Lindum Vale Residential Development 1960 and 2040 Mickleham Road Mickleham, Victoria: Preliminary Documentation (EPBC 2015/7516)

Prepared for Department of Environment and Energy on behalf of Satterley Property Group Pty Ltd

26 June 2020

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- Department of the Environment and Energy for access to the Protected Matters Search Tool of the Australian Government

Biosis staff involved in this project were:

- Sally Mitchell (mapping)

Cover Photo: Native ground cover in the proposed woodland conservation reserve in the south east corner of 1960 and 2040 Mickleham Road.

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1. Introduction

Biosis was commissioned by Satterley Property Group Pty Ltd (SPG) to prepare the preliminary documentation to enable assessment of the proposed residential development at 1960 and 2040 Mickleham Road, Mickleham, Victoria under Part 9 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The proposed works involve the construction of a residential development of approximately 1500 housing allotments at 1960 and 2040 Mickleham Road, Mickleham Victoria (Figure 1). The residential development is proposed to occur in stages, which will be determined to an extent by market demand.

Biosis has been involved in ecological assessments on the property since 2004 for various clients prior to purchase of the land by Satterley in 2016. Biosis conducted a flora and fauna assessment for MAB Corporation in 2012, who called the proposed development "Lindum Vale". The 2012 assessment identified habitat for Golden Sun Moth *Synemon plana* and the Grassy Eucalypt Woodland of the Victorian Volcanic Plain community (both matters of national environmental significance (MNES)). As a result of the presence of MNES, the proposed works were referred to the Australian Government Minister for the Environment in 2015 (referral 2015/7516) (Referral) to determine if approval was required under the EPBC Act.

On 15 September 2015 the proposed works were declared a controlled action and needed to be assessed on the basis of preliminary documentation. The decision was based on the fact that the proposed works were considered likely to have a significant impact on the critically endangered Golden Sun Moth (GSM) and the critically endangered community Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP).

1960 and 2040 Mickleham Road dominate the area included in precinct 1202 as defined by the Victorian Planning Authority (VPA). The VPA has prepared a Precinct Structure Plan (PSP) for precinct 1202 which includes two small parcels of land separate from 1960 and 2040 Mickleham Road (Areas 3 and 4 in Figure 1). For simplicity this referral includes the entire area of precinct 1202 (VPA 2018a).

The proposed works at 1960 and 2040 Mickleham Road, will also including land within the northern portion of the road reserve for Mt Ridley Road (2.568 ha) within which SPD will be required to construct a temporary water main. This main will provide water into the SPD residential subdivision "Botanical", which is covered by the MSA and located in the parcel north of 1960 and 2040 Mickleham Road (2090 Mickleham Road).

Also included is the drainage reserve which covers the headwaters of Malcolm Creek between the middle of the site and Forest Red Gum Drive. This drainage reserve is required for drainage works required to provide for the surface water flows leaving the Lindum Vale development.

These areas (the northern part of Mt Ridley Road and the drainage reserve) will also be included with the area subject to the original referral and is herein referred to as the "Land".

Land covered by the development therefore totals 153.64 hectares (Figure 1).

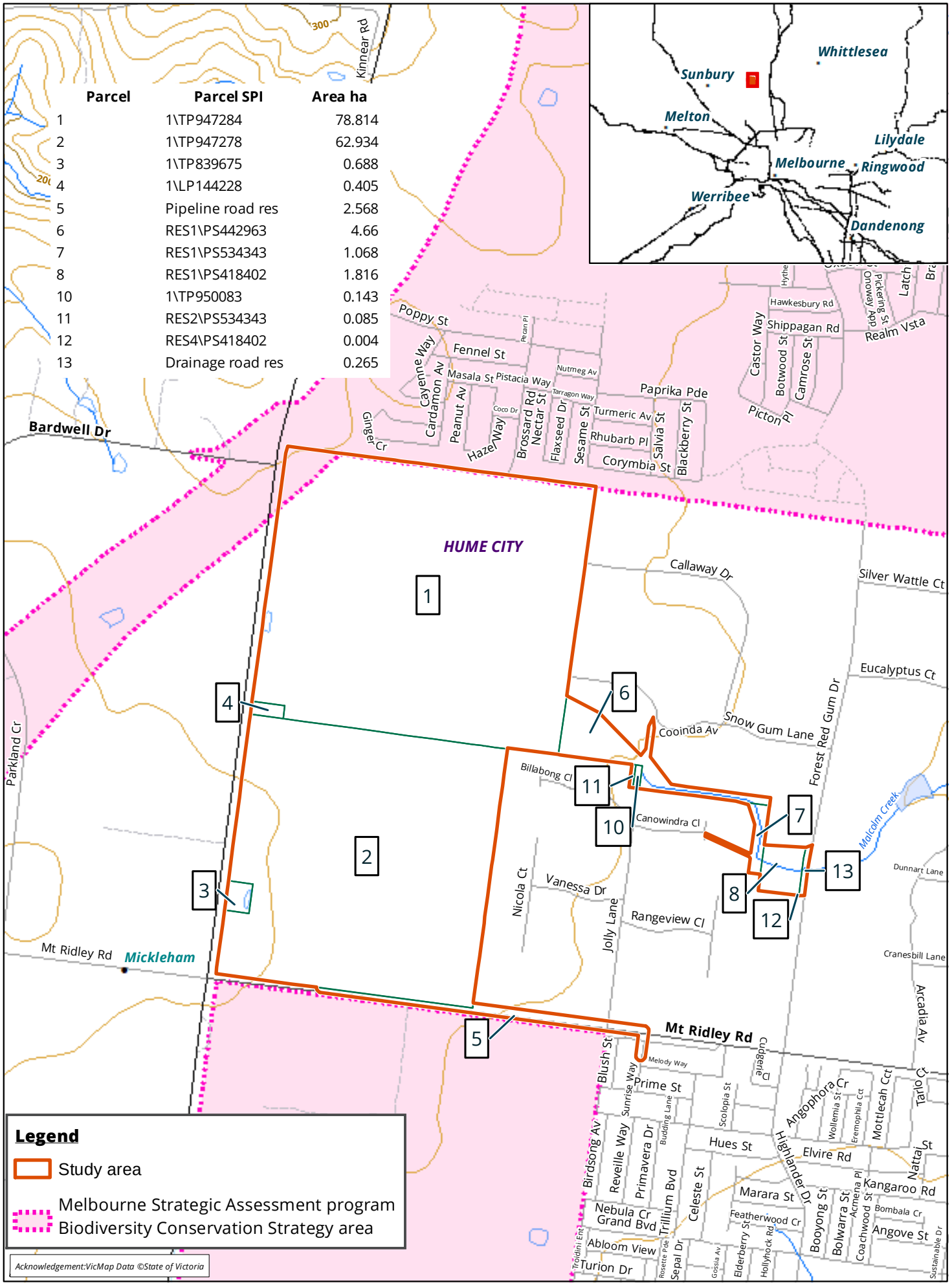

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Figure 1: Location of Lindum Vale, Mickleham, Victoria

Matter: 27761,
Date: 08 April 2020,
Checked by: LJS, Drawn by: SKM, Last edited by: smitchell
Location:P:\27700s\27761\Mapping\27761_F1_Locality.mxd

2. Description of the Proposed Action

2.1 Location of works

The Land is located within Hume City Council (Council) on the northern fringe of Melbourne approximately nine kilometres north of Craigieburn and 25 kilometres north of the Melbourne Central Business District (Figure 1).

The Land includes 1960 (Lot 1 on TP947284N/Vol 11252 Fol 194) and 2040 (Lot 1 on PS947278H / Vol 11252 Vol 162) Mickleham Road, Mickleham Victoria, the northern road reserve of Mt Ridley Road and the drainage reserve for the headwaters of Malcolm Creek between Forest Red Gum Drive and the middle of Lindum Vale. The Land consists of 141.75 hectares associated with 1960 and 2040 Mickleham Road, 1.09 hectares associated with the balance of Precinct 1202, 2.57 ha with the northern road reserve of Mt Ridley Road and 8.23 hectares associated with the drainage reserve in the headwaters of Malcolm Creek.

Lindum Vale is bound to the west by Mickleham Road, to the south by Mt Ridley Road, to the north by high tension power-lines on private property and to the west by private rural residential lots. The Land is currently an agricultural property and has a history of grazing and cropping, although smaller rocky paddocks have had limited pasture improvement. The Land is located in the Victorian Volcanic Plain bioregion and supports scattered individuals and clusters of mature River Red Gums *Eucalyptus camaldulensis* and some Grey Box *Eucalyptus microcarpa.* Despite the presence of indigenous species typical of the Victorian Volcanic Plain, the study area contains exotic species mixed with native grasses and herbs as a groundcover throughout.

The Land is located on the northern margin of the Melbourne metropolitan area with residential development encroaching on the eastern, northern and southern boundaries with land to the west still used for agriculture.

Table 1 GPS Points (GDA 1994 MGA Zone 55) of locations of the proposed residential development, Mickleham, Victoria.

Point	Easting (m)	Northing (m)
1	312711.30	5842280.47
2	313656.48	5842162.23
3	313539.99	5841340.40
4	313383.49	5841357.67
5	313280.18	5840581.54
6	313816.52	5840486.37
7	313794.81	5840402.86
8	313785.57	5840481.27
9	312493.46	5840668.84

2.2 Operational requirements

Once completed, the residential development will consist of approximately 1500 dwellings that will house approximately 4,200 people. The Land is also proposed to accommodate a local convenience centre and a network of on and off-road bicycle paths and pedestrian links, to encourage various modes of transportation. The construction of the subdivision will be progressed in stages. The size and timing of each stage will, to some extent, be governed by the market demand for land.

Construction of a water main within the Mt Ridley Road reserve will be completed to provide water to 2090 Mickleham Road through 1960 and 2040 Mickleham Road. Works within the drainage reserve will facilitate stormwater flows through the subdivision.

Pre-construction phase

All pre-construction planning activities have been completed, including a planning panel, public consultation process and iterative design improvements to minimise impacts to native vegetation and important habitat throughout the study area. This process has resulted in the production of PSP 1202 (VPA 2018a) and the associated Native Vegetation Precinct Plan (VPA 2018b).

In designing the subdivision, Satterley have worked alongside Biosis, Council and the VPA to conserve the maximum practical amount of environmental values on the Land for GEWVVP and GSM. A contract for the construction will be awarded, following the conclusion of the EPBC referral process.

Construction phase

At the start of the construction phase the approved construction contractor will need to fence off any identified environmental areas of significance, such as the conservation reserve, areas of cultural heritage significance and trees to be retained.

Inductions for all staff will be required to ensure that all areas of environmental and cultural significance are identified and avoided during construction.

Key construction activities associated with the subdivision will include the construction of roads and other infrastructure as per the subdivision plan, stormwater flow, treatment and detention construction, and fill placement as well as the installation of the water main which will supply 2090 Mickleham Road. While the Land is relatively flat, gentle undulations will require some levelling and placement of fill across the site.

Operation phase

During the operational phase the Land will be used for residential purposes. The conservation area will require active management and monitoring in accordance with an approved Conservation Management Plan (CMP). The CMP includes a detailed monitoring plan of the required actions and appropriate timing for operational activities. Management of the reserve will commence once construction commences and will occur for the period of time outlined within the CMP. Satterley will fund the first 10 years of management of the Land and then propose to hand the site over to a statutory authority for future management.

2.3 Timing and duration

Construction is expected to begin in May 2021 and is expected to be complete by September 2028. Once the construction of the development is complete, operational requirements will be minimal for the majority of the residential development. The conservation reserve will require monitoring for a 10 year period, which will be paid for by Satterley, at which point they propose to hand the site over to a public authority for future management (City of Hume). All management of the land within the conservation reserve (VPA 2018a) will be conducted as per the Offset Management Plan (Biosis 2020a).

2.4 Layout plan

Satterley has developed a concept plan with input from the VPA and the guidance from Council, other agencies and major stakeholders. A Precinct Structure Plan (PSP) has been developed to guide land use and development of the broader area (VPA 2018a).

The concept plan for the development includes different types of land use including open active space, a conservation area, recreational/bike trails, a local convenience centre and approximately 1500 residential dwellings (Figure 2).

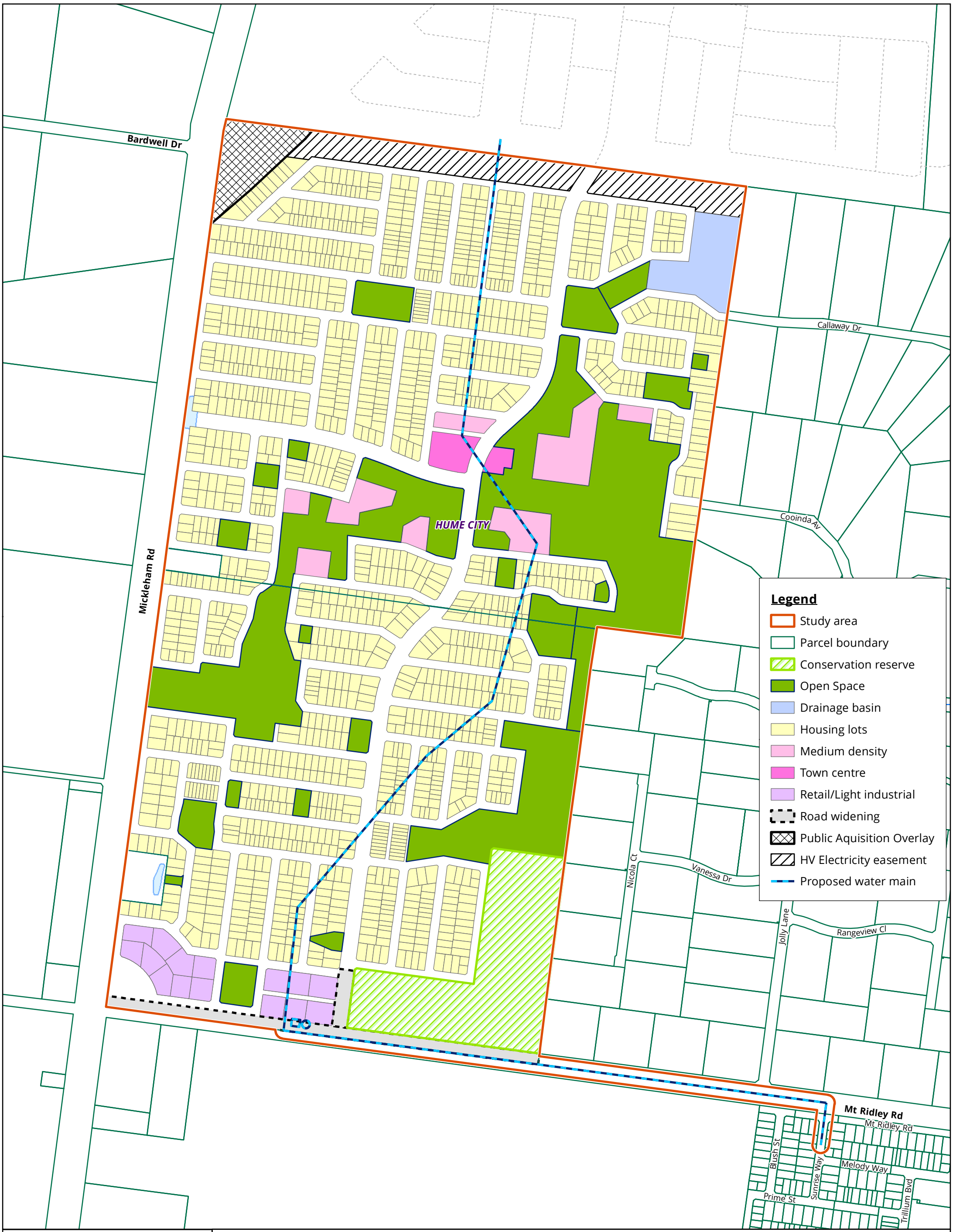


Figure 2 Layout plan of residential subdivision for 1960 and 2040 Mickleham Road

Biosis Pty Ltd

Albury, Ballarat, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Acknowledgements: Vicmap ©State of Victoria, NearMap imagery January 2018

Matter: 27761,
Date: 04 September 2018,
Checked by: LJS, Drawn by: SKM, Last edited by: smitchell
Location:P:\27700s\27761\Mapping\27761_F2_Concept

0 60 120 180 240 300

Metres

Scale 1:6,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

3. Description of the environment and MNES

3.1 General description of the environment

The study area is on the north eastern margin of the Victorian Volcanic Plain bioregion in close proximity to a boundary with the Central Victorian Uplands. No permanent creeks traverse the property. It is less than two kilometres from the Mount Ridley Grasslands Nature Conservation Reserve. Patches of trees within the study area contribute to a broader wooded area which is relatively unusual within the local landscape.

The vegetation throughout the majority of the study area has been highly modified by grazing and ploughing. Most paddocks support scattered mature, hollow-bearing trees overlying highly degraded predominantly introduced vegetation. Two areas however, support substantial although degraded areas of Plains Grassy Woodland (EVC 55_61). The vegetation condition over the entire study site varies from poor, through moderate to good. The sites in moderate to good condition are restricted to the south-eastern corner (within the proposed conservation reserve), and along the western boundary.

3.2 Golden Sun Moth

Golden Sun Moth *Synemon plana* (GSM) has been recorded on the Land (Biosis 2009, 2014).

GSM is a medium-sized, day-flying moth with clubbed antennae (Edwards 1993). GSM are found in grasslands throughout south-eastern Australia (DoE 2013). Suitable habitat for the GSM includes native temperate grassland and open grassy woodlands dominated by wallaby grass (DEC 2007). Most recent studies show that GSM can exist within degraded grasslands dominated by exotic Chilean Needle-grass *Nassella neesiana* (Braby & Dunford 2006; Gibson 2006; Gilmore et al. 2008). GSM emerge from their larval stage during hot, sunny, low wind days during the breeding season which falls between mid-October and early January (DoE 2013). Adult males will not fly more than 100 m away from suitable habitat while searching for a female to mate with (DoE 2013).

Potential habitat for GSM was identified within the study area by Biosis in 2008 during a preliminary targeted survey of the Land. Potential habitat was considered to be present where the grassland vegetation supported known food plants: Spear-grasses *Austrostipa* spp., Wallaby-grasses *Rytidosperma* spp. and Chilean Needle-grass, and had a suitable open tussock structure.

Prior to Biosis' 2008 survey there are no records of GSM surveys within the study area. Studies conducted by Biosis in the surrounding areas have confirmed that GSM are present within habitat located in Melbourne's northern and western outskirts in areas where food plants are present. GSM have been observed previously flying in paddocks adjacent to 1960 and 2040 Mickleham Road, south of Mount Ridley Road (D. Gilmore, pers. obs.).

Targeted surveys were conducted on 12 and 18 November 2008 and 28 November 2014. GSM were confirmed during all three survey dates. Due to the confirmed presence of GSM during the 2008 surveys and the high number of individuals (226) recorded during the first day of survey in 2014, this survey effort was deemed suitable to confirm the presence of GSM throughout the Land and surrounding area. Given the known presence of GSM, the property has not been surveyed for GSM since the 2014/15 flight season.

Biosis (2015) mapped the distribution of GSM habitat to include 12.19 ha of high quality habitat, 18.50 ha of medium quality habitat, 74.18 ha of low quality habitat and 37.60 ha not considered to be GSM habitat (as a result of cropping and or pasture improvement practices establishing a cover dominated by cereal crops or Toowomba Canary Grass *Phalaris aquatica* and Cocksfoot *Dactylis glomerata*) within the Land associated with

1960 and 2040 Mickleham Road. The distribution of GSM across the Land is concentrated in areas with higher densities of suspected larval food plants, including Spear-grasses, Wallaby-grasses and Chilean Needle-Grass and lower cover of weeds. Much of the Land is currently subject to a heavy cattle and kangaroo grazing regime that maintains a low, open grassland structure much favoured by GSM.

In addition, large areas have been subject to cropping and pasture improvement, reducing the suitability of habitat as these areas present low to medium quality habitat. A total of 37.60 ha of the property was considered to have a GSM habitat score of zero because of the extent of pasture improvement and the frequency of cropping. GSM we not observed to use areas dominated by cereal crops and have not been recorded in areas subject to intensive pasture improvement. Similarly GSM were not recorded within the Malcolm Creek drainage reserve. These areas are therefore not considered to provide any habitat for GSM.

Habitat quality mapping for GSM produced by Biosis (2015) is shown in Figure 3 and the report is appended to this document. Areas of high quality habitat are concentrated in the southern half of the study area, with a patch of high quality habitat in the southeast corner and northwest corner of this area. Medium quality habitat is located in the southwest corner of the study area. The rest of the southern section, and the northern half of the study area, support no or low quality habitat.

A total of 1.06 ha of GSM habitat is present within the 2.568 hectare area of the northern road reserve of Mt Ridley Road as identified by Biosis (2017) and S. Mueck (pers. obs.). The majority of this habitat is of low quality but has the potential to support GSM with an abundance of weed species including Chilean Needle-grass. Following the habitat condition assessment of Biosis (2015) the habitat within the northern road reserve of Mt Ridley Road was allocated a habitat value of 2/10. Note however, no targeted surveys were conducted within the road reserve and GSM have not been recorded here. The habitat score is based on a field inspection of this environment and a comparison with similar environments observed within the broader study area.

These calculations therefore allocate all of the 153.64 ha of the study area to a GSM habitat category (including 37.60 ha not considered to be GSM habitat within land north of the road reserve for Mt Ridley Road, 1.508 hectares not considered GSM habitat within the road reserve of Mt Ridley Road and the drainage reserve for Malcolm Creek also not considered as GSM habitat). While habitat conditions may change from one year to the next, the consistent results from the 2008 and 2014 surveys provide a high degree of confidence in the habitat mapping provided by Biosis (2015).

3.3 Grassy Eucalypt Woodland of the Victorian Volcanic Plain

Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) has been identified on the Land.

GEWVVP is a critically endangered threatened ecological community listed under the EPBC Act. It is characterised by grassy eucalypt woodlands located south of the Great Dividing Range and is limited to basalt plains of Victoria typically dominated by River Red Gum *Eucalyptus camaldulensis*. GEWVVP occupies areas that are flat to undulating plains with occasional stony rises and can be found within Melbourne's northern region. This woodland community was formerly widespread across but is now reduced to mostly small and degraded fragments.

GEWVVP is an open eucalypt woodland with a predominately grassy understorey similar to grassland dominated by kangaroo grass (*Themeda*), spear grass (*Austrostipa*), Wallaby grass (*Austrodanthonia*), poa tussock grass (*Poa*) or weeping grass (*Microlaena*). A range of wildflowers are typical amongst the grass tussocks in spring. This community occurs on flat to gently undulating plains and associated stony knolls with heavy grey to red cracking clays that tend to be fertile but poor draining (DSEWPaC 2011).

1.612 ha
64.625 ha
12.983 ha
11.225 ha
24.589 ha
8.059 ha
12.235 ha
7.435 ha
0.193 ha
0.127 ha
0.471 ha
0.116 ha
0.152 ha
1.586 ha

Legend

- Study area
- Parcel boundary

Golden Sun Moth habitat

Suitability Score with area summary

- 0 - 39.158 ha
- 2 - 67.297 ha
- 4 - 8.059 ha
- 5 - 18.660 ha
- 8 - 12.235 ha
- Melbourne Strategic Assessment program Biodiversity Conservation Strategy area

Figure 3 Golden Sun Moth habitat throughout 1960 and 2040 Mickleham Road, Mickleham, Victoria

Biosis Pty Ltd

Albury, Ballarat, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Acknowledgements: Vicmap ©State of Victoria, NearMap imagery January 2018

Matter: 27761,
Date: 13 September 2018,
Checked by: LJS, Drawn by: SKM, Last edited by: smitchell
Location:P:\27700s\27761\Mapping\27761_F3_GSM_habitat

0 60 120 180 240 300

Metres

Scale 1:5,584 @ A3

Coordinate System: GDA 1994 MGA Zone 55

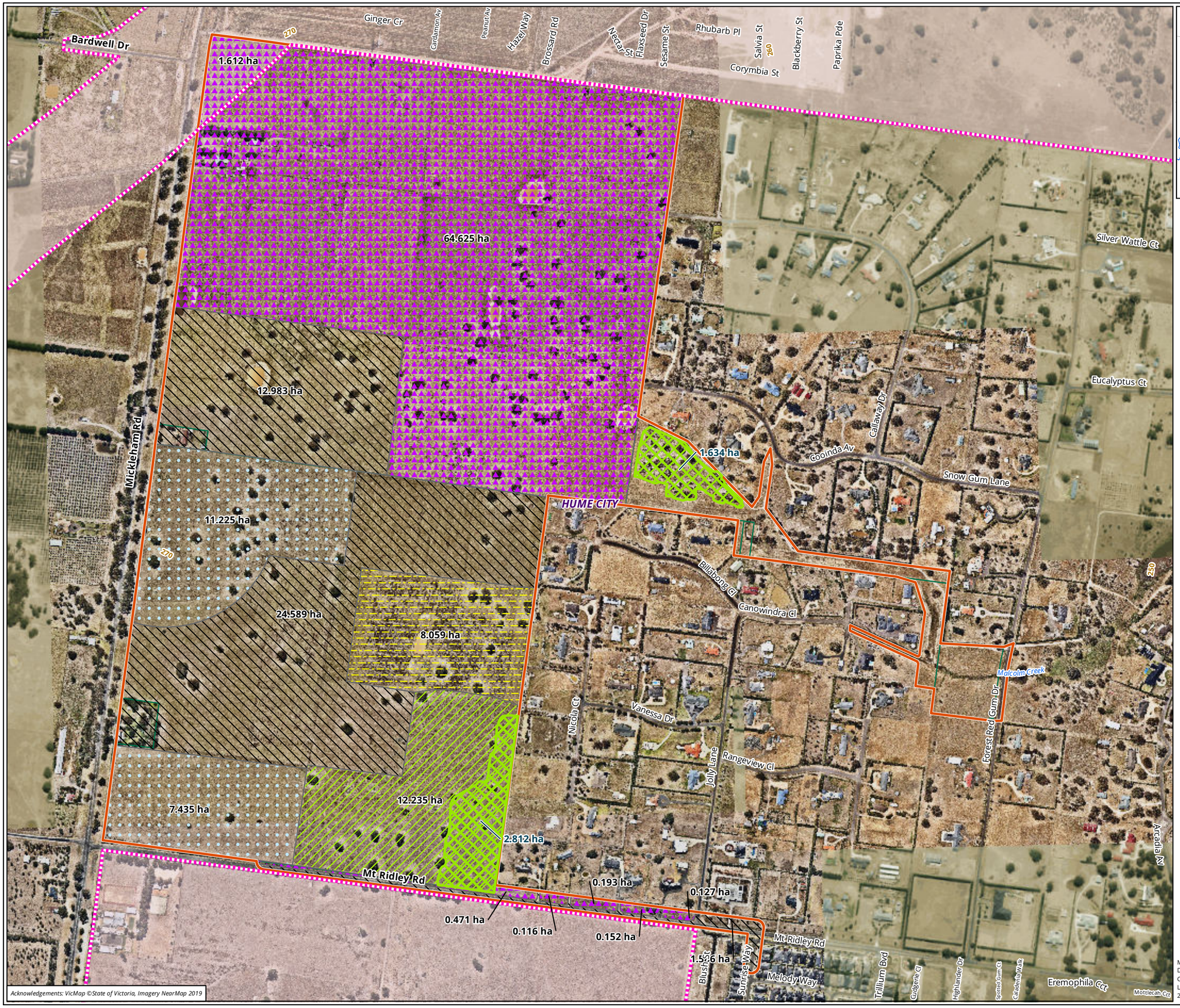
N

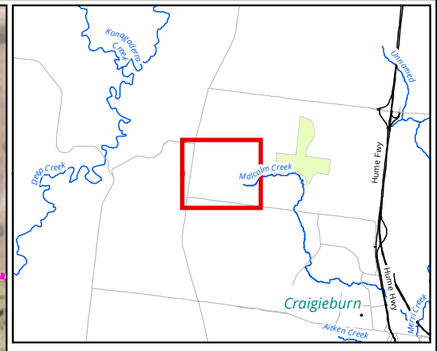
Various patches of Plains Grassy Woodland (EVC 55_61) were identified throughout the property (i.e. Biosis 2015) but they are degraded and do not meet the classification for the EPBC listed GEWVVP community.

The south-east corner of the Land supports a high quality area of Plains Grassy Woodland that does meet the requirements for GEWVVP (Biosis 2016). The total area of the EPBC listed community within the subdivision is 2.812 ha with an additional 1.634 ha identified within the adjacent drainage reserve (Figure 4).

Throughout that 2.812 ha within the subdivision, the overstorey is dominated by River Red-gum. Grasses such as Common Wheat-grass *Elymus scaber*, Striped Wallaby-grass *Austrodanthonia racemosa*, Brown-back Wallaby grass *Austrodanthonia duttoniana* and Common Tussock-grass *Poa labillardierei* dominate (as per DSEWPaC 2011) the ground layer. Other native grasses present include Long-hair Plume-grass *Dichelachne crinita*, Spear Grasses *Austrostipa* spp. and Kangaroo Grass *Themeda triandra*.

Beyond the defined area of this community (Figure 4), the vegetation present retains a condition allowing it to satisfy the Victorian definition of a patch of native vegetation (i.e. it has the minimum native species cover of 25% of the projected foliage cover of understorey vegetation present) but not the minimum 50% of the ground layer cover required by the condition threshold defined for the community by DSEWPaC (2011). This was assessed by careful mapping of this vegetation during appropriate seasonal conditions (i.e. when the majority of species were visible and/or flowering) (Biosis 2016).





Legend

- Study area
- Parcel boundary
- Melbourne Strategic Assessment(MSA) program Biodiversity Conservation Strategy (BCS) area
- Grassy Eucalypt Woodland of the Victorian Volcanic Plain

Golden Sun Moth habitat

Suitability Score with area summary

- 0 - 39.158 ha
- 2 - 67.297 ha
- 4 - 8.059 ha
- 5 - 18.660 ha
- 8 - 12.235 ha

Figure 4 Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) within Lindum Vale

0 50 100 150 200 250

Metres

N

Scale: 1:7,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

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Matter: 27761,
Date: 08 April 2020,
Checked by: SGM, Drawn by: SKM, Last edited by: smitchell
Location: P:\27700s\27761\Mapping\
27761_PrelimDoc_F2_GEW_GSM_habitat.mxd

4. Relevant Impacts

Various biodiversity assessments and surveys prepared by Biosis were used to make detailed assessments of the relevant impacts of the proposed residential development and associated project works on MNES. The following documents were used to determine priority areas and habitat requirements for GSM and GEWVVP:

- *Approved Conservation Advice for the Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Department of the Environment, Water, Heritage and Arts, 2009).*
- *Commonwealth Listing Advice on Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Threatened Species Scientific Committee, 2009).*
- *Approved Conservation Advice for* Synemon plana *(Golden Sun Moth) (Department of the Environment, 2013).*
- *Commonwealth Listing Advice on* Synemon plana *(Golden Sun Moth) (Threatened Species Scientific Committee, 2002).*

4.1 Direct and indirect loss

Below is a summary of potential impacts to GSM and GEWVVP resulting from the proposed action.

4.1.1 Golden Sun Moth

Overall the impacts to GSM associated with the action are expected to be confined to a local scale with an array of reserves supporting this species protected in the Melbourne region including the local northern suburbs and expanded urban growth areas.

The south-east corner of the Land, which contains high quality GSM habitat, will be preserved as a 7.21 hectare Conservation Reserve. This will ensure the presence of GSM, within the local area. No indirect habitat loss is anticipated as all physical disturbance associated with the development of the site will be contained within the site.

The majority of the 80 known sites within NSW/ACT are smaller than five hectares in size and GSM are known to be locally abundant at many small sites (DEWHA 2009). While such areas are regarded as small sites and otherwise vulnerable to stochastic events such as fire, the proposed targeted ecological management of the Conservation Reserve will minimise these threats. The reserve follows the general principles for reserve design outlined in the background paper to EPBC Act Policy Statement 3.12, by including the highest concentrations of GSM records, the highest quality habitat and having a block design rather than a linear design. These principles note that small well managed areas can still be of long term value although management costs are expected to be higher (DEWHA 2009).

4.1.2 Grassy Eucalypt Woodland of the Victorian Volcanic Plain

Roadworks associated with the residential subdivision (Mt Ridley Road duplication) will remove a small portion of the GEWVVP community (0.226 ha) on the Land, with the rest of the listed community within the subdivision (2.59 hectares) being retained within a 7.21 hectare Conservation Reserve in the southeast corner. The reserve includes areas of native vegetation (as defined by the Victorian habitat hectare assessment protocols – DSE 2004) on the northern and western margins of the area defined as GEWVVP (Figure 4). The area of GEWVVP is therefore buffered on these boundaries by lower quality areas of vegetation (which do not meet the threshold requirements to be defined as GEWVVP) but will be managed to improve its condition over time (Biosis 2018) with a target of expanding the area identifiable as GEWVVP.

Land to the east and south of the reserve is part of an existing development and the proposed expanded road reserve for Mt Ridley Road and is therefore outside the control of the proponent. However, ongoing

conservation management of the reserve (Biosis 2020a) will manage any edge effects (which already exist) associated with these boundaries, as far as possible.

The interface between the Conservation Reserve and the residential development will include a road (i.e. housing will not back onto the reserve), associated pedestrian/cycling shared pathways and indigenous landscape plantings.

While the proposed reserve is considered small, this a reflection of the existing extent of this remnant, with impacts associated with development restricted to the unavoidable location of the existing road reserve for Mount Ridley Road and the area required for its upgrade in response to the approved Melbourne Strategic Assessment (MSA). However, while small, the conservation value of small reserves in an urbanised environment is acknowledged by a number of authors including Kendal et al. (2017) and Wintle et al. (2019). With the relatively intensive management proposed by Biosis (2020a), the proposed Conservation Reserve for this retained area of GEWVVP is expected to retain significant conservation value in both the short and longer term.

No direct or indirect impacts are proposed to the remnant of GEWVVP (1.634 hectares) within the drainage reserve as construction works will avoid this area which is already identified as a council managed offset area. Design of the drainage channel and associated hydrology will maintain current conditions for this retained Council Reserve.

No indirect impacts are anticipated on other remnants of this community within the broader landscape as these remnants are isolated from any other surrounding remnants of native vegetation.

4.2 Distance of proposed works to any habitat of EPBC Act species/communities within 500m

4.2.1 EPBC Act species/communities

During the initial flora and fauna assessment conducted by Biosis (2012) the following MNES were identified within 1km from the Land (Table 2).

All targeted surveys were conducted according to the survey guidelines outlined by the Commonwealth and during the appropriate season which include:

- Commonwealth of Australia 2009. *Significant impact guidelines for the critically endangered golden sun moth* (Synemon plana).
- Commonwealth of Australia 2011. *Environment Protection and Biodiversity Conservation Act 1999 referral guidelines for the vulnerable striped legless lizard* Delma impar.
- Commonwealth of Australia 2009. *Significant impact guidelines for the vulnerable growling grass frog (*Litoria raniformis*)*.

Table 2 EPBC Act listed species and communities predicted to be within 1 km of the study area.

Species/Community	Status	Impacts
Communities		
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	2.81 ha identified within the SE corner of the study area. The proposed development plan conserves 2.59 ha within a conservation reserve. There will be no indirect impacts associated to areas of the community outside of the study area.
Grey Box (Eucalyptus macrocarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community not identified within the study area and therefore not impacted upon. There will be no indirect impacts associated with the development of the study area.

Species/Community	Status	Impacts
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community not identified within the study area and therefore not impacted upon. There will be no indirect impacts associated with the development of the study area.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community not identified within the study area and therefore not impacted upon. There will be no indirect impacts associated with the development of the study area.
Birds		
Regent Honeyeater *Anthochaera phrygia*	Critically Endangered	Low habitat potential in the study area. No indirect impact to populations outside of the study area.
Australasian Bittern *Botaurus poiciloptilus*	Endangered	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Curlew Sandpiper *Calidris ferruginea*	Critically Endangered	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Painted Honeyeater *Grantiella picta*	Vulnerable	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Swift Parrot *Lathamus discolor*	Critically Endangered	Low habitat potential in the study area. No indirect impact to populations outside of the study area.
Eastern Curlew *Numenius madagascariensis*	Critically Endangered	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Plains-wanderer *Pedionomus torquatus*	Critically Endangered	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Australian Painted Snipe *Rostratula australis*	Endangered	Negligible habitat potential in the study area. No indirect impact to populations outside of the study area.
Fish		
Eastern Dwarf Galaxias *Galaxiella pusilla*	Vulnerable	Negligible habitat present throughout the study area and within 1km of the study area.
Murray Cod *Maccullochella peelii*	Vulnerable	Negligible habitat present throughout the study area and within 1km of the study area.
Australian Grayling *Prototroctes maraena*	Vulnerable	Negligible habitat present throughout the study area and within 1km of the study area.
Frogs		
Growling Grass Frog *Litoria raniformis*	Vulnerable	No habitat present throughout the study area. Habitat exists within 1 km of the study area but no indirect impacts will occur as a result of the residential development.
Insects		
Golden Sun Moth *Synemon plana*	Critically Endangered	Species recorded during targeted survey. Total of 98.79 ha of habitat identified within the study area. Offsetting will be required under the EPBC Act. No indirect impacts will result on the species in the greater area.
Mammals		
Grey-headed Flying-fox *Pteropus poliocephalis*	Vulnerable	Fly-over habitat present within the area but not significant habitat for the population. No indirect impacts to populations outside of the study area.
Reptiles		
Pink-tailed Worm-lizard *Aprasia parapulchella*	Vulnerable	No habitat present throughout the study area. No indirect impacts will occur as a result of the residential development.
Striped Legless Lizard *Delma impar*	Vulnerable	Targeted surveys conducted using artificial shelter surveys. Species was not recorded during targeted surveys. Unlikely that population is present within 1km of study area. No indirect impacts will occur as a

Species/Community	Status	Impacts
		result of the residential development.
Plants		
River Swamp Wallaby-grass *Amphibromus fluitans*	Vulnerable	Habitat present, but not recorded within the study area. No negative indirect impact likely to populations outside of the study area.
Matted Flax-lily *Dianella amoena*	Endangered	Potential habitat identified during initial flora and fauna assessment. Targeted surveys conducted during late summer in remnant Plains Grassy Woodland with relatively intact understorey vegetation. Matte Flax-lily were not detected during the targeted survey. No indirect impacts will occur to populations outside of the study area.
Trailing Hop-bush *Dodonaea procumbens*	Vulnerable	Negligible presence. No indirect impact to populations outside of the study area.
Clover Glycine *Glycine latrobeana*	Vulnerable	Low likelihood of presence. No indirect impact to populations outside of the study area.
Adamson's Blown-grass *Lachnagrotis adamsonii*	Endangered	Negligible presence. No indirect impact to populations outside of the study area.
Hoary Sunray *Leucochrysum albicans* var. *tricolor*	Endangered	Negligible presence. No indirect impact to populations outside of the study area.
Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*	Critically Endangered	Low habitat potential. No indirect impacts to populations located outside of the study area.
Maroon Leek-orchid *Prasophyllum frenchii*	Endangered	Negligible presence. No indirect impact to populations outside of the study area.
Button Wrinklewort *Rutidosis leptorrhynchoides*	Endangered	Negligible presence. No indirect impact to populations outside of the study area.
Swamp Everlasting *Xerochrysum palustre*	Vulnerable	Negligible presence. No indirect impact to populations outside of the study area.

4.2.2 Migratory species

The following migratory species were identified by a Protected Matters Search Tool to have the potential to be found within 1 km of the study area (Table 3).

As the survey site is not located within coastal areas the majority of these species will not be present. Habitat is present for some of these species, but it is likely to be fly-over habitat and not significant to the larger population.

4.3 Details on if impacts are unknown, unpredictable or irreversible

The impacts of the development on the Land will be irreversible as the Land will be converted from a degraded agricultural grassland area used for grazing into a residential development with approximately 1500 dwellings. The development will create a change of land use in the local landscape. As there will be removal of vegetation and changes to land use, most factors associated with MNES will be predictable with a high degree of confidence.

While the majority of these direct impacts are predictable and will be irreversible (i.e. once an area of habitat for GSM is cleared it cannot be recovered), management of these impacts will occur through the application of an on-site management plan (i.e. conservation reserve for GSM and GEWVPP) and the implementation of the EPBC Act Offsets Policy (DSEWPaC 2012).

Table 3 Migratory species predicted to occur within 1 km of the study area

Common Name	Scientific Name
Common Sandpiper	*Actitis hypoleucos*
Fork-tailed Swift	*Apus pacificus*
Great Egret	*Ardea alba*
Cattle Egret	*Ardea ibis*
Sharp-tailed Sandpiper	*Calidris acuminate*
Curlew Sandpiper	*Calidris ferruginea*
Pectoral Sandpiper	*Calidris melanotos*
Latham's Snipe	*Gallinago hardwicki*
White-bellied Sea-Eagle	*Haliaeetus leucogaster*
White-throated Needletail	*Hirundapus caudacutus*
Swift Parrot	*Lathamus discolor*
Rainbow Bee-eater	*Merops ornatus*
Black-faced Monarch	*Monarcha melanopsis*
Yellow Wagtail	*Motacilla flava*
Satin Flycatcher	*Myiagra cyanoleuca*
Eastern Curlew	*Numenius madagascariensis*
Osprey	*Pandion haliaetus*
Rufous Fantail	*Rhipidura rufifrons*
Painted Snape	*Rostratula benghalensis (sensu lato)*
Common Greenshank	*Tringa nebularia*

4.4 Analysis of the acceptability of impacts and technical data

The technical data used to prepare this preliminary documentation includes:

- Biosis Research 2009. *Survey of the Golden Sun Moth at Lindum Vale, Mickleham, Victoria*. A report for MAB Corporation. Authors M. Venosta, D. Gilmore and N. Garvey. Biosis Research, Melbourne. Project No. 7564.
- Biosis Research 2012. *'Lindum Vale' property, 1920 and 2040 Mickleham Road, Mickleham, Victoria: Flora and fauna assessment.* Report for MAB Corporation. Authors Steve Mueck and Daniel Gilmore, Biosis Research, Melbourne Office. Project No. 13869
- Biosis Pty Ltd 2013. *Systematic search for Matted Flax-lily in area of native vegetation at "Lindum Vale" 1920 and 2040 Mickleham Road, Mickleham*. Report for MAB Corporation. Author Steve Mueck. Melbourne Office. Project No. 16173
- Biosis 2015. *Lindum Vale: Golden Sun Moth survey and habitat assessment*. Report for MAB Corporation. Author: Venosta, M. and Mueck, S. Biosis Pty Ltd, Melbourne. Project no. 19308.

- Biosis 2017.Mickleham Road Parcels 2 & 3 Flora and fauna assessment for road reserves along Mickleham Road and Mt Ridley Road. Report for Satterley Property Group. Authors: Stoot L, Harvey A & Mueck S, Biosis Pty Ltd, Melbourne. Project no. 25032
- Biosis 2018. *Lindum Vale PSP 1202: Biodiversity Assessment. Report for Victorian Planning Authority.* Authors: Mueck, S., Salmon, K., Gilmore, D., Dredge, T. & Tate, J. Biosis Pty Ltd, Melbourne. Project no. 27694.
- Biosis 2020b. Lindum Vale Drainage Reserve, Mickleham: Flora and Fauna Assessment. Report for Satterley Property Group Pty Ltd. Authors: Cargill, Dl. & Nerenberg S., Biosis Pty Ltd, Melbourne. Project no. 31285.

Overall the assessments conducted are considered to be detailed and provide a high level of confidence in the habitat values the site provides and the presence, abundance and condition of relevant MNES.

4.5 Local and regional scale analysis of likely impacts

The majority of the impacts associated with the residential development of the Land will have local impacts to GSM and GEWVVP. A total of 97.11 ha of GSM habitat will be removed and 0.226 ha of GEWVVP will have localised impacts by removing this habitat within the area. The removal of this area will result in less habitat present for GSM within northern Melbourne as well as less area of GEWVVP. Due to the localised nature of this project, it is likely to have no regional impacts associated with the project.

4.6 Proposed Avoidance and Mitigation Measures

The development will result in the direct loss of 97.11 ha of GSM habitat and the loss of 0.226 ha of GEWVVP.

4.6.1 Avoidance

Satterley along with planning and environmental consultants have worked together to design a residential layout plan to best avoid impacts to MNES prior to the beginning of construction. Since the first iteration of the residential development layout plan, Satterley has increased the size of the conservation reserve in the south eastern corner of the development substantially. This has ensured the conservation of additional GSM habitat within areas of GEWVVP.

The Land also contains a large population of indigenous River Red-gums throughout the property. Satterley has designed their layout plan to ensure a 70% retention of these trees throughout the property. This will ensure the creation of a linear biodiversity network across the Land which protects biodiversity values and connects with biodiversity links on adjoining land. Note that the areas protected for the conservation of River Red-gums are not considered to have avoided impacts to GSM habitat as their future management will be unable to focus on the conservation of this species.

4.6.2 Mitigation Measures

Satterley has mitigated the effects associated with the development of 1960 and 2040 Mickleham Road through minimising the effects to MNES. Satterley has chosen to protect areas of higher biodiversity (i.e. GEWVVP) over areas of lower quality vegetation. Additionally, they have retained habitat areas for large River Red-gums that will create connectivity corridors throughout the Land to allow for movement of common native species.

During the construction phase the conservation reserve will be clearly delineated by protective fencing and identified as a construction no-go zone. Any access by construction workers or associated activities will be strictly prohibited.

The reserve will also be protected sediment control fencing to protect it from any potential movement of sediment during high rainfall events or persistent wet conditions.

Construction activities will also be excluded from the tree protection zones (TPZ) (12 times the diameter at breast height to a maximum of 15 metres) for all trees identified as to be retained and these areas (outside the conservation reserve) will have the TPZ identified using temporary fencing.

4.7 Offsets

Satterley has proposed both first party and third party offsets for GSM. The 7.21 ha Conservation Reserve in the south eastern corner will provide a first party offset for all impacts to GEWVVP and contribute a small portion of the total offset required for GSM (300.5 hectares) and will maintain a population of GSM locally within the best habitat quality available within the development.

The impacts will be offset as prescribed under the EPBC Act Offset Policy (DSEWPaC 2012, Appendix 1). The net result of offset calculations for these MNES amounts to the protection and management of 293.3 hectares of occupied GSM habitat external to the development site. This external offset (297.77 hectares) in conjunction with the on-site conservation reserve of 7.21 hectares, provides over 100% of the total GSM offset calculated to be 300.5 hectares.

The management of the remaining 2.59 ha of GEWVVP within the proposed 7.21 ha conservation reserve would provide over double the prescribed offset for this MNES.

External offsets (297.77 hectares) identified for GSM habitat impacted by the project include 37.9 ha of GSM habitat identified at Glenhope, 121.0 ha at Glenaroua and 138.87 hectares at Beaufort, Victoria. While preferred offset options have been identified and the manner in which these offsets would be secured, managed and monitored has been defined in relatively specific terms, Satterley prefers to operate in an approval process driven by outcomes. In that context the identified offset options could change, subject to the approval of the Australian Government Minister for the Environment, should better and/or more cost effective options become available to achieve the same outcome.

No external offsets are proposed for GEWVVP as the protection and management of the conservation reserve in the south eastern corner of the subdivision satisfies the offset requirements for impacts to this MNES. Ongoing management of the conservation reserve will also improve the condition of this remnant vegetation and its habitat values for GSM.

4.8 Grassy Eucalypt Woodland Conservation Management Plan

The protection and conservation management of the reserve to be established in the south eastern corner of the study area will be subject to an approved CMP. This plan is provided as an attachment to this preliminary documentation (Biosis 2020a). The plan will be subject to the approval of DAWE. The CMP documents how the reserve will be managed for the protection and enhancement of its values as GEWVVP and habitat for GSM.

Impacts associated with the loss of 0.226 ha GEWVVP have been assessed as requiring an offset of about 1.2 ha under the assumptions identified in the EPBC Act offset calculator provided in Appendix 1, the 2.59 ha to be retained in the proposed conservation reserve would provide more than double the prescribed offset.

The quality of the area defined as GEWVVP was assessed by using the Victorian Government's 'habitat hectare' assessment protocols developed by the Department of Environment, Land, Water and Planning (DELWP) (DSE 2004). The 'habitat hectare' assessment considers a number of factors including weed cover,

organic matter, recruitment and species richness to define a score for vegetation which is then provided as a score out of 100.

This assessment uses the habitat hectare scores calculated by Biosis (2017 – Appendix 4) for this habitat zone (45/100 for HZ1) rounded to the nearest equivalent quality value required by the DoEE Offset Assessment Guide under the "Area of Community" component. The score used in the EPBC Act offset calculator for all areas defined as GEWVVP is therefore 5/10.

Other settings in the offset calculator are as follows. The risk related time horizon for the offset is set at its maximum level of 20 years. This parameter deals with the life of the offset which is otherwise capped at 20 years. As offsets are protected in perpetuity the maximum value has been selected.

Offset site management plans typically cover the initial 10 year management period for a site and therefore the time until ecological benefit is set at 10 years.

The site quality score of the nominated offset site is the same as the area to be cleared (5/10).

The quality of such areas when managed in a manner with little or no consideration for the biodiversity values can deteriorate very quickly. In Victoria, there are no restrictions to practices such as the application of fertiliser, high stocking rates, seeding areas with exotic pasture or changing the type of animal traditionally raised within a property (i.e. changing from sheep to cattle or horses). All of such practices are considered as of right uses associated with farming land, whether or not such areas support native vegetation. While remnants of GEWVVP within an agricultural setting may have survived the development of agricultural land around them, the gradual increase in weed cover, the number of weed species, nutrient loads etc. can result in the rapid loss of vegetation quality in response to changes or disturbances (i.e. fire and drought). A decline in condition from a score of 5/10 to 4/10 is considered conservative for a 10 year period.

The future quality with offset for the nominated offset vegetation is elevated to a score of 6/10. This decision is based on experience which dictates that once a significant conservation effort is applied to improve the quality of a woodland such active ecological management over a ten year period can be expected to significantly reduce the extent of perennial weeds, including woody weeds and high threat perennial grasses. The nominated increase in condition is therefore considered reasonable and achievable.

The risk of loss for the vegetation without the offset is set at 10%. This is based on the existing land-use (grazing) and the low likelihood that this area of native vegetation would be cleared in the next 20 years, since it is protected under national environment law. However, remnants such as these are still illegally or inadvertently cleared, so there is still some residual risk of loss given that the site does not have formal protection. The proposed offset would continue to be used for grazing purposes if not protected under a legal mechanism. While Victoria's native vegetation clearing regulations offer some existing protection to the native vegetation within the proposed offset site, continued agricultural uses such as grazing may lead to its continued degradation.

The risk of loss with offset is set at 1% because the site would be protected in perpetuity and the relatively low probability of the vegetation deteriorating in the presence of active management to promote the improvement of native vegetation through active weed control works and biomass management. The risk is not considered zero as there is a small probability that the invasion of new high threat weeds or the influence of climate change could have negative impacts on this vegetation.

These assessments are made with a relatively high degree of confidence (set at 90%) because of observations associated with other GEWVVP offsets in Victoria. Similarly, there is a high confidence (90%) for the time to ecological benefit being achieved based on observations from similar management regimes for grassland and grassy woodland offset areas managed under Trust for Nature covenants.

Based on the assumptions outlined in these Appendix an offset protecting 2.58 ha of GEWVVP would satisfy the current policy requirements for the loss of the 0.226 ha of GEWVVP associated with the upgrade of Mt

Ridley Road. The output of the offset calculator for GEWVVP using these parameters identifies an offset of 2.586 ha as providing in excess of a 200% direct offset.

The offset for GEWVVP will be established before the development proceeds and protected under a Section 173 Agreement under the *Planning and Environment Act 1988* or similar mechanism. Satterley will ensure the reserve is managed accordance with the OMP (Biosis 2020a) for the first 10 years, upon which it will be transferred into the management of a public authority (e.g. council, Parks Victoria, etc.).

4.9 Conservation Management Plan for Golden Sun Moth

Impacts associated with the loss of 97.11 ha of GSM habitat (i.e. 37.6 ha was identified as not being GSM habitat) have been assessed as requiring an offset of 300.5 ha (about 3.1 times the loss) under the assumptions identified in the offset calculator provided in Appendix 1.

The development site supports a relatively large population of GSM but is currently isolated by development and pending development (i.e. the rural residential subdivision adjacent to the eastern boundary and the surrounding areas to the north and south are within the expanded urban growth boundary covered by the MSA and the Biodiversity Conservation Strategy (BCS) (DEPI 2013). The size, extent and context of the GSM population across 1960 and 2040 Mickleham Road was assessed by Biosis 2015. This identified a range of habitat conditions, rated on a scale of 0 to 10, scored between 0 and 8.

Areas identified as not supporting GSM habitat (37.60 ha, Figure 3) were excluded from any offset requirement.

The scores identified by Biosis (2015) were multiplied by the area of land allocated that score to calculate the adjusted hectares of GSM habitat. The 1.06 ha identified as GSM habitat within the Mount Ridley road reserve was allocated a score of 2/10. These adjusted hectares were then summed (35.656) and divided by the total area of GSM habitat (105.93) identified providing an average score for each hectare of habitat within the development (0.34). As the habitat quality score options within the calculator only allow the selection of whole numbers, the quality of habitat was selected as 3/10 by this assessment (Table 4).

Table 4 Calculations for the mean GSM habitat condition

Habitat Zone (Biosis 2015)	Area (ha)	No. of GSM recorded	GSM density (No./ha)	Site condition Score	Site Context Score	Stocking Rate Score	Habitat Score (rounded)	Adjusted Ha
1	12.19	87	7.1	10	5	8	0.8	9.752
2	11.1	9	0.8	10	3	1	0.5	5.550
3	7.40	81	10.9	1	5	8	0.5	3.700
4	8.03	10	1.3	5	5	2	0.4	3.212
5	28.03	24	0.9	2	3	1	0.2	5.606
6	38.12	15	0.4	1	3	1	0.2	7.624
7	37.60*	NA	NA	0	0	0	0.0	0
Road Res.	1.06	NA	NA	NA	NA	NA	0.2	0.212
Total GSM	105.93							35.656

Note: * indicates area is not GSM habitat (i.e. has a score of zero) and is excluded from the total area

Impacts to the 105.93 ha of habitat present is reduced by 7.21 ha to 98.72 ha by the protection of the Conservation Reserve in the south eastern corner of the development. This is further reduced by 1.61 ha to 97.11 ha to account for land covered by the MSA in the north west of the study area. With an average quality score of 3/10 the adjusted GSM hectares therefore amounts to an impact of 29.13 (Appendix 1).

Again, the risk related time horizon for the offset site has been set at 20 years with the time until ecological benefit set at 10 years to match the timeframe of the OMP.

The site quality score of the potential offset site is set at 5/10 based on the presence of a large population of GSM within an area of modified but suitable habitat otherwise imbedded within a broader area of unsuitable habitat. Again, given the agricultural nature of such habitat it has the potential to suffer significant declines in condition within a relatively short period of time. Potential changes which could readily influence the population include over-grazing, a change in the type of animals grazed (changing from sheep to cattle) or the application of superphosphate which would significantly alter the ground cover species composition. The future quality of such a site without offset is therefore set at 4/10.

As with the other MNES above it is considered relatively difficult to improve the quality of habitat. However in this instance the elevated level of weed control and permanent application of targeted management to improve the habitat for GSM, the future quality with offset is conservatively set to improve to 6/10.

Given the persistence of GSM in the offset environment and the extent of change required to completely remove this species, the risk of loss without offset is set relatively low at 10%. When such a site is secured for an offset the risk of loss is set at 1% because the site would be protected in perpetuity and the relatively low probability of the vegetation deteriorating in the presence of active management to maintain this habitat in appropriate condition through active weed control works and biomass management. The risk is not considered zero as there is a small probability that the invasion of new high threat weeds or the influence of climate change could have negative impacts on this vegetation.

Again these assumptions are provided with a relatively high degree of confidence (set at 90% for the risk settings and 90% for the quality settings) because of our observations over time in areas managed for the protection and maintenance of GSM populations.

Based on the assumptions outlined in the relevant spreadsheet, an offset protecting 300.5 hectares of GSM habitat would satisfy the current policy requirements (i.e. provide a 100% or greater direct offset).

Offsets provided as a first party offset on site for GEWVVP also support the best quality GSM habitat within 1960 and 2040 Mickleham Road. The nominated offset for GEWVVP will therefore also contribute an offset of 7.21 ha of GSM habitat providing 2.4% of the required 100% direct offset. The remaining 293.3 hectares of GSM habitat will therefore be secured offsite.

GSM offsets have been identified at Glenhope (Sievers Lane), Glenaroua (Muncktons Lane) and Beaufort (Western Highway), Victoria and provide a combined 297.87 ha of occupied habitat for GSM habitat (Hamilton Environmental Services 2015, 2018a, 2018b, Biosis 2020c, d & e).

Satterley is currently in the process of securing the offsets available at these properties. These sites support known populations of GSM and Satterley is negotiating with the landowners to secure the required offsets (296.1 ha). Ecological management of each offset area (Biosis 2020f, g & h) will be governed by an approved offset management plan (OMP) tailored for the specific conditions of the selected site (Biosis 2020i, j & k).

Each offset site will be secured through a Trust for Nature covenant. The OMP will be subject to regular implementation monitoring and reporting and GSM populations will be monitored biennially including a baseline survey to be conducted during the first available flight season.

These baseline surveys were completed for the Glenhope and Glenaroua sites but the seasonal window for the 2019/20 flight season was missed for the Beaufort site. Four surveys for the Beaufort site were conducted by Ecocentric (2019) during the 2018/19 flight season but these were not conducted in a systematic manner. However this data provided the only alternative source of information which could substitute for the required dataset and was used in the absence of any other alternative.

A conservation management plan for the management of the onsite conservation reserve is provided by Biosis (2020a).

5. Proposed offsets

External offsets (297.77 hectares) have been secured for the additional external offsets required for GSM. Site condition assessments for these sites are provided by Biosis (2020i). Associated Offset Management Plans (OMP) include Biosis (2020f, g & h).

The offset for GEWVVP (2.59 hectares) will be protected within the Conservation Reserve (VPA 2018a – 7.21 hectares) in the south east corner of 1960 Mickleham Road (Figure 5).

An offset management plan has been prepared to detail how each offset will compensate for the residual impacts of the project and includes the location, duration and what management activities will occur (Biosis 2020a, f, g & h). Each offset management plan describes how the offset will ensure to protect, conserve and manage the MNES and its relationship to the project. The area of offsets provided provides a direct offset of over 100% of the offset requirements defined by the EPBC Act offset calculator. The cost of any offset will therefore remain confidential.

5.1 First Party Offsets

Satterley will use land within 1960 Mickleham Road identified by the PSP as a Conservation Reserve (VPA 2018b) for the entirety of their offsets for GEWVVP and part of the offsets for GSM.

An Offset Management Plan (Biosis 2020a) has been developed for the 7.21 hectare Conservation Reserve which details the management actions required to uphold this area as habitat for both the 2.59 hectares of GEWVVP and GSM is included with this preliminary documentation. Satterley has set aside financial support for the management of the reserve for both GSM and GEWVVP for the duration of the referral approval. After 10 years of management, it is likely that the management of the reserve will be transferred over to a statutory authority for long-term management. Management of the reserve for its MNES values will be maintained at a minimum for the duration of the EPBC Act approval and any funds for this management will be negotiated with Council prior to any transfer of land.

5.2 Third Party Offsets

Satterley is currently in the process of securing agreements to protect external properties as the third party offsets for the remaining 296.1 hectares which will serve as the majority of the offsets for GSM. Three sites in Glenhope, Glenaroua and Beaufort, Victoria have been identified with the required area of occupied GSM habitat, which is more than that required to satisfy the offset requirement associated with this project. Each offset site will be managed via an Offset Management Plan specific to the site which will dictate the timing, duration and actions required to properly manage and maintain the land for GSM and the associated monitoring. These plans form attachments to this preliminary documentation (Biosis 2020f, g & h).

In line with the nominated staging of the development, subdivision stages will be initiated within 1960 Mickleham Road and subsequently within 2040 Mickleham Road. Offsets will be secured in line with the development of each parcel of land, initially 1960 Mickleham Road followed by 2040. Offsets for 1960 represent a third of the total offset prescription with those for 2040 being the remaining two thirds.

The nominated offsets will initially be secured through a memorandum of understanding. Offsets able to cover the offset requirements for each parcel will receive permanent legal protection prior to works commencing on that parcel. Requirements defined by the offset providers may require the developer to secure the full offset requirement well before the development extends into 2040 Mickleham Road. However, some flexibility in the regulatory requirement to secure all offsets from the beginning of the project will allow these costs to be managed by the proponent over a more economically manageable timeframe.

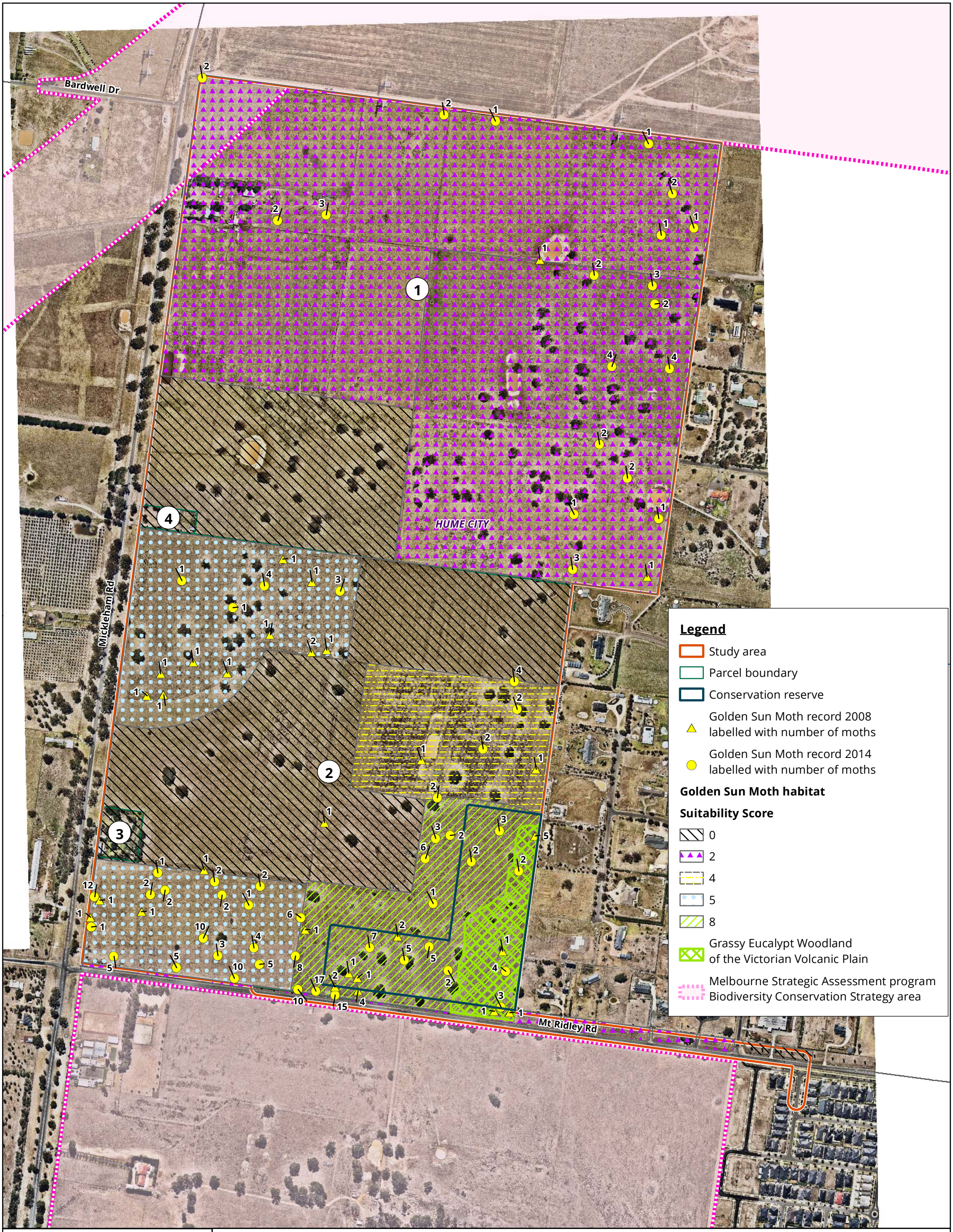

Figure 5 Location of the Conservation Reserve within 1960 Mickleham Road, Mickleham, Victoria

Biosis Pty Ltd

Albury, Ballarat, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Acknowledgements: Vicmap ©State of Victoria, NearMap imagery January 2018

Matter: 27761,
Date: 11 September 2018,
Checked by: LJS, Drawn by: SKM, Last edited by: smitchell
Location:P:\27700s\27761\Mapping\27761_F5_ConsRes

0 60 120 180 240 300

Metres

Scale 1:6,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

The onsite Conservation Reserve will be delineated prior to the commencement of works and the initiation of the OMP synchronised with the beginning of subdivisional works.

Note that works within 1960 Mickleham Road will include the proposed water pipeline required to service external subdivisions to the north of Lindum Vale and will involve limited works within 2040 Mickleham Road. These works are not considered subdivisional works associated with 2040 Mickleham Road and are covered by the offset arrangement.

6. Environmental Outcomes

Satterley proposes to have the following environmental outcomes associated with the proposed development of the 1960 and 2040 Mickleham Road residential development.

6.1 Golden Sun Moth

Due to development of the Land for residential purposes, 97.11 ha of GSM habitat will be removed. In order to obtain Commonwealth approval under the EPBC Act, Satterley will need to offset this impact by purchasing land credits and managing land that contains a viable GSM population.

Satterley will have a first party offset for GSM on the Land located within the 7.21 ha conservation reserve in the south-east corner of the development that will also conserve, protect and manage the GEWVVP community. This reserve will have a offset management plan (Biosis 2020a) to ensure that the ecological integrity of the reserve is upheld and continues to support both GSM and the community GEWVVP.

Additionally, Satterley will acquire third party offsets to fulfil the Commonwealth offset requirements. Satterley is currently secured suitable offsets at properties in Glenhope, Glenaroua and Beaufort in central Victoria for GSM habitat that will fulfil the Commonwealth offset requirements. All three external offset sites will require a conservation management plan that will detail the conditions that need to be met regarding management activities such as weed and pest control and monitoring activities. Environmental outcomes that will be achieved within all three offset areas include:

- Legal protection of 296.1 ha of GSM habitat for the period of the plan, and in perpetuity.
- Physical protection of the habitat area from manageable threats including stock grazing, weed infestation and firewood collection.
- Improvement in the condition of GSM habitat, as defined in each OMP (Biosis 2020a, f, g & h).

By agreeing to these plans and ensuring the plans are implemented for the duration recommended, Satterley will be ensuring that they are conserving similar or greater quality habitat in both quality and quantity than that associated with removing GSM habitat within Lindum Vale.

6.2 Grassy Eucalypt Woodland of the Victorian Volcanic Plain

As a result of the development of the Land for residential purposes, approximately 0.226 ha of GEWVVP will be removed. In order to obtain Commonwealth approval under the EPBC Act, Satterley will need to offset this impact by managing land that contains the listed community.

The offset for the GEWVVP will be within the conservation reserve in the south east corner. The conservation reserve has been designed to include all of the GEWVVP possible (the expansion of Mt Ridley Road is prescribed by the PSP and is otherwise out of SPD's control), with other boundaries defined in negotiation with the VPA and Hume Council to balance competing interests such as development yield, open space and conservation objectives. The reserve provides a manageable unit by virtue of the relatively flat nature of the reserve and its surrounds, the existing configuration of conservation values and the proposed interface between the reserve and development.

As an isolated remnant within a farmland environment the condition of the vegetation would continue to decline over time and eventually be overwhelmed by invasive introduced species. However, management under the OMP (Biosis 2020a), targets the threatening process currently degrading this remnant and provides

active ecological management which has been shown to improve the condition of native vegetation in other remnants retained in association with residential development.

This land will have a conservation management plan to ensure that the ecological integrity of the reserve is upheld and continues to support both GSM and the community GEWVVP.

Environmental outcomes that will be achieved within the offset area includes:

- Legal protection of 2.59 ha of GEWVVP for the period of the plan, and in perpetuity.
- Physical protection of the habitat area from manageable threats including stock grazing, weed infestation and firewood collection.
- Improvement in the condition of GEWVVP and its surrounds, as measured by Habitat Hectare score (DSE 2004).

The offset management plan will detail the conditions that need to be met regarding management activities such as weed and pest control and monitoring activities. By agreeing to this plan and ensuring the plan is implemented for the duration prescribed by the EPBC Act approval, SPD will be ensuring that they are conserving similar or greater habitat in both quality and quantity associated with removing GEWVVP within Victoria. In addition, this will create an environmental outreach/education opportunity to further understanding of local residents of the natural history of the area and the importance of the Victorian Volcanic Plain, including GEWVVP and the species that reside within the community.

The conservation value of small reserves in an urbanised environment is also acknowledged by a number of authors including Kendal et al. (2017) and Wintle et al. (2019). With the relatively intensive management proposed by Biosis (2020a), the proposed Conservation Reserve for this retained area of GEWVVP is expected to retain significant conservation value in both the short and longer term

Upon transfer the Hume Council, the land transfer will be associated with a mutually agreed capital fund for the ongoing management of the reserve.

7. Social and Economic

7.1 Economic and Social impacts of proposed action

Development of the Land will provide local and regional economic benefits in the form of construction jobs for the duration of the development. This project will provide various new employment opportunities and will provide new residents to the growing areas surrounding Craigieburn, Merrifield and Donnybrook.

The proposed offsets and management of the on-site retained area would also require management and monitoring works over the first ten years after their establishment and will create opportunities for employment for natural resource management services.

7.1.1 Public Consultation

The Land forms part of the Lindum Vale Precinct Structure Plan (Lindum Vale PSP). Various public consultation activities have occurred as part of the PSP.

A community newsletter was created in August 2017 to inform the public of the proposed Lindum Vale PSP information session which occurred on 12 September 2017. Additionally, the public have had the opportunity to make submissions to planning scheme amendment C205 which seeks to introduce the Lindum Vale PSP into the planning scheme.

An independent panel considered submissions and a public hearing was conducted. The panel has made a number of recommendations about the planning scheme amendment and it is currently before the Minister for Planning awaiting approval.

7.1.2 Indigenous consultation

A CHMP (12270) was prepared in accordance with Part 4 of the Victorian *Aboriginal Heritage Act* 2006 and was required by the *Aboriginal Heritage Regulations* 2007. Urban Colours conducted the CHMP in 2015 for the Land. The specific regulations which triggered the requirement for the plan include:

- r. 22: the activity area is located within an area of cultural heritage sensitivity as it is located within 50 metres of one registered cultural heritage place which is listed on the Victorian Aboriginal Heritage Register (VAHR): VAHR 7822-0024 (Cocking)
- r. 46: the subdivision of land is a high impact activity.

The findings of the CHMP include:

- Five newly identified scar trees (VAHR 7822-3588, 7822-3589, 7822-3590, 7822-3591, 7822-3592)
- The previously recorded scarred tree Cocking VAHR 7822-0024 could not be relocated.
- An artefact scatter site identified in the low-lying ridgeline in the extreme south-west and west of the activity area.

The CHMP recommends the following:

- Removal of VAHR 7822-3588, VAHR 7822-3589, VAHR 7822-3591
- Retention of VAHR 7822-3590, VAHR 7822-3592
- No management action regarding VAHR 7822-0024
- Tamboore 26 (VAHR 7822-3840) is considered to be of low significance. No salvage is recommended and the artefact should be reburied in a durable, sealed vessel as close to the location as possible.
- Mechanical salvage is recommended for Tamboore 25 (VAHR 7822-3841) and all artefacts should be dated and reburied in a durable, sealed vessel as close to the location as possible.

Biosis has been involved in more recent consultation alongside the Wurrundjeri and Satterley Property Group in regards to the findings from the initial CHMP and implementing these into the current design.

7.1.3 Costs and Benefits associated with 1960 and 2040 Mickleham Road

The development of the 144 ha parcel of land will result in the creation of a residential development to support approximately 1500 dwellings. The project will accommodate approximately 7,000 new residents and include a range of services and facilities, including a new sporting facility with ovals and pavilions which will be occupied by new sporting clubs as well as being utilised by local schools.

Total costs associated with the development of the land and civil construction (roads, services and public facilities) will total approximately $250 million. Housing construction will be approximately $750 million based upon $300,000 per dwelling.

Employment opportunities will be created at a local scale throughout the need for skilled trades people during the construction of the ancillary services (water, electricity, sewage, roads) as well as the construction of the residential dwellings. The construction of the project will generate approximately 125,000 jobs with approximately 2,000 jobs generated through the civil stages of the project.

With the additional 1500 dwellings, this will also increase the demand for basic services (petrol, convenience stores, grocery stores). The project includes a local town centre with a full line supermarket, speciality retail shops, medical centre and gym. The local town centre is forecast to generate resident spending of approximately $ 35 million by 2037 which will generate further significant employment opportunities.

8. Ecologically Sustainable Development (ESD)

Australia's National Strategy for Ecologically Sustainable Development (1992) defines ecologically sustainable development as: 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'.

Under Section 516A of the EPBC Act Commonwealth organisations have a statutory requirement to report on their environmental performance and how they accord with and advance the principles of ecologically sustainable development (ESD).

The guidelines were developed to assist organisations in meeting their statutory ESD and environmental performance reporting requirements under S.516A of the EPBC Act. The National Strategy for Ecologically Sustainable Development, endorsed by all Australian jurisdictions in 1992, defines the goal of ESD as: 'development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.'

The following ESD principles are outlined in Section 3A of the EPBC Act:

a.) Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle').

b.) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (the 'precautionary principle').

c.) The principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations (the 'intergenerational principle').

d.) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making (the 'biodiversity principle').

e.) Improved valuation, pricing and incentive mechanisms should be promoted (the 'valuation principle').

Extensive planning and background research has gone into the development of 1960 and 2040 Mickleham Road to ensure that decision-making processes have integrated both long-term and short-term economic, environmental, social and equitable considerations (the 'integration principle'). Satterley has worked alongside ecological and planning specialists to minimise its ecological footprint and when unable to do so, will ensure that habitat for the MNES impacted by the proposed development will be offset with sites of equal or greater quality and quantity. Furthermore, extensive survey has been conducted at the proposed residential development site which provides a high level of confidence in the environmental values that are present.

The development of the site known as 1960 and 2040 Mickleham Road will provide approximately 1500 dwellings in Melbourne's north which is quickly transforming from agricultural land into residential developments. The development of this area will provide employment opportunities through the construction phase from May 2019 until September 2026. Furthermore, it will provide an influx for basic services (petrol, convenience centres, grocery stores) into town centres in areas that are developing nearby such as Donnybrook, Craigieburn and Merrifield.

Satterley has worked alongside Biosis, the VPA and Council to ensure the maximum amount of environmental values of the sites, including MNES will be retained. The retention of the conservation reserve in the south east corner which is habitat for GSM as well as the GEWVVP community serves not only as a conservation reserve but also as an example for residents of the area of the past environmental values of the site, creating an environmental connection with residents and the local landscape. Furthermore, Satterley has worked to retain a large amount of the River Red-gum throughout the property, which is an ode to the environmental history of the area. The presence of the conservation reserve as well as the River Red-gums through the proposed development will ensure inter-generational equity for future generations.

In order to fulfil the EPBC Offset requirements, Satterley is currently acquiring credits in which to provide a site of equal or greater quality and quantity of habitat for GSM. As part of the offset policy, Satterley will manage the land for a pre-determined length of time which will be dictated by the site specific Offset Management Plan and then be passed along to a statutory authority.

9. Environmental Record

Satterley have previously lodged 12 referrals under the EPBC Act including:

- 2017/8062 - SATTERLEY PROPERTY GROUP PTY LTD/Residential Development/Lots 1, 13255 and 13256 Railways Parade, Lots 2, 3, 27 Apple Street, Lots 28, 30, 32, 34 Orange Aven/Western Australia/Upper Swan Urban Development, 25km north, north-east of Perth, WA
- 2016/7770 - SATTERLEY PROPERTY GROUP PTY LTD/Residential Development/Hawtin Rd and Lovett Dr/Western Australia/Residential development of Lots 302, 308, 320 and part of Lot 9502, Hawtin Rd, Forrestfield, WA
- 2014/7308 - SATTERLEY PROPERTY GROUP P/L/Residential Development/Mandogalup, WA/Western Australia/Mandogalup Urban Development, Mandogalup, WA
- 2014/7298 - Satterley Property Group Pty Ltd/Residential development/Mt Peter area, 20km south of Cairns/QLD/Residential development, Mt Peter Estate, 20km south of Cairns, Qld
- 2014/7198 - Satterley Property Group/Residential Development/Wandi/Western Australia/Wandi South residential development Kenby Close & Lyon Rd, Wandi, WA
- 2011/6137 - SATTERLEY PROPERTY GROUP/Residential Development/40km from Perth/Western Australia/Urban and Residential Development at Lot 9 Brighton
- 2010/5476 - SATTERLEY PROPERTY GROUP/Residential Development/Lyon Road, Wandi /Western Australia/Honeywood Estate Development
- 2009/5155 - SATTERLEY PROPERTY GROUP PTY LTD/Residential Development/Butler/Western Australia/Urban Residential Development at Lot 9049 Marmoin Avenue
- 2007/3885 - Satterley Property Group/Residential Development/South Yunderup Rd and Bens Rd, South Yunderup/Western Australia/Austin Cove Estate Phase II Residential Development
- 2007/3361 - Satterley Property Group/Residential Development/Bunbury/Western Australia/Dalyellup Beach Estate - Residential Development
- 2006/2924 - Satterley Property Group/Urban and commercial new development/Pt Lot 1 South Yunderup Road, South Yunderup/WA/urban residential development
- 2004/1878 - Satterley Property Group/Residential Development/Yalyalup/Western Australia/East Busselton Residential Estate

Satterley been developing land across Australia for more than 37 years. In this time, the company has developed 165 residential communities and attracted more than 100 international, national and state industry awards.

Satterley endeavours at all times to undertake its developments in an environmentally responsible manner. Satterley is committed to providing current best practice environmental management for its residential developments. Satterley does have an environmental policy of which the following is extracted:

Satterley Property Group (SPG) respects the environment and accepts their responsibility to conduct all activities with due concern for their environmental impact. SPG is committed to reducing the environmental impact of its businesses while continuing to provide high quality services that meet the needs of our customers. We will do this through continuous improvement in the environmental performance of our activities.

In addressing environmental issues SPG will:

- Comply with all applicable environmental laws and regulations.
- Maintain management systems that identify, monitor and control environmental risks and performance and facilitate sharing of information and knowledge across the organisation.
- Embrace continuous improvement; seek to find ways of further enhancing our energy and water efficiency; minimise the generation of waste and not cause unacceptable environmental impacts on land, air and water.
- Ensure that significant planning changes are assessed in advance to prevent adverse environmental impacts.
- Act as an environmentally responsible neighbour.
- Conduct regular environmental audits of our activities to ensure legal compliance and achievement of this Policy.
- Implement corrective actions in a timely manner.
- Minimise, wherever practicable, the environmental impact of our developments, whilst maintaining quality and safety standards.
- All employees have a responsibility in the implementation of this policy.

Officers and managers are responsible for ensuring that:

- The commitments of this policy and the environmental obligations of the company are met and adequate resources are made available; and
- Employees are aware of this policy, are appropriately trained and encouraged to fulfil their environmental responsibilities.

This policy will be made available to all interested parties, including employees, contractors, visitors and the general public, and will be periodically reviewed.

10. Other Approvals and Conditions

10.1 Any approval obtained or is required to be obtained from a State or Territory

10.1.1 Planning and Environment Act

The proposed action will require approval under the *Planning and Environment Act 1987* (Vic) (PE Act).

The Hume Planning Scheme (Planning Scheme) has been amended so the proposed action can proceed. A planning scheme amendment C205 (Amendment C205) has been prepared and approved. Amendment C205 has introduced a number of changes to the planning controls that apply to the Land, including the introduction of the Lindum Vale Precinct Structure Plan (PSP) and the Lindum Vale Native Vegetation Precinct Plan (NVPP) (VPA 2018a & b).

During the preparation of Amendment C205 the EPBC Act requirements were considered by an independent panel who made recommendations regarding the final form and content of the PSP and the NVPP. As a result, a number of biodiversity protection measures are embedded in the PSP and NVPP to avoid and mitigate impacts of development on relevant matters of NES. These measures include:

- Creation of a dedicated conservation reserve in the south eastern corner of the Project Area.
- Creation of a linear biodiversity network across the Project Area which protects biodiversity values and connects with biodiversity links on adjoining land.
- Specific requirements and objectives relating to biodiversity conservation and native vegetation retention (e.g. management of conservation areas, buffers, tree protection requirements and water sensitive urban design requirements).
- Native vegetation areas to be protected and offsets to compensation of the loss of native vegetation.

Now that Amendment C205 is gazetted any application for a planning permit will need to comply with all of the abovementioned requirements in the PSP and the NVPP. Conditions will be imposed on any planning permit issued to secure these requirements.

10.1.2 Environment Protection Act

State environment protection policies (SEPPs) are subordinate legislation made under the *Environment Protection Act 1970 (Vic)* (EP Act) to safeguard the environment from the effects of pollution and waste.

The SEPP standards will need to be complied during the construction and operation phase of the proposed action. It is usually a requirement of any planning permit that an Environmental Management Framework (EMF) needs to be prepared to mitigate any environmental impacts. The EMF will need to be consistent with SEPP standards.

10.1.3 Flora and Fauna Guarantee Act

The *Flora and Fauna Guarantee Act 1988* (Vic) (FFG Act) does not apply to the proposed action because the Project Area is within private ownership and the listed communities (e.g. Western (Basalt) Plains Grassland Community and Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04) identified on the land are not declared 'critical habitat' for the purposes of the FFG Act. Further, the flora species proposed to be removed are not being taken for the purpose of commercial sale.

Scattered indigenous species have been identified within the road reserve adjacent to the Land. DELWP may require an FFG Act permit for any impacts to this area of public land. If a permit was required, appropriate conditions would be included to mitigate any impacts on that species.

10.1.4 Catchment and Land Protection Act 1994

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species. Eleven declared noxious weeds (two regionally restricted and nine regionally controlled) have been identified within the Project Area.

Appropriate weed control and hygiene methods will be employed during development of the site to ensure that noxious weeds are not spread. These requirements will be incorporated via the EMF.

10.2 Description of monitoring, enforcement and review procedures

The primary State authorisation for the proposed action will occur under the PE Act. As outlined above, a planning permit can only be granted once the Planning Scheme has been amended to rezone the land to introduce the PSP and NVPP as an incorporated document.

Any planning permit must be consistent with the PSP and NVPP and incorporate the conservation and biodiversity requirements (including the creation of conservation areas and securing of offset areas). It is anticipated that as a condition of any planning permit that there would be requirement to prepare an EMF and a requirement to secure any environmental offsets via an agreement on title (e.g. section 173 agreement).

There is an established enforcement process under the PE Act. If there is a breach of a planning permit condition or any obligations in a section 173 agreement, the Council or any other person may apply to the Victoria Civil and Administrative Tribunal (Tribunal) for an enforcement order. The enforcement order can require the owner or occupier of the land to restore the land to its original condition or anything else required to ensure compliance with the conditions or section 173 agreement obligations.

There are also enforcement processes under the EP Act e.g. in the event of pollution of spills during the construction period that may affected matters of MNES.

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Appendices

Appendix 1 EPBC Calculator Results

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Golden Sun Moth
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		**Area**	97.11	Hectares	Survey and on site assessment
			Quality	**3**	Scale 0-10	
			Total quantum of impact	29.13	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																				
Area of community	No				**Risk-related time horizon (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**									
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0								
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**									
Threatened species habitat																				
Area of habitat	Yes	29.13	Adjusted hectares	300.5	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	300.5	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	1%								
									Future area without offset (adjusted hectares)	270.5	**Future area with offset (adjusted hectares)**	297.5	27.05	90%	24.34	6.53	29.13	100.00%	Yes	
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**6**	2.00	90%	1.80	0.93				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																			
Condition of habitat Change in habitat condition, but no change in extent	No																			
Threatened species																				
Birth rate e.g. Change in nest success	No																			
Mortality rate e.g Change in number of road kills per year	No																			
Number of individuals e.g. Individual plants/animals	No																			

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	29.133	29.13	100.00%	**Yes**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	GEWVVP
EPBC Act status	Critically Endangered
Annual probability of extinction Based on IUCN category definitions	**6.8%**

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes		**Area**	0.226	Hectares	
			Quality	**5**	Scale 0-10	
			Total quantum of impact	0.11	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
Birth rate e.g. Change in nest success	No					
Mortality rate e.g Change in number of road kills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	0.11	Adjusted hectares	2.586	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	2.586	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	1%	0.23	90%	0.21	0.06	0.25	221.86%	Yes		
									Future area without offset (adjusted hectares)	2.3	**Future area with offset (adjusted hectares)**	2.6									
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	**5**	**Future quality without offset (scale of 0-10)**	**4**	**Future quality with offset (scale of 0-10)**	**6**	2.00	90%	1.80	0.93					
Threatened species habitat																					
Area of habitat	Yes	Adjusted hectares			**Time over which loss is averted (max. 20 years)**		**Start area (hectares)**		**Risk of loss (%) without offset**		**Risk of loss (%) with offset**		0.00		0.00	0.00	0.00	#DIV/0!	#DIV/0!		
									Future area without offset (adjusted hectares)	0.0	**Future area with offset (adjusted hectares)**	0.0									
					Time until ecological benefit		**Start quality (scale of 0-10)**		**Future quality without offset (scale of 0-10)**		**Future quality with offset (scale of 0-10)**		0.00		0.00	0.00					
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**		**Start value**		**Future value without offset**		**Future value with offset**		**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**		**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
Birth rate e.g. Change in nest success	No																				
Mortality rate e.g Change in number of road kills per year	No																				
Number of individuals e.g. Individual plants/animals	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0	0.00	#DIV/0!	**#DIV/0!**	$0.00	#DIV/0!	#DIV/0!
Area of community	0.113	0.25	221.86%	**Yes**	$0.00	N/A	$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**