cyperus tetraphyllus						1													X
Gahnia melanocarpa																	X		
Lomandraceae																			
# Lomandra hystrix																		X	
Lomandra longifolia		4											0.1	0.1					

Botanical name	Sub-quadrats																GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	GTa	GTb	GTc
Philesiaceae																			
Eustrephus latifolius	1			0.1	0.1	1	0.1	1	1		0.1		1		1		X		X
Phormiaceae																			
Dianella caerulea														2			X		
Poaceae																			
* Ehrharta erecta	20	30	0.1	10		0.1		5	5	1	1	1	30	80	50	30	X	X	
Entolasia marginata										0.1			0.1	0.1					
Entolasia stricta																0.1			
Microlaena stipoides							0.1						0.1	10					
Oplismenus aemulus		0.1	0.1							0.1		0.1							
Oplismenus imbecillis						1	0.1						0.1	0.1		1			X
Smilacaceae																			
Smilax australis					0.1	1				3		0.1					X		X

Table 4c - Species recorded in sub-quadrats and at supplementary sampling locations in Darvall Park

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the spot locations and ground truthing locations, presence only is indicated (X).

4. 'GT locs.' = Ground truthing locations.

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
1. Pteridophytes												
Blechnaceae												
Doodia aspera	Prickly Rasp Fern									X		
3. Dicotyledons												
Acanthaceae												
Pseuderanthemum variabile	Pastel Flower		0.1							X		
* Thunbergia alata	Black-eyed Susan			0.1	0.1							
Anacardiaceae												
* Toxicodendron succedaneum	Rhus Tree, Wax Tree	2										
Apiaceae												
Centella asiatica	Indian Pennywort	0.1										
Hydrocotyle hirta	Hairy Pennywort									X		
Apocynaceae												
* Araujia sericifera	Moth Vine, Cruel Plant				0.1							
Araliaceae												
Polyscias sambucifolia	Elderberry Panax									X		
# Schefflera actinophylla	Queensland Umbrella Tree					X						

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
Asteraceae												
* Bidens pilosa	Cobbler's Pegs		0.1									
Ozothamnus diosmifolius	White Dogwood									X		
Sigesbeckia orientalis	Indian Weed	0.1		0.1	1							
Basellaceae												
* Anredera cordifolia	Madeira Vine, Lamb's Tail											X
Bignoniaceae												
Pandorea pandorana	Wonga Vine									X		
Celastraceae												
Denhamia silvestris	Narrow-leaved Orangebark, Orange Bush,									X		
Elaeodendron australe	Red Olive-plum				2				X			
Convolvulaceae												
Dichondra sp. A	Hairy Kidney Weed									X		
* Ipomoea indica	Blue Morning Glory						X	X	X			
Euphorbiaceae												
Glochidion ferdinandi	Cheese Tree					X						
Homalanthus populifolius	Bleeding heart, Native Poplar	1								X	X	
Phyllanthus gunnii	Scrubby Spurge		2		0.1							
Fabaceae Faboideae												
Glycine clandestina	Twining Glycine				1					X		
Glycine tabacina					1							
Indigofera australis	Native Indigo										X	
Kennedia rubicunda	Dusky Coral-pea					X						
Fabaceae Mimosoideae												
Acacia floribunda	White Sally Wattle										X	
Acacia parramattensis	Parramatta Green Wattle	0.1			0.1					X	X	
Geraniaceae												
Geranium homeanum	Rainforest Cranesbill	5	2	15	3			X	X			

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
Lamiaceae												
Plectranthus parviflorus	Cockspur Flower	2	5	1	1							
Lobeliaceae												
Pratia purpurascens	Whiteroot			1	0.1							
Malvaceae												
* Pavonia hastata											X	
* Sida rhombifolia	Paddy's Lucerne		0.1	0.1	1							
Menispermaceae												
Sarcopetalum harveyanum	Pearl Vine									X		
Stephania japonica var. discolor	Snake Vine	0.1	0.1		1					X		
Moraceae												
Ficus coronata	Creek Sandpaper Fig					X						
Myrtaceae												
Acmena smithii	Lilly-pilly				2			X	X		X	
Backhousia myrtifolia	Grey Myrtle, Ironwood					X				X		X
Callistemon salignus	White Bottlebrush, Pink-tips			1	2				X			
Eucalyptus acmenoides	White Mahogany						X			X		X
# Eucalyptus grandis	Flooded Gum	10				X					X	
# Eucalyptus microcorys	Tallowwood			5		X						
Eucalyptus paniculata	Grey Ironbark	10			10			X	X			
Eucalyptus pilularis	Blackbutt	10										
Eucalyptus saligna	Sydney Blue Gum		15	30	10	X	X	X	X	X		X
# Eucalyptus tereticornis	Forest Red Gum										X	
# Lophostemon confertus	Brush Box					X						
Melaleuca styphelioides	Prickly Paperbark		5	0.1		X	X	X			X	
Syncarpia glomulifera	Turpentine		5		5		X	X	X	X		X
Oleaceae												
* Ligustrum lucidum	Broad-leaved Privet, Glossy Privet									X		X
Notelaea longifolia	Large Mock-olive	1	0.1					X		X		

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
Passifloraceae												
* Passiflora suberosa	Corky Passionflower		2	1								
Pittosporaceae												
Pittosporum revolutum	Yellow Pittosporum		5			X	X			X		
Pittosporum undulatum	Pittosporum						X				X	
Proteaceae												
# Macadamia tetraphylla	Bopple Nut, Rough-shelled Macadamia									X		
Ranunculaceae												
Clematis glycinoides	Headache Vine, Traveller's Joy, Old Man's			1	2				X	X		
Rosaceae												
* Rubus laudatus	Plains Blackberry		0.1	2	2							
Rubus rosifolius	Native Raspberry, Rose-leaf Bramble					X	X				X	
Rubiaceae												
* Galium aparine	Cleavers, Goose-grass, Bedstraw											X
Sapindaceae												
* Cardiospermum grandiflorum	Balloon Vine	5										
Dodonaea triquetra	Hopbush										X	
Solanaceae												
* Cestrum nocturnum	Night-scented Jessamine, Lady of the Nigh			1								
Solanum aviculare	Kangaroo Apple									X		
* Solanum chenopodioides	White-tip Nightshade				0.1							
* Solanum mauritianum	Tree Tobacco, Wild Tobacco											X
* Solanum seaforthianum	Brazilian Nightshade		2	1	0.1							
* Solanum sp.		1										
Sterculiaceae												
# Brachychiton acerifolius	Illawarra Flame-tree, Flame Kurrajong					X			X			
Ulmaceae												
Trema tomentosa var. aspera	Poison Peach, Peach-leaf Poison Bush							X				

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
Verbenaceae												
* Lantana camara	Lantana							X	X	X		X
Vitaceae												
Cayratia clematidea	Slender Grape	5	10	2	1	X			X			
Cissus antarctica	Kangaroo Vine	30	40	3	2		X		X	X		
Cissus hypoglauca	Native Grape, Water Vine									X		
4. Monocotyledons												
Alstroemeriaceae												
* Alstroemeria pulchella	Parrot Alstroemeria					X						
Araceae												
Alocasia brisbanensis	Cunjevoi Lily					X						
* Colocasia esculenta	Taro, Dasheen											X
Asparagaceae												
* Asparagus aethiopicus	Asparagus Fern				0.1							
* Asparagus officinalis	Asparagus	1										
Commelinaceae												
Commelina cyanea	Blue Spiderwort	5	2	3	0.1					X		
* Tradescantia fluminensis	Trad, Wandering Jew	60	70	30	10	X	X	X	X		X	X
Cyperaceae												
Cyperus tetraphyllus										X		
Gahnia melanocarpa	Black-fruit Saw-sedge						X					
Lomandraceae												
Lomandra longifolia	Honey Reed, Spike Mat-rush	0.1	5		5						X	
Musaceae												
* Musa acuminata	Banana											X
Philesiaceae												
Eustrephus latifolius	Wombat Berry									X		

Botanical name	Common name	Sub-quadrats				GT locs.						
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf	GTg
Phormiaceae												
Dianella caerulea	Blue Flax-lily		0.1					X			X	
Poaceae												
* Ehrharta erecta	Panic Veld-grass	10	10	15	2	X		X	X	X	X	X
* Megathyrsus maximus	Guinea Grass		5									
Microlaena stipoides	Weeping Grass, Meadow Rice-grass	10		1	5			X	X	X		
Oplismenus aemulus	Australian Basket Grass, Wavy Beard Gra	5	15	5	15	X				X		
Oplismenus imbecillis	Narrow-leaved Basket Grass	2								X		
* Paspalum dilatatum	Paspalum				0.1							

Table 4d-1 - Species recorded in sub-quadrats and at supplementary sampling locations in Field of Mars Reserve

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the spot locations and ground truthing locations, presence only is indicated (X).

4. 'Spot locs.' = Spot Locations. 'GT locs.' = Ground truthing locations.

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
1. Pteridophytes																									
Adiantaceae																									
Pellaea nana									0.1																
Aspleniaceae																									
Asplenium australasicum									0.1		0.1														
Asplenium flabellifolium									0.1																
Blechnaceae																									
Doodia aspera													0.1												
Doodia caudata											0.1														
Cyatheaceae																									
# Cyathea cooperi																						X			
Dennstaedtiaceae																									
Pteridium esculentum												0.1			1	2		2		5					
Dicksoniaceae																									
Calochlaena dubia									0.1		2														
Lindsaeaceae																									
Lindsaea linearis																			0.1						
Pteridaceae																									
Pteris tremula																								X	

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
3. Dicotyledons																									
Acanthaceae																									
Avicennia marina subsp. australasica	40	15	60	10																					
Pseuderanthemum variabile					0.1	0.1	0.1																		
Aizoaceae																									
Tetragonia tetragonioides	20	5	0.1																						
Amaranthaceae																									
Alternanthera denticulata		0.1																							
Apiaceae																									
Apium prostratum	0.1	5	0.1	1																					
* Cyclospermum leptophyllum		0.1																							
Platysace lanceolata																			0.1						
Xanthosia pilosa												0.1													
Xanthosia tridentata																			0.1						
Apocynaceae																									
* Araujia sericifera											0.1														
Parsonsia straminea															0.1	0.1									
Araliaceae																									
Polyscias sambucifolia					0.1								3	1	3	1			0.1	0.1					X
Asteraceae																									
* Ageratina adenophora																								X	X
* Aster subulatus	0.1		0.1																						
* Coreopsis lanceolata																0.1									
* Hypochaeris radicata																				0.1					
Ozothamnus diosmifolius																	1		1						
* Sonchus oleraceus				0.1																					
Basellaceae																									
* Anredera cordifolia			0.1																						
Bignoniaceae																									
Pandorea pandorana					3	0.1	1	2		1								0.1	0.1	0.1					

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Brassicaceae																									
* Brassica fruticulosa																								X	
Caprifoliaceae																									
* Lonicera japonica																					20				X
Casuarinaceae																									
Allocasuarina littoralis					1	2		2					1	1	1	5			2						
Casuarina glauca	10	15		5																					
Chenopodiaceae																									
Atriplex australasica	0.1	0.1																							
Convolvulaceae																									
Calystegia marginata																								X	
Dichondra sp. A					2	2	0.1	1																	
Cunoniaceae																									
Callicoma serratifolia												3													
Ceratopetalum apetalum									50	40	30	10										X			
Dilleniaceae																									
Hibbertia aspera					1	1	1	2																	
Hibbertia dentata												1													
Elaeocarpaceae																									
Elaeocarpus reticulatus					1												3	10	3	10					
Ericaceae Styphelioideae																									
Epacris pulchella														1						0.1					
Leucopogon ericoides																				0.1					
Leucopogon juniperinus					1	1	2	2						0.1					1						
Leucopogon lanceolatus																		1							
Euphorbiaceae																									
Breynia oblongifolia					1	1	0.1	1												0.1				X	X
Glochidion ferdinandi					1	1		1							2						margina				X
Homalanthus populifolius	0.1															0.1									X
Micrantheum ericoides													1	2		0.1	2	1		3					

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Phyllanthus hirtellus													1						0.1	0.1					
Fabaceae Caesalpinioideae																									
* Senna pendula var. glabrata		0.1					0.1				0.1										5			X	X
Fabaceae Faboideae																									
* Crotalaria sp.		0.1																							
Glycine clandestina					3														0.1						
Kennedia rubicunda																		0.1							
Platylobium formosum																			0.1	1					
Pultenaea tuberculata																	1								
Fabaceae Mimosoideae																									
Acacia linifolia													0.1		0.1		0.1	0.1	0.1						
Acacia longifolia																	1		0.1					X	
Acacia suaveolens																			0.1						
Acacia terminalis subsp. angustifolia																	1	1	0.1						
Geraniaceae																									
Geranium homeanum																								X	
Goodeniaceae																									
Goodenia hederacea													1	1					0.1	0.1					
Haloragaceae																									
Gonocarpus teucrioides													0.1						0.1						
Lauraceae																									
Cassytha pubescens													0.1	0.1	0.1	0.1				0.1					
* Cinnamomum camphora					0.1		0.1	0.1		1				0.1	0.1						margin				
Lobeliaceae																									
Lobelia anceps		1	0.1	0.1																					
Pratia purpurascens													0.1			0.1	0.1								
Malvaceae																									
* Pavonia hastata					0.1																				
Meliaceae																									
# Melia azedarach						0.1																			

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Moraceae																									
* Morus alba																									X
Myrsinaceae																									
Aegiceras corniculatum		3	2																						
Myrtaceae																									
Acmena smithii																						X			
Angophora costata					10	2		20					5	4	10	20		25					X		
Austromyrtus tenuifolia										0.1															
Callistemon linearis																								X	
Corymbia gummifera													2	10	10	10									
Eucalyptus globoidea																			0.1						
Eucalyptus pilularis																								X	
Eucalyptus piperita																	40	5							
Eucalyptus punctata							30																	X	
Eucalyptus racemosa													5	10	10	10									
Eucalyptus resinifera subsp. resinifera					20	10	30						10	20	15		2	5	25				X		X
Kunzea ambigua													5	7			5	5	3	10					
Leptospermum trinervium													0.1												
# Lophostemon confertus																								X	
Melaleuca linariifolia																	3								
Syncarpia glomulifera					15	30	25	1																X	
Tristaniopsis laurina									25	20	20	30													
Ochnaceae																									
* Ochna serrulata					0.1	0.1	0.1	0.1			0.1	1	0.1	0.1					0.1	0.1					
Oleaceae																									
* Ligustrum lucidum					0.1	0.1		0.1			3	5									margina			X	
* Ligustrum sinense					0.1	0.1			2		4		1	0.1		0.1	0.1	0.1			margina	X		X	X
Pittosporaceae																									
Billardiera scandens													0.1	0.1	0.1					0.1					
Pittosporum undulatum					5	10	5	20	2	3		0.1	2	3	0.1	2		2	2		margina			X	X
Plantaginaceae																									
* Plantago major		0.1																							

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Polygonaceae																									
* Acetosa sagittata	0.1			1																					
Persicaria sp.		0.1																							
Rumex brownii	0.1	1		0.1																					
Primulaceae																									
Samolus repens	15	10	60	2																					
Proteaceae																									
Banksia spinulosa													2	1	1	0.1									
Grevillea sericea																	1	0.1	1						
Hakea laevipes																1									
Hakea salicifolia																	1	3							X
Lambertia formosa												1													
Lomatia silaifolia					0.1							0.1	0.1	0.1	1	0.1				0.1					
Persoonia levis																			1						
Ranunculaceae																									
Clematis glycinoides					3	3	1	1																	
Rosaceae																									
* Rubus laudatus																					3				
Rubiaceae																									
* Galium aparine		0.1																							
Rutaceae																									
Correa reflexa																			0.1						
Zieria smithii											0.1	3													
Sapindaceae																									
* Cardiospermum grandiflorum	0.1	0.1																			margina				
Dodonaea triquetra								1					0.1	0.1			2	1	10	0.1					
Solanaceae																									
* Cestrum parqui																					margina			X	
* Solanum nigrum				0.1																					

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Stylidiaceae																									
Stylidium graminifolium																			0.1						
Thymelaeaceae																									
Pimelea linifolia													0.1			0.1	0.1	0.1							
Urticaceae																									
* Parietaria judaica																								X	
Verbenaceae																									
* Lantana camara						0.1		0.1					0.1					0.1		0.1	margina			X	X
4. Monocotyledons																									
Agavaceae																									
* Agave attenuata							0.1																		
Arecaceae																									
* Syagrus romanzoffiana						0.1	0.1				0.1														
Asparagaceae																									
* Asparagus aethiopicus					1			0.1			0.1	1													
Commelinaceae																									
Commelina cyanea		0.1		0.1																					
* Tradescantia fluminensis	0.1	0.1		1							0.1														
Cyperaceae																									
Baumea juncea																					1				
* Cyperus eragrostis				0.1																					
Gahnia clarkei										0.1															
Lepidosperma elatius												0.1	0.1	0.1	2	1									
Lepidosperma laterale					0.1	0.1											0.1			0.1					
Schoenus melanostachys																	1		3						
Iridaceae																									
* Dietes iridioides									0.1																
Juncaceae																									
Juncus continuus																	0.1								

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
Juncus kraussii	1	10	2	20																					
Juncus usitatus																								X	
Lomandraceae																									
Lomandra cylindrica													2	1	1										
Lomandra gracilis																1									
Lomandra longifolia					3	2	1	1	3	1	1		1	3	20	15	5	20	5	10					X
Lomandra multiflora					0.1		0.1	0.1							1										
Lomandra obliqua														0.1					0.1						
Orchidaceae																									
Cryptostylis erecta																0.1									
Cryptostylis subulata												0.1													
Philesiaceae																									
Eustrephus latifolius							2																		
Phormiaceae																									
Dianella caerulea					0.1	0.1		1				0.1				0.1	1	1	1	2					X
Dianella revoluta													0.1	0.1		0.1									
Poaceae																									
* Andropogon virginicus																	0.1								
Anisopogon avenaceus																0.1									
Aristida vagans													0.1												
Austrostipa pubescens													0.1	0.1			0.1								
Cymbopogon refractus						0.1																			
Digitaria parviflora																	0.1			0.1					
* Echinochloa crus-galli		1																							
Echinopogon caespitosus																	0.1	0.1		0.1					
Echinopogon ovatus					0.1	0.1							0.1												
* Ehrharta erecta							1	1																X	
Entolasia marginata												0.1													
Entolasia stricta					2		1	1		0.1			40	50	15	5	10	10	3	3					
Eragrostis brownii																	0.1								
Hemarthria uncinata	0.1	15	2	50																					
Imperata cylindrica					3	7	1	3					10	2	10	3	10	30	2	1				X	X

Botanical name	Sub-quadrats																				Spot locs.		GT locs.		
	1-1	1-2	1-3	1-4	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	4-1	4-2	4-3	4-4	5-1	5-2	5-3	5-4	A	B	GTa	GTb	GTc
* Lolium perenne	0.1	1																							
Microlaena stipoides					5	5	1	2					3	2	1	1	1	2	3	2				X	
Oplismenus aemulus		0.1			5	3	2	3									0.1								
Oplismenus imbecillis									0.1																
Panicum simile																									
* Paspalum dilatatum													0.1												
Poa affinis											1	1						1							
* Setaria parviflora						0.1		1																	
Themeda triandra					5	3	5	20					1	3	10	5									
Smilacaceae																									
Smilax glyciphylla							1					1					1	1		2					
Typhaceae																									
Typha orientalis																					80				
Xanthorrhoeaceae																									
Xanthorrhoea media					2	1	1						1	1	1	2									

Table 4d-2 - Species recorded at supplementary ground truthing quadrats in Field of Mars Reserve

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the 10 m x 10 m sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. The numbers in the columns for GT Quadrats denote average percent (%) projected foliage cover for each quadrat, from the percent (%) projected foliage cover recorded in the four sub-quadrats.

4. 'GT Quadrats' = Ground truthing quadrats.

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
1. Pteridophytes																				
Adiantaceae																				
Cheilanthes sieberi													0.1							0.025
Cyatheaceae																				
# Cyathea cooperi			5	2													1.75			
Davalliaceae																				
# Nephrolepis cordifolia		2															0.5			
Dennstaedtiaceae																				
Hypolepis muelleri			1														0.25			
Pteridium esculentum				0.1					2	3	5	5	1			1	0.025		3.75	0.5
Dicksoniaceae																				
Calochlaena dubia												5							1.25	
3. Dicotyledons																				
Acanthaceae																				
Brunoniella pumilio						0.1												0.025		
Pseuderanthemum variabile													0.1	1	0.1	0.1				0.325

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
Apiaceae																				
Centella asiatica			0.1														0.025			
Platysace lanceolata												1							0.25	
Xanthosia pilosa									0.1	0.1	1	0.1							0.325	
Araliaceae																				
Polyscias sambucifolia	3	3	1	1				0.1	1	1	1	1	1	1	1		2	0.025	1	0.75
Asteraceae																				
Ozothamnus diosmifolius											0.1								0.025	
Bignoniaceae																				
Pandorea pandorana	1	1	2							0.1	0.1		2	1	2	1	1		0.05	1.5
Casuarinaceae																				
Allocasuarina littoralis	2	3	1	3	30	30	15	15	2	5	5	5	5	15	2		2.25	22.5	4.25	5.5
Allocasuarina torulosa														2		3				1.25
Dilleniaceae																				
Hibbertia aspera													1	2						0.75
Hibbertia riparia					1	1	1	1										1		
Elaeocarpaceae																				
Elaeocarpus reticulatus	3	2	1					0.1	0.1	2			0.1				1.5	0.025	0.525	0.025
Ericaceae Styphelioideae																				
Epacris pulchella					1	2	3	1										1.75		
Leucopogon juniperinus													2	2	3	1				2
Leucopogon lanceolatus											1								0.25	
Monotoca scoparia									1										0.25	
Woollsia pungens										0.1									0.025	
Euphorbiaceae																				
Breynia oblongifolia	2	2	2	3									1			1	2.25			0.5
Glochidion ferdinandi	1	5	1										0.1	1	1	1	1.75			0.775
Homalanthus populifolius	1	2		0.1							0.1		0.1				0.775		0.025	0.025
Micrantheum ericoides								0.1		0.1								0.025	0.025	
Phyllanthus hirtellus					1			1		0.1	0.1		1	1				0.5	0.05	0.5

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
Fabaceae Caesalpinioideae																				
* Senna pendula var. glabrata		1	1	1												2	0.75			0.5
Fabaceae Faboideae																				
Bossiaea obcordata	1					1	1	1			0.1						0.25	0.75	0.025	
Bossiaea scolopendria							0.1	0.1										0.05		
Dillwynia retorta							1											0.25		
Glycine clandestina					1	1	1											0.75		
Hovea linearis						0.1		0.1										0.05		
Mirbelia rubiifolia					0.1													0.025		
Platylobium formosum	0.1	1							10	7	5	10	2	1	1	1	0.275		8	1.25
Pultenaea paleacea					1													0.25		
Pultenaea tuberculata					1	1	1	0.1										0.775		
Fabaceae Mimosoideae																				
Acacia fimbriata						1	2											0.75		
Acacia linifolia									1	0.1	1		1						0.525	0.25
Acacia longifolia	1			1													0.5			
Acacia myrtifolia							0.1											0.025		
Acacia suaveolens							0.1											0.025		
Acacia terminalis subsp. angustifolia													1							0.25
Goodeniaceae																				
Goodenia bellidifolia													0.1							0.025
Goodenia hederacea					0.1	0.1	1	1					0.1					0.55		0.025
Haloragaceae																				
Gonocarpus tetragynus	1		1														0.5			
Gonocarpus teucrioides									1	1	1	0.1							0.775	
Lauraceae																				
Cassytha pubescens					2	1	1		2	1	1	1	1					1	1.25	0.25
* Cinnamomum camphora	1			0.1				0.1	0.1	0.1			0.1				0.275	0.025	0.05	0.025
Lobeliaceae																				
Pratia purpurascens	0.1				0.1								0.1	0.1			0.025	0.025		0.05
Myrtaceae																				
Angophora costata	20	10	10	5	15			10	35	35	30	20	25	10	30	20	11.25	6.25	30	21.25

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
Corymbia gummifera					5	20	10	20										13.75		
Eucalyptus globoidea							20	10					15					7.5		3.75
Eucalyptus resinifera subsp. resinifera			5		0.1	10	20	5						2			1.25	8.775		0.5
Leptospermum polygalifolium subsp. polygalif	1																0.25			
Leptospermum trinervium							2		1									0.5	0.25	
Melaleuca linariifolia			5														1.25			
Syncarpia glomulifera													15		15	10				10
Nandinaceae																				
* Nandina domestica		0.1															0.025			
Ochnaceae																				
* Ochna serrulata	1	2	2			0.1	0.1		0.1				0.1	0.1	1		1.25	0.05	0.025	0.3
Oleaceae																				
* Ligustrum lucidum	0.1	1														1	0.275			0.25
* Ligustrum sinense	1	2	2	1									1	1		1	1.5			0.75
Notelaea longifolia	2		2	2		1	1						1	0.1	1		1.5	0.5		0.525
Oxalidaceae																				
Oxalis exilis													0.1		0.1					0.05
Pittosporaceae																				
Billardiera scandens					0.1	0.1	1	0.1	0.1	0.1	0.1	1	0.1					0.325	0.325	0.025
Pittosporum revolutum													5	3	50	40				24.5
Pittosporum undulatum	10	25	10	30			1		0.1		1	1					18.75	0.25	0.525	
Proteaceae																				
Banksia spinulosa	1	1							1	2			2	1			0.5		0.75	0.75
Grevillea buxifolia							1											0.25		
Grevillea sericea					1	1	1											0.75		
Lomatia silaifolia	1	1			0.1	1	1	1	0.1	1	1	1	0.1			1	0.5	0.775	0.775	0.275
Persoonia lanceolata					1	1												0.5		
Persoonia laurina subsp. laurina						0.1												0.025		
Persoonia levis									1	2		2							1.25	
Persoonia linearis											1								0.25	
Xylomelum pyriforme								1			1							0.25	0.25	
Ranunculaceae																				
Clematis glycinoides	1	1	2	1					0.1				1	1	1		1.25		0.025	0.75

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
Rhamnaceae																				
Pomaderris lanigera													1							0.25
Rubiaceae																				
Opercularia diphylla						0.1	0.1											0.05		
Sapindaceae																				
Dodonaea triquetra										0.1	1	1	2	2	1				0.525	1.25
Verbenaceae																				
* Lantana camara	1	1		2									1		2		1			0.75
4. Monocotyledons																				
Anthericaceae																				
Tricoryne simplex													0.1	0.1						0.05
Arecaceae																				
* Syagrus romanzoffiana						0.1										0.1		0.025		0.025
Asparagaceae																				
* Asparagus aethiopicus				1											0.1		0.25			0.025
Colchicaceae																				
Burchardia umbellata							0.1						0.1					0.025		0.025
Cyperaceae																				
Carex breviculmis		0.1															0.025			
Cyathochaeta diandra									0.1				1						0.025	0.25
Gahnia clarkei			1														0.25			
Lepidosperma laterale	3	1		1	2	2	3	2	2	3	3	3	1		3	1	1.25	2.25	2.75	1.25
Ptilothrix deusta						0.1												0.025		
Schoenus apogon			1														0.25			
Iridaceae																				
Patersonia sericea						0.1	0.1	0.1										0.075		
Liliaceae																				
* Lilium formosanum	0.1	0.1															0.05			

Botanical name	Sub-quadrats																GT Quadrats			
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	B-4	C-1	C-2	C-3	C-4	D-1	D-2	D-3	D-4	A	B	C	D
Lomandraceae																				
Lomandra cylindrica							0.1	0.1										0.05		
Lomandra filiformis subsp. filiformis	0.1	0.1							0.1	0.1	0.1		0.1	0.1			0.05		0.075	0.05
Lomandra gracilis	0.1											0.1					0.025		0.025	
Lomandra longifolia	15	20	1	10					25	10	15	20	5	5	2	10	11.5		17.5	5.5
Lomandra multiflora	0.1	0.1	1			0.1	0.1		0.1		0.1		0.1				0.3	0.05	0.05	0.025
Lomandra obliqua								0.1										0.025		
Orchidaceae																				
Acianthus sp.									0.1		0.1								0.05	
Calochilus paludosus							0.1											0.025		
Cryptostylis erecta											0.1								0.025	
Phormiaceae																				
Dianella caerulea	1	10	3		1	1		1	1	1	1	1	1	1	2	1	3.5	0.75	1	1.25
Dianella revoluta	0.1		0.1		1	0.1					0.1		1				0.05	0.275	0.025	0.25
Poaceae																				
Aristida vagans							0.1	0.1										0.05		
Austrostipa pubescens						2			2		0.1		2	2		1		0.5	0.525	1.25
Entolasia stricta	3	1	5		25	25	30	15	3	2	3	2	5	10	10	10	2.25	23.75	2.5	8.75
Imperata cylindrica	5	10	20	5					3	1	1	0.1	5		20	5	10		1.275	7.5
Microlaena stipoides	15	5	2	2	10	10	10	10	1	1	0.1	2	10	25	10	10	6	10	1.025	13.75
Oplismenus aemulus			1														0.25			
Oplismenus imbecillis		1											0.1				0.25			0.025
Panicum simile									0.1										0.025	
Paspalidium distans													0.1							0.025
* Paspalum urvillei			0.1														0.025			
Poa sieberiana													0.1		0.1					0.05
Themeda triandra	1	1	1		10	5	15	5	2	1			15	15	2	2	0.75	8.75	0.75	8.5
Smilacaceae																				
Smilax glyciphylla	1								2	5	3	2			0.1	1	0.25		3	0.275
Xanthorrhoeaceae																				
Xanthorrhoea arborea										1		1							0.5	
Xanthorrhoea media	2	2		1	5	2	1	2					0.1	0.1	1	0.1	1.25	2.5		0.325

Table 4e - Species recorded in sub-quadrats and at supplementary sampling locations in Lambert Park

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.

3. The numbers in the columns for subquadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the spot locations and ground truthing locations, presence only is indicated (X).

4. 'GT locs.' = Ground truthing locations.

Botanical name	Common name	Sub-quadrats				GT locs.					
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf
1. Pteridophytes											
Adiantaceae											
Adiantum aethiopicum	Common Maidenhair Fern										X
Adiantum hispidulum	Rough Maidenhair Fern		0.1								X
Blechnaceae											
Doodia aspera	Prickly Rasp Fern										X
Cyatheaceae											
# Cyathea cooperi	Straw Tree-fern, Scaly Tree-Fern		1			X					
Pteridaceae											
Pteris tremula	Tender Brake										X
Thelypteridaceae											
Cyclosorus dentatus			0.1		0.1						
3. Dicotyledons											
Aceraceae											
* Acer negundo	Box-elder Maple, Box Elder		0.1								
Aphanopetalaceae											
Aphanopetalum resinosum	Gum Vine		1		2						
Araliaceae											
* Hedera helix	Ivy, English Ivy		0.1		0.1						

Botanical name	Common name	Sub-quadrats				GT locs.					
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf
Asteraceae											
* Bidens pilosa	Cobbler's Pegs	0.1					X				
* Lactuca serriola	Prickly Lettuce, Compass Plant						X				
* Sonchus oleraceus	Common Sow-thistle, Milk-thistle						X				
Basellaceae											
* Anredera cordifolia	Madeira Vine, Lamb's Tail	0.1		0.1	0.1						
Caryophyllaceae											
* Stellaria media	Chickweed						X				
Casuarinaceae											
# Casuarina cunninghamiana	River Oak, River She-oak		10								
Casuarina glauca	Swamp Oak, Swamp She-oak					X					
Celastraceae											
Elaeodendron australe	Red Olive-plum								X		
Convolvulaceae											
Calystegia marginata		0.1									
Euphorbiaceae											
Breynia oblongifolia	Coffee Bush										X
* Euphorbia peplus	Petty Spurge, Radium Plant						X				
Homalanthus populifolius	Bleeding heart, Native Poplar	15								X	
Fabaceae Mimosoideae											
Acacia floribunda	White Sally Wattle								X		
Acacia parramattensis	Parramatta Green Wattle						X		X	X	X
Lamiaceae											
Plectranthus parviflorus	Cockspur Flower									X	
Lauraceae											
* Cinnamomum camphora	Camphor Laurel	0.1	0.1								
Malvaceae											
Hibiscus heterophyllus	Native Rosella									X	
Meliaceae											
# Melia azedarach	White Cedar, Persian Lilac	0.1								X	

Botanical name	Common name	Sub-quadrats				GT locs.					
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf
# Toona ciliata	Australian Red Cedar										X
Menispermaceae											
Stephania japonica var. discolor	Snake Vine	1	0.1		0.1						
Moraceae											
Ficus coronata	Creek Sandpaper Fig	10	1	2	1	X			X		X
Ficus rubiginosa	Port Jackson Fig, Rusty Fig		15	40	50	X					
Myrtaceae											
Acmena smithii	Lilly-pilly	60	20	40	30	X	X		X		
Angophora floribunda	Rough-barked Apple									X	
Callistemon salignus	White Bottlebrush, Pink-tips								X		
# Callistemon viminalis	Weeping Bottlebrush									X	
Eucalyptus globoidea	White Stringybark							X			
# Eucalyptus grandis	Flooded Gum			15			X			X	X
Eucalyptus paniculata	Grey Ironbark							X			
Eucalyptus pilularis	Blackbutt					X					
Eucalyptus saligna	Sydney Blue Gum			20	15	X			X		X
# Melaleuca quinquenervia	Broad-leaved Paperbark									X	
Melaleuca styphelioides	Prickly Paperbark						X	X	X	X	
Syncarpia glomulifera	Turpentine					X	X	X	X		X
Nandinaceae											
* Nandina domestica	Sacred Bamboo		0.1								
Ochnaceae											
* Ochna serrulata	Mickey Mouse Plant	0.1									
Oleaceae											
* Jasminum polyanthum	Jasmine								X		
* Ligustrum lucidum	Broad-leaved Privet, Glossy Privet		0.1								
* Ligustrum sinense	Small-Leaved Privet, Chinese Privet				0.1						
* Olea europaea subsp. cuspidata	African Olive			0.1							
Passifloraceae											
Passiflora herbertiana	Native Passionfruit	10									
* Passiflora subpeltata	White Passionfruit	2									

Botanical name	Common name	Sub-quadrats				GT locs.					
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf
Pittosporaceae											
Bursaria spinosa	Australian Boxthorn						X				
Pittosporum revolutum	Yellow Pittosporum	0.1	2		1		X				
Pittosporum undulatum	Pittosporum	5	20	3	3	X		X		X	X
Ranunculaceae											
Clematis glycinoides	Headache Vine, Traveller's Joy, Old Man's Beard	1									
Rosaceae											
* Eriobotrya japonica	Loquat	0.1		0.1							
Rubus moluccanus var. trilobus	Molucca Bramble									X	
Rubus rosifolius	Native Raspberry, Rose-leaf Bramble									X	
Rubiaceae											
Morinda jasminoides	Morinda	0.1	1	1	0.1						
Rutaceae											
Melicope micrococca	Hairy-leaved Doughwood	0.1	3								
# Murraya paniculata	Jasmine-orange, Cosmetic Bark	0.1									
Sapindaceae											
# Alectryon tomentosus	Hairy Bird's-eye, Woolly Rambutan										X
Solanaceae											
* Cestrum nocturnum	Night-scented Jessamine, Lady of the Night	0.1	2		1						
* Physalis peruviana	Cape Gooseberry	0.1									
* Solanum pseudocapsicum	Jerusalem Cherry										X
Ulmaceae											
* Celtis sinensis	Chinese Hackberry, Chinese Nettle-tree									X	
Trema tomentosa var. aspera	Poison Peach, Peach-leaf Poison Bush	2					X				
* Ulmus parvifolia	Chinese Elm									X	
Vitaceae											
Cissus antarctica	Kangaroo Vine		1								
4. Monocotyledons											
Araceae											
Alocasia brisbanensis	Cunjevoi Lily										X

Botanical name	Common name	Sub-quadrats				GT locs.					
		1-1	1-2	1-3	1-4	GTa	GTb	GTc	GTd	GTe	GTf
Arecaceae											
# Archontophoenix sp.					0.1						
Livistona australis	Cabbage Palm, Cabbage-tree Palm										X
* Phoenix canariensis	Canary Island Date										X
Asparagaceae											
* Asparagus aethiopicus	Asparagus Fern				0.1					X	
Commelinaceae											
* Tradescantia fluminensis	Trad, Wandering Jew	30	2			X		X			
Cyperaceae											
Cyperus tetraphyllus		1	0.1		0.1						X
Lomandraceae											
Lomandra longifolia	Honey Reed, Spike Mat-rush			1		X		X		X	X
Philesiaceae											
Geitonoplesium cymosum	Scrambling Lily	0.1									
Phormiaceae											
Dianella caerulea	Blue Flax-lily	1	0.1		1	X				X	
Poaceae											
* Ehrharta erecta	Panic Veld-grass	5	2	0.1	1	X	X	X		X	X
* Lolium perenne	Perennial Ryegrass							X			
Microlaena stipoides	Weeping Grass, Meadow Rice-grass		1							X	X
Oplismenus aemulus	Australian Basket Grass, Wavy Beard Grass	0.1			0.1					X	
Oplismenus imbecillis	Narrow-leaved Basket Grass	0.1			0.1						
* Pennisetum clandestinum	Kikuyu Grass, Kikuyu								X		

Table 4f - Species recorded in sub-quadrats and at supplementary sampling locations in Outlook Park

Notes:

1. **Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised.**
2. **Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons. One or more of these plant groups may be absent from this site.**
3. **The numbers in the columns for sub-quadrats denote percent (%) projected foliage cover in each of the sub-quadrats within the 20 m x 20 m or 10 m x 40 m quadrats. For the ground truthing locations, presence only is indicated (X).**
4. **'GT locs.' = Ground truthing locations.**

Botanical name	Common name	Sub-quadrats				GT locs.		
		1-1	1-2	1-3	1-4	GTa	GTb	GTc
1. Pteridophytes								
Davalliaceae								
# Nephrolepis cordifolia	Fishbone Fern					X		
2. Gymnosperms								
Araucariaceae								
Araucaria heterophylla	Norfolk Island Pine		0.1					
Pinaceae								
* Cedrus deodara	Deodar, Deodar Cedar					X		
3. Dicotyledons								
Acanthaceae								
* Justicia sp.			0.1					
Pseuderanthemum variabile	Pastel Flower	1	1	0.1	0.1	X		
Araliaceae								
* Hedera helix	Ivy, English Ivy	0.1						
Asteraceae								
* Roldana petasitis	Mexican Giant Groundsel						X	
Sigesbeckia orientalis	Indian Weed			0.1				
Bignoniaceae								
* Jacaranda mimosifolia	Jacaranda		2			X		X
Casuarinaceae								
Allocasuarina torulosa	Forest She-oak			2				
Chenopodiaceae								
Einadia trigonos	Fishweed					X		
Convolvulaceae								
Dichondra sp. A	Hairy Kidney Weed			1		X		
Cunoniaceae								
Ceratopetalum apetalum	Coachwood	7						
Elaeocarpaceae								
Elaeocarpus reticulatus	Blueberry Ash				5			
Euphorbiaceae								
Glochidion ferdinandi	Cheese Tree	2						

Botanical name	Common name	Sub-quadrats				GT locs.		
		1-1	1-2	1-3	1-4	GTa	GTb	GTc
Homalanthus populifolius	Bleeding heart, Native Poplar	1				X		
Eupomatiaceae								
Eupomatia laurina	Bolwarra					X		
Fabaceae Mimosoideae								
Acacia parramattensis	Parramatta Green Wattle					X		
Lamiaceae								
Clerodendrum tomentosum	Hairy Clerodendrum					X		
Plectranthus parviflorus	Cockspur Flower		0.1			X		
Lauraceae								
* Cinnamomum camphora	Camphor Laurel		0.1					
Cryptocarya glaucescens	Jackwood	1	1		1			
Meliaceae								
# Melia azedarach	White Cedar, Persian Lilac				0.1			
# Toona ciliata	Australian Red Cedar	0.1				X		
Menispermaceae								
Stephania japonica var. discolor	Snake Vine					X		
Moraceae								
Ficus coronata	Creek Sandpaper Fig	3			10	X		
Ficus rubiginosa	Port Jackson Fig, Rusty Fig	10					X	
Myrtaceae								
Acmena smithii	Lilly-pilly	2	2					
Angophora costata	Sydney Red Gum, Smooth-barked Appl					X		
Backhousia myrtifolia	Grey Myrtle, Ironwood	2						
Eucalyptus acmenoides	White Mahogany					X	X	
Eucalyptus saligna	Sydney Blue Gum	15	15		20			X
Melaleuca styphelioides	Prickly Paperbark		1	5		X		X
Syncarpia glomulifera	Turpentine		60		25	X	X	X
Syzygium australe	Brush Cherry	1		1				
# Syzygium paniculatum	Brush Cherry		1	1				
Tristaniopsis laurina	Water Gum, Kanuka Box					X		
Ochnaceae								
* Ochna serrulata	Mickey Mouse Plant					X		
Oleaceae								
* Ligustrum lucidum	Broad-leaved Privet, Glossy Privet					X		
Notelaea longifolia	Large Mock-olive					X		
Oxalidaceae								
* Oxalis latifolia		0.1		0.1		X		
Passifloraceae								
* Passiflora suberosa	Corky Passionflower	0.1						
Pittosporaceae								
Pittosporum revolutum	Yellow Pittosporum	1				X		
Pittosporum undulatum	Pittosporum		15		7	X		X
Proteaceae								
# Grevillea robusta	Silky Oak			10				
# Stenocarpus sinuatus	Firewheel Tree	0.1						
Rosaceae								
Rubus rosifolius	Native Raspberry, Rose-leaf Bramble	1	1					

Botanical name	Common name	Sub-quadrats				GT locs.		
		1-1	1-2	1-3	1-4	GTa	GTb	GTc
Rutaceae								
Melicope micrococca	Hairy-leaved Doughwood				0.1			
Sapindaceae								
Dodonaea triquetra	Hopbush	0.1						
Solanaceae								
* Solanum pseudocapsicum	Jerusalem Cherry		0.1	0.1				
Sterculiaceae								
# Brachychiton acerifolius	Illawarra Flame-tree, Flame Kurrajong	5	1			X		
Ulmaceae								
* Celtis occidentalis	American Hackberry		1					
Trema tomentosa var. aspera	Poison Peach, Peach-leaf Poison Bush		1					
Verbenaceae								
* Lantana camara	Lantana					X	X	
Vitaceae								
Cayratia clematidea	Slender Grape	0.1		0.1	0.1	X		
4. Monocotyledons								
Arecaceae								
Livistona australis	Cabbage Palm, Cabbage-tree Palm	2			1			
Asteliaceae								
# Cordyline rubra	Palm-lily					X		
Commelinaceae								
Commelina cyanea	Blue Spiderwort	1	1	1	1	X		
* Tradescantia fluminensis	Trad, Wandering Jew					X		
Cyperaceae								
Cyperus imbecillis				0.1				
Cyperus tetraphyllus		0.1	1					
Iridaceae								
* Dietes grandiflora	Butterfly Iris		1					
* Neomarica sp.	Walking Iris					X		
Lomandraceae								
Lomandra longifolia	Honey Reed, Spike Mat-rush	1	1	1				
Philesiaceae								
Eustrephus latifolius	Wombat Berry					X		
Phormiaceae								
Dianella caerulea	Blue Flax-lily			0.1		X		
Poaceae								
* Ehrharta erecta	Panic Veld-grass	0.1	0.1	0.1		X		
Entolasia marginata	Bordered Panic	0.1		0.1				
Microlaena stipoides	Weeping Grass, Meadow Rice-grass					X		
Oplismenus aemulus	Australian Basket Grass, Wavy Beard	1	1	20	1	X		

Table 5: Species recorded greater than 2 m in height in the supplementary sampling locations, including spot locations, ground truthing locations, and ground truthing quadrats, in the 4 re-surveyed parks (Brush Farm Park, Darvall Park, Field of Mars Reserve, Lambert Park) and 2 previously unsurveyed parks (Bell Park, Outlook Park)

Bell Park

		GTa		GTb	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia parramattensis	X			
	Acmena smithii	X			
#	*Angophora costata*	X			
	Angophora floribunda	X	heights		heights
#	*Araucaria bidwillii*			X	
#	*Casuarina glauca*	X			
	Ceratopetalum apetalum	X			
#	*Eucalyptus grandis*			X	
#	*Eucalyptus microcorys*	X		X	
	Eucalyptus paniculata			X	
#	*Eucalyptus pilularis*	X	not	X	not
#	*Eucalyptus robusta*				
#	*Eucalyptus saligna*			X	
	Eucalyptus scoparia	X			
*	*Jacaranda mimosifolia*			X	
*	*Lantana camara*	X			
*	*Ligustrum lucidum*	X	recorded		recorded
*	*Ligustrum sinense*	X			
#	*Melaleuca styphelioides*	X			
*	*Phoenix canariensis*			X	
	Pittosporum undulatum	X			
*	*Quercus robur*			X	
*	*Rothmannia globosa*			X	
	Syzygium paniculatum	X			
#	*Toona ciliata*	X			
	Tristaniopsis laurina	X			

Bell Park

		Spot A		Spot B	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**
#	*Brachychiton acerifolius*			1	3
#	*Eucalyptus microcorys*	3	20	7	30
#	*Eucalyptus robusta*			4	20
	Ficus rubiginosa	1	17		
#	*Melaleuca styphelioides*			1	7

Brush Farm Park

		GTa		GTb		GTc	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia parramattensis			1	18		
	Acmena smithii	X	not				
	Backhousia myrtifolia			1	5		
#	*Eucalyptus grandis*			1	27		
*	*Ligustrum lucidum*	X					
	Melia azedarach					1	15
	Pittosporum undulatum	X	recorded	1	17	1	17
#	*Toona ciliata*					1	7

Darvall Park

		GTa			GTb		
	Species	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**
#	*Brachychiton acerifolius*	1	15				
	Eucalyptus acmenoides				X	18	
#	*Eucalyptus grandis*			0.4			
	Eucalyptus saligna	1	25	1	1	25	0.45
#	*Lophostemon confertus*	X	13				
#	*Melaleuca styphelioides*	1	15				
	Pittosporum undulatum				X	7	
	Syncarpia glomulifera				1	14	0.3

		GTc			GTd		
	Species	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**
	Acmena smithii	X	4		X	6	
#	*Brachychiton acerifolius*				X	6	
	Callistemon salignus				1	10	
	Elaeodendron australe				X	2	
	Eucalyptus paniculata	X	30	0.8			
	Eucalyptus saligna	X	30		X	30	0.9
#	*Melaleuca styphelioides*	X	8				
	Notelaea longifolia	X	2				
	Syncarpia glomulifera	X	7		X	17	
	Trema tomentosa	X	2				

Darvall Park

		GTe			GTf		
	Species	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**
	Acacia parramattensis				**X**	15	
#	*Brachychiton acerifolius*	X	9				
	Eucalyptus acmenoides	X	25	0.5			
#	*Eucalyptus grandis*				X	20	0.2
	Eucalyptus saligna	X	30	0.6			
	Eucalyptus tereticornis				X	6	
#	*Melaleuca styphelioides*				X	6	
	Notelaea longifolia	X	2				
	Syncarpia glomulifera	X	10				

		GTg		
	Species	**Number**	**Height (m)**	**Diameter (m)**
#	*Brachychiton acerifolius*	X	7	
#	*Eucalyptus grandis*	X	20	0.6
	Eucalyptus tereticornis	X	28	0.6
#	*Lophostemon confertus*	X	9	
	Trema tomentosa	X	25	0.7

Field of Mars Reserve

		GT QA-1		GT QA-2		GT QA-3		GT QA-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia longifolia			1	3				
	Allocasuarina littoralis	5	12	2	12			2	14
	Angophora costata	2	17	1	16	1	16	2	16
	Breynia oblongifolia			3	4	2	2	3	4
#	*Cyathea cooperi*					3	3	1	3
	Elaeocarpus reticulatus	2	3						
	Eucalyptus resinifera					3	18		
	Glochidion ferdinandi			3	7				
	Leptospermum polygalifolium subsp. *polygalifolium*	1	2						
*	*Ligustrum lucidum*			1	2				
*	*Ligustrum sinense*								
	Melaleuca linariifolia					2	13		
	Notelaea longifolia	3	3					1	5
	Pittosporum undulatum	5	4	9	4	2	4	8	4
	Polyscias sambucifolia	4	2						
*	*Senna pendula* var. *glabrata*			1	3			3	4

		GT QB-1		GT QB-2		GT QB-3		GT QB-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Acacia fimbriata			1	5				
	Allocasuarina littoralis	40+	8	50+	8	25	8	20	6
	Angophora costata	1	14					2	11
	Corymbia gummifera	1	10	3	16	2	10		
	Eucalyptus globoidea					1	16	1	15
	Eucalyptus resinifera	1	2			3	13	1	7
	Grevillea sericea								
	Leptospermum trinervium					1	3		
	Notelaea longifolia					1	2	1	2
	Persoonia lanceolata	1	3	1	3				

Field of Mars Reserve

		GT QC-1		GT QC-2		GT QC-3		GT QC-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Allocasuarina littoralis	2	4	3	5	3	5	2	6
	Angophora costata	4	17	4	18	3	18	2	13
	Dodonaea triquetra					2	3	2	3
	Elaeocarpus reticulatus			1	5				
	Persoonia levis			1	2			1	3
	Xylomelum pyriforme					1	2		

		GT QD-1		GT QD-2		GT QD-3		GT QD-4	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Allocasuarina littoralis	7	10	5	11			1	5
	Allocasuarina torulosa			1	9			1	12
	Angophora costata	8	14	6	18	6	18		
	Breynia oblongifolia							1	2
	Dodonaea triquetra	1	2						
	Eucalyptus globoidea	1	16						
	Eucalyptus resinifera			3	10	1	18		
	Notelaea longifolia					1	3		
	Pittosporum undulatum	2	2	4	2	5	3	4	4
*	*Senna pendula* var. *glabrata*					1	3		
	Syncarpia glomulifera	2	12			1	10	1	13

Field of Mars Reserve

		GTa		GTb		GTc	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Angophora costata	3 (ArborPlan 317, 314, 312)	heights				
	Eucalyptus pilularis			X	18		
	Eucalyptus punctata		not	X	15		
	Eucalyptus resinifera	1 (ArborPlan 313)				X	20
	Glochidion ferdinandi		recorded			X	3
	Hakea salicifolia					X	6
	Pittosporum undulatum			X	8	X	7
	Polyscias sambucifolia					X	4

Lambert Park

		GTa			GTb			GTc		
	Species	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**
	Acacia parramattensis				(many)	15				
	Acmena smithii				X	7				
	Eucalyptus globoidea							(several)	10	
#	*Eucalyptus grandis*				1	25	0.3			
	Eucalyptus paniculata							X	12	
	Eucalyptus pilularis	1	11	0.25						
	Eucalyptus saligna	1	25+	<0.4						
#	*Melaleuca styphelioides*							X	10	

		GTd			GTe			GTf		
	Species	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**	**Number**	**Height (m)**	**Diameter (m)**
*	*Celtis sinensis*				1	8				
	Elaeodendron australe				X	5				
	Eucalyptus globoidea	1	2							
	Hibiscus heterophyllus	1	20							
	Homalanthus populifolius				X	5				
#	*Melaleuca styphelioides*				X	3				
	Melaleuca quinquenervia	(numerous)	10		X	9				
	Pittosporum undulatum				X	3				
	Syncarpia glomulifera							X	9	
	Ulmus parviflolia	2	not recorded							

Outlook Park

		GTa		GTb		GTc	
	Species	**Number**	**Height (m)**	**Number**	**Height (m)**	**Number**	**Height (m)**
	Angophora costata	2	27				
	Eucalyptus acmenoides	2	25	1	35		
	Eucalyptus saligna					3	30
	Ficus rubiginosa			1	10		
	Syncarpia glomulifera			10	25	5	25

Appendices

Appendix 1. City of Ryde Land Register (dated 8 July 2014)

City of Ryde

Lifestyle and opportunity @ your doorstep

Land Register Report

Pursuant to Section 53, Local Government Act, 1993, as amended

Publication prepared by the City of Ryde Property Management

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Appendix 2. Climatic record at time of the 2006 and 2016 fauna surveys

Appendix 2
Climatic conditions during Autumn and Spring survey times

Autumn 2006 and 2016 surveys (Station 66124)

	Apr-06	Apr-06	Apr-06	Apr-16	Apr-16	Apr-16	May-06	May-06	May-06	May-16	May-16	May-16
Day	temp min	temp max	rain	temp min	temp max	rain	temp min	temp max	rain	temp min	temp max	rain
1	15.0	23.5	0	13.8	28.5	0	12.1	22.9	0	16.8	27.5	3.6
2	6.1	23.2	0	14.5	31.2	0	9.9	23.5	0	9.0	23.0	0
3	7.9	26.0	0	17.0	25.5	0	11.0	25.5	0	8.5	25.8	0
4	15.2	30.0	0	18.5	23.8	9.4	10.9	24.5	0	15.9	25.8	0
5	12.5	33.0	0	15.2	29.5	0	6.6	26.0	0	9.0	24.2	0
6	14.7	22.8	0	16.0	35.2	0	7.9	22.9	0	10.1	26.2	0
7	8.6	25.3	0	19.0	20.0	0	5.4	26.0	0	9.2	25.2	0
8	10.7	23.6	0	17.0	21.0	0	6.9	18.4	0	14.5	21.0	0.2
9	7.5	23.0	0	13.5	25.3	1.0	4.6	21.2	0	16.6	23.0	3.2
10	10.5	24.2	0	13.0	28.2	0	11.2	23.1	0	16.2	24.2	0
11	11.1	30.6	0	12.0	26.5	0	10.5	17.8	0	7.2	23.0	0
12	13.7	32.3	0	16.0	22.0	0	11.3	17.9	2.2	12.0	24.2	0
13	14.5	24.0	0	12.5	23.8	2.8	7.1	22.5	0.1	11.8	25.7	0
14	15.0	27.8	3.4	13.5	22.4	0.6	7.6	21.2	0	8.5	27.6	0
15	15.1	23.1	0	13.8	27.0	0.2	11.7	19.2	2.4	9.1	24.7	0
16	5.9	22.0	0	13.0	28.0	0	12.4	19.5	0.2	6.3	24.8	0
17	7.3	25.4	0	18.0	23.0	0	9.8	21.7	0	14.4	28.1	0
18	12.3	26.7	0	12.7	24.0	3.2	8.5	21.4	0	9.5	21.2	0
19	15.3	33.0	0	15.0	23.6	2.6	9.6	24.3	0	8.7	23.2	0
20	20.0	28.3	0.2	14.0	26.0	0	11.0	21.0	0	8.2	24.2	0
21	11.4	24.8	0	14.2	27.1	0	7.5	20.8	0	10.3	21.1	0
22	5.7	20.7	0	14.5	26.2	0	7.2	18.8	0	11.3	24.3	0
23	4.5	22.0	0	14.3	18.5	4.0	7.2	16.0	3.0	12.5	27.2	0
24	9.5	20.2	0	14.0	22.2	6.0	9.0	20.8	3.0	8.3	22.5	0
25	9.5	19.3	0	10.8	23.3	0	7.8	21.4	0	6.2	21.2	0
26	9.6	20.3	0	10.7	24.0	0	8.1	20.3	0	10.5	20.7	0.6
27	11.6	21.0	0	12.0	25.0	0	7.6	17.7	0	7.8	19.0	0
28	8.8	22.2	0	12.8	27.6	0	6.6	19.2	0	7.7	16.5	0.6
29	11.8	25.0	0.6	12.5	26.2	0	4.9	18.0	0	6.3	19.6	1.4
30	10.1	22.7	0	16.0	25.5	0.8	4.8	16.5	0	4.0	19.7	0
31								18.5	0.8	6.5	18.0	0

Spring 2006 and 2016 surveys (Station 66124)

	Sep-16	Sep-16	Sep-16	Oct-06	Oct-06	Oct-06	Nov-06	Nov-06	Nov-06
Day	temp min	temp max	rain	temp min	temp max	rain	temp min	temp max	rain
1	9.5	23.0	0	7.2	23.5	0	12.2	27.5	0
2	13.8	17.7	13.0	8.5	29.6	0	12.2	33.6	0
3	14.0	20.1	18.4	14.0	21.3	0	16.7	22.2	2.2
4	8.3	20.5	0	9.1	23.2	0	16.7	18.2	1.4
5	6.0	22.0	0	10.3	33.3	0	14.5	18.2	6.0
6	7.8	24.3	0	12.5	22.2	0	15.5	20.0	25.5
7	10.7	22.0	0	12.0	27.9	0	10.6	22.0	0
8	13.0	23.3	0	12.0	30.0	0	13.6	19.6	0.6
9	10.8	24.7	0	12.6	18.5	0	12.3	19.2	1.2
10	13.2	22.2	1.8	6.5	20.2	0	8.1	27.0	0
11	8.0	20.7	0	7.5	26.9	0	13.0	32.3	0.4
12	9.7	21.0	0	11.4	33.4	0	17.1	31.8	0
13	12.3	20.4	0	21.1	37.2	0	17.4	27.3	0
14	15.5	24.0	2.6	23.0	37.2	0	9.9	25.0	3.5
15	12.2	20.3	0	18.0	22.6	0	15.3	25.4	0
16	10.7	21.8	0.4	14.0	16.5	3.0	8.4	18.2	0.6
17	7.8	22.0	0	14.1	23.8	0	7.4	20.2	3.8
18	11.0	17.7	0	14.7	29.8	0	9.5	28.0	0
19	12.2	21.2	15.0	15.0	25.7	0	12.0	30.0	0
20	5.4	20.3	0	16.1	29.5	0	13.1	35.3	0
21	12.0	20.0	0	14.5	16.0	1.0	15.4	38.5	0
22	12.0	20.2	1.0	10.0	19.3	4.2	25.5	38.3	0
23	14.2	21.4	0	6.2	21.2	0	13.0	28.0	0
24	9.4	23.3	0	9.0	25.5	0	19.0	25.1	0
25	12.9	22.0	1.2	12.6	28.7	0	17.0	30.9	0
26	8.8	22.0	0	15.3	19.6	0	19.5	23.6	0
27	8.7	23.0	0	15.1	31.8	0	16.5	25.8	0
28	6.0	20.6	0	12.5	21.3	0	18.4	37.0	0
29	8.8	22.0	2.2	9.2	19.7	0	17.4	25.5	0.4
30	11.0	19.4	0.2	7.0	21.8	0	10.3	23.5	0
31				12.4	27.8	0			

Appendix 3. Soil report by Dr Pamela Hazelton for soil transects in the Field of Mars Reserve

TRANSECT 1

Site 1 grid reference: 326856 6256929

On tape @ 0m

Depth in cm	Colour (wet)	Texture	Comments
0-8	5YR 4/3 dull reddish brown	Silt loam	Topsoil Single grain to crumb peds Fine roots (many)
8-14	5YR 5/4 dull reddish brown	Sandy clay loam	Subsoil Crumb peds, fine roots in peds Slightly sticky

Transect 1 0m ground surface

Transect 1 0m soil sample

Site 2 grid reference: 326867 6256927

On tape @ 10m

Depth in cm	Colour (wet)	Texture	Comments
0-8	5YR 3/2 dark reddish brown	Silt loam	Crumb to angular blocky peds Fine roots (many) Could be disturbed

Transect 1 10m ground surface

Transect 1 10m soil sample

Site 3 grid reference: 326871 6256917

On tape @ 20m

Depth in cm	Colour (wet)	Texture	Comments
0-8	5YR 3/1 brownish black	Silt loam	Topsoil Single grain Stones
8-21	5YR 3/6 dark reddish brown	Sandy clay	Subsoil Single grained to angular blocky peds sticky
21-30+	5YR 5/8 bright reddish brown	Light clay	Angular blocky Very sticky

Transect 1 20m ground surface

Transect 1 20m soil sample

Site 4 grid reference: 326880 6256911

On tape @ 30m

Depth in cm	Colour (wet)	Texture	Comments
0-10	5YR 3/1 brownish black	Loamy sand	Topsoil Single grain Fine roots (many)
10-24	5YR 4/4 dull reddish brown	Sandy clay loam	Subsoil Single grained to angular blocky peds Roots few in ped
24-36+	5YR 4/8 bright reddish brown	Light clay	Angular blocky Very sticky Roots in ped

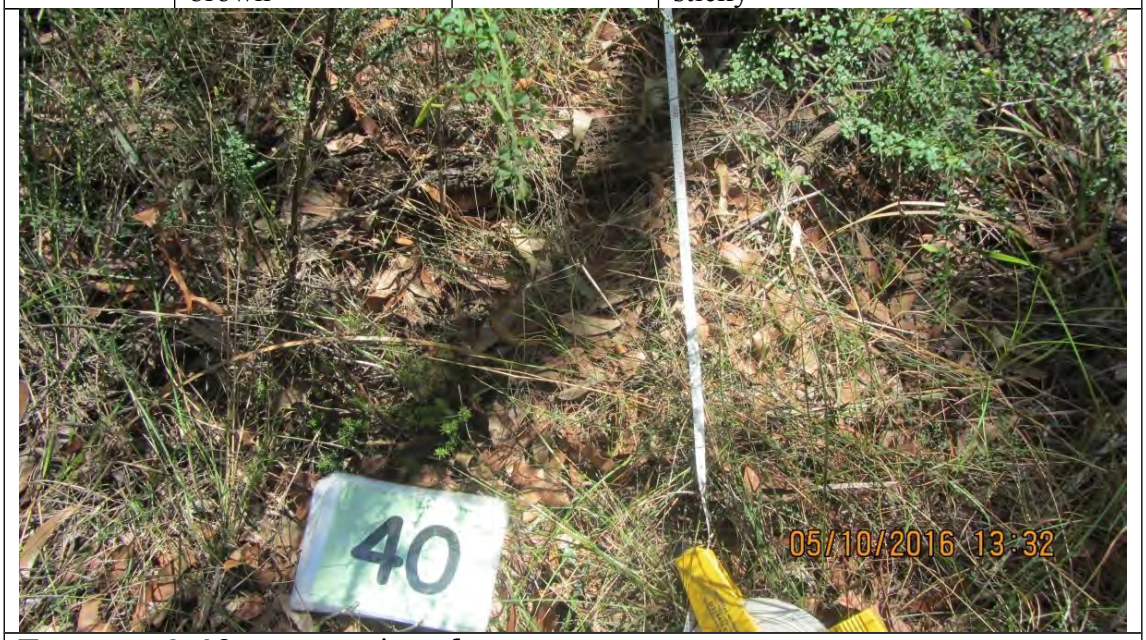
Transect 1 30m ground surface

Transect 1 30m soil sample

Site 5 grid reference: 326885 6256909

On tape @ 40m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 4/3 brown	Silt loam	Topsoil Single grain to crumb/round Round stones (possible ironstone)
8-15	7.5YR 5/4 dull brown	sandy clay loam	Subsoil angular blocky peds ironstone fragments and sandstone fragments
15-26+	7.5YR 5/6 bright brown	light clay	Angular blocky sticky



Transect 1 40m ground surface

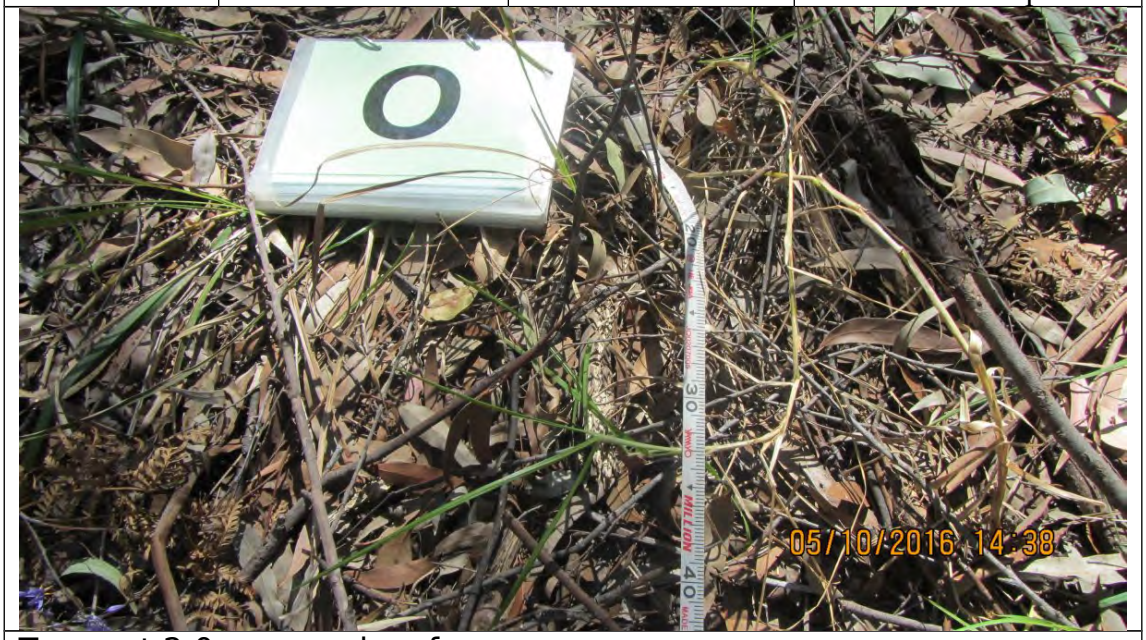
Transect 1 40m soil sample

TRANSECT 2

Site 1 grid reference 326740 6256807

On tape @ 0m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/3 dark brown	Loamy sand to sand	Single grain Small sandstone pieces



Transect 2 0m ground surface

Transect 2 0m soil sample

Site 2 grid reference 326745 6256806

On Tape @10m

Depth in cm	Colour (wet)	Texture	Comments
0-8.5	7.5YR 3/3 dark brown	Loamy sand to sand	Single grain Small sandstone pieces
8.5-17	7.5YR 3/4 dark brown	Clayey sand with silt	Single grain Small ironstone pisoliths
17-33	7.5YR 5/4 dull brown	Clayey sand with silt	Single grain Small ironstone pisoliths

Transect 2 10m ground surface

Transect 2 10m soil sample

Site 3 grid reference 326754 6256801

On tape @20m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/4 dark brown	Loamy sand to sand	Single grain Small sandstone pieces

Transect 2 20m ground surface

Transect 2 20m soil sample

Site 4 grid reference 326770 6256787

On tape @30m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/4 dark brown	Loamy sand to sand	Single grain sandstone pieces <1cm

Transect 2 30m ground surface

Transect 2 30m soil sample

Site 5 grid reference 326777 6256784

On tape @40m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/4 dark brown	Loamy sand	Single grain

Transect 2 40m ground surface

Transect 2 40m soil sample

TRANSECT 3

Site 1 grid reference 326484 6256904

On tape @0 m

Depth in cm	Colour (wet)	Texture	Comments
0-10	7.5YR 3/1 brownish black	Loamy sand	Single grain
10-16	7.5YR 3/2 brownish black	Light sandy clay loam with silt	Single grain Small sandstone fragments with ironstone colouring sticky

Transect 3 0m ground surface

Transect 3 0m soil sample

Site 2 grid reference 326482 6256901

On Tape @10 m

Depth in cm	Colour (wet)	Texture	Comments
0-9	7.5YR 3/1 brownish black	Loamy sand with silt	Single grain Slightly sticky
9-19	7.5YR 3/4 dark brown	Sandy clay loam	Single grain Small ironstone pisoliths
19-34	7.5YR 5/6 bright brown	Light clay with sand	Angular blocky

Transect 3 10m ground surface

Transect 3 10m soil sample

Site 3 grid reference 326473 6256891

On tape @20 m

Depth in cm	Colour (wet)	Texture	Comments
0-10	7.5YR 3/1 brownish black	Loamy sand	Single grain
10-15.5	7.5YR 3/4 dark brown	Loamy sand	Round-crumb peds

Transect 3 20m ground surface

Transect 3 20m soil sample

Site 4 grid reference 326466 6256888

On Tape @30 m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/1 brownish black	Loamy sand	Single grain Sandstone fragments
8-16	7.5YR 3/4 dark brown	Sandy loam	Single grain Small ironstone pisoliths
16-34	7.5YR 3/4 dark brown	Sandy clay	Single grain Round-crumb peds sticky

Transect 3 30m ground surface

Transect 3 30m soil sample

Site 5 grid reference 326466 6256877

On Tape @40 m

Depth in cm	Colour (wet)	Texture	Comments
0-7	7.5YR 3/1 brownish black	Loamy sand	Single grain to crumb Fine roots (many)
7-12	7.5YR 3/4 dark brown	Sandy loam	Single grain Sandstone fragments
12-22	7.5YR 4/6 brown	Sandy clay loam	Single grain to round peds Ironstone pisoliths Sandstone fragments

Transect 3 40m ground surface

Transect 3 40m soil sample

TRANSECT 4

Site 1 grid reference 326358 6256942

On tape @0 m

Depth in cm	Colour (wet)	Texture	Comments
0-2	7.5YR 3/4 dark brown	Loamy sand with silt	Single grain Small shale fragments

Transect 4 0m ground surface

Transect 4 0m soil sample; photo not taken as tiny sample

Site 2 grid reference 326350 6256928

On tape @10 m

Depth in cm	Colour (wet)	Texture	Comments
0-8	7.5YR 3/2 brownish black	Loamy sand with silt	Single grain Sandstone pieces and flakes
8-22	7.5YR 5/4 dull brown	Loamy sand	Single grain to crumb Sandstone fragments

Transect 4 10m ground surface; photo not taken

Transect 4 10m soil sample

Site 3 grid reference 326350 6256926

On tape @20 m

Depth in cm	Colour (wet)	Texture	Comments
0-5	7.5YR 3/4 dark brown	Loamy sand	Single grain

Transect 4 20m ground surface

Transect 4 20m soil sample; photo not taken as tiny sample

Site 4 grid reference 326337 6256915

On tape @30 m

Depth in cm	Colour (wet)	Texture	Comments
0	N/A	N/A	Rock (sandstone boulder) with a few mm of leaf litter on surface

Transect 4 30m ground surface; photo not taken as no sample due to rock

Transect 4 30m soil sample; photo not taken as no sample due to rock

Site 5 grid reference 326332 6256907

On Tape @40 m

Depth in cm	Colour (wet)	Texture	Comments
0-12	7.5YR 4/1 brownish grey	Silty loam	Crumb
12-26	7.5YR 4/6 brown	Sandy clay loam	Angular blocky Sandstone fragments
26-33	7.5YR 5/8 bright brown	Sandy clay	Angular blocky

Transect 4 40m ground surface

Transect 4 40m soil sample

Site 6 grid reference 326324 6256897

On Tape @50 m

Depth in cm	Colour (wet)	Texture	Comments
0	N/A	N/A	Rock (sandstone boulder) with a few mm of leaf litter on surface
Transect 4 50m ground surface; photo not taken as no sample due to rock			
Transect 4 50m soil sample; photo not taken as no sample due to rock			

GTb grid reference 326481 6256825

Depth in cm	Colour (wet)	Texture	Comments
0-5	7.5YR 2/1 black	Loamy sand	Single grain
5-8	7.5YR 3/3 dark brown	Silty clay loam	Crumb

GTb ground surface

GTb soil sample

GTc grid reference
326521 6256841

Depth in cm	Colour (wet)	Texture	Comments
0-20	7.5YR 4/3 brown	Silty clay	Crumb to round slightly sticky

GTc ground surface

GTc soil sample

Appendix 4. Photo file for autumn flora studies 2016

Bell Park

15/04/2016: *Passiflora subpeltata* (White Passionfruit), in centre of park

15/04/2016: Sign at northern end of Bell Park

15/04/2016: Spot Location A; *Ficus rubiginosa*

15/04/2016: Ground truthing section 'a' (GTa); gully in centre of GTa , looking south

15/04/2016: Ground truthing section 'a' (GTa); view to east at the centre of GTa

15/04/2016: Ground truthing section 'a' (GTa); view to south from northern end of GTa

15/04/2016: Centre of the park

15/04/2016: *Passiflora subpeltata* (White Passionfruit), with fruit, in centre of park

15/04/2016: *Passiflora subpeltata* (White Passionfruit), in centre of park

15/04/2016: *Passiflora suberosa* (Corky Passionflower), close to Quadrat 1

15/04/2016: *Ipomea indica* (Morning Glory) covering foliage, close to Spot Location B

15/04/2016: Tubers on aerial stems of *Anredera cordifolia* (Madeira Vine), close to Spot Location B

15/04/2016: Spot Location B, facing north-west

15/04/2016: Quadrat 1, facing east

15/04/2016: Fruit of *Eucalyptus saligna* in Quadrat 1. Fruit is the best way to tell the difference between the locally native *Eucalyptus saligna*, and the non-locally native *E. grandis*.

Brush Farm Park

08/04/2016: Quadrat 1, facing south-east

08/04/2016: Quadrat 1, facing east

08/04/2016: Quadrat 1, facing south-west

13/04/2016: Quadrat 2, facing east

13/04/2016: Quadrat 3, facing south

19/04/2016: Quadrat 4, facing south-west

19/04/2016: Quadrat 4, facing west

15/04/2016: Ground truthing section 'a' (GTa); mapped as 'S_WSF09: Sydney Turpentine-Ironbark Forest' (OEH 2013)

08/07/16: Remnant canopy tree close to Quadrat 3 (Tony Rodd pictured)

Darvall Park

12/07/16: Quadrat 1-1, facing north-west

12/07/16: Quadrat 1-2, facing south-east

12/07/16: Quadrat 1-3, facing north-west

12/07/16: Quadrat 1-4, facing south-east

12/07/16: Quadrat 1-4, facing north-west

Field of Mars Reserve

30/03/2016: Quadrat 1, facing south-west

30/03/2016: Quadrat 1, facing west

30/03/2016: *Casuarina glauca* (Swamp She-oaks) in corner of Quadrat 1, facing south west

07/04/2016: Quadrat 4, facing north-east

07/04/2016: Quadrat 4, facing south-west

07/04/2016: Quadrat 5, facing north

07/04/2016: Quadrat 5, facing north

07/04/2016: Quadrat 5, facing south

Lambert Park

7/04/2016: Sign at southern entrance to Lambert Park

7/04/2016: Quadrat 1, facing north

7/04/2016: *Ficus rubiginosa* in Quadrat 1-4, facing west

7/04/2016: Quadrat 1, facing north, with Guides hall to rear

7/04/2016: *Ficus coronata* in Quadrat 1-3, facing north

7/04/2016: *Acmena smithii* in Quadrat 1-1, facing north

Outlook Park

22/04/16: Quadrat 1, facing north-east

22/04/16: Area included in Quadrat 1, facing north

22/04/16: Entry to park via Trelawney Street, facing east

22/04/16: Ground truthing section 'a' (GTa); vegetation on southern side of entry stairwell from Trelawney Street

22/04/16: Entry stairwell from Trelawney Street, facing west

22/04/16: Northern end of ground truthing section 'b' (GTb); facing north

22/04/16: Western edge of GTb, facing north-west

22/04/16: Western edge of GTb, facing west

22/04/16: Central area of GTb, facing south

22/04/16: Eastern edge of GTb, facing south-east

22/04/16: Suspected remnant *Eucalyptus saligna* in Quadrat 1

22/04/16: Another suspected remnant *Eucalyptus saligna* in Quadrat 1

22/04/16: Vegetation in park and boundary wall for neighbouring property, 150 Chatham Road, Denistone

22/04/16: Entrance to park from Chatham Road

Appendix 5. Statistical report

Summary of Ryde Floristic Surveys 2006 and 2016

Data

The Ryde survey data were downloaded from the OEH VIS data base on 28/04/2016 as 2297_MRydeCensusList.csv, 2297_MRydeTaxonomicList.csv, and 2297_MRyde.csv. These files giving the site descriptions, the taxonomic matches to the coded species labels, and the site by species file, respectively. The data downloaded were spatially delimited by the latitudes, -33.84 and -33.74, and longitudes, 151.04 and 151.14. This gave 484 sites and 1130 plant species, from which the data for the 11 Biosphere sites were extracted.

The ACA site by species data was supplied as RydeCouncil2016withBotnames.txt on June 3, 2016, by email. The file "Survey details, Tree tables.xls" (received by the same email) supplied further site and survey information.

Ryde Survey 2006 (By BioSphere

Table 1 Results from 2006 surveys by BioSphere

Park	nplots	nNative	nSpecies	nNotfullyID	propNative
Brush Farm Park	2	35	62	1	56%
Darvall Park	1	43	75	3	57%
Field of Mars	6	141	177	6	80%
Lambert Park	2	54	83	2	65%
All parks surveyed	11	179	244	10	73%

Table 1 shows the parks surveyed in 2006, the number of plots, the total number of local native plant species found in the park, the total number of species, The column, nNotfullyID, shows the number of plant species identified only to genus. The column, propNative, is the proportion of plant species found in the park which were locally native.

There was no indication of the sampling strategy. Hence the proportions of native species to the total species (propNative) found in a park may not be representative of the park as a whole.

(This 2006 survey was the only Ryde survey which had been uploaded to the VIS database.)

Ryde Survey 2016 (ACA)

Table 2 Results from 2016 Flora surveys by ACA

Park	nSites	nNative	nspecies	nNotFullID	propNative
Brush Farm Park	19	76	117	1	65%
Bell Park	8	17	58	1	29%
Darvall Park	4	34	54	1	63%
Field of Mars	20	122	155	2	79%

Lambert Park	4	25	48	1	52%
Outlook Park	7	44	70	1	63%
All Parks	62	185	286	7	65%

Comparisons of species observed in 2006 versus those observed in 2016

The Venn diagrams in Figure 1 - Figure 2 show the numbers of species in common between the surveys, with the first showing the overall differences, and Figure 2 - Figure 5 showing them on a park by park basis.

The Venn diagrams in Figure 6 - Figure 10 show the numbers of exotic species in common between the surveys, with Figure 6 showing the overall differences, and Figure 7 - Figure 10 showing them on a park by park basis.

The Venn diagrams in Figure 11 - Figure 15 show the numbers of native species in common between the surveys, with Figure 11 showing the overall differences, and Figure 12 - Figure 15 showing them on a park by park basis.

The Venn diagrams in Figure 16 - Figure 20 show the numbers of non-local (NLN) native species in common between the surveys, with Figure 16 showing the overall differences, and Figure 17 - Figure 20 showing them on a park by park basis.

The Venn diagram of Figure 21 Figure 21 Native species shared across four parks (2016)Figure 22 shows overlapping species for the same four parks in 2006. Again, Field of Mars is clearly distinct from the other parks in its native species composition. (Given that there are four sets of overlaps, areas in these two graphs are not proportional to the counts. The geometry of circles is such that with three groups proportionality is almost always impossible.)

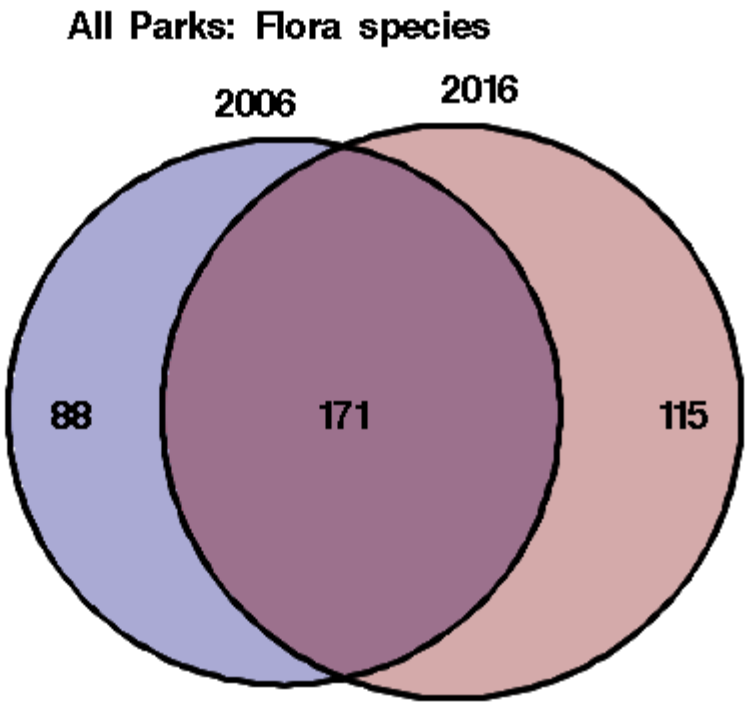


Figure 1 Venn diagram showing all flora species found and shared between the surveys of 2006 and 2016.

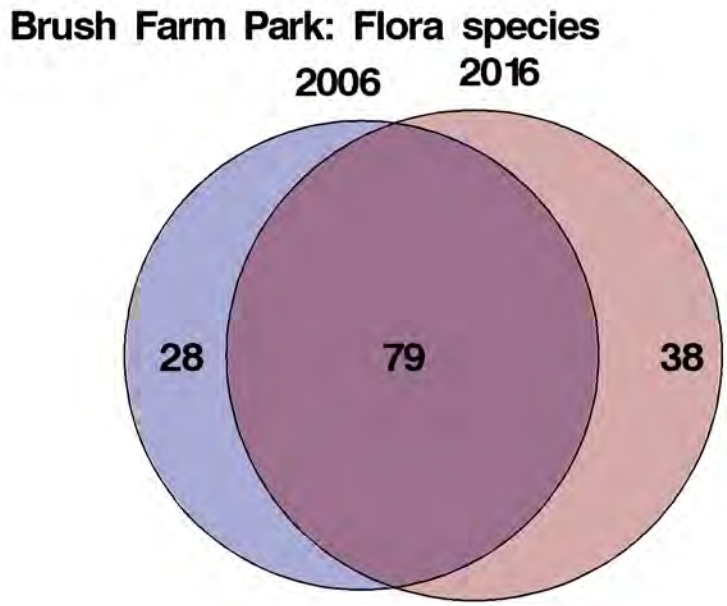


Figure 2 Comparing shared species from 2006 and 2016 at Brush Farm Park.

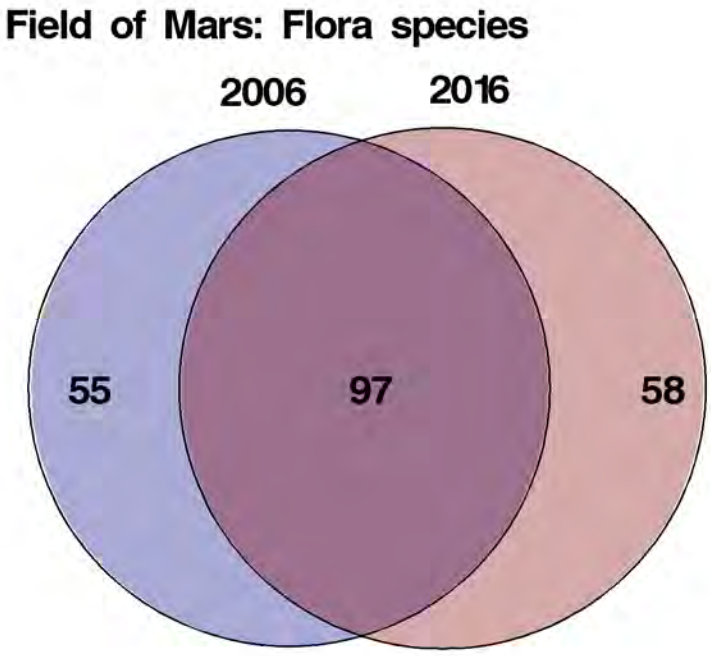


Figure 3 Comparing shared species from 2006 and 2016 at Field of Mars.

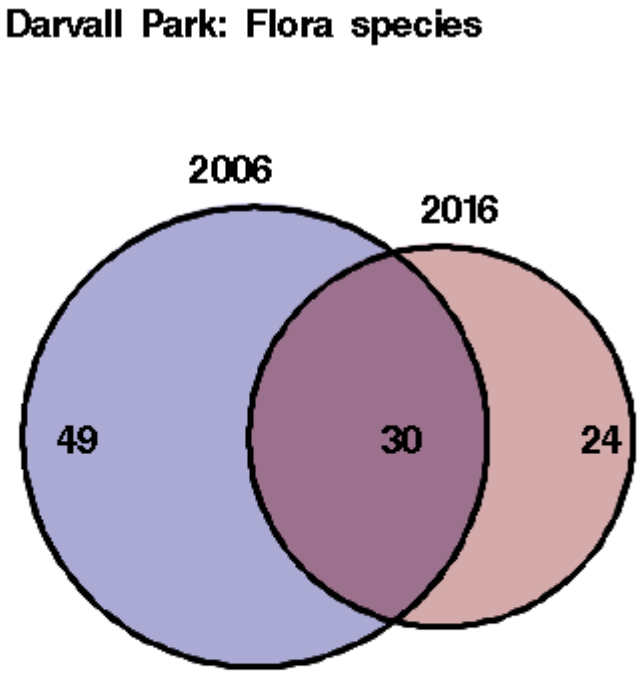


Figure 4 Comparing shared species from 2006 and 2016 at Darvall Park.

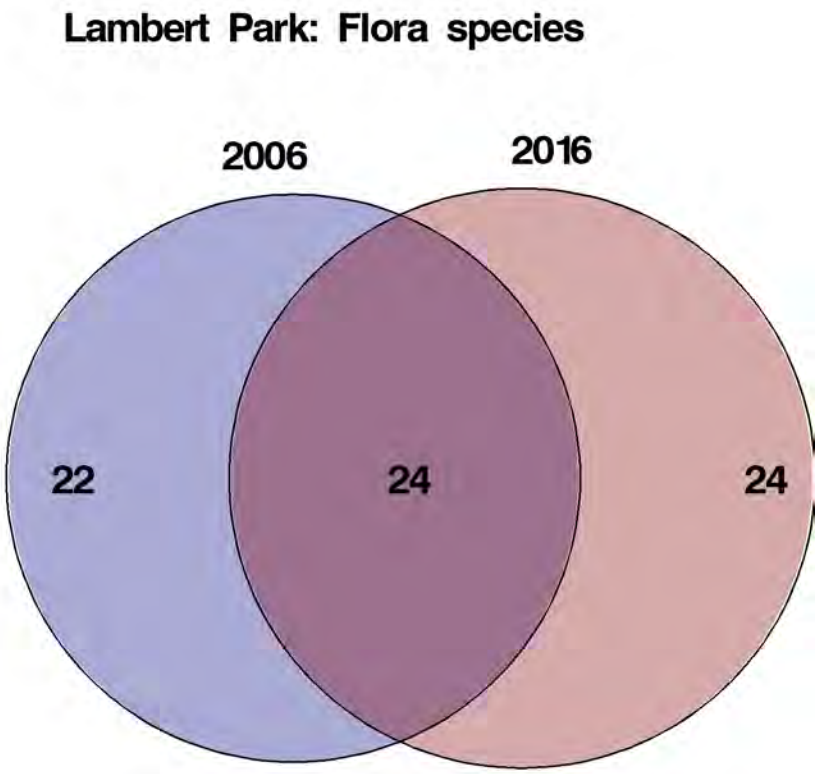


Figure 5 Comparing shared species from 2006 and 2016 at Lambert Park.

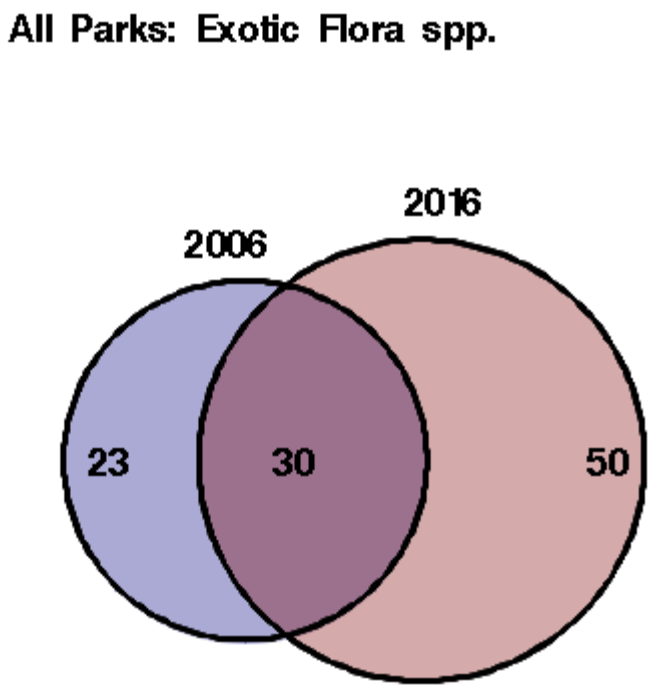


Figure 6 Comparing shared exotic species from 2006 and 2016 at all parks.

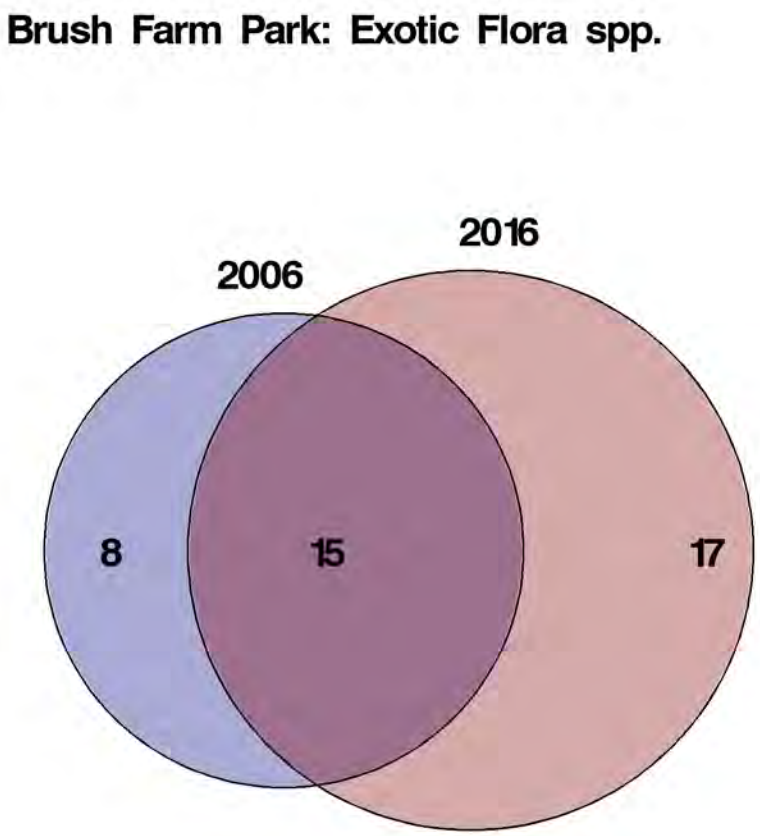


Figure 7 Comparing shared exotic species from 2006 and 2016 at Brush Farm Park.

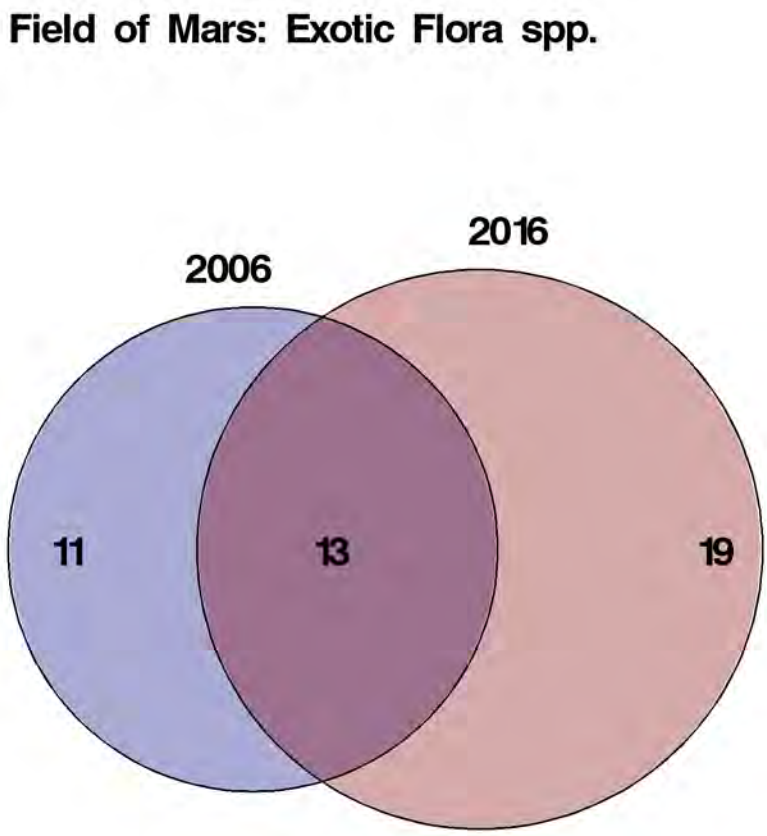


Figure 8 Comparing shared exotic species from 2006 and 2016 at Field of Mars.

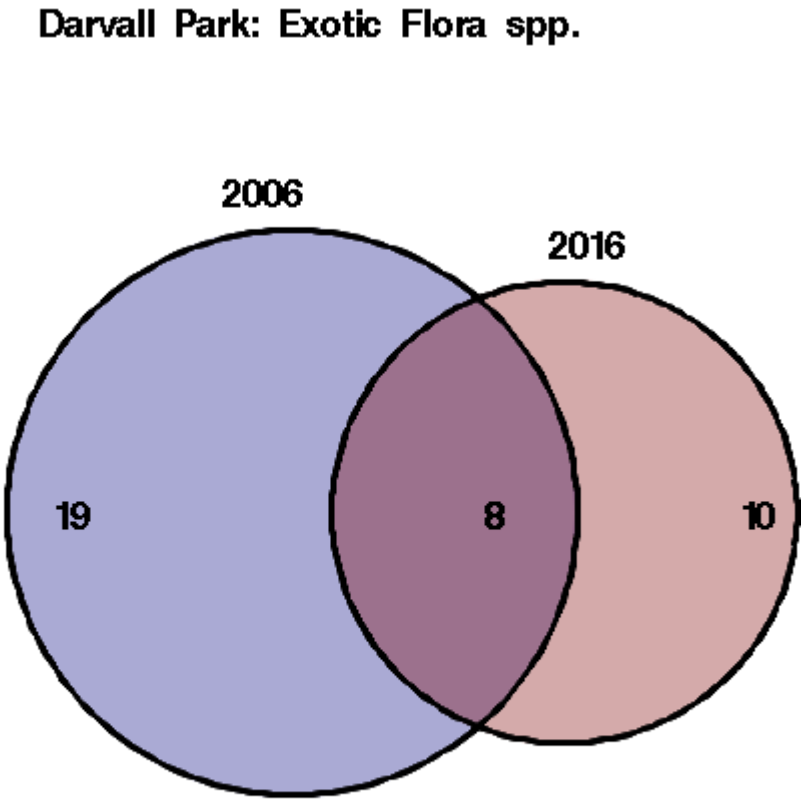


Figure 9 Comparing shared exotic species from 2006 and 2016 at Darvall Park.

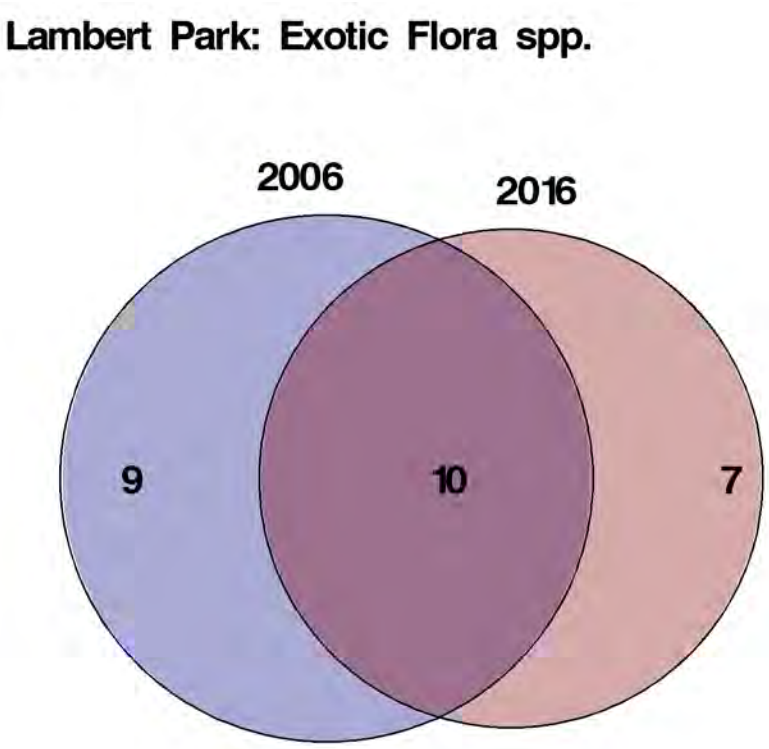


Figure 10 Comparing shared exotic species from 2006 and 2016 at Lambert Park.

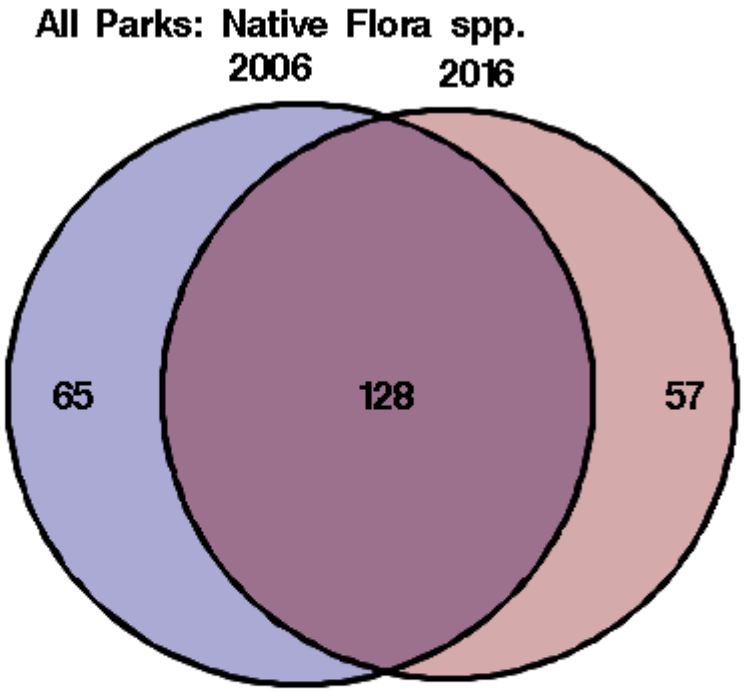


Figure 11 Comparing shared native species from 2006 and 2016 at all parks.

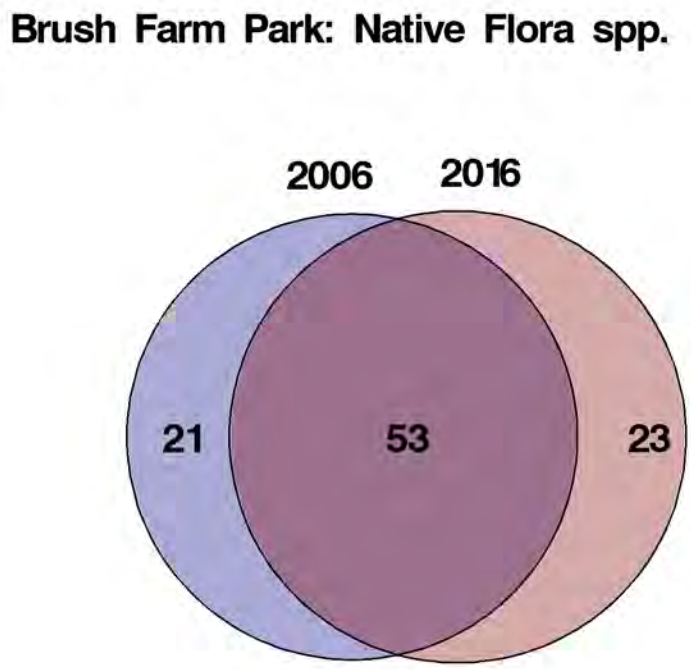


Figure 12 Comparing shared native species from 2006 and 2016 at Brush Farm Park.

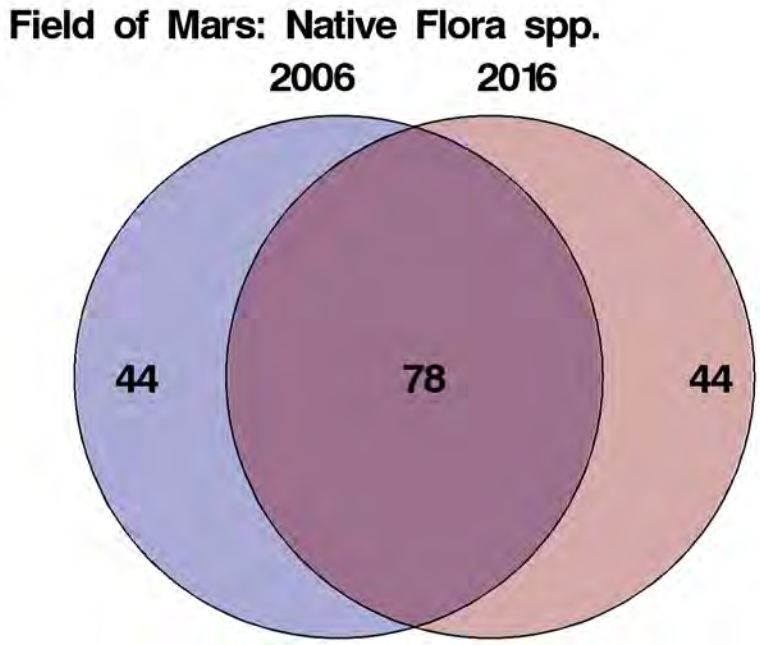


Figure 13 Comparing shared native species from 2006 and 2016 at Field of Mars.

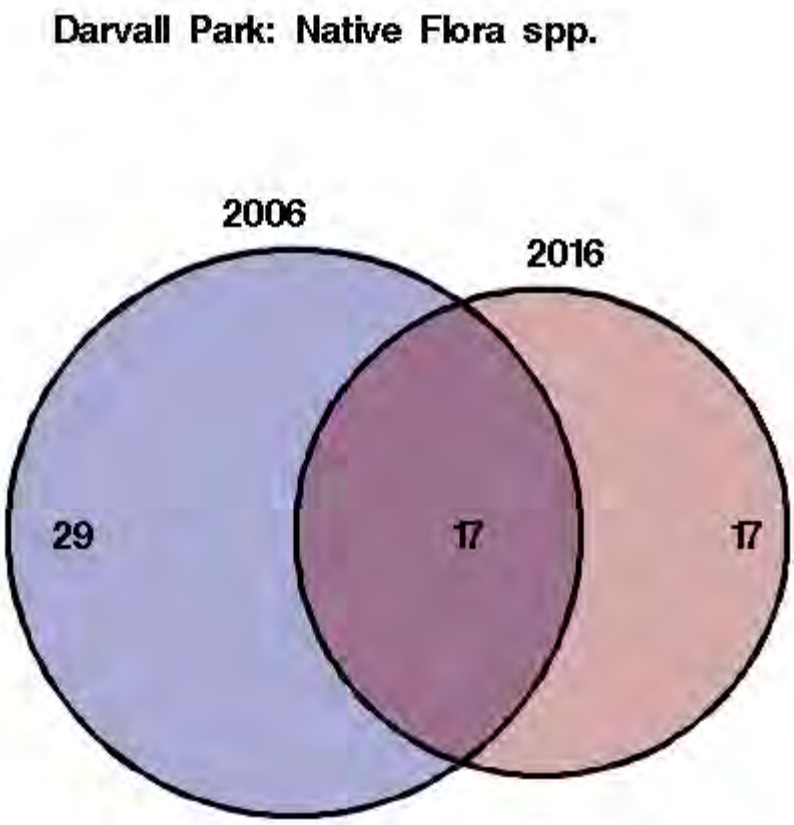


Figure 14 Comparing shared native species from 2006 and 2016 at Darvall Park.

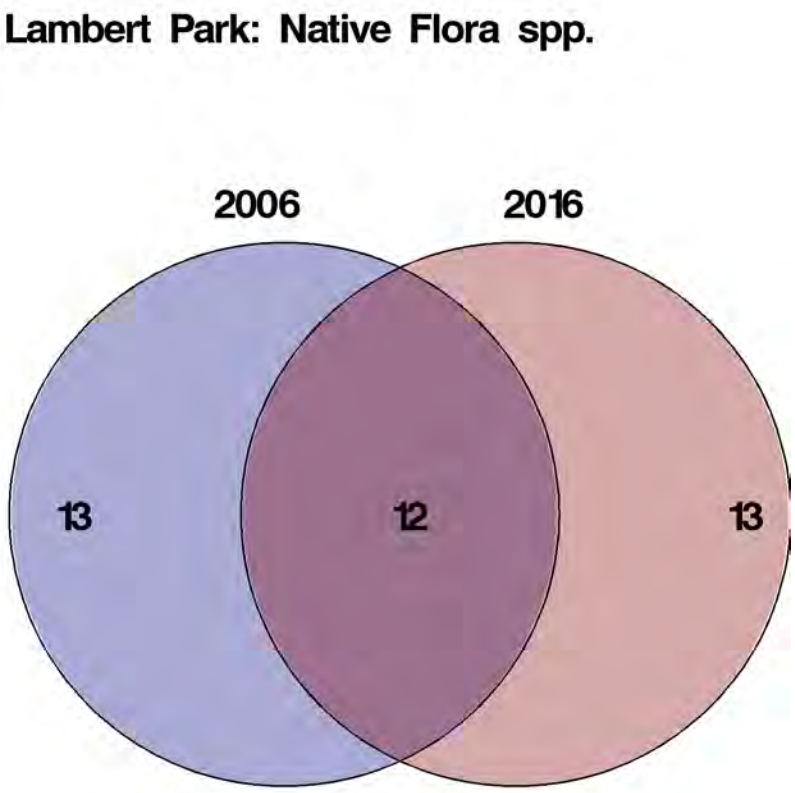


Figure 15 Comparing shared native species from 2006 and 2016 at Lambert Park.

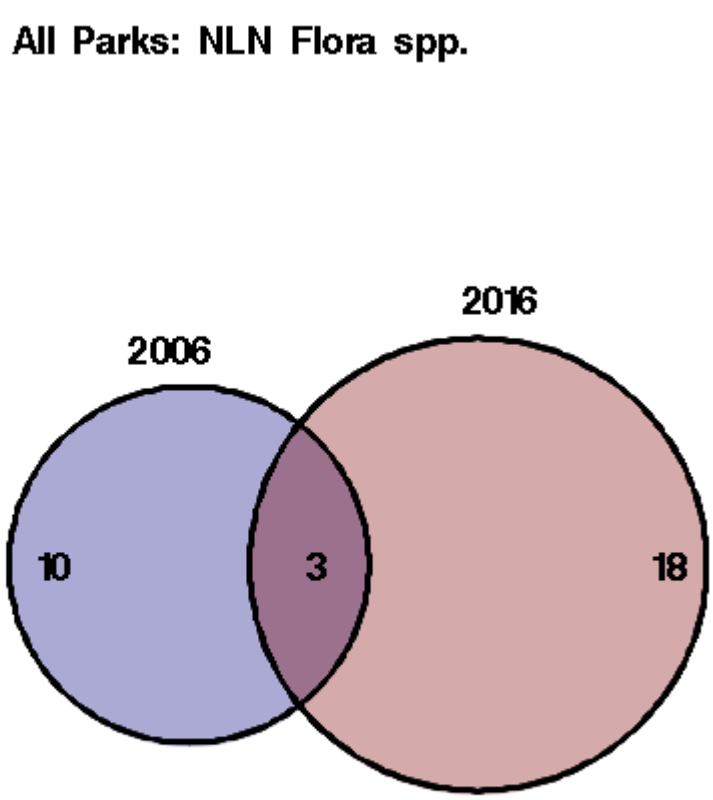


Figure 16 Comparing shared non-local native (NLN) species from 2006 and 2016 at all parks.

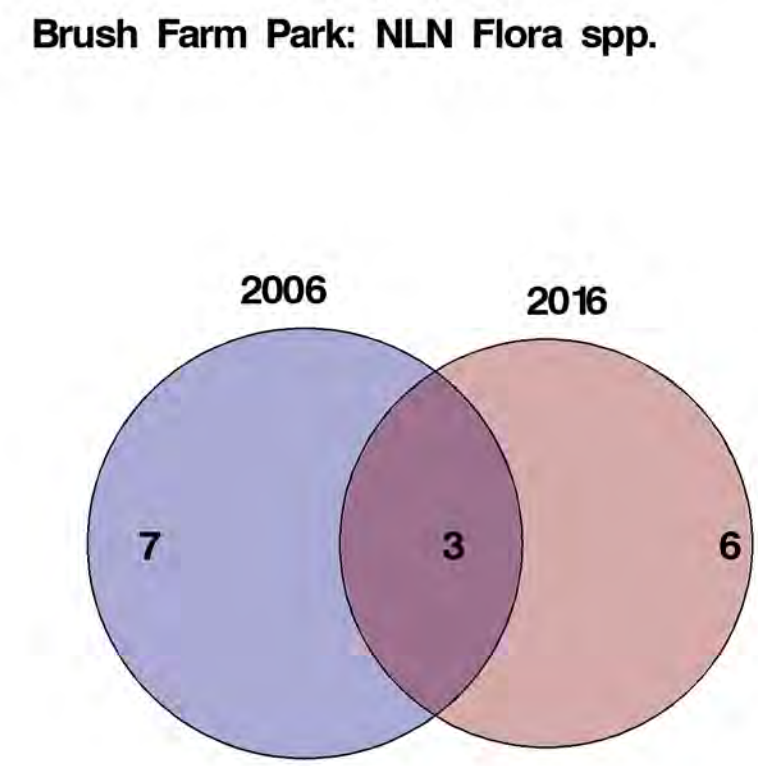


Figure 17 Comparing shared non-local native (NLN) species from 2006 and 2016 at Brush Farm Park.

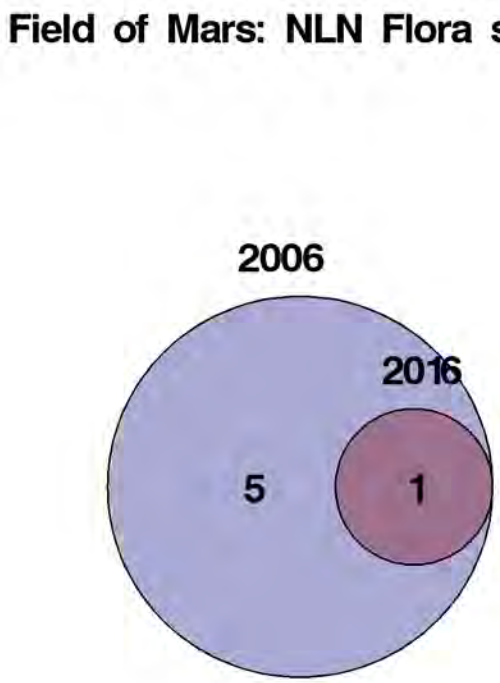


Figure 18 Comparing shared non-local native (NLN) species from 2006 and 2016 at Field of Mars.

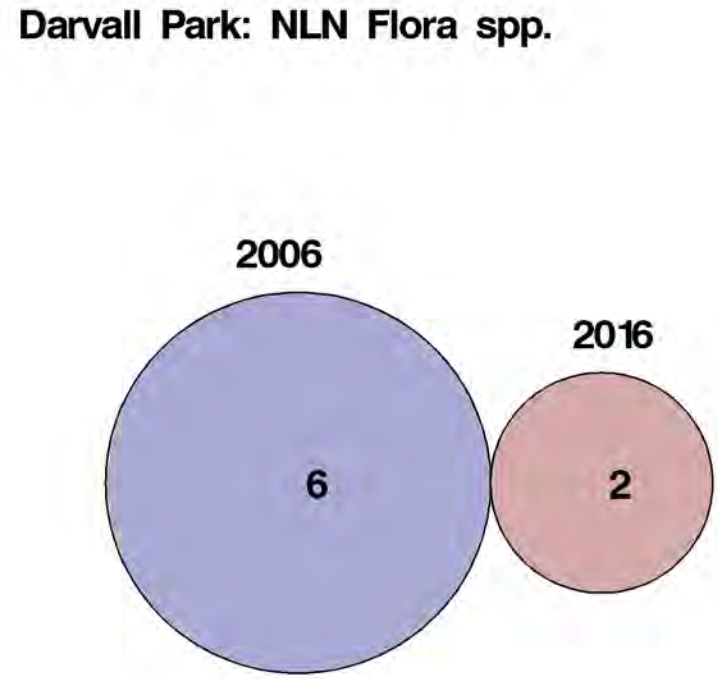


Figure 19 Comparing shared non-local native (NLN) species from 2006 and 2016 at Darvall Park.

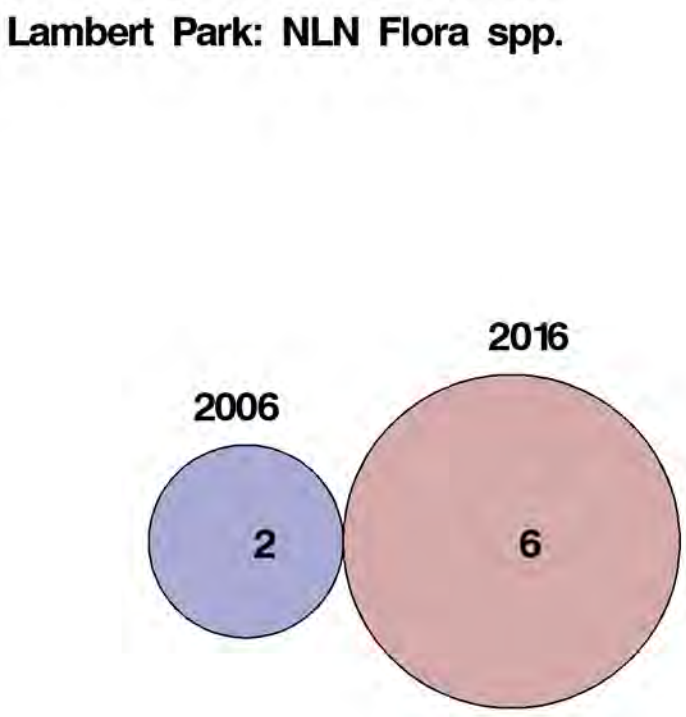


Figure 20 Comparing shared non-local native (NLN) species from 2006 and 2016 at Lambert Park.

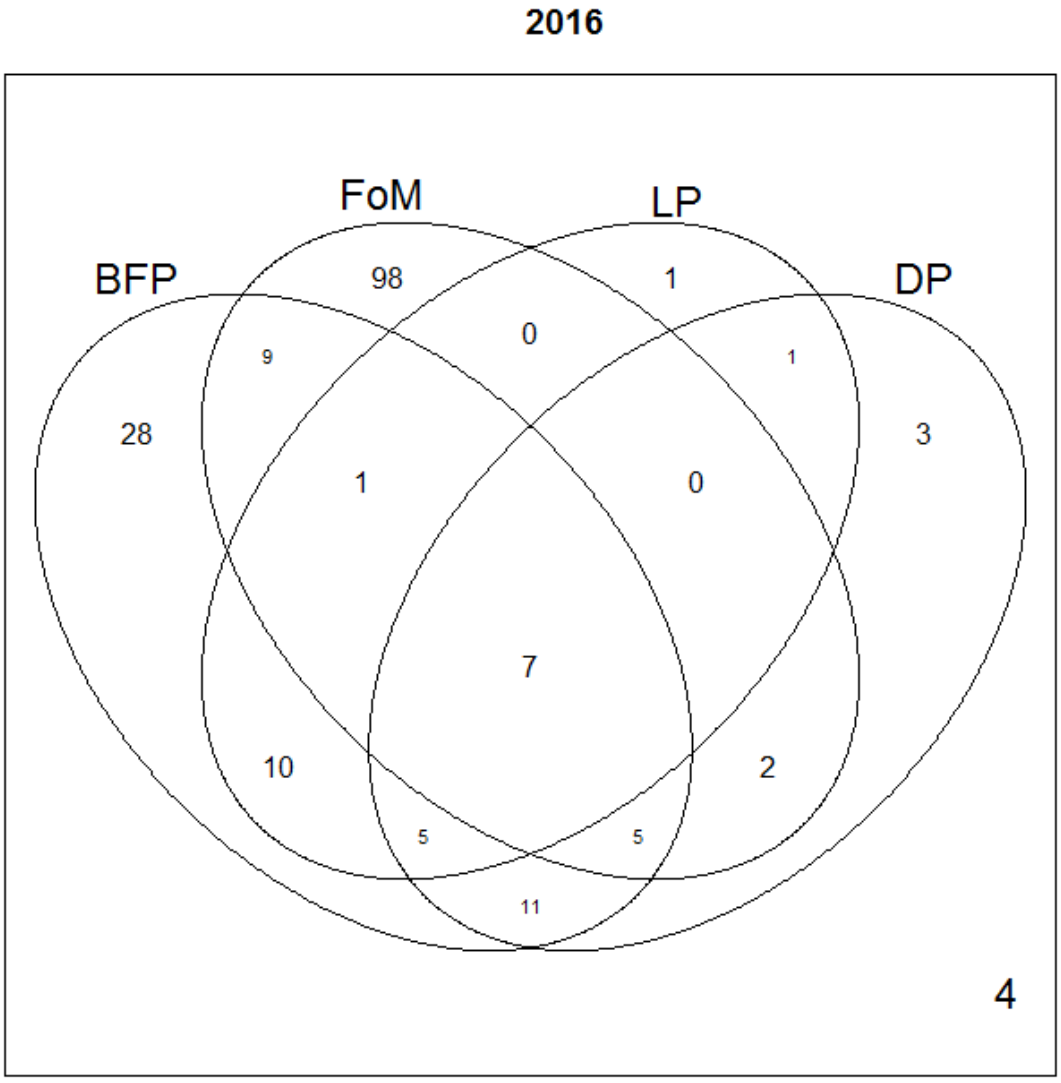


Figure 21 Native species shared across four parks (2016)

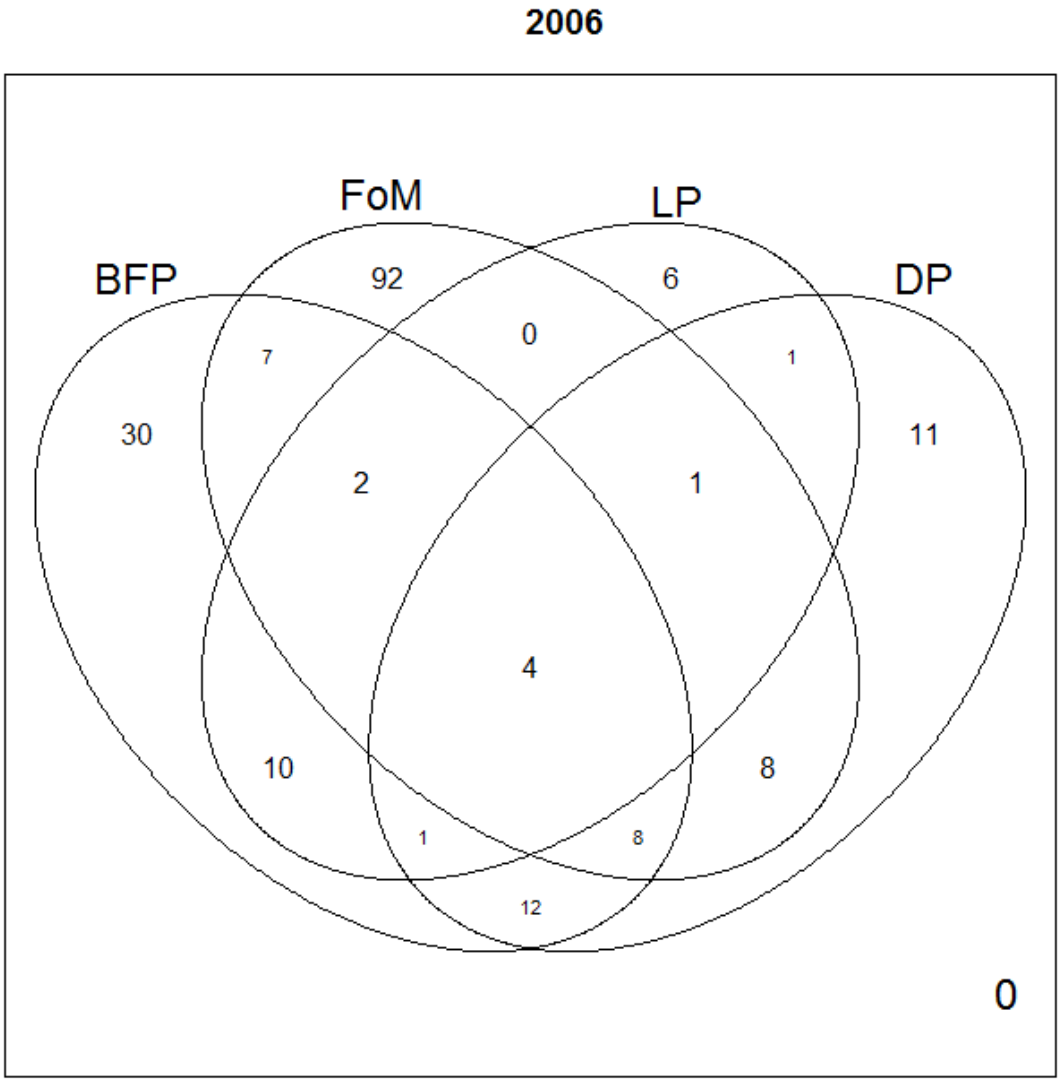


Figure 22 Native species shared across four parks (2006)

Comparisons of percentage native cover

Braun-Blanquet scores are ordinal and therefore cannot be averaged meaningfully. Using the table of meanings for the 1-7 Braun-Blanquet scores , the scores were converted to an approximate value for percentage cover. See . Note that the Braun-Blanquet scale is a mixture of frequency and cover, two quite different concepts, and that converting a Braun-Blanquet score of 4, is not really possible, since it represents a very abundant plant with cover <5% or a plant with 5-20% cover. However, this confusion arises only for the first few Braun-Blanquet values, and given that that these all represent low cover values, it was felt that these conversions would allow meaningful cover comparisons between the two surveys. The ACA data were collected using percentage cover. (In order to find average native cover, values of cover which were less than 1% were converted to 1%. This was compatible with the Braun-Blanquet conversion.) shows the resultant average percentage native cover by park and year.

Note that the spot data where plant species were scored as present/absent is excluded from this analysis.

BB score	Meaning	% cover	Interval
1	<=3 individuals and <5% cover	1	(.1 - 1)
2	Uncommon >3 individuals and cover <5%	2.5	(.1 - 5)
3	Common cover <5%	5	(.1 - 5)
4	(Very abundant and cover <5%) OR (between 5%-20% cover)	12	(.1 - 20)
5	20% - 50%	35	(20 - 50)
6	50% - 75%	62	(50 - 75)
7	75% - 100%	87	(75 - 100)

Table 3 Conversions from 1-7 Braun-Blanquet scores to percentage cover (column 3) and intervals used for the interval censored data analysis.

	Year	n	mean	std	min	max
Bell Park	2016	1	5		5	5
Brush Farm Park	2006	4	150	127.11	44.5	320.5
	2016	4	74.75	12.81	65.75	93.75
Darvall Park	2006	1	196		196	196
	2016	1	73.75		73.75	73.75
Field of Mars	2006	5	145.4	35.80	112.5	188.5
	2016	5	95.35	17.85	67	116.5
Lambert Park	2006	1	83		83	83
	2016	1	99.75		99.75	99.75
Outlook Park	2016	1	67.25		67.25	67.25
All Parks	2006	11	146.18	77.49	44.5	321
	2016	13	78.58	27.76	5	116.5

Table 4 Summary statistics for percentage native cover at each park

does shows that only at Brush Farm Park and Field of Mars can parks be compared for change in cover. between 2006 and 2016. Under a t-test using the point estimates, Field of Mars appears to have less native cover in 2016 (p=.0197, data treated as lognormal). However, the t-test analysis is not valid in that intervals are approximated by points. Using an interval censored data analysis (PROC LIFEREG,), no difference in total native cover was found at either Field of Mars (p=.7630) or Brush Farm Park (p=.6654). (Total native cover was treated as being lognormally distributed.)

As seen in the earlier analyses, there are no overall differences and there are no differences for each park, except at Field of Mars, which again shows a possible decrease in total native cover between the survey years (p=.0002). The crudity of the Braun-Blanquet scale, together with observer differences is sufficient to account for this apparent difference. See discussion below.

The same analyses were repeated for total percentage exotic cover. shows the summary statistics for total percent exotic cover at each park and for all parks surveyed.

	Year	n	mean	std	min	max
Bell Park	2016	1	133.75		133.75	133.75
Brush Farm Park	2006	4	93.00	61.00	33.00	155.50
	2016	4	42.56	35.80	8.75	74.00
Darvall Park	2006	1	115.50		115.50	115.50
	2016	1	64.25		64.25	64.25
Field of Mars	2006	5	21.90	15.10	11.50	46.50
	2016	5	4.45	2.06	2.00	6.50
Lambert Park	2006	1	178.00		178.00	178.00
	2016	1	23.50		23.50	23.50
Outlook Park	2016	1	9.25		9.25	9.25
All Parks	2006	11	70.45	62.84	11.50	178.00
	2016	13	32.56	40.91	2.00	133.75

Table 5 Summary statistics for percentage exotic cover at each park

T-tests for the point estimates for exotic cover showed no apparent difference at Brush Farm Park (p=.2016) and an apparent difference at Field of Mars (p=.0032). The interval censored data analysis gave no differences in exotic cover between the survey years at either site (p=.3195, and p=.4885. respectively.

Paired Quadrats

The above analyses for differences in exotic and native cover at the parks have not accounted for the fact that the quadrats of 2016 were ostensibly the same as those of 2006. This means that the

tests for difference in cover should be paired difference tests. Again, we can work with either a point estimate of difference or an interval censored estimate of difference.

Using interval censored analysis and using both differences of logs and differences on the original scale, no differences were found for native cover, at Brush Farm Park, at Field of Mars, nor for the parks overall.

A decrease in exotic cover was found for the parks overall, but not for either of the parks where this was testable (Brush Farm Park and Field of Mars).

Problems with these analyses of cover

What is noticeable about these analyses is that the estimated total cover values for the 2016 surveys is always numerically less than those for 2006. Whether one uses the intervals or the points in the analysis, it seems that the intervals implied by the Braun-Blanquet scale are so wide and so numerically large that inevitably the estimated total cover is higher in 2006. Consequently we place no trust in the conclusions of any analysis.

We illustrate the nature of the data in and Table 9 where the intervals (Low, High) used in the censored data analysis are given for Field of Mars quadrats in 2006 and 2016, respectively, together with the point estimates. As can be seen, the intervals for the 2016 data are smaller, with neither the extreme lows or highs. This is a consequence of being estimated at 10% intervals after the first 1% to 10% cover values.

		% Native Cover		
park	quadrat	Point	(Low,	High)
Field of Mars	RYDE_BS1	179	(25.5,	304)
Field of Mars	RYDE_C1	112.5	(23.1,	179)
Field of Mars	RYDE_E1	116.5	(70.9,	162)
Field of Mars	RYDE_SG1	130.5	(24,	199)
Field of Mars	RYDE_WR1	189.5	(44.3,	261)

Table 6. Field of Mars (2006): Point estimates and intervals (low, high) used in the analyses of % native cover

	quadrat	% Native Cover Point	(Low,	High)
Field of Mars	FoM_1	99	(89.15,	106.25)
Field of Mars	FoM_2	98.5	(88.45,	104.5)
Field of Mars	FoM_3	67	(56.725,	73)
Field of Mars	FoM_4	116.5	(102.78,	121)
Field of Mars	FoM_5	95.75	(80.73,	99.75)

Table 7 Field of Mars (2016): Point estimates and intervals (low, high) used in the analyses of % native cover

References

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Appendix 6. Comparison of species composition in 2006 and 2016 recorded in the fixed quadrats

Appendix 6

Comparison of species composition in 2006 and 2016 recorded in the fixed quadrats

Park/Reserve Quadrat Code	Year of study	Total no. of species	No. of native species	No. of exotic species	No. of Non-local natives
Brush Farm Park					
Total park	**2006**	**109**	**78**	**28**	**3**
Total park	**2016**	**100**	**63**	**31**	**6**
1 (SBG1)	2006	43	30	12	1
BF#1	2016	55	33	18	4
2 (S1)	2006	53	43	9	1
BF#2	2016	39	30	7	2
3 (TI1)	2006	38	23	13	2
BF#3	2016	30	20	7	3
4 (TC1)	2006	60	45	14	1
BF#4	2016	48	32	15	1
Darvall Park					
Total park	**2006**	**78**	**50**	**28**	**0**
Total park	**2016**	**54**	**34**	**18**	**2**
1 (DP1)	2006	78	50	28	0
DP#1	2016	54	34	18	2
Field of Mars Reserve					
Total park	**2006**	**152**	**124**	**27**	**1**
Total park	**2016**	**155**	**122**	**32**	**1**
1 (E1)	2006	18	12	6	0
FoM#1	2016	31	16	15	0
2 (SG1)	2006	48	42	6	0
FoM#4	2016	54	48	6	0
3 (WR1)	2006	63	48	14	1
FoM#2	2016	48	35	12	1
4 (C1)	2006	42	31	11	0
FoM#3	2016	37	27	10	0
5 (BS1)	2006	58	58	0	0
FoM#5	2016	66	61	5	0
Lambert Park					
Total park	**2006**	**46**	**22**	**24**	**1**
Total park	**2016**	**48**	**25**	**17**	**6**
1 (LP1)	2006	46	22	23	1
LP#1	2016	48	25	17	6