Annual monitoring of Matted Flax-lily: Aurora, Epping (year 9: 2017–18)

FINAL REPORT

Prepared for Development Victoria

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- Development Victoria: Jessamy Smooker and Sonya Rezo

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- Tim Dredge (assistance in the field)
- Sally Mitchell (mapping)

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1 Background

Biosis Pty Ltd was commissioned by Development Victoria to undertake the year 9 (2017-–18) annual monitoring of the Matted Flax-lily *Dianella amoena* population within reserves 11 and 14 at the Aurora residential development, Epping, Victoria (Figure 1).

1.1 Approval under the EPBC Act

Aurora is a residential development area in Epping North, Victoria (Figure 1). It is approximately 20 kilometres north of the Melbourne CBD, and 1.5 kilometres north of existing urban development in the township of Epping. It is bounded by Craigieburn Road East to the north, O'Herns Road to the south and the Craigieburn Bypass to the west. The east boundary follows existing property titles. Development Victoria (formerly known as VicUrban and then Places Victoria) were the major land holder of Aurora. In 2014 Lendlease Communities (Australia) Limited (Lendlease) acquired the balance of development land at Aurora although three of the Conservation Reserves remain as Development Victoria land (Reserve 10, 11 &14).

The action was referred to the Australian Government Department of the Environment and Energy (DoEE) on 3 July 2007 seeking approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (EPBC 2007/3524). On 3 August 2007, DoEE declared that the proposed action is deemed a 'controlled action' and that it will be assessed by preliminary documentation. The project was approved with conditions on the 16 March 2008. Variations to the approval were given on the 15 April 2011, 3 October 2016 and the 29 November 2017.

Conditions relating to Matted Flax-lily include 1, 2c and 2e, as outlined below.

1. The person taking the action must undertake all works in accordance with the Aurora Conservation Management Plan – January 2008 (Biosis Research 2008).
2. To protect the threatened species listed EPBC Act, in particular the Matted Flax-lily and Golden Sun Moth *Synemon plana*, the person taking the action must monitor and manage the reserves identified in Figures 1a and 1b in accordance with the Aurora Conservation Management Plan – January 2008. In particular the following actions must be taken:
    c. Monitoring of the Matted Flax-lily is to be undertaken between 1 October and 1 March every 12 months commencing 2008 and continuing for a period of 10 years after establishment of reserves.
    e. If monitoring indicates a decrease of the Matted Flax-lily, the cause of the decline must be investigated. Corrective actions must be developed and implemented. In this event the Department must be provided, within two months of the monitoring results being known, with a report stating the corrective action(s) implemented.

1.2 Annual monitoring

Biosis has monitored the Matted Flax-lily population at Aurora annually since 2008. Annual reports submitted to the relevant Departments are listed in Table 1.

Table 1 Annual monitoring reports

Year	Report
Year 0: 2008–2009	Letters to DEWHA, 5 May and 26 June 2009
Year 1: 2009–2010	Report to DEWHA, 19 July 2010
Year 2: 2010–2011	Report to DSEWPaC, 4 May 2011
Year 3: 2011–2012	Report to DSEWPaC, 8 June 2012
Year 4: 2012–2013	Report to DSEWPaC, 4 April 2013
Year 5: 2013–2014	Report to DoE, 11 April 2014
Year 6: 2014–2015	Report to DoE, 1 March 2015
Year 7: 2015–2016	Report to DoE, 25 August 2016
Year 8: 2016–2017	Report to DoE, 25 August 2017
Year 9: 2017–2018	Current report – to be submitted to DoEE upon finalisation

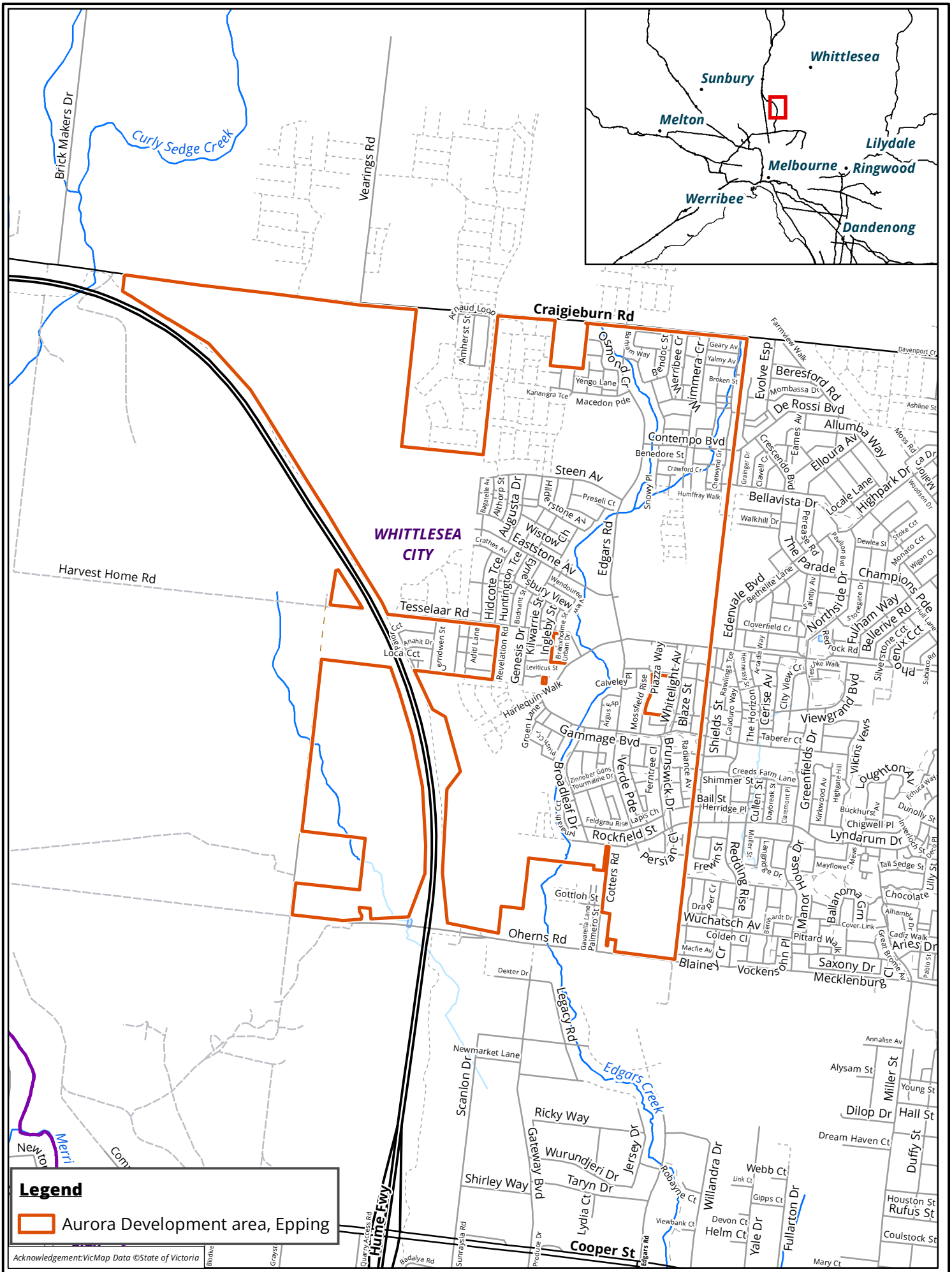

Figure 1 Location of the Aurora development, Epping North, Victoria (EPBC 2007/3524)

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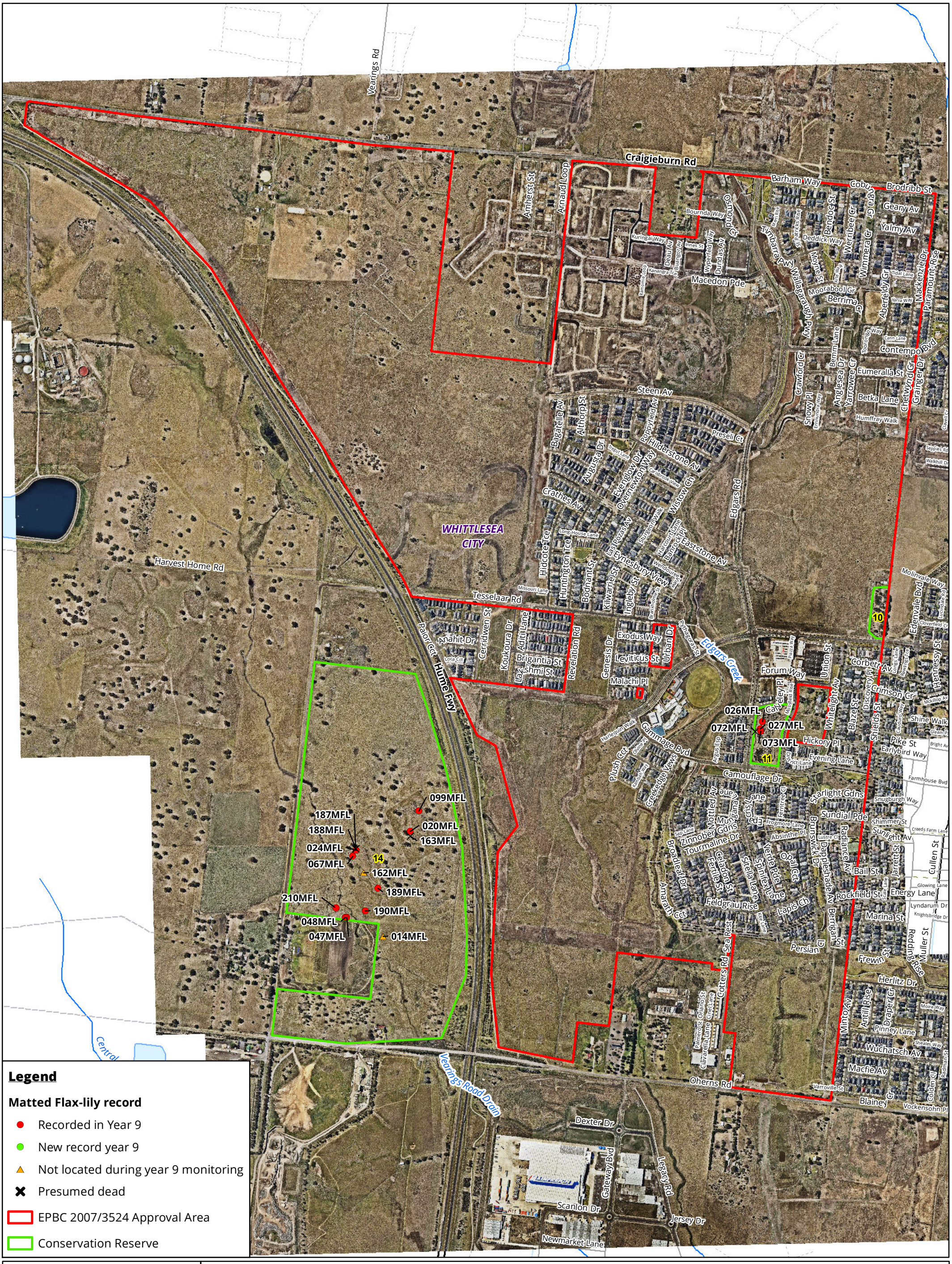
Matter: 26288,
Date: 04 October 2018,
Checked by: KMC, Drawn by: SKM, Last edited by: kcampbell
Location:P:\26200s\26288\Mapping\26288_F1_Locality.mxd



Legend

Matted Flax-lily record

- Recorded in Year 9
- New record year 9
- Not located during year 9 monitoring
- Presumed dead
- EPBC 2007/3524 Approval Area
- Conservation Reserve

Figure 2 The distribution of Matted Flax-lily (MFL) within conservation reserves managed by Development Victoria

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Acknowledgements: Vicmap ©State of Victoria, NearMap Imagery Oct 2016

Matter: 25681,
Date: 26 July 2018,
Checked by: CP, Drawn by: SKM, Last edited by: smitchell
Location:P:\25600s\25681\Mapping\25681_F2_MFL_Annual_Monitoring

0 100 200 300 400 500
Metres
Scale 1:12,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55
N

1.3 Timing of surveys

A total of 30 Matted Flax-lily were included in the EPBC Act referral and these plants were recorded over a number of years prior to March 2008. Since then, Biosis has completed nine years of annual Matted Flax-lily population monitoring. Surveys undertaken are set out in Table 2.

Table 2 Annual monitoring surveys

Year	Surveys
Pre 2008	Original records – plants included in the EPBC approval in March 2008, from surveys between 2001–2008 (i.e. the 30 original records)
2008–09 Year 0	Monitoring in December 2008 and June 2009
2009–10 Year 1	Monitoring in November 2009 and January 2010 (when plants were staked) and May–June 2010
2010–12 Year 2	Monitoring in December 2010 and January 2011 (when new plants were located with a DGPS and staked)
2011–12 Year 3	Monitoring in January–February 2012
2012–13 Year 4	Monitoring in December 2012 and January 2013
2013–14 Year 5	Monitoring in December 2013
2014–15 Year 6	Monitoring in December 2014 and January–February 2015
2015–16 Year 7	Monitoring in December 2015
2016–17 Year 8	Monitoring in December 2016 and January 2017
2017-18 Year 9	Monitoring in January 2018

In years 1 and 2 monitoring was undertaken in late spring–summer (as per the EPBC approval conditions), when the plants were due to flower and therefore generally easier to locate. However, due to poor conditions (drought and grazing) during 2008–2010 it was found that most of the plants had not flowered and were generally difficult to locate during the late spring–summer period. As a result, for both years 1 and 2, Biosis undertook follow-up surveys in autumn–winter, following substantial rains and subsequent growth of the plants. In both years, the plants were easier to locate at this time.

Surveys in years 3–9 have been undertaken in late spring–summer only. Plants were observed to be flowering and fruiting in each of these years and were mostly easily located. In addition, all of the plants have now been individually marked in the field with star pickets and labels, making them easier to locate.

2 Methods

2.1 Marking of Matted Flax-lily

At commencement of the 10-year monitoring program, the locations of Matted Flax-lily were recorded using a hand-held GPS unit (+/– 7 m accuracy). This aided in relocation of plants, but still led to difficulties where plants were stressed and–or surrounding biomass was high.

Biosis have since recorded plants with a DGPS, which has greater accuracy than a standard GPS (+/– 4 m) enabling improved accuracy of mapped Matted Flax-lily locations.

All monitored Matted Flax-lily have also been marked with a star picket positioned adjacent to each plant with a numbered tag attached to each star picket. This has made relocation of plants much easier and also ensures contractors undertaking vegetation management works within conservation reserves are aware of the location of all Matted Flax-lily plants.

2.2 Monitoring data

During year 9 (2017–18) monitored plants were located using current mapping (Figure 2) and with the aid of star pickets next to each plant.

The following information was recorded for each plant:

- Plant health (good, moderate, poor)
- Number of inflorescences (<5, ≥5 <10, ≥10)
- Approximate number of leaf tufts (<5, ≥5 <10, ≥10)
- Approximate spread of the plant (width at the widest point in cm)
- Management–other notes (e.g. presence of fruit, if weeding is required, evidence of herbivory).

2.3 Year 9 monitoring dates

Monitoring in Year 9 was undertaken on 11, 12, 23, 24 and 25 January 2018.

3 Results

The total number of Matted Flax-lily recorded in each reserve is provided in Table 3 and plant health data is provided in Table 4. Figure 2 indicates the location of monitored Matted Flax-lily in year 9.

3.1 Annual numbers of Matted Flax-lily

Since year 0 (2008–2009) surveys, more Matted Flax-lilys have been discovered and added to the annual monitoring program. Table 3 provides the located and monitored numbers of Matted Flax-lily by survey year. In year 0, data was collected on five Matted Flax-lilys within reserves 11 and 14, whereas in year 5 data was collected on 18 Matted Flax-lilys. It is possible some of the additional plants are due to recruitment within the population, but the increase is also likely to reflect accumulated survey effort over time enabling these plants to be found. There has been a decrease from 18 to 11 plants in both reserves since 2014–15 and this will continue to be monitored.

Six Matted Flax-lily (072, 014, 162, 163, 187 and 188) were searched for but not found during year 9 monitoring. Searches around star pickets and rocks where the other four plants were located did not reveal any dead leaf tufts. Whether lack of detection of these plants is due to death is difficult to conclude after a single year of monitoring. Failure to detect a plant may be due to natural fluctuations of foliar growth, seasonal differences and locational error. These 'missing' plants will be searched for again in year 10, along with all other recorded Matted Flax-lily.

Table 3 Number of Matted Flax-lily observed yearly by reserve

Reserve–location	Baseline pre-2008	Year 0 2008–09	Year 1 2009–10	Year 2 2010–11	Year 3 2011–12	Year 4 2012–13	Year 5 2013–14	Year 6 2014–15	Year 7 2015–16	Year 8 2016–17	Year 9 2017–2018
11	2	2	4	4	4	4	4	4	3	3	2
14	-	3	6	13	13	12	14	14	10	11	9
Total in reserves	**2**	**5**	**10**	**17**	**17**	**16**	**18**	**18**	**13**	**14**	**11**

3.2 Plant health

A comparison of data collected from years 3 to 9 is provided in Table 4. Please note, health calculations to year 6 are inclusive of all Matted Flax-lily from Aurora landholdings. Health data collected from year 7 onwards includes only Matted Flax-lily from reserves managed by Development Victoria.

A fire burnt all of reserve 14 in December 2015, including the rocky knolls where Matted Flax-lily are located. When this last occurred in the summer of 2012–2013 the following monitoring season recorded the highest number of Matted Flax-lily producing inflorescences on record. It is possible the fire has been a factor in the increase in inflorescences in year 8.

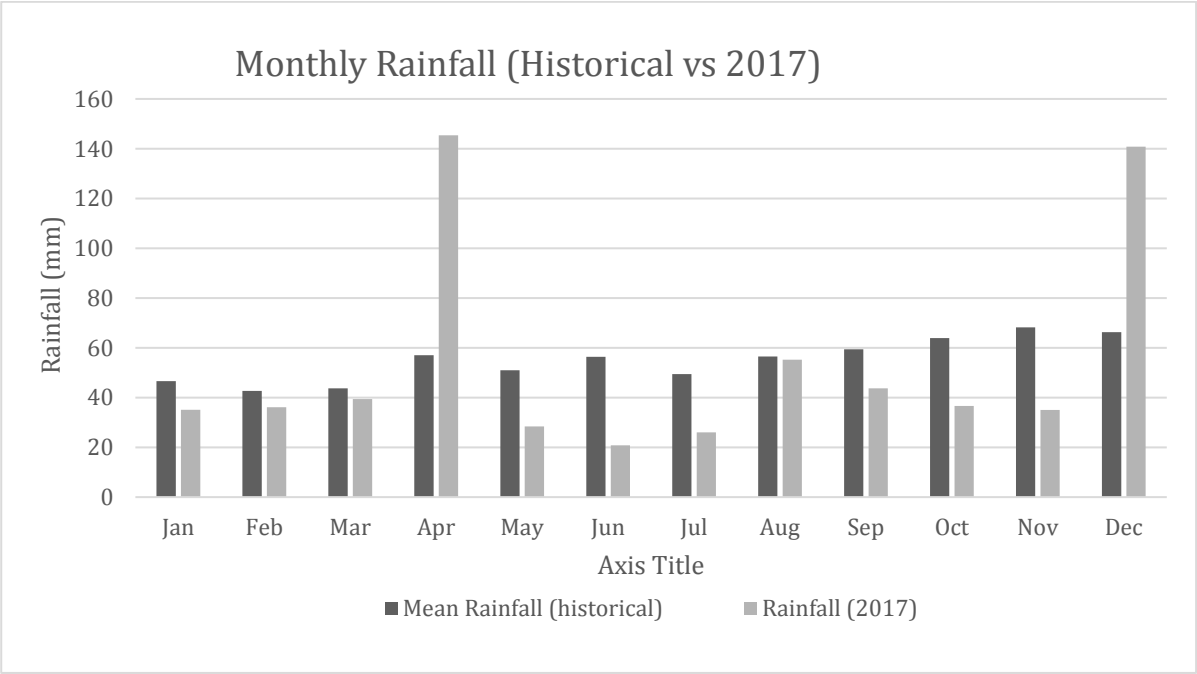
The overall health of the Matted Flax-lily population recorded in year 8 was relatively good with 64 per cent of plants recorded in good health, compared to 54 per cent in year 7. It is likely that below average rainfall and higher maximum daily temperatures during spring and summer of year 7 contributed to the results (Table 4).

Table 4 Analysis of Matted Flax-lily population health

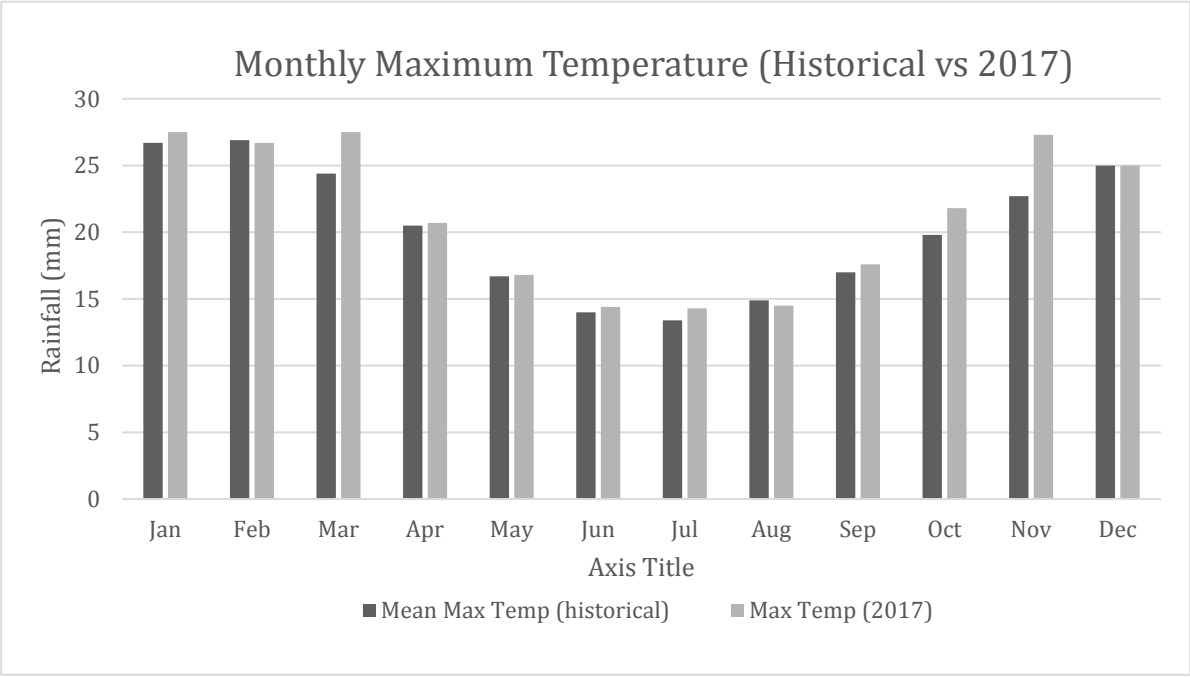
	Year 3: 2011–12	Year 4: 2012–13	Year 5: 2013–14	Year 6: 2014–15	Year 7: 2015–16	Year 8: 2016–17	Year 9: 2018
Health							
Poor	10%	9%	0%	1%	8%	0%	0%
Moderate	76%	20%	1%	8%	38%	36%	9%
Good	14%	71%	99%	91%	54%	64%	91%
Number of inflorescences							
<5	51%	66%	40%	83%	53%	43%	73%
≥5 <10	21%	14%	13%	8%	23%	14%	0%
≥10	28%	20%	47%	9%	23%	43%	27%
Number of leaf tufts							
<5	5%	13%	5%	11%	15%	14%	18%
≥5 <10	21%	13%	8%	17%	0%	7%	27%
≥10	74%	74%	87%	72%	85%	79%	55%

3.3 Seasonal conditions of 2017

Weather data from Bundoora (the closest weather station to Aurora) presented in Graph 1 shows that overall, the mean monthly rainfall in 2017 was lower than the historical mean monthly rainfall (Commonwealth of Australia Bureau of Meteorology 2018). April and December were exceptions, both having a monthly rainfall of more than double the historical mean. The monthly mean maximum temperature was generally higher throughout 2017 compared with the historical mean, most notably throughout spring (Graph 2). Spring and summer rainfall in particular, are known to influence the reproductive output of Matted Flax-lily. Lower than average rainfall throughout spring in 2017 might, in part, explain the fewer inflorescences recorded on plants this season compared with the last.



Graph 1 2017 monthly rainfall, Bundoora, Victoria



Graph 2 2017 mean daily maximum temperature, Bundoora, Victoria

4 Proposed actions in accordance with Condition 2(e)

At the end of year 9 the health of the natural populations of Matted Flax-lily is stable and generally good. Fluctuations in health are within the ranges of natural variability and do not represent a decline. If significant further declines in health or survivorship are observed in this population further actions may need to be taken.

5 Conclusion

There has been a decrease from 18 to 11 Matted Flax-lily plants in both reserves since 2014–15. Matted Flax-lily undergoes natural cycles of dieback. It is uncertain whether the non-detection of 3 plants this season is related to natural cycles, detection error or some underlying cause of decline.

Grazing pressure from Eastern Grey Kangaroos and cattle in conservation reserve 14 may be a contributing factor to the decline in Matted Flax-lily numbers in this reserve. It is recommended that plants that are not currently fenced off from cattle grazing are fenced off to prevent cattle from grazing on new growth of the plants, this should also occur for the plants not detected in the year 9 monitoring season as this may increase the chance of these plants being detected in the year 10 monitoring period.

If the weather outlook for the second half of 2018 indicates a hot, dry summer outside normal climatic limits, year 10 monitoring will be conducted earlier in the season to monitor Matted Flax-lily at peak flowering time. This will maximise the probability of detecting Matted Flax-lily as they are easier to detect when flowering.

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