APPENDIX D

ECOLOGICAL ENVIRONMENTAL REPORT

Lot 503 Native Vegetation Clearing Permit Application

Lot 503 Native Vegetation Clearing Permit Application

Neerabup Industrial Area

Prepared for
Western Australian Land Authority (LandCorp)

6 December 2016

DOCUMENT TRACKING

Item	Detail
Project Name	Lot 503 Native Vegetation Clearing Permit Application
Project Number	16PER-5279
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Approved by	Ben Casillas-Smith
Status	Final
Version Number	2
Last saved on	6 December 2016
Photos	*Eucalyptus* and *Banksia* woodlands in Lot 503 and adjacent bushland

This report should be cited as 'Eco Logical Australia 2016. *Lot 503 Native Vegetation Clearing Permit Application, Neerabup Industrial Area*. Western Australian Land Authority (LandCorp).'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from LandCorp.

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Abbreviations

Abbreviation	Description
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
CEMP	Construction Environmental Management Plan
DEC	Department of Environment and Conservation
DoEE	Department of the Environment and Energy
DPS	District Planning Scheme
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
ELA	Eco Logical Australia
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
GPS	Global Positioning System
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
MNES	Matter of National Environmental Significance
MRS	Metropolitan Region Scheme
NVCP	Native Vegetation Clearing Permit
NIA	Neerabup Industrial Area
Parks and Wildlife	Department of Parks and Wildlife
PaWST	Parks and Wildlife Service Tasmania
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
WA	Western Australia
WC Act	*Wildlife Conservation Act 1950* (WA)

1 Introduction

1.1 Development overview and background

The Western Australian Land Authority (LandCorp) proposes to develop an industrial estate on a portion of land within Lot 503 (DP 409677) Flynn Drive in Neerabup, Western Australia (WA) (**Figure 1**). Vegetation clearing will be undertaken within a 93.4 hectare (ha) area, which includes a 3.6 ha area termed the 'Boundary Rationalisation Area', in which clearing may be necessary in the future as part of road widening. Lot 503 lies within the superseded Lot 701 and is located within the larger Neerabup Industrial Area (NIA). The proposed development ('the Development') involves the staged clearing of vegetation and topsoil followed by basic raw material (limestone and sand) extraction and earthworks to bring the site to required contour levels. This would be followed by the creation of industrial lots, construction of roads and drainage infrastructure, and installation of services.

Eco Logical Australia (ELA) was commissioned by LandCorp to assist in preparing a Native Vegetation Clearing Permit (NVCP) application for the disturbance associated with the Development. This document is provided to support the NVCP application and has been prepared for assessment and approval under Part V of the WA *Environmental Protection Act 1986* (EP Act). The 'Development Area' refers to the area within which clearing of native vegetation will occur for construction of the Development components (**Figure 1**).

Note that the lot number of the Development Area was recently changed from Lot 701 to Lot 503, following the exclusion of the portion of Bush Forever Sites that were originally contained within Lot 701. Lot 701 had previously been called Lot 21, with the name change resulting from a minor change to the lot boundary to alter the configuration of the road reserve for Flynn Drive. Consequently, a number of studies completed for the Development refer to Lot 701 or Lot 21. Some of the information contained within this report refers to the old Lot numbers, where it was not possible to delineate the data for only Lot 503 or the Development Area.

1.2 Project approvals history

The Development Area (with the exception of the Boundary Rationalisation Area) was zoned 'Industrial' in the Metropolitan Region Scheme (MRS) following advice from the Environmental Protection Authority (EPA) to the State Planning Commission (now Western Australian Planning Commission) in 1994 on MRS Major Amendment no 948/33 for the North West Corridor (East Wanneroo). The EPA recommended more detailed planning for the proposed industrial area be referred to the EPA to ensure the detailed plans accommodate site constraints and provide for adequate services.

The Neerabup Industrial Area Agreed Structure Plan (As Amended) was adopted in January 2005, under the provisions of Part 9 of City of Wanneroo District Planning Scheme (DPS) No. 2. The Structure Plan has not been assessed formally by the EPA; therefore, a separate referral of this proposed development was required. The proposal to develop Lot 503 (under its previous lot numbers) was referred to the EPA and, on 7 September 2012, the EPA decided to not assess the proposal, with public advice given.

A proposal to extract basic raw materials and develop the land for industrial use was referred to the then Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC; now the Department of Environment and Energy; DoEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in 2012 (EPBC Reference: 2012/6424). The proposal was for a larger area of development (218 ha) than is currently proposed and was deemed a controlled action requiring

assessment under the controlling provision 'listed Threatened species and communities (Sections 18 and 18A)'. DSEWPaC set the level of assessment at Preliminary Documentation and requested additional information on the proposed development in October 2012.

In December 2013, a variation to the original proposal, involving a reduced area of disturbance, was sought and accepted under section 156A of the EPBC Act. As part of the variation, all provisions under the EPBC Act ceased to apply to the original proposal and applied instead to the revised proposal, including the October 2012 request for additional information.

In December 2015, the Preliminary Documentation - Additional Information Request (ELA 2016; Appendix C) was submitted to the then Department of the Environment (DoE; now DoEE). The document was released for public review in April 2016. No comments were received during the review period. An Offset Proposal (ELA 2015a; Appendix F), elaborating on the offsets outlined in ELA (2016) was submitted to the then DoE in May 2016, and the contents are currently under negotiation. Approval of the Offset Proposal by DoEE is anticipated to occur by the end of 2016.

1.3 Purpose of this document

While the proposal was not assessed by the EPA, the Development will require the clearing of native vegetation and therefore an assessment of the potential environmental impacts of the Development in accordance with the requirements of the EP Act Part V is required. This NVCP application has been prepared to address this requirement.

Note that the 3.6 ha Boundary Rationalisation Area located within the Development Area is currently considered part of Bush Forever Site 384; however, LandCorp will request an amendment to the MRS to alter the zoning of this area from 'Parks and Recreation' to 'Industrial'. The vegetation present within this area has already been subjected to clearing and other degrading processes, including for an access road. The potential impacts to the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) habitat contained within this area were addressed in the EPBC Act referral.

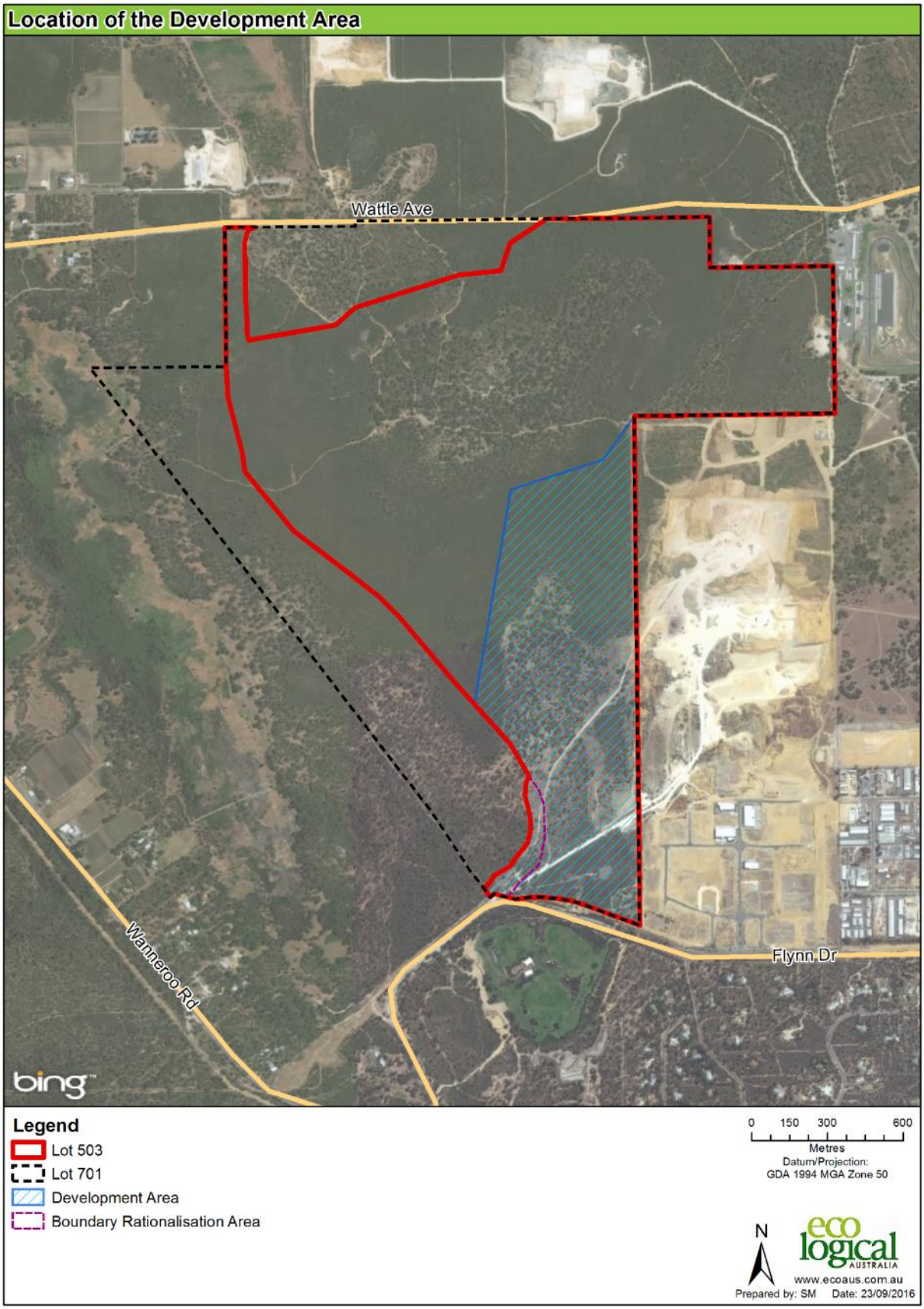

Figure 1: Location of Development Area

2 Description of the Development

2.1 Development overview

The proposal involves clearing of native vegetation within a Development Area of 93.4 ha for basic raw material extraction and subsequent industrial development. This includes the 3.6 ha Boundary Rationalisation Area in which clearing may be necessary in the future as part of access road widening activities. The remaining 225.4 ha of vegetation within Lot 503 will be retained.

The Development consists of sequential extraction of an on-site limestone resource prior to industrial development of the land. The works and associated land clearing will be undertaken in stages. As clearing and limestone extraction progress, land will be made ready for earthworks and conversion to industrial lots and roads (with installation of required services) for the NIA.

The Development comprises industrial lots and road reserves. Part Bush Forever Site 293 and part Bush Forever Site 384 (located within Lot 502 on DP 409677; were previously contained within Lot 701) located adjacent to Lot 503 will be rehabilitated and managed for conservation.

2.2 Schedule

Initial vegetation clearing works are proposed to commence in early to mid-2017, and will be staged over a period of approximately five years along with the limestone extraction operation. Resource extraction will be carried out by a pre-qualified earthworks and quarrying contractor following a request for tender process. Operations will be governed by an extraction licence issued by the WA Department of Mines and Petroleum.

2.3 Proposed works

The proposed works involve:

- Clearing of native vegetation;
- Earthworks for creation of appropriate levels and lot areas;
- Installation of services (water, power, electricity, gas, sewer, and communications);
- Road construction for establishment of transport networks;
- Landscaping of streetscapes;
- Implementation of conservation management measures for retained vegetation; and
- Selling of lots and subsequent development of commercial buildings.

The quarry operator has not yet been determined; however, the quarrying process is likely to be similar in nature to other quarries in the surrounding area (there is a quarry operating immediately adjacent to Lot 503 on LandCorp land) and will require vehicle and machinery access, storage facilities (which could include fuels and chemicals), offices and wash-down areas on site. Quarry activities will be contained wholly within the Development Area.

2.3.1 Pre-clearing

Prior to clearing, the boundaries of the Development Area and retained vegetation will be surveyed and clearly marked by a fence, with a 6 m fire break located alongside the boundary in the Development Area (as required by the Department of Fire and Emergency Services). This demarcation will ensure over-clearing does not occur. As the development of the site is staged, each stage will be surveyed and clearly marked to identify clearing limits. An induction will be provided to all personnel who will be on-site, which

will outline the environmental values of the site and re-iterate the importance of remaining within defined clearing areas.

An inspection of the site for suitable rehabilitation material will occur prior to clearing. Seed collection and storage for future rehabilitation and/or landscaping is likely to be undertaken in the first summer seed collection period (generally from October to February). The seed collection program (including volume of seed) will be influenced by the staging of raw materials extraction. Other material suitable for rehabilitation includes habitat logs, hollow-bearing trees (hollows could potentially be relocated to other areas), mulched vegetation and topsoil. The suitability of the site for rehabilitation material (including consideration of the weed store that may occur in more disturbed areas) will be determined prior to clearing. Rehabilitation areas within the Bush Forever Sites 293 and 384 are identified in the Rehabilitation Strategy (attached as part of ELA (2016) in Appendix C) and are mapped in **Figure 7**.

Prior to clearing each stage, the site will be inspected for suitable habitat trees or hollow-bearing trees. Any such trees recorded will be flagged for retention and relocation to rehabilitation areas.

2.3.2 Clearing and topsoil stripping

Clearing of vegetation and stripping of topsoil within the site will be staged, dependent on the raw materials extraction likely to occur over the next five years. A fauna relocation program will be undertaken prior to commencement of each stage. In addition, the staged development will assist the natural relocation of native fauna to other suitable habitats in the area. Clearing of vegetation and stripping of topsoil will be undertaken as follows:

- Clearing boundaries will be clearly demarcated by a fence to prevent clearing outside the Development Area;
- Where available, GPS equipment in machinery will be loaded with the GPS coordinates of the areas to be cleared to further provide a demarcation of vegetation to be cleared and retained;
- Vegetation clearing will occur from a disturbed edge, where possible, to encourage any remaining fauna to naturally relocate to retained vegetated areas;
- A fauna handler will be available during on-site clearing activities;
- Topsoil will be stripped and, where possible, directly relocated to appropriate rehabilitation areas. Where this is not possible, stripped topsoil will be stored on-site until a rehabilitation use is identified (topsoil storage time will be minimised as far as practicable);
- Vegetation (excluding relocated habitat trees/hollow-bearing trees) will be mulched for use on-site (rehabilitation or landscaping) or in off-site rehabilitation; and
- Mulch and topsoil not used for rehabilitation will be used for on-site landscaping where possible. Where this is not possible, mulch and topsoil will be disposed of to an appropriate facility.

Clearing activities will be in line with the Ten Clearing Principles (Section 6).

2.3.3 Raw materials extraction

The site is designated as a Priority Resource Location for limestone/limesand under the Basic Raw Materials Statement of Planning Policy 2.4 (Western Australian Planning Commission 2000). The intent of this policy is to ensure consideration of the availability of raw materials in the Perth metropolitan area for construction purposes, to keep down the costs of land development and contribute to the availability of affordable housing.

2.3.4 Earthworks / levelling

Following raw material extraction in each stage, earthworks will be required to meet the final surface contours as determined in the final contour plan. This is expected to involve reconfiguration of the residual soil to create the desired landform. In the future, roads are likely to be constructed adjacent to the retained

vegetation in Bush Forever Site 384, which will require batters. The batter from the edge of the 6 m fire break to the development level (and the proposed road reserve in the area adjacent to the Bush Forever Site) will form a separation of approximately 50-60 m from the retained vegetation outside the Development Area (see cross-sections in **Figure 2**). Further minor earthworks will also be required to allow installation of infrastructure and services.

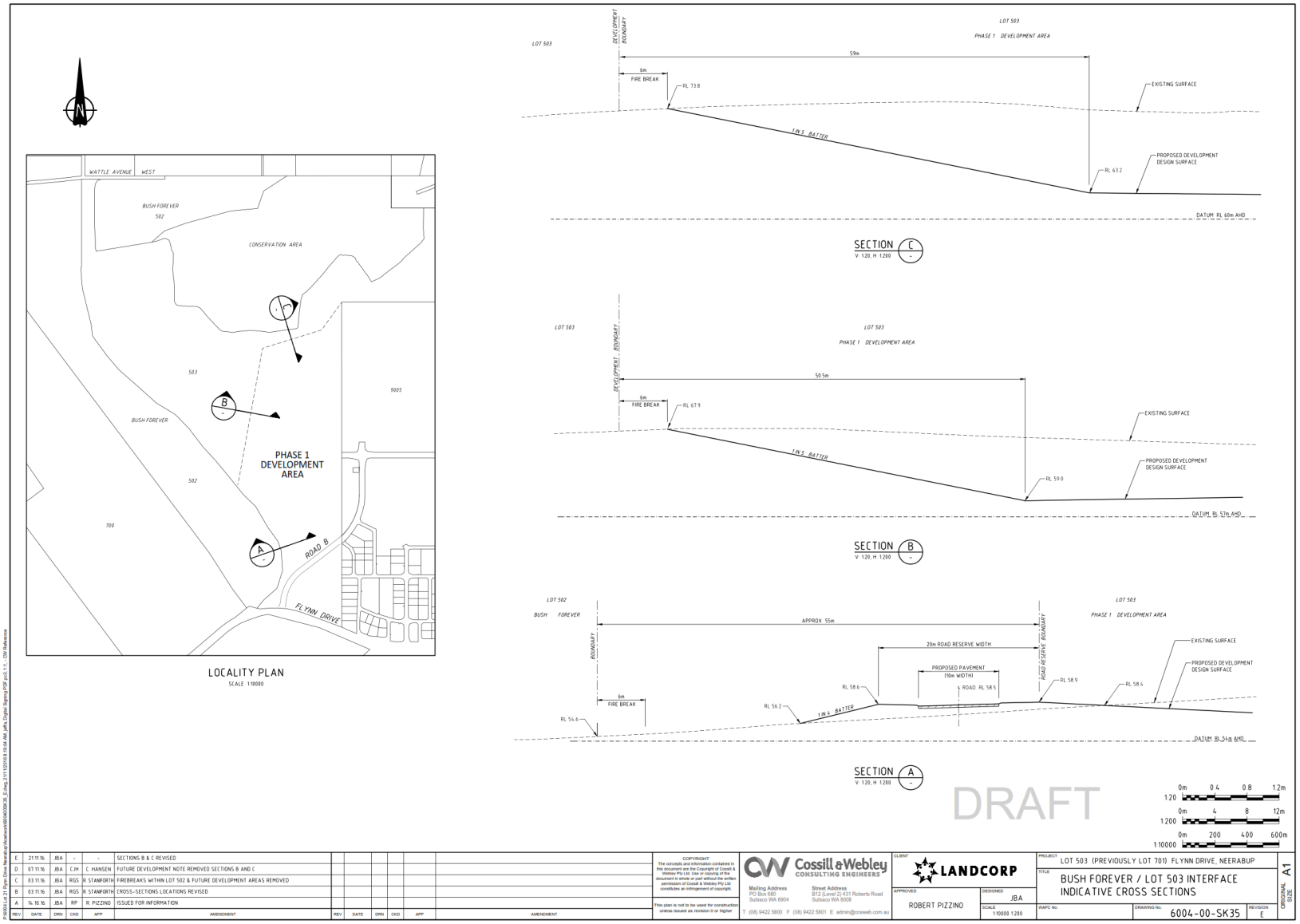

Figure 2: Indicative cross-sections along the length of the Development Area boundary.

3 Physical Environment

3.1 Biogeographic and regional setting

The Interim Biogeographic Regionalisation for Australia (IBRA) recognises 89 bioregions (DoEE 2016a). The Development Area is located in the Swan Coastal Plain bioregion as defined by the IBRA. The Swan Coastal Plain bioregion has been further subdivided into two sub-regions: Dandaragan Plateau (SWA1); and Swan Coastal Plain (SWA2). The Development Area is located in the Swan Coastal Plain sub-region, which is described by Mitchell et al. (2002) as:

- A low lying coastal plain, mainly covered with woodlands. It is dominated by *Banksia* or Tuart on sandy soils. *Casuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. The climate is Warm Mediterranean. It is composed of colluvial and Aeolian sands, alluvial river flats and coastal limestone.

3.2 Geology, geomorphology and land systems

The geology of the site comprises Tamala Limestone (units LS1 and LS2) and Sand Derived from Tamala Limestone (Gozzard 1982), and is situated on the Spearwood Dune System. The system originally formed in the Aeolian period, and consists of a core of Tamala Limestone with a hard capping of calcite (cap-rock) overlain by a variable depth of yellow to brown sands (Ecoscape 2009).

The following phases of the Spearwood soil system occur within the site (DAFWA 2007):

- Spearwood Sand Phase (Sp) – undulating dunes with rocky crests on aeolian sand over limestone in the Swan Coastal Plain between Wanneroo and Moore River;
- Karrakatta Shallow Soils Phase (Kls) – rocky low hills and ridges on limestone in the Swan Coastal Plain between Wanneroo and Lancelin. Bare rock, yellow/brown shallow sands and stony soils; and
- Karrakatta Sand Yellow Phase (Ky) – undulating dunes on aeolian sand over limestone in the Swan Coastal Plain between Wanneroo and Lancelin. Yellow deep sands and brown deep sands.

3.3 Hydrological processes and inland waters

Lot 503 is gently undulating, and generally slopes downward toward the south-west, with groundwater flow in that direction. Groundwater depth ranges between 27 m AHD on the north-eastern boundary to 20 m AHD on the western boundary. Using the 'depth to groundwater' tool from the Perth Groundwater Atlas (Department of Water 2016), depth to groundwater within the Development Area varies from 32 m in south-west to 52 m in the north-east. Soils are porous and are derived from Tamala Limestone, hence it is likely that surface water rapidly infiltrates the soil, although large rainfall events are likely to result in surface run off that flows towards Neerabup Lake (Coffey Environments 2009).

There are no minor or major drainage lines within the Development Area. The closest water feature is the ephemeral Neerabup Lake (Resource Enhancement Category Wetland; Hill et al. 1996), located 370 m to the east of Lot 503 at its closest point.

4 Biological environment

4.1 Flora and vegetation

A single season Level 2 flora and vegetation survey of the Development Area and the larger Lot 21 (427 ha) was undertaken by Ecoscape in October/November 2008 (Ecoscape 2009). The Ecoscape (2009) report is provided in Appendix D with the key findings summarised below.

4.1.1 Flora

A total of 153 taxa of terrestrial vascular flora representing 102 genera and 46 families were recorded during the survey, including 36 introduced species. The most common families were Proteaceae (17 native species), Fabaceae (11 native species, three introduced) and Myrtaceae (12 native species).

4.1.2 Threatened and Priority flora

No Threatened flora species pursuant to subsection (2) of section 23F of the *Wildlife Conservation Act* 1950 (WC Act) were recorded within the Development Area (Ecoscape 2009). One Priority 3 flora species, *Stylidium maritimum,* was recorded in the north-east of Lot 503, outside the Development Area. This species has been recorded from Lancelin to south of Mandurah, and grows on sandy soils over limestone (Department of Parks and Wildlife (Parks and Wildlife) 2016). This record of *Stylidium maritimum* will not be affected by the Development.

The Parks and Wildlife and WA Museum (WAM) NatureMap database (Parks and Wildlife 2007-2016) and the EPBC Act Protected Matters Search Tool (PMST) were searched for flora that have the potential to occur within the Development Area. A 5 km buffer of the coordinates -31.67758° S 115.77292° E was used for both searches.

A list of 17 conservation listed flora species (species listed under the WC Act or as Priority species) was generated (Appendix B). A likelihood of occurrence assessment was undertaken (**Table 1**, criteria attached in Appendix A), and it was determined that two species had potential to occur within the Development Area; *Conostylis bracteata* (Priority 3) and *Pimelea calcicola* (Priority 3). If these species are present in the Development Area, they are unlikely to occur in high numbers, as they were not observed during the Ecoscape (2009) survey. Thus, the clearing of vegetation within the Development Area is unlikely to have a significant impact on these species.

Table 1: Likelihood of occurrence assessment for conservation significant terrestrial flora species

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Acacia benthamii	Priority 2	-	Unlikely
Andersonia gracilis (Slender Andersonia)	Vulnerable	Endangered	Unlikely
Anigozanthos viridis subsp. *terraspectans* (Dwarf Green Kangaroo Paw)	Vulnerable	Vulnerable	Unlikely
Caladenia huegelii (King Spider-orchid)	Critically Endangered	Endangered	Unlikely
Conostylis bracteata	Priority 3		Potential
Diuris micrantha (Dwarf Bee-orchid)	Endangered	Vulnerable	Unlikely

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Diuris purdiei (Purdie's Donkey-orchid)	Endangered	Endangered	Unlikely
Drakaea elastica (Glossy-leafed Hammer-orchid)	Critically Endangered	Endangered	Unlikely
Drakaea micrantha (Dwarf Hammer-orchid)	Vulnerable	Vulnerable	Unlikely
Drosera x *sidjamesii*	Priority 1	-	Unlikely
Eucalyptus argutifolia (Wabling Hill Mallee)	Vulnerable	Vulnerable	Unlikely
Hibbertia spicata subsp. *leptotheca*	Priority 3	-	Unlikely
Jacksonia sericea (Waldjumi)	Priority 4	-	Unlikely
Lepidosperma rostratum (Beaked Lepidosperma)	Endangered	Endangered	Unlikely
Melaleuca sp. Wanneroo (G.J. Keighery 16705)	Priority 1	-	Unlikely
Pimelea calcicola	Priority 3	-	Potential
Stylidium maritimum	Priority 3	-	Recorded
Stylidium striatum (Fan-leaved Triggerplant)	Priority 4	-	Unlikely

* Parks and Wildlife 2015a, DoEE 2016b

EN = listed as Endangered under the EPBC Act, WC Act.

VU = listed as Vulnerable under the EPBC Act, WC Act.

S = listed as Specially Protected under the WC Act.

P = listed as Priority by Parks and Wildlife 2015a.

4.1.3 Introduced species

A total of 36 introduced (weed) species were recorded in Lot 701 during the Ecoscape (2009) survey. Individual quadrats recorded one to 11 species. The most common weed species were **Lysimachia arvensis* (Pimpernel; 17 quadrats), **Hypochaeris glabra* (Smooth Cats-ear; 11 quadrats) and **Gladiolus caryophyllaceus* (Wild Gladiolus; 10 quadrats). Two species recorded in Lot 701 are classified as Declared Pests under s22(2) of the *Biosecurity and Agriculture Management Act 2007* (BAM Act); **Asparagus asparagoides* (Bridal Creeper) and **Echium plantagineum* (Patterson's Curse). These species are in the Control Category C3 (Management; DAFWA 2016). **Asparagus asparagoides* is also a Weed of National Significance (WoNS).

4.2 Beard's Vegetation and Pre-European Vegetation Extent

Vegetation type and extent in WA has been mapped at a regional scale by Beard (1981), who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:1,000,000, the Department of Agriculture and Food WA (DAFWA) has compiled a list of vegetation extent and types across WA (Shepherd et al. 2002). The Development Area intersects two vegetation associations:

- Spearwood 6 (e2,4Mi): Medium woodland; Tuart and Jarrah (19% of the Development Area); and
- Spearwood 949 (bLi): Low woodland; *Banksia* (81% of the Development Area).

The pre-European and current extent of native vegetation associations in WA has been interpreted by Shepherd et al. (2002) using data from Beard's (1981) regional vegetation mapping, along with other vegetation mapping and satellite imagery and orthophoto interpretation. The Development Area contains 0.13% of the current extent of Spearwood 6 (e2,4Mi), and 1.11% of the current extent of Spearwood 949 (bLi); see **Table 2** (Government of WA 2016).

Table 2: Beard's mapping unit occurring within the Development Area, its current and Pre-European extent within the Spearwood system and its extent across the Development Area.

Beard's Mapping Unit (Shepherd vegetation association)	Pre-European extent (ha) (Government of WA 2016)	Current extent (ha) (Government of WA 2016)	Extent within the Development Area (ha) (% of current extent)
e2,4Mi (Spearwood 6)	54,427.13	13,335.50	17.73 (0.13)
bLi (Spearwood 949)	13,221.96	6,797.69	75.64 (1.11)

4.2.1 Vegetation communities

The vegetation of the Development Area is associated with the Cottesloe – Central and South Complex, described as a mosaic woodland of *Eucalyptus gomphocephala* and open forest of *Eucalyptus gomphocephala*, *Eucalyptus marginata, Corymbia calophylla*; closed heath on limestone outcrops (Heddle et al. 1980). The flora and vegetation assessment of Lot 701 by Ecoscape (2009) resulted in delineation of a total of 11 vegetation communities comprised of *Eucalyptus* woodlands and *Banksia* dominated heathlands (**Figure 3**). Six of these vegetation communities are present with the Development Area; BgBmBaAfLOW, BsOH, BsOaMsTOS, EmBaBmAfW, EmCcW and CcOW (**Table 3**). EmBaBmAfW and BsOH are the most widespread, comprising 31.7% and 26.5% of the Development Area respectively.

Table 3: Vegetation communities in the Development Area

Code	Habitat	Area to be cleared (ha)
BgBmBaAfLOW	*Banksia grandis, B. menzeisii, B. attenuata* and *Allocasuarina fraseriana* Low Open Woodland	9.1
BsOH	*Banksia sessilis* Open Heath with scattered *Xanthorrhoea preissi* over Low Open Heath, dominated by *Calothamnus quadrifidus* and *Hibbertia hypericoides*	26.5
BsOaMsTOS	*Banksia sessilis, Olearia axillaris* and *Melaleuca systena* Tall Open Scrub	9.0
EmBaBmAfW	*Eucalyptus marginata, Banksia attenuata, B. menziesii* and *Allocasuarina fraseriana* Woodland	31.7
EmCcW	*Eucalyptus marginata* and *Corymbia calophylla* Open Forest	0.2
CcOW	*Corymbia calophylla* Open Woodland over *Allocasuarina fraseriana, Banksia attenuata* Low Open Woodland	0.2

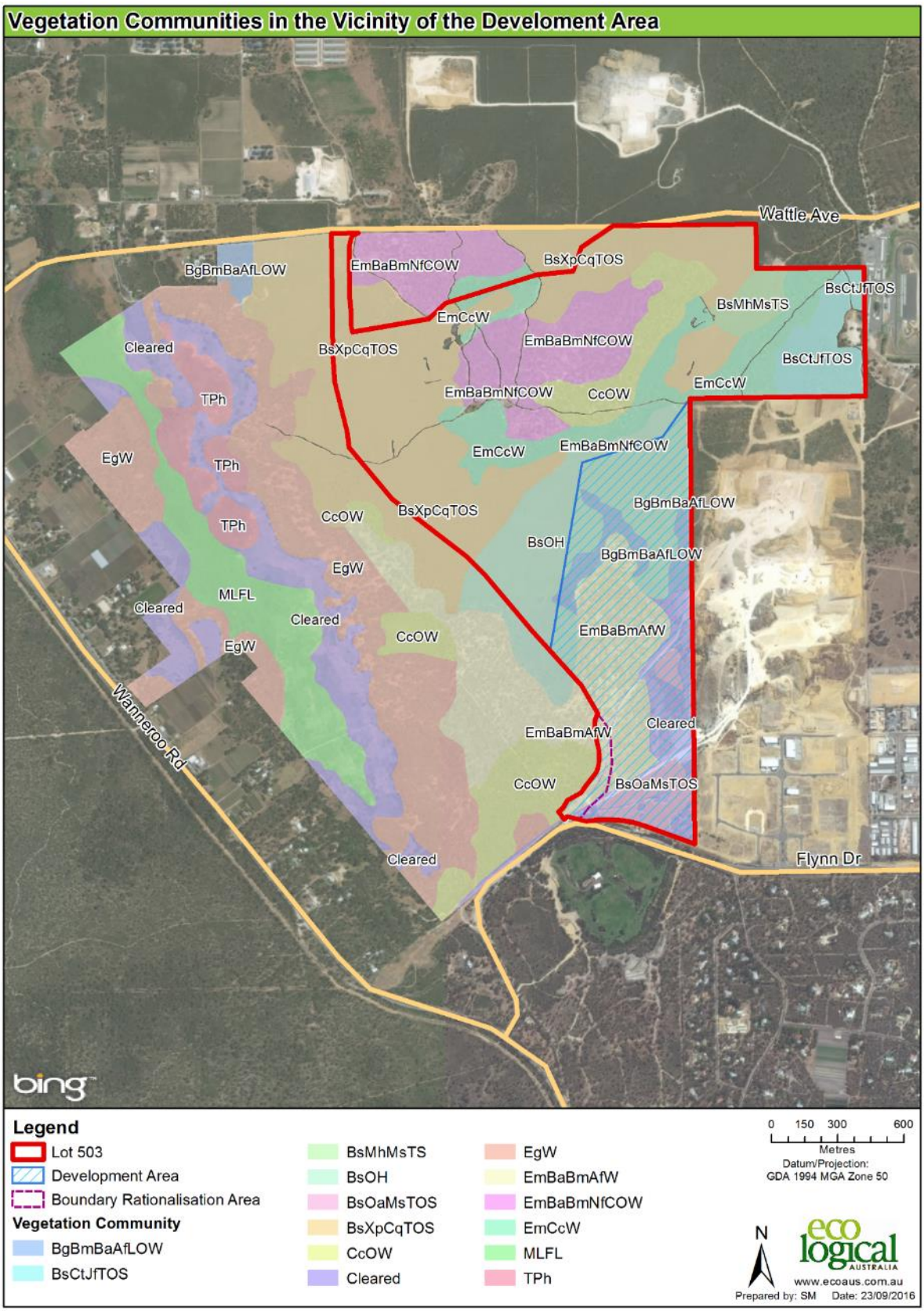

Figure 3: Vegetation communities in the vicinity of the Development Area

4.2.2 Vegetation condition

Vegetation condition ranges from Very Good to Excellent in the north of the Development Area, and decreases towards the south where vegetation is in Good to Completely Degraded condition (**Figure 4**). The vegetation adjacent to the south-eastern boundary (near Lot 9004 on DP 72054, Eclipse Resources' 19 Mile Quarry) is in the poorest condition, containing little to no habitat value for flora and fauna species. A total of 73.6% of the Development Area is in Good to Excellent condition, with the remaining 26.4% in Degraded or Completely Degraded condition (**Table 4**).

Table 4: Vegetation condition in the Development Area

Condition	Area (ha)	Proportion of Development Area (%)
Very Good-Excellent	26.5	28.4
Very Good	18.4	19.7
Good	23.9	25.6
Degraded	8.0	8.6
Completely Degraded	16.6	17.8

4.2.3 Bush Forever Sites

Bush Forever is a WA policy framework that identifies regionally significant bushland that should be retained (Government of Western Australia 2000). Bush Forever Sites 384 (Neerabup Lake and Adjacent Bushland Neerabup) and 293 (Shire View Hill and Adjacent Bushland, Nowergup / Neerabup) are located adjacent to the western and northern boundaries of Lot 503. Bush Forever Site 383 (Neerabup National Park) is located to the west of Bush Forever Site 284; the two sites are separated by Wanneroo Road (**Figure 5**).

4.2.4 Threatened and Priority Ecological Communities

An Endangered State-listed Threatened Ecological Community (TEC), Limestone ridges (SCP 26a), is present within north-eastern portion of Lot 503 in close proximity to Barbagallo Raceway, but outside the Development Area. This TEC is described as *'Melaleuca huegelii - Melaleuca acerosa*[1] shrublands on limestone ridges (Gibson et al. 1994 type 26a)' (Parks and Wildlife 2015b). This 7.63 ha TEC, along with a 50 m surrounding buffer, will be retained, with no vegetation clearing proposed within this area. This area, along with a larger portion of high quality vegetation, will be protected within a proposed 'conservation area' within Lot 503 (**Figure 5**).

Vegetation sampled by Ecoscape (2009) throughout Lot 503 and the adjacent Bush Forever Sites, including the Development Area (14 of 21 quadrats), was determined to be representative of the State-listed Priority Ecological Community (PEC) Northern Spearwood shrublands and woodlands (community type 24'). This PEC is described as 'heaths with scattered *Eucalyptus gomphocephala* occurring on deeper soils north from Woodman Point. Most sites occur on the Cottesloe unit of the Spearwood system. The heathlands in this group typically include *Dryandra sessilis*[2]*, Calothamnus quadrifidus*, and *Schoenus grandiflorus*' (Parks and Wildlife 2015c). This PEC has not been defined by mapping in this area. While

[1] Currently *Melaleuca systena*
[2] Currently *Banksia sessilis*

some clearing of the Priority 3 PEC will occur within the Development Area, the PEC will remain represented within the retained vegetation with Lot 503 and the adjacent Bush Forever Sites.

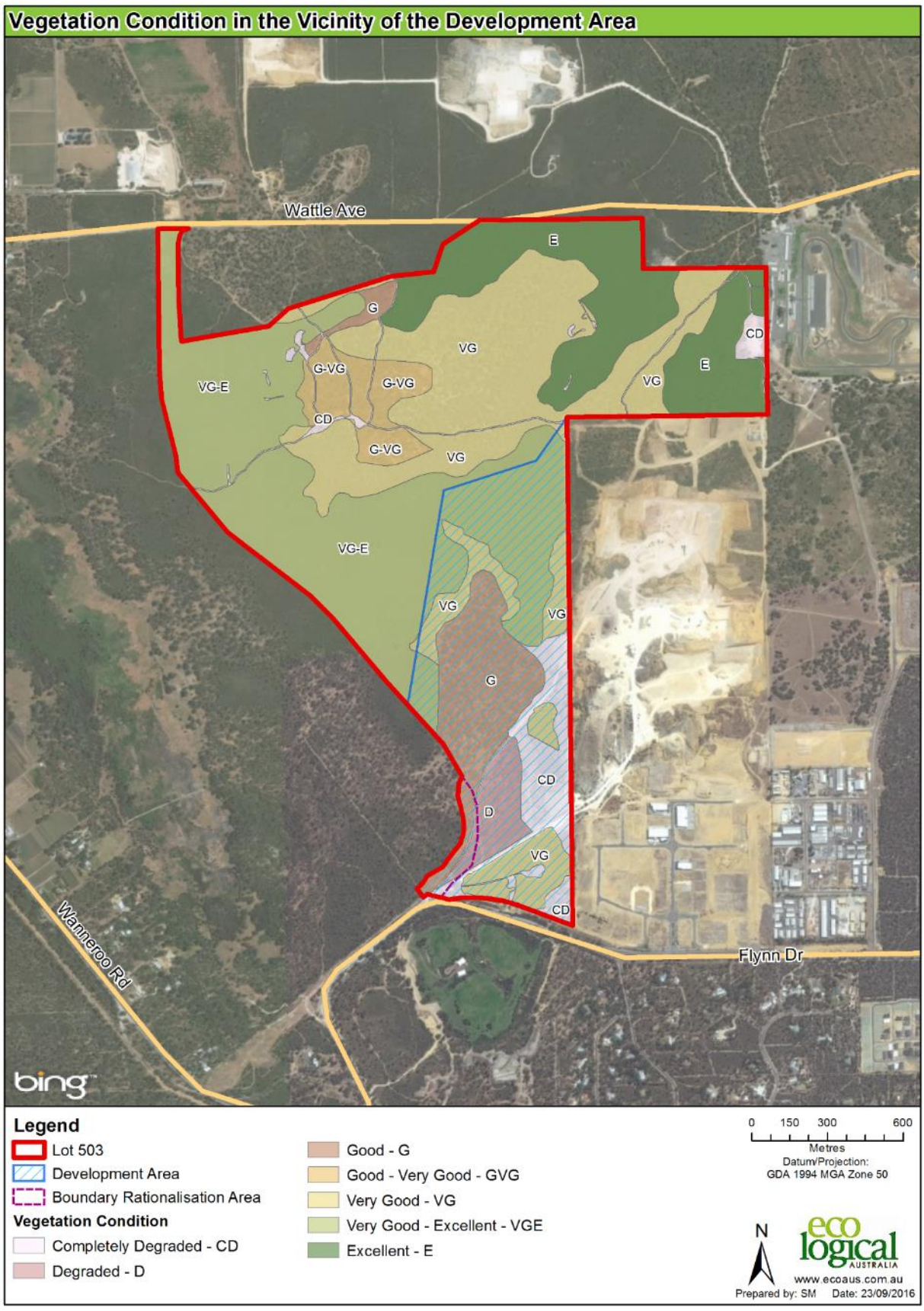

Figure 4: Vegetation condition in the vicinity of the Development Area

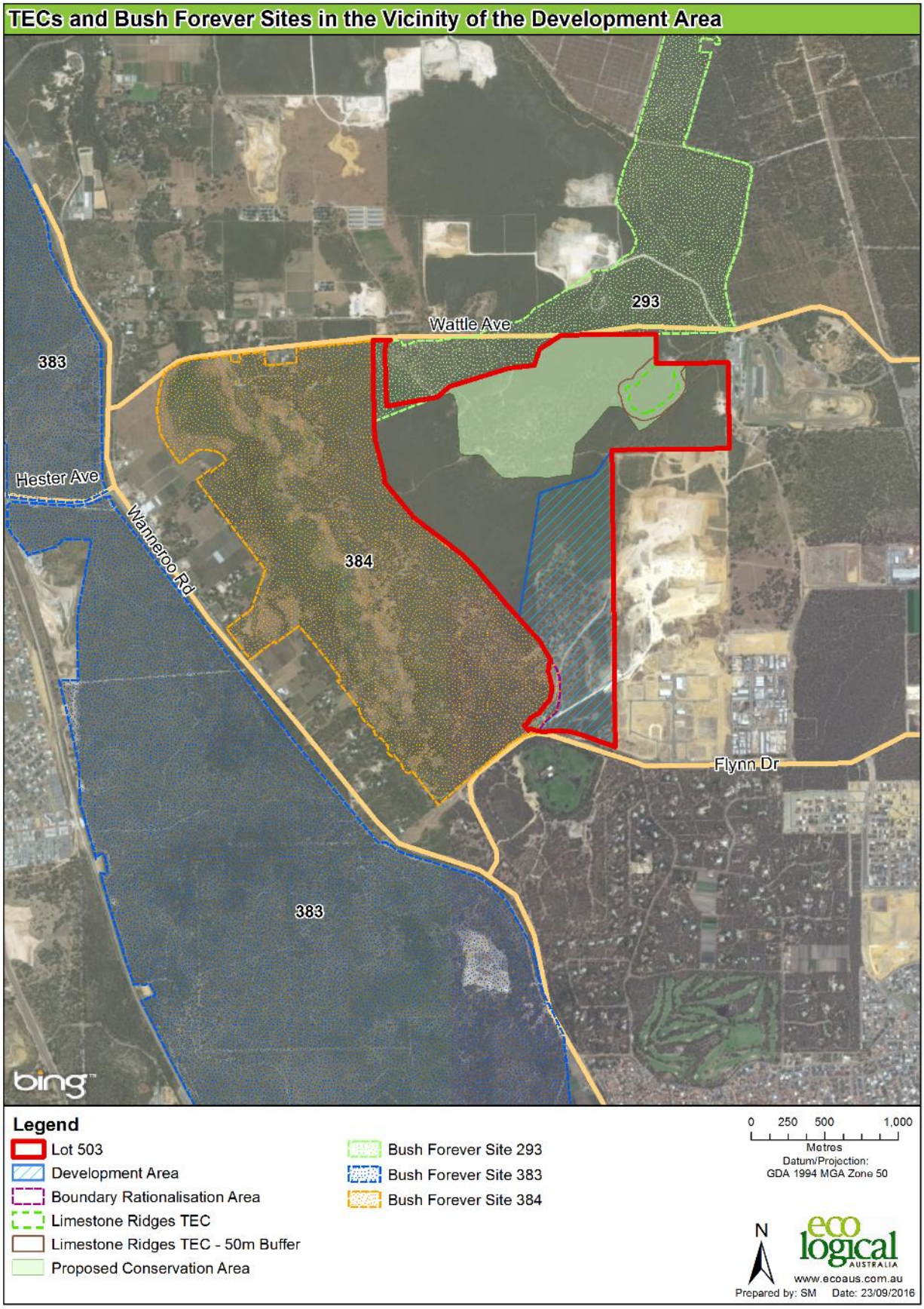

Figure 5: State-listed TECs and Bush Forever Sites in the vicinity of the Development Area

4.3 Terrestrial fauna

A level 2 vertebrate fauna survey was undertaken by ELA in March/April 2012 to assess the vertebrate fauna assemblages and any conservation significant species present within Lot 701 and the remaining portion of Bush Forever Site 384 located to the west of Lot 701 (ELA 2012; Appendix E).

Relevant survey limitations relate mainly to survey timing, which was outside the optimal surveying period of spring-early summer for the Swan Coastal Plain. Due to very dry, cool conditions some species of reptile, amphibian and birds may not have been recorded due to lower activity or seasonal absence. However, analysis of capture data and species observed indicates that the survey methodology recorded the majority of species detectable at the time of the survey.

4.3.1 Terrestrial fauna habitats

Two main fauna habitat types were defined by ELA (2012) in Lot 701; 'Mixed woodlands' (*Eucalyptus*/*Corymbia*/*Banksia*) and 'Fringing vegetation associated with Neerabup Lake'. Mixed woodlands is the only habitat type that occurs within the Development Area. This fauna habitat type is common throughout Lot 503 and the vicinity.

Carnaby's Black Cockatoo moderate to high value habitat has been mapped for the Development Area (**Figure 6**), and is described in detail in Section 4.3.4.

4.3.2 Terrestrial fauna species

The level 2 vertebrate fauna survey undertaken by ELA (2012) recorded a total of 61 native vertebrate fauna species within Lot 701, including one amphibian, 18 reptile, 37 bird and four mammal species. Introduced fauna observed included the European Mouse (*Mus musculus*), Cat (*Felis catus*), Rabbit (*Oryctolagus cuniculus*), Red Fox (*Vulpes vulpes*), Laughing Turtle-Dove (*Streptopelia senegalensis*), Laughing Kookaburra (*Dacelo novaeguineae*) and Rainbow Lorikeet (*Trichoglossus haematodus*).

4.3.3 Threatened and Priority fauna

One Threatened species listed under the WC Act, Carnaby's Black Cockatoo, has been recorded in Lot 701. This bird species was observed in groups of up to approximately 100 individuals (ELA 2009). Carnaby's Black Cockatoo is listed as Endangered under both the WC Act and EPBC Act. One Priority 4 species was recorded within the Development Area, the Western Brush Wallaby (*Macropus irma*). The Rainbow Bee-eater (*Merops ornatus*; listed as a Migratory bird protected under an international agreement under the WC Act), was recorded within Lot 503, although outside the Development Area. However, it is very likely this species would also utilise the Development Area for foraging and potentially breeding, as suitable sandy habitat is available.

The Parks and Wildlife and WAM NatureMap database (Parks and Wildlife 2007-2016) and the EPBC Act PMST were searched for fauna that have the potential to utilise the habitats present within the Development Area (Appendix B). A 5 km buffer of the coordinates -31.67758° S 115.77292° E was used for both searches. A list of 23 conservation listed fauna species (species listed under the WC Act or as Priority species) was generated (**Table 5**); with an additional species, the Black-striped Snake (*Neelaps calonotos*), included as it was identified in a previous survey report as likely to occur in Lot 701 (ELA 2012). This list includes species that are now considered to be locally extinct (e.g. Chuditch (*Dasyurus geoffroii*) and Malleefowl (*Leipoa ocellata*)). A likelihood of occurrence assessment was undertaken (**Table 5**, criteria in Appendix A), and it was determined that two species were likely to occur within the Development Area; the Priority 3 Black-striped Snake and the Priority 4 Quenda (*Isoodon obesulus* subsp. *fusciventer*).

An additional four species were considered to have the potential to occur, given the available habitat and proximity of nearby records:

- *Hylaeus globuliferus* (bee) (Priority 3);
- *Austrosaga spinifer* (cricket) (Priority 3);
- *Falco peregrinus* (Peregrine Falcon) (Specially Protected under the WC Act); and
- *Apus pacificus* (Fork-tailed Swift) (Migratory under the WC Act and EPBC Act).

It should be noted that the Indian Ocean and associated near-coastal habitats are approximately 5 km to the west of Lot 503. Migratory birds that frequent the ocean and beach may occasionally fly over the Development Area but would not utilise the habitats in this area.

Table 5: Likelihood of occurrence assessment for conservation listed terrestrial fauna species

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Apus pacificus (Fork-tailed Swift)	IA	IA	Potential
Ardea modesta (Eastern Great Egret)	IA	IA	Unlikely
Austrosaga spinifer (cricket)	P3	-	Potential
Calidris acuminata (Sharp-tailed Sandpiper)	IA	IA	Unlikely
Calidris ferruginea (Curlew Sandpiper)	VU/IA	CR/IA	Unlikely
Calidris ruficollis (Red-necked Stint)	IA	IA	Unlikely
Calyptorhynchus baudinii (Baudin's Cockatoo)	EN	EN	Unlikely
Calyptorhynchus latirostris (Carnaby's Black Cockatoo)	EN	EN	Recorded
Dasyurus geoffroii (Chuditch)	VU	VU	Unlikely
Falco peregrinus (Peregrine Falcon)	OS	-	Potential
Hylaeus globuliferus (bee)	P3	-	Potential
Isoodon obesulus subsp. *fusciventer* (Quenda)	P4	-	Likely
Leipoa ocellata (Malleefowl)	VU	VU	Unlikely
Macropus irma (Western Brush Wallaby)	P4	-	Recorded
Merops ornatus (Rainbow Bee-eater)	IA	-	Recorded
Motacilla cinerea (Grey Wagtail)	IA	IA	Unlikely
Neelaps calonotos (*Black-striped Snake)*	P3	-	Likely
Numenius madagascariensis (Eastern Curlew)	VU/IA	CR/IA	Unlikely
Oxyura australis (Blue-billed Duck)	P4	-	Unlikely
Pandion haliaetus (Osprey)	IA	IA	Unlikely
Plegadis falcinellus (Glossy Ibis)	IA	IA	Unlikely
Synemon gratiosa (Graceful Sunmoth)	P4	-	Unlikely

Species	Conservation status*		Likelihood of occurrence
	WC Act / Parks and Wildlife	EPBC Act	
Tringa hypoleucos (Common Sandpiper)	IA	IA	Unlikely
Tringa nebularia (Common Greenshank)	IA	IA	Unlikely

*Parks and Wildlife 2015a, DoEE 2016b

CR = listed as Critically Endangered under the EPBC Act or WC Act.

EN = listed as Endangered under the EPBC Act or WC Act.

VU = listed as Vulnerable under the EPBC Act or WC Act.

IA = listed as Migratory (protected under an international agreement) under the EPBC Act or WC Act.

OS = listed as Specially Protected under the WC Act.

P = listed as Priority by Parks and Wildlife 2015a.

4.3.4 Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*)

Carnaby's Black Cockatoo is endemic to south-west WA with populations extending from the Murchison River to Esperance, and inland to Coorow, Kellerberrin and Lake Cronin. The species feeds on seeds, nuts and flowers of a variety of native species including *Banksia, Hakea, Grevillea, Allocasuarina, Eucalyptus* and *Corymbia*. Carnaby's Black-Cockatoos have also been recorded feeding extensively on seeds from the cones of exotic pines (*Pinus* spp.; Shah 2006). Pine plantations in the coastal zone are now considered important feeding areas in the non-breeding season (Cale 2003).

The species is a post-breeding nomad, tending to move west to coastal areas with its young after breeding (late spring to mid-winter), particularly to the Swan Coastal Plain. A small number of birds remain resident on the Swan Coastal Plain all year and have been recorded breeding in a number of areas including Gingin, Yanchep, Mandurah, and Bunbury. Like most cockatoo species, Carnaby's Black Cockatoo is gregarious and is usually seen in small groups and will occasionally congregate in large flocks comprised of hundreds or, exceptionally, thousands of birds. During the breeding season, adults nest as solitary pairs.

Carnaby's Black Cockatoo nest in hollows of smooth-barked eucalypts, especially Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*), but nests have also been found in other eucalypts, including York Gum (*Eucalyptus loxophleba*), Flooded Gum (*Eucalyptus rudis*), Tuart (*Eucalyptus gomphocephala*) and the rough-barked Marri (*Corymbia calophylla*). On the Swan Coastal Plain, most nests are in Tuart trees (Johnstone & Storr 1998). Breeding birds forage no more than approximately 20 km from their nesting hollows during the breeding season, and therefore having sufficient foraging and water resources close to breeding areas is critical to their breeding success (Saunders 1980).

Approximately 17,000 ha of Carnaby's Black Cockatoo habitat has been recorded within the City of Wanneroo, of which 0.5% is located within the Development Area. Yanchep National Park, approximately 17 km to the north of the Development Area, contains some of the northern Swan Coastal Plain's highest quality foraging habitat for Carnaby's Black Cockatoo and breeding has been recorded in the park (Department of Planning 2011).

ELA undertook a Carnaby's Black Cockatoo breeding habitat assessment in 2014; the assessment report (ELA 2014) is attached in Appendix C (Appendix D in ELA 2016). Carnaby's Black Cockatoo moderate and high value habitat was mapped in the Development Area and vicinity (**Figure 6**). The Development Area contains 69.2 ha of foraging habitat (44.6 ha of high value foraging habitat and 24.6 ha of moderate value foraging habitat, including 0.03 ha within the Boundary Rationalisation Area). A total of 31.9 ha of

potential breeding habitat (ELA 2014, ELA 2016) is located within the Development Area (including 3.1 ha within the Boundary Rationalisation Area). All but 10.2 ha of the 31.9 ha of potential breeding habitat overlaps with foraging habitat. Only 0.15 ha (0.5%) of the 31.9 ha of potential breeding habitat is considered to be of high value (13.6 potential breeding trees per hectare, or a total loss of approximately two trees); the remaining 99.5% is low value potential breeding habitat (8.4 potential breeding trees per hectare). Based on the density of potential breeding trees, the estimated total number of potential breeding trees to be lost due to the clearing of the Development Area will be approximately 269.

The Development Area's primary attribute for Carnaby's Black Cockatoo is its foraging value; the potential breeding habitat is mostly low value, with no actual breeding having been recorded on site. The closest breeding records are located at Yanchep National Park and in remnant vegetation approximately 16 km to the north-east (Department of Planning 2011).

4.3.5 Western Brush Wallaby (*Macropus irma*)

The Western Brush Wallaby is found in the south-west coastal region of WA where populations are particularly centralised near the Swan River and the dry sclerophyll Jarrah forests to the east of Perth (Groves 2005). The species is found in some areas of mallee and heathland but is generally uncommon in wet sclerophyll forest further south. It prefers tall open forests that supply adequate grazing and open, seasonally damp flat areas with low grasses and open scrubby brushes that allow it to move freely and speedily.

The Western Brush Wallaby is a crepuscular animal, unlike many macropod species, and is active mainly at dusk and dawn (Menkhorst and Knight 2009). It is herbivorous and feeds on many plant species, in particular on *Carpobrotus edulis, *Cynodon dactylon*, and *Nuytsia floribunda*. Western Brush Wallabies are commonly recorded around the Swan Coastal Plain in suitable habitat. Scats identified as most likely to be from this species were recorded during the fauna survey (ELA 2012) and suitable habitat for grazing and breeding occurs throughout much of Lot 503. The Development will result in the loss of Western Brush Wallaby habitat. During clearing, it is likely that individuals will move away into similar habitat adjacent to the Development Area. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation.

4.3.6 Rainbow Bee-eater (*Merops ornatus*)

Rainbow Bee-eaters are commonly found during the summer throughout most of southern Australia excluding Tasmania (Barrett et al. 2003). They migrate north at the onset of cooler weather in Autumn, spending the winter in northern Australia, New Guinea, and some of the southern islands of Indonesia. They occur in a wide range of habitats including open woodlands, shrublands, beaches, dunes, cliffs, mangroves, woodlands and parks and private gardens (Boland 2004).

Rainbow Bee-eaters eat insects, mainly bees and wasps, as well as dragonflies, beetles, butterflies and moths. They gather in small flocks before returning to summer breeding areas after over-wintering in the north (aside from resident northern populations). Both males and females select a suitable nesting site in a sandy bank and dig a long tunnel leading to a nesting chamber, which is often lined with grasses. Both parents incubate the eggs and both feed the young, sometimes with the assistance of auxiliaries (Boland 2004). Nest holes are often located in disturbed areas such as bare sand batches and road sidings.

Rainbow Bee-eaters have been previously recorded within Lot 503, and it is likely they are present within the Development Area. While no breeding burrows have been identified, the sandy substrate available provides potentially suitable nesting areas. Vegetation clearing will result in a loss of habitat, and potential loss of young in nests, depending on the time of year the clearing is undertaken. As this species is aerial

and migratory, it will be able to move away from disturbances and is likely to find alternative foraging and breeding sites in the nearby remaining vegetation.

4.3.7 Black-striped Snake (*Neelaps calonotos*)

The Black-striped Snake occurs on the coastal plain and coastal dune formations supporting low shrublands, heaths, and *Banksia* woodlands between Mandurah and Cataby (Bush et al. 2010). It feeds primarily on burrowing skinks (genus *Lerista*). It is a seasonal breeder, like most reptiles in the south-west of WA. Little information has been documented on its ecology; however, it is known to be abundant in many bushland reserves in Perth such as Bold Park (Bush et al. 2010).

Extensive areas of *Banksia* woodland with mixed shrubs and low heath within Lot 503 are considered suitable habitat for this species. There are a number of records of the species on Bassendean sand formations on the northern Swan Coastal Plain (Bush et al. 2010). The closest record on NatureMap (Parks and Wildlife 2007-2016) is 5.8 km east of the Development Area.

Clearing within the Development Area will result in a loss of Black-striped Snake habitat, and potentially mortality and forced relocation away from the Development Area, if the species is present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation. A fauna handler will be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

4.3.8 Quenda (*Isoodon obesulus* subsp*. fusciventer*)

The Quenda is widely but patchily distributed through south-western WA, from around Guilderton to east of Esperance and inland to Hyden. This species prefers low, dense vegetation such as heath and swampy habitat and is often associated with forests, woodland, shrubland and riparian areas (Department of Environment and Conservation (DEC) 2012). Its foraging often extends into adjacent, more open grasslands, pastures, or areas subject to regular burning (DEC 2012). The species is nocturnal and sleeps during the day in a nest of heaped vegetation with a hollow centre. The nest is usually concealed in a depression or amongst dense vegetation or ground litter. Food is located by digging conical holes with the forefeet and probing with the snout, and includes insects and larvae, worms, bulbs, berries and small vertebrates (Menkhorst and Knight 2009).

This species is commonly recorded around the Swan Coastal Plain, and is considered likely to occur in the Development Area, as suitable habitat is present. Vegetation clearing will result in a loss of habitat for the species, and potentially mortality and forced relocation away from the Development Area, if the species is present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation. A fauna handler will be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

4.3.9 Bee sp. (*Hylaeus globuliferus*)

The native bee *Hylaeus globuliferus* has a distribution that extends from the south coast near Fitzgerald River National Park, to the Mid West near Dongara (Parks and Wildlife 2007-2016). It has been recorded near the Development Area; the closest record on NatureMap is less than 2 km from the Development Area (Parks and Wildlife 2007-2016). This species of native bee is known to feed on the flowers of *Adenanthos cygnorum*, but has also been collected from the flowers of *Grevillea cagiana, Grevillea* sp. aff. *hookeriana*, *Banksia grossa* and *Banksia attenuata* (Western Wildife 2008, Parks and Wildlife 2007-2016). Due to the the proximity of nearby records and as *Banksia attenuata* is present in the Development Area, this species may be present. Vegetation clearing will result in loss of habitat and potential mortality of individuals of the species, if present within the Development Area. Suitable habitat for the species is also present within the retained vegetation within Lot 503, and within the adjacent Bush Forever Sites.

4.3.10 Cricket sp. (*Austrosaga spinifer*)

The cricket *Austrosaga spinifer* is known from heath habitats from Perth to Cervantes (Western Wildlife 2008). There are only four records of this species on NatureMap; two of the records are from Neerabup National Park, less than 2 km west of the Development Area (Parks and Wildlife 2007-2016). Given its habitat preference, and the proximity of nearby records, this species may potentially occur in the Development Area. Vegetation clearing will result in loss of habitat and potential mortality of individuals of the species, if present within the Development Area. Suitable habitat for the species is also present within the retained vegetation within Lot 503, and within the adjacent Bush Forever Sites.

4.3.11 Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is a large bird of prey. NatureMap (Parks and Wildlife 2007-2016) identifies the Peregrine Falcon as occurring throughout WA, from the south near Albany to the north near Kununurra. Whilst considered uncommon, it is widespread across Australia, and occurs across all continents (Parks and Wildlife Service Tasmania (PaWST) 2011). The Peregrine Falcon occupies a variety of habitats including inland cliffs, rocky outcrops and gorges, coastal cliffs and islands, open woodlands near water, and can also be found nesting on ledges of high city buildings (PaWST 2011).

The Peregrine Falcon has been recorded in close proximity to the Development Area, and is considered to potentially occur in the Development Area. However, it is likely to be an infrequent visitor and is not considered to be dependent on the habitat in the Development Area.

4.3.12 Fork-tailed Swift (*Apus pacificus*)

Fork-tailed Swifts are nomadic and typically respond to broad-scale weather pattern changes. They are attracted to thunderstorms and cyclonic disturbances where they can be seen in flocks hawking insects from the storm fronts with numbers ranging from a few individuals to flocks of up to 2,000 birds. In WA, the Fork-tailed Swift is considered uncommon to moderately common near the north-west, west and south-east coasts, common in the Kimberley and rare or scarce elsewhere (Johnstone *et al.* 1998). They live almost exclusively in the air and rarely land (Simpson et al. 2004). This species may hunt for insects over the site on a seasonal basis, but is unlikely to utilise it for roosting as breeding occurs outside Australia.

Figure 6: Moderate and high value Carnaby's Black Cockatoo habitat in the vicinity of the Development Area

5 Social environment

5.1 Tenure

The Development Area is located within freehold land owned by LandCorp. The site is predominantly intended for industrial use, in line with the current MRS zoning of 'Industrial', and the 'Industrial Development' zoning under the Wanneroo District Planning Scheme No 2 (DPS 2). The Development Area is within the boundaries of the larger NIA, which is approximately 1000 ha of general industrial land in the north-west corridor of the Perth metropolitan area.

The 3.6 ha Boundary Rationalisation Area within the Development Area is currently considered part of Bush Forever Site 384 and is zoned as 'Parks and Recreation'; however, LandCorp will request an amendment to the MRS to alter the zoning to 'Industrial'.

5.2 Population demographics

The Development Area is located in Neerabup, in the City of Wanneroo, approximately 32 km north of the Perth Central Business District and 9 km north-east of Joondalup. The City of Wanneroo covers an area of 68,561 ha and has a population of approximately 198,689 people (August 2016 forecast; City of Wanneroo 2016). A total of 38.5% of residents in 2011 were aged between 25-49 years, with the remaining 29.0% and 32.5% aged between 0-24 years and 50+ years respectively.

In the City of Wanneroo, construction is the largest employer, generating 11,126 local jobs in 2014/15 (21.7% of all workers). Other major industries (City of Wanneroo 2016) include retail trade (6,657 people or 13.0%), education and training (6,518 people or 12.7%) and manufacturing (5,890 people or 11.5%).

5.3 Heritage

An Aboriginal heritage analysis of Lot 701 Flynn Drive was undertaken by R. & E. O'Connor Pty Ltd (2012). The objective of the analysis was to establish whether there are any known Aboriginal heritage constraints which would be required to be taken into consideration in advance of development of the site.

There are no registered Aboriginal sites within the Development Area, however there are two sites located in the vicinity of the Development Area. These are Registered Aboriginal Heritage Site Number 4404 ('Orchestra Shell Cave') and Other Heritage Place Number 3693 ('Neerabup Lake'). These Registered Aboriginal Heritage Sites are contained within Bush Forever Site 384 and found on land designated as 'Parks and Recreation', and therefore will not be affected by the Development.

6 Assessment against the Ten Clearing Principles

An assessment of the proposed vegetation clearing against the ten native vegetation Clearing Principles contained in Schedule 5 of the EP Act is provided in Section 6.1-6.10. Based on the assessment of the environmental values of the Development Area, it is deemed that the Development is unlikely to be at variance with eight of the ten Clearing Principles. However, the Development could be considered to potentially be at variance to Principles (a) and (b).

6.1 Comprises high level of biological diversity

Principle (a): Native vegetation should not be cleared if it comprises a high level of biological diversity.

The vegetation in the Development Area is a mixture of *Eucalyptus* woodlands and *Banksia* dominated heathlands, with six vegetation communities present with the Development Area. The most widespread vegetation communities were EmBaBmAfW (*Eucalyptus marginata*, *Banksia attenuata*, *B. menziesii* and *Allocasuarina fraseriana* Woodland) and BsOH (*Banksia sessilis* Open Heath), comprising 31.7% and 26.5% of the Development Area respectively.

A total of 153 taxa of terrestrial vascular flora representing 102 genera and 46 families have been recorded within what was Lot 21 (437 ha), including 36 weed species. As a comparison, Bennett Environmental Consulting (2000) conducted a previous flora survey in Lot 21, and recorded 121 vascular flora species from the same area. A 325 ha survey conducted in other areas of the NIA (ATA Environmental 2007) recorded 136 taxa, including 19 weed species.

One Priority 3 flora species was recorded in Lot 503 outside the Development Area. A further two Priority 3 species were considered to potentially occur in the Development Area, but if present, they are unlikely to occur in high numbers, as they were not observed during the Ecoscape (2009) survey.

A total of 73.6% of the Development Area is in Good to Excellent condition, with the remaining 26.4% in Degraded or Completely Degraded condition (**Table 4**). Of the 36 weed species recorded in Lot 701, two are classified as Declared Pests under s22(2) of the BAM Act; **Asparagus asparagoides* (Bridal Creeper) and **Echium plantagineum* (Patterson's Curse). **Asparagus asparagoides* is also a Weed of National Significance (WoNS).

The fauna habitat that occurs within the Development Area ('Mixed woodlands' habitat type) is common on the Swan Coastal Plain, and is well represented outside the Development Area in the locality. A level 2 vertebrate fauna survey (ELA 2012) covering approximately 715 ha (but primarily focusing on the 437 ha Lot 701) recorded a total of 61 native vertebrate fauna species, including one amphibian, 18 reptiles, 37 birds and four mammals. Eight species of introduced fauna were recorded during the ELA (2012) survey. The number of species recorded during the ELA (2012) survey is comparable to a similar scale of survey (325 ha) conducted nearby (ATA Environmental 2007), which found a total of 63 native vertebrate fauna species, including two amphibians, 17 reptiles, 42 birds and two mammals.

Three conservation listed fauna species have been recorded in the Development Area or in very close proximity; Carnaby's Black Cockatoo, Western Brush Wallaby and Rainbow Bee-eater. A further two species are considered likely to occur (Black-striped Snake and Quenda), and four species are considered to have the potential to occur (Peregrine Falcon, Fork-tailed Swift, *Hylaeus globuliferus* and *Austrosaga spinifer*).

The fauna, flora and vegetation of the Development Area could be considered to potentially have a high level of biodiversity, although it is consistent with surveys undertaken in nearby vegetation. However, none of the mapped vegetation communities or fauna habitats found within the Development Area are restricted and all extend well beyond the boundaries of the Development Area. There are no known Rare or Priority flora records located in the Development Area and the number of conservation listed fauna species occurring or likely to occur in the Development Area is not considered high. Therefore, while the Development could potentially be considered to be at variance with this Principle, the Development Area is not considered to contain an unusually high level of biological diversity or significant species for this region.

6.2 Potential impact to any significant habitat for fauna indigenous to Western Australia

Principle (b): Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

A total of 61 native vertebrate fauna species have been recorded within Lot 701 and the vicinity, including one amphibian, 18 reptiles, 37 birds and four mammals (ELA 2012). Of these terrestrial fauna species, three are conservation listed; Carnaby's Black Cockatoo, Western Brush Wallaby and Rainbow Bee-eater. A further two species are considered likely to occur (Black-striped Snake and Quenda), and four species are considered to have the potential to occur (Peregrine Falcon, Fork-tailed Swift, *Hylaeus globuliferus* and *Austrosaga spinifer*).

The Development will cause the destruction of actual or potential habitat for these conservation listed species. Clearing will potential cause mortality or forced relocation away from the Development Area of individuals, if present. Vegetation clearing will be undertaken in stages to facilitate the movement of fauna species into the surrounding vegetation, and a fauna relocation program will be undertaken prior to commencement of each stage. A fauna handler will also be present at all times during vegetation clearing to facilitate the capture and relocation of fauna.

The Development Area contains 69.2 ha of Carnaby's Black Cockatoo foraging habitat (44.6 ha of high value and 24.6 ha of moderate value) and 31.8 ha of potential breeding habitat (0.2 ha of moderate value and 31.6 ha of low value). LandCorp has proposed several avoidance and mitigation measures to reduce the impact to the Carnaby's Black Cockatoo and to maximise the potential for the undeveloped portions of the Lot 503 and the adjacent Bush Forever Sites to continue to be utilised by Carnaby's Black Cockatoo during and following development (see Section 7).

The residual impact to Carnaby's Cockatoo having applied avoidance and mitigation measures is loss of 69.2 ha of known foraging habitat of moderate to high value. As there is still a significant residual impact to Carnaby's Black-Cockatoo, LandCorp is currently negotiating with DoEE regarding offsets for the loss of the foraging habitat within the Development Area; details of the proposed offset strategy are outlined in Section 7 and elaborated further in ELA 2015a (Appendix F) and ELA 2016 (Appendix C). Consequently, as there is significant residual impact to Carnaby's Black Cockatoo foraging habitat, the Development could be considered to be at variance to this Principle.

6.3 Potential impact to any rare flora

Principle (c): Native vegetation should not be cleared if it includes, or is necessary for the continued existence of Rare flora.

No Rare flora species have been recorded in the Development Area (Ecoscape 2009) and the Development is therefore considered to not be at variance with this Principle.

6.4 Presence of any threatened ecological communities

Principle (d): Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of a threatened ecological community (TEC).

An Endangered state-listed TEC, Limestone ridges (SCP 26a), is present within north-eastern portion of Lot 503 outside the Development Area. This 7.63 ha TEC, along with a buffer and a larger portion of high quality vegetation, will be protected within a 'conservation area' proposed within Lot 503.

As there are no state-listed TECs present in the Development Area, the Development is therefore not at variance with this Principle.

6.5 Significance as a remnant of native vegetation in the area that has been extensively cleared

Principle (e): Native vegetation should not be cleared if it is significant as remnant vegetation in an area that has been extensively cleared.

The Development Area intersects two vegetation associations defined by Shepherd et al. (2002):

- Spearwood 6 (e2,4Mi): Medium woodland; Tuart and Jarrah (19%); and
- Spearwood 949 (bLi): Low woodland; *Banksia* (81%).

The Development Area contains 0.13% of the current extent of Spearwood 6 (e2,4Mi), and 1.11% of the current extent of Spearwood 949 (bLi) within the Swan Coastal Plain sub-region (Government of WA 2016). A total of 13,335.50 ha (24.88%) of Spearwood 6 and 6,797.69 ha of Spearwood 949 (57.73%) remain respectively within this sub-region.

The State Government is committed to the National Objectives and Targets for Biodiversity Conservation (Commonwealth of Australia 2001) that includes a target that prevents a clearance of ecological communities with an extent below 30% of that present prior to European settlement. The vegetation association Spearwood 6 is below this 30% target level. However, the EPA (2006) recognises the Perth Metropolitan Region as a constrained area, providing for the reduction of the vegetation associations to a minimum of 10% of the pre-European extent. The Development Area is located within the Perth Metropolitan Region, and intersects vegetation communities that have over 10% of the pre-European extent. As the Development will not reduce the extent of these vegetation communities below 10% of their pre-European extent, the Development is therefore considered to not be at variance with this Principle.

6.6 Impact on any watercourses and/or wetlands

Principle (f): Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

There are no watercourses or wetlands located within the Development Area. The closest water feature is the ephemeral Neerabup Lake, located 370 m to the east of Lot 503 at its closest point. As the Development will not have an impact to any watercourses or wetlands, it is not at variance with this Principle.

6.7 Potential to cause appreciable land degradation

Principle (g): Native vegetation should not be cleared if the clearing of vegetation is likely to cause appreciable land degradation.

The Development Area will be cleared progressively over approximately five years in accordance with the requirements for extraction of the limestone resource. Clearing within the Development Area will occur as access to the resource is required. LandCorp proposes to manage potential impacts associated with clearing and construction, such as land degradation from erosion, sedimentation and spread of weeds, through a Construction Environmental Management Plan (CEMP). A 6 m fire break will run the length of the entire western and northern Development Area boundaries. A 20 m road reserve will also be located next to the batter adjacent to the Bush Forever Site; where the road reserve is not present, the batter width will be greater (>45 m). The Development will therefore be separated from the remaining vegetation outside the Development Area by a distance of 50-60 m. This distance, along with the height of the batter, will reduce the risk of indirect impacts to vegetation outside the Development Area. Furthermore, the Development Area boundary will be fenced. Specific outcomes-based conditions will be included as part of the CEMP, with related management actions, monitoring and corrective actions.

The Extractive Industry Licence for the Development Area is conditional on various environmental and rehabilitation conditions as required by the Department of Mines and Petroleum; these conditions will also be reflected within the CEMP. The requirements of the CEMP will be included in the contract with the limestone extraction contractor. The contract will also address management of potential environmental impacts associated with other requirements during construction and operation of the quarry (e.g. erosion management, fauna relocation, storage and handling of chemicals and hydrocarbons, and groundwater and surface water quality management).

The occurrence of 36 weed species within Lot 701 has implications for the spread of these weeds. This risk will be managed by implementing weed management and hygiene measures during vegetation clearing and construction to minimise the spread of weeds within or outside the Development Area. The CEMP will also include measures to prevent the introduction of weeds to the Development Area. Annual weed monitoring (including mapping) in the Development Area within 50 m of the cleared area at the time of survey (up to the point where the clearing meets the batter or road reserve with the Development Area) is proposed. Where the clearing boundary is adjacent to Bush Forever Site 384, monitoring will be undertaken as part of on-going monitoring activities associated with the rehabilitation of this area (see ELA 2015c). Additional monitoring and/or corrective actions will be implemented in the event of a reported incident (for example, the observed presence of a new weed species adjacent to the cleared area boundary or in the cleared area of the Development Area).

As the Development is not anticipated to cause appreciable land degradation, the Development is therefore considered to not be at variance with this Principle.

6.8 Potential to impact on the environmental values of adjacent or nearby conservation areas

Principle (h): Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Bush Forever Sites 384 (Neerabup Lake and Adjacent Bushland Neerabup) and 293 (Shire View Hill and Adjacent Bushland, Nowergup / Neerabup) are located adjacent to the western and northern boundaries of Lot 503. Bush Forever Site 383 (Neerabup National Park) is located to the west of Bush Forever Site 284, separated by Wanneroo Road (**Figure 5**).

The Development is not anticipated to have a significant impact on the adjacent Bush Forever Sites. Due to ground level differences between the Development Area and the remaining vegetation (including the Bush Forever Sites), the batters between these two areas will act as a physical buffer. The Development Area boundary will also be fenced and separated from the industrial estate by a 20 m road reserve that

together with the batter and fire break, will form a buffer greater than 50 metres in width when constructed. The potential direct and indirect impacts to the Bush Forever Sites (weeds, land degradation, inadvertent clearing of vegetation, access by members of the public) associated with clearing and construction will be managed through a CEMP.

The Development is not at variance with this Principle as the Development is not anticipated to have a significant impact to the environmental values of adjacent or nearby conservation areas.

In addition, LandCorp is committed to a comprehensive offsets strategy focussed on addressing significant residual impacts to Carnaby's Black Cockatoo; two of these offsets will directly benefit the Bush Forever Sites, resulting in greater protection and enhanced vegetation condition within Bush Forever Sites 293 and 384. Direct Offset 2 (see Section 7.2) will result in the rehabilitation and management of portions of the two Bush Forever Sites within what was Lot 701 (now located within Lot 502 on DP 409677). The aim of the rehabilitation works is to improve the overall condition and environmental function of the Bush Forever Sites. Direct Offset 1 (see Section 7.1) will alter the of tenure and zoning of the portion of Bush Forever Site 293 within Lot 502, from 'Industrial' to 'Parks and Recreation', giving this area of bushland protection in perpetuity from future clearing. It is intended that in the future, Bush Forever Sites 293 and 384 within Lot 502 will be managed as a single unit, in conjunction with the remainder of Bush Forever Site 384, to create a large consolidated conservation area under a single management regime, managed by Parks and Wildlife.

6.9 Potential deterioration in the quality of surface or underground water

Principle (i): Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

There are no watercourses or wetlands located within the Development Area. The closest water feature is the ephemeral Neerabup Lake (Resource Enhancement Category Wetland), located 370 m to the east of Lot 503 at its closest point. A wetland buffer of 50 m is recommended to protect wetland values and functions of Resource Enhancement Category wetlands (Western Australian Planning Commission 2005). Given the distance to the closest surface water body, the Development is not considered likely to cause deterioration to the quality of the surface water in the vicinity of the Development Area.

The depth to groundwater within the Development Area varies from 32 m in south-west to 52 m in the north-east (Department of Water 2016). The soils of the Development Area are porous and are derived from Tamala Limestone, hence it is likely that surface water rapidly infiltrates the soil although large rainfall events are likely to result in surface run off that flows towards Neerabup Lake (Coffey Environments 2009). Implementation of the CEMP will ensure protection of groundwater and surface water quality during vegetation clearing and construction. The Development is considered unlikely to be at variance with this Principle.

6.10 Potential of clearing to cause, or exacerbate, the incidence of flooding

Principle (j): Native vegetation should not be cleared if the clearing of vegetation is likely to cause, or exacerbate, the incidence of flooding.

The Development is considered unlikely to cause or exacerbate the incidence of flooding. Lot 503 is gently undulating, and generally slopes downward toward the south-west, reducing the chance of water pooling. There are no watercourses or wetlands located within the Development Area. The soils of the Development Area are porous and are derived from Tamala Limestone, hence it is likely that surface water would rapidly infiltrate the soil rather than form sheet flow, with the exception of during large rainfall

events (Coffey Environments 2009). The Development is not anticipated to significantly alter drainage flows or overland sheet flow and is therefore considered to not be at variance with this Principle.

7 Proposed EPBC Act Offsets for Carnaby's Black Cockatoo

LandCorp has proposed several avoidance and mitigation measures to minimise impacts to Carnaby's Black Cockatoo during and following development. Implementation of mitigation measures will span the life of the Development (including construction) and include the retention of habitat within Lot 503 outside the Development Area and progressive clearing of vegetation over a period of five years in accordance with the requirements for extraction of the limestone resource. A CEMP will be developed to manage potential impacts associated with clearing and construction. A management target of zero off-site direct or indirect impacts is proposed. The CEMP will specify management measures (controls) within the Development Area to avoid off-site impacts, and will outline monitoring both within the site to ensure management actions are implemented properly and off-site to ensure the management target of zero off-site impacts is being achieved during construction activities and quarry operations. Trigger levels for incidents and corrective actions will be included in the CEMP. An emphasis will be placed on effective and proactive adaptive management.

The extent of impact to Carnaby's Black Cockatoo foraging habitat from the Development is the loss of 69.2 ha of foraging habitat (44.6 ha of high value foraging habitat and 24.6 ha of moderate value foraging habitat). A total of 31.9 ha of potential breeding habitat is also located within the Development Area (with over 68% of this habitat overlapping with foraging habitat). The majority (99.5%) of this potential breeding habitat is considered to be low value potential breeding habitat, with no significant impact to the species from the clearing of this vegetation. The residual impact to Carnaby's Black Cockatoo that LandCorp proposes to offset, having applied avoidance and mitigation measures, is loss of 69.2 ha of known foraging habitat.

LandCorp is committed to a comprehensive offsets program. There are three direct offsets proposed:

- Direct Offset 1: The change in tenure of part Bush Forever Site 293 from 'Industrial' zoned land to conservation tenure;
- Direct Offset 2: The rehabilitation and management of part Bush Forever Site 293 and 384; and
- Direct Offset 3: The acquisition of offsite land that contains Carnaby's Black Cockatoo habitat for management by Parks and Wildlife.

The information provided in Sections 7.1-7.3 is a summary from the proposed offsets strategy provided in the Additional Information Request (ELA 2016) and further elaborated in the Offset Proposal (ELA 2015a), and is currently subject to further negotiation with DoEE. The EPBC Act Offsets Calculator was used to determine the value of the proposed offsets (see ELA 2015a); these values are currently under discussion with DoEE and are subject to change.

7.1 Direct Offset 1: Transfer of Industrial zoned land to conservation tenure

The first component of the Offsets Proposal (ELA 2015a) is the retention of approximately 34.1 ha of Bush Forever Site 293 within Lot 502 (previously Lot 701). This area is currently zoned as 'Industrial' and provides foraging and potential breeding habitat for Carnaby's Black-Cockatoo. This portion of Lot 701 was designated as a Strategic Negotiated Planning Solution (NPS) implementation category within the Bush Forever program. This category of NPS intends for a site outcome that balances the needs of conservation and development and pre-supposes an outcome where portions of the Bush Forever Site will be developed.

7.2 Direct Offset 2: Rehabilitation Strategy

A Rehabilitation Strategy (ELA 2015b; see Appendix C) is proposed to be implemented to increase the long-term value and viability of retained habitat in the portion of Bush Forever Sites 293 and 394 that were within Lot 701 (now within Lot 502). The Rehabilitation Strategy aims to improve the overall condition and environmental function of these areas, and to create, rehabilitate or enhance Carnaby's Black Cockatoo habitat. The Strategy has been endorsed by Parks and Wildlife, and includes:

- Details of the location and areas to be revegetated;
- Objectives and completion criteria, including:
    - The rehabilitation of vegetation to Very Good or better condition, if currently in Completely Degraded to Good condition (46.8 ha); or
    - The maintenance of the condition of vegetation considered to be in Very Good or better condition (69.9 ha); see **Figure 7**.
- Revegetation and creation of habitat in cleared areas;
- Supplementary planting and weed control in degraded habitat;
- Implementation of a conservation management regime controlling access, weeds, pests, and addressing other threatening processes; and
- A monitoring program and contingency actions/response triggers.

It is expected that the Rehabilitation Strategy will be supplemented by more detailed rehabilitation specifications to further describe activities required, though all activities will be consistent with the requirements of this document. The CEMP will include additional detail on the Rehabilitation Strategy and other management requirements within the Development Area. In addition to rehabilitation, the CEMP will address issues including installation of artificial hollows, monitoring, access control and fire management, and will be implemented in consultation with Parks and Wildlife. The Rehabilitation Strategy will be implemented during the life of the Development and continue until handover of the site to Parks and Wildlife to undertake its long-term maintenance; the timing of this will be detailed in the CEMP.

7.3 Direct Offset 3: Land Acquisition

Direct Offset 3 is funding the acquisition of a 140 ha area[3] of Carnaby's Black Cockatoo foraging habitat (potentially also supporting breeding habitat) located at Lot 1, Wannamal Road West, Mindarra (as a portion of the entire 950 ha lot) in the Gingin / Boonanarring area (the 'offset site'; **Figure 8**). Having been purchased by LandCorp as part of the advanced offset package (the purchasing of parcels of land with suitable Carnaby's Black Cockatoo habitat by LandCorp to offset potential impacts associated with current and future projects referred to the DoEE under the EPBC Act), the offset site is currently zoned as freehold land and is managed by Parks and Wildlife as a 'Nature Reserve for the purposes of conservation of flora and fauna'.

The offset site acquired by LandCorp contains vegetation with equivalent Carnaby's Black Cockatoo habitat value to that on the Swan Coastal Plain. The offset site is understood to contain Very Good to Excellent condition *Banksia* woodland/shrubland (e.g. *B. attenuata, B. menziesii*) typical of key Carnaby's Black Cockatoo foraging habitat in the Dandaragan Plateau sub-region. The offset site has been inspected by Parks and Wildlife staff, who considered it suitable for acquisition as an offset for impacts to Carnaby's Black Cockatoo habitat.

[3] Area of the offset site is subject to change based on negotiation with DoEE on the EPBC Act Offset Calculator values.

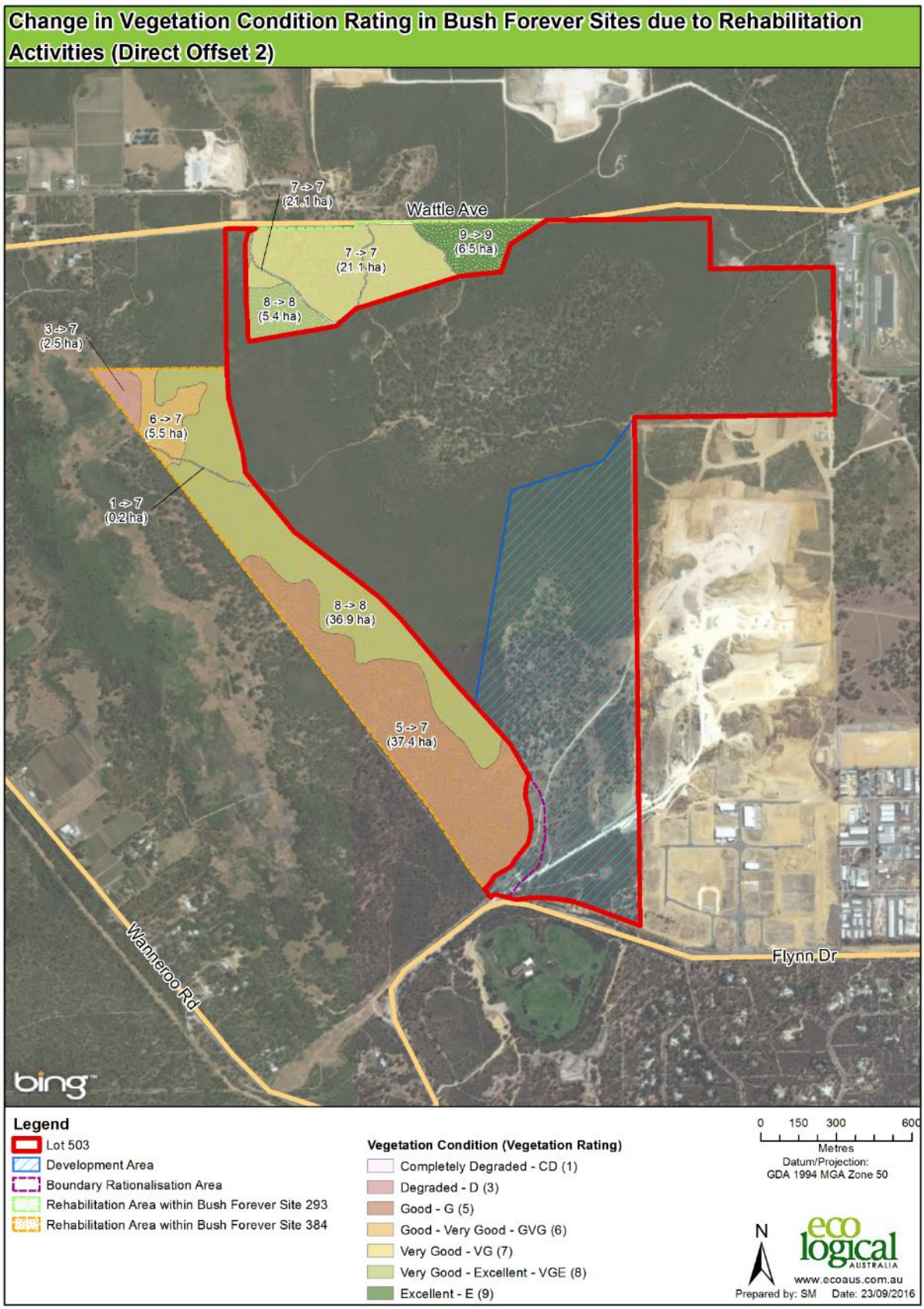

Figure 7: Change in vegetation condition rating in Bush Forever Sites due to rehabilitation activities (Direct Offset 2).

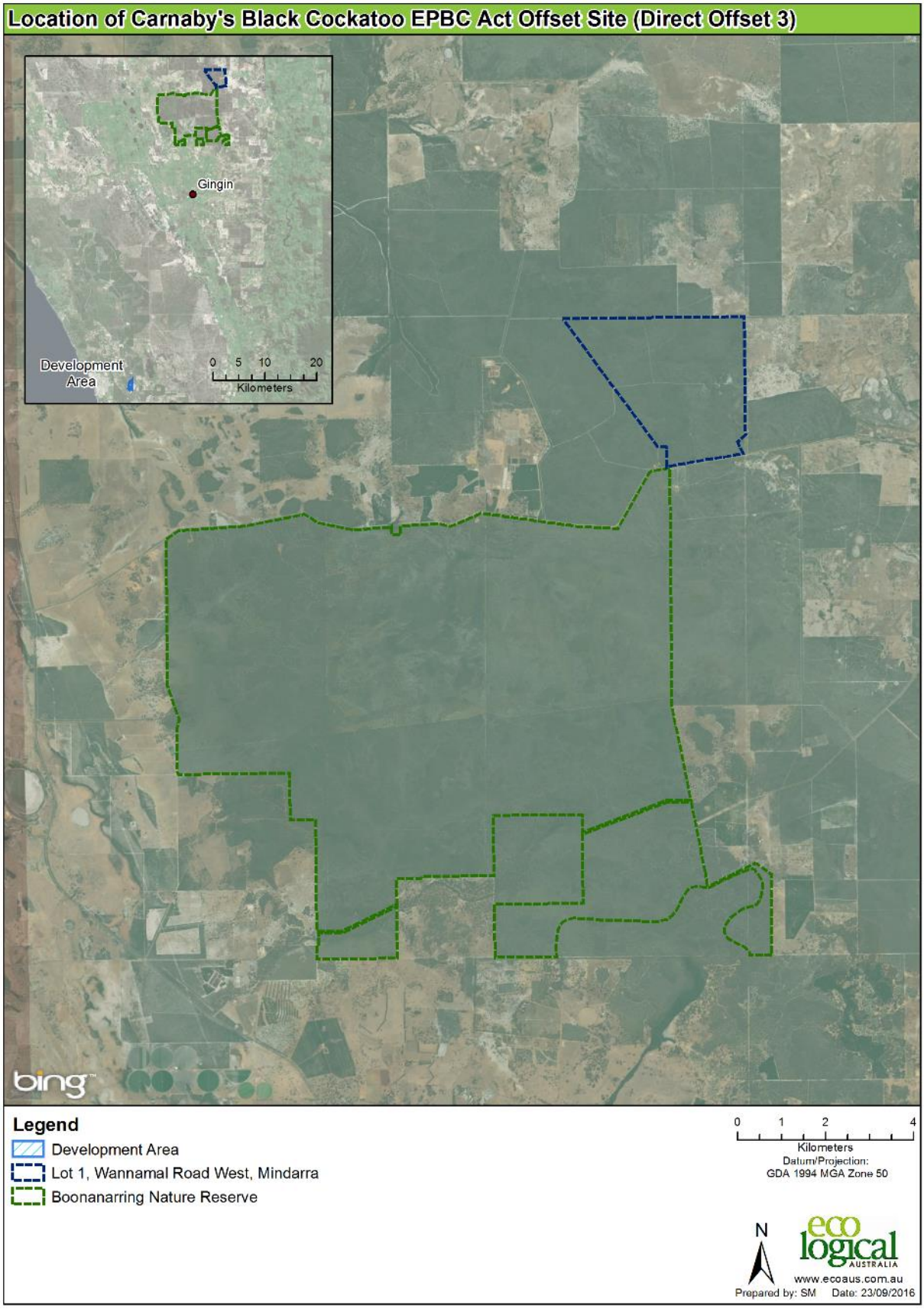

Figure 8: Location of Direct Offset Site 3

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VERSION	AMENDMENT	AUTHORISED BY	DATE
2	AUDIT REQUIREMENTS	Matthew L. SETH	24/11/2016

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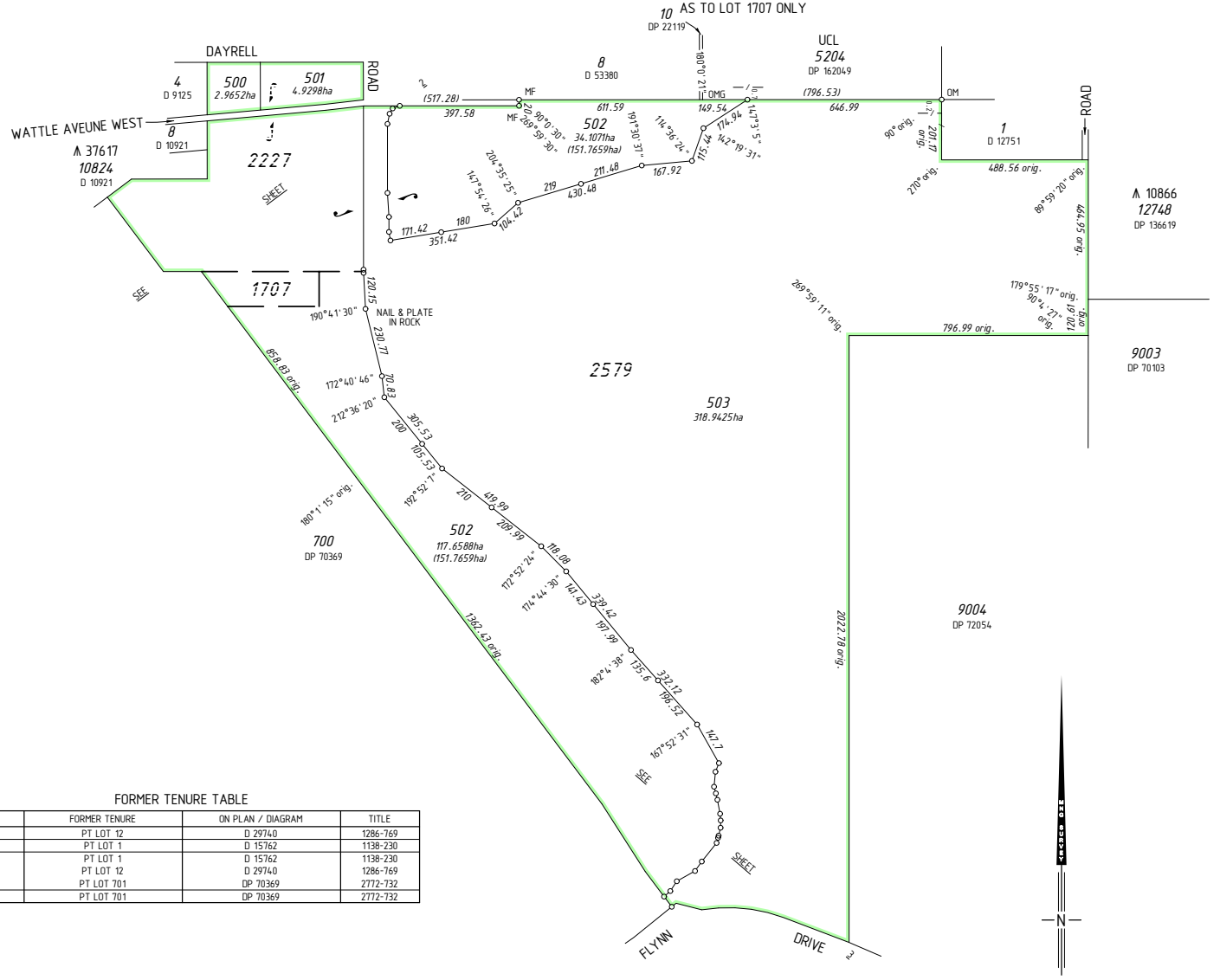
AS TO LOT 2227 AND 2579
LIMITED IN DEPTH TO 609.6 METRES
AS TO LOT 1707 ONLY



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502	PT LOT 1 PT LOT 12 PT LOT 701	D 15762 D 29740 DP 70369	1138-230 1286-769 2772-732
503	PT LOT 701	DP 70369	2772-732

INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS

MNG
MC MULLEN NOLAN GROUP
PO Box 3526, Success W.A. 6964
Tel: (08) 6436 1599
Fax: (08) 6436 1500
Email: info@mngsurvey.com.au
MNG Ref : 96767dp-024d - DP409677#00.CSD

TYPE FREEHOLD S.S.A. NO

PURPOSE SUBDIVISION

PLAN OF
LOTS 500-503

FORMER TENURE SEE FORMER TENURE TABLE

LOCAL AUTHORITY CITY OF WANNEROO

LOCALITY NEERABUP, NOWERGUP

D.O.L. FILE

FIELD RECORD 137081

SURVEYOR'S CERTIFICATE - REG 54

I, Matthew L. SETH
hereby certify that this plan is accurate and is a correct representation of the -
(a) *survey, and/or
(b) *calculations from measurements recorded in the field records,
[* delete if inapplicable]
undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

Matthew Seth
2016.11.24 15:55:41 +08'00'
LICENSED SURVEYOR DATE

LODGED

3.11.16	$554.50	121744
DATE	FEE PAID	ASSESS No.

I.S.C.

EXAMINED

E. Milewska 30.11.2016 DATE

WESTERN AUSTRALIAN PLANNING COMMISSION
FILE WAPC/15/0033

Delegated under S.16 P&D Act 2005 DATE

IN ORDER FOR DEALINGS
SUBJECT TO

FOR INSPECTOR OF PLANS AND SURVEYS DATE

APPROVED

INSPECTOR OF PLANS AND SURVEYS DATE
(S. 18 Licensed Surveyors Act 1909)

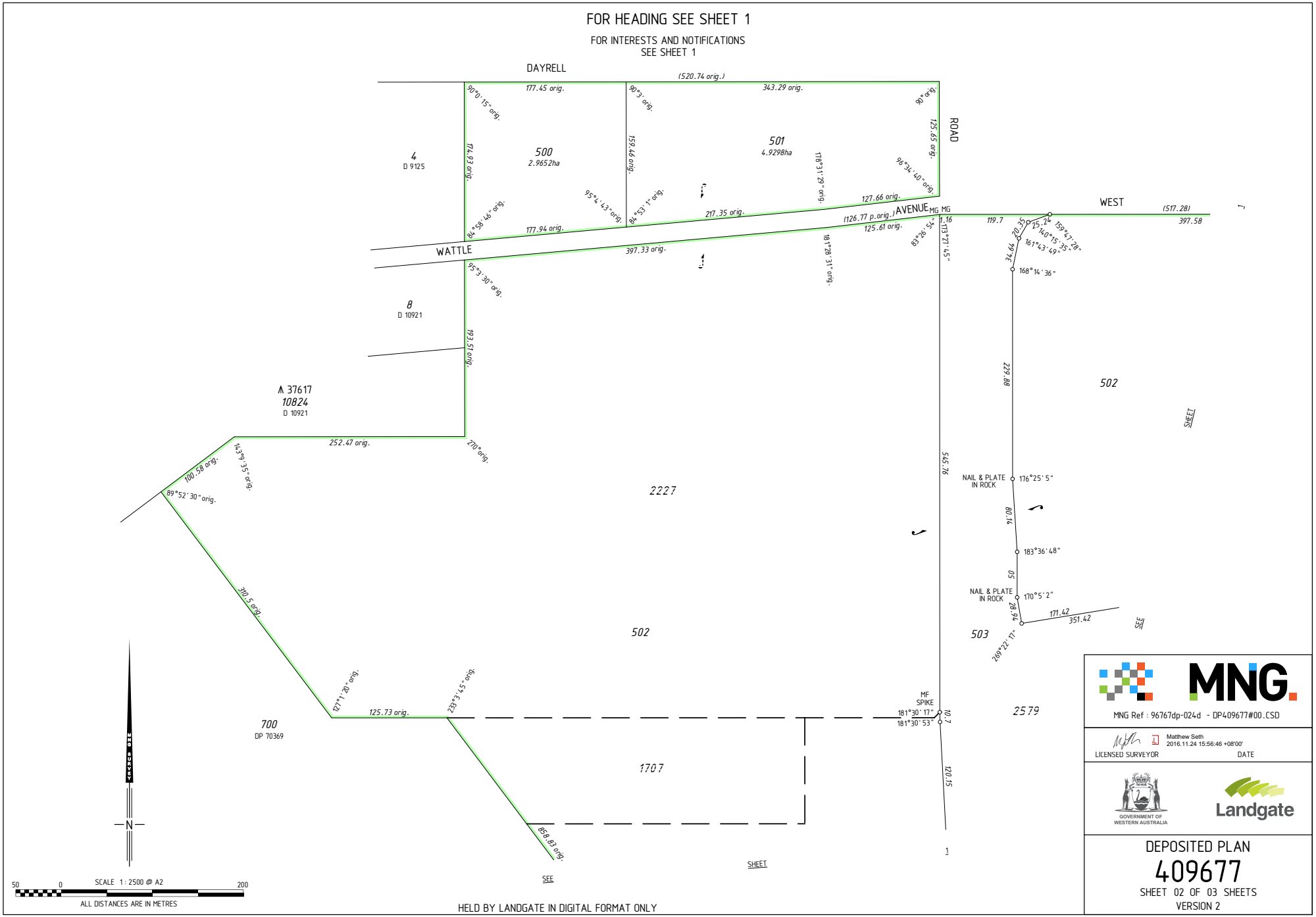
GOVERNMENT OF WESTERN AUSTRALIA

Landgate

DEPOSITED PLAN
409677
SHEET 01 OF 03 SHEETS
VERSION 2

FOR HEADING SEE SHEET 1

FOR INTERESTS AND NOTIFICATIONS
SEE SHEET 1



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MNG.

MNG Ref : 96767dp-024d - DP409677#00.CSD

LICENSED SURVEYOR

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DATE

GOVERNMENT OF WESTERN AUSTRALIA

Landgate

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SHEET 02 OF 03 SHEETS
VERSION 2

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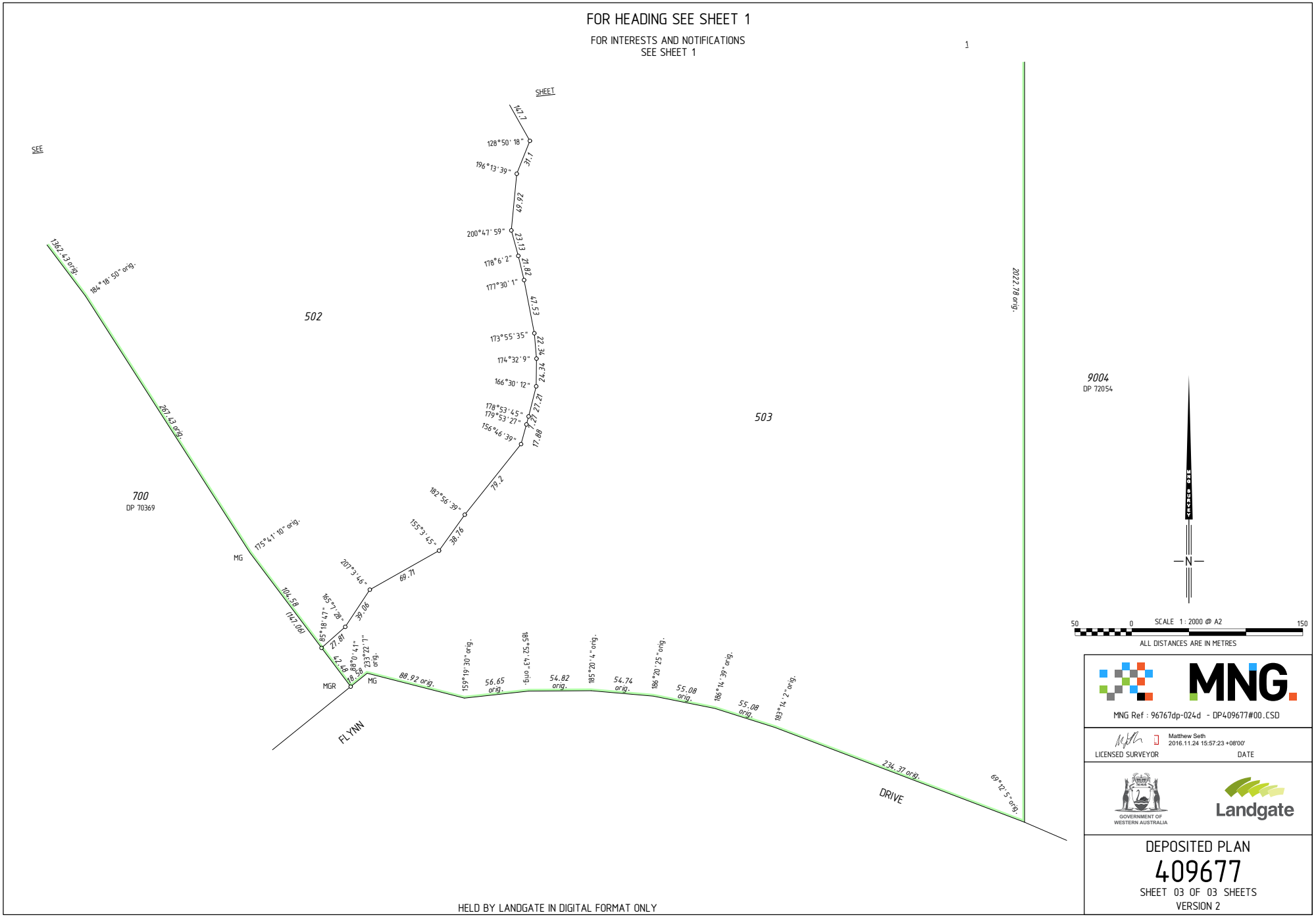

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Landgate

DEPOSITED PLAN

409677

SHEET 03 OF 03 SHEETS

VERSION 2

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WESTERN AUSTRALIA

REGISTER NUMBER	
503/DP409677	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
N/A	**N/A**

RECORD OF CERTIFICATE OF TITLE

VOLUME **2915** FOLIO **803**

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 503 ON DEPOSITED PLAN 409677

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

WESTERN AUSTRALIAN LAND AUTHORITY OF LEVEL 6, 40 THE ESPLANADE, PERTH
(AF N475323) REGISTERED 6 DECEMBER 2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. *G665221 CAVEAT BY TELSTRA CORPORATION LTD AS TO PORTION ONLY. LODGED 16.12.1997.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP409677.
PREVIOUS TITLE:	2772-732.
PROPERTY STREET ADDRESS:	398 FLYNN DR, NEERABUP.
LOCAL GOVERNMENT AREA:	CITY OF WANNEROO.
RESPONSIBLE AGENCY:	WESTERN AUSTRALIAN LAND AUTHORITY.

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING N475323

intelligent outcomes | respected experience

Bushfire Management Plan

Neerabup Industrial Area

Prepared for
LandCorp
by Strategen

June 2017

strategen
ENVIRONMENTAL

Bushfire Management Plan

Neerabup Industrial Area

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

June 2017

Limitations

Scope of services

This report ("the report") has been prepared by Strategen Environmental Consultants Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: LandCorp

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For review by client	Z Cockerill / R Banks	Electronic (email)	15/07/2016
Final Report	Rev 0	Issued for use: for submission to CoW and DoP	Z Cockerill	Electronic (email)	3/08/2016
Final Report	**Rev 1**	**Issued for use: to address WAPC modifications**	**Z Cockerill (BPAD37803)**	**Electronic (email)**	**2/06/2017**

Filename: LAN16242_01 R001 Rev 1 - 2 June 2017

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1. Introduction

1.1 Background

LandCorp is progressing development approvals within the Neerabup Industrial Area (hereon referred to as the project area). The Neerabup Industrial Area Agreed Structure Plan No. 17 (ASP 17, first adopted in January 2005) provides the overarching planning framework that guides development over the industrial estate (Figure 1a). TPG, on behalf of LandCorp, has recently lodged an amendment to ASP 17 (Amendment No. 4) that proposes modifications to the Final Surface Contour Plan to reflect the revised earthwork design levels across the site (Figure 1b). The proposed Structure Plan Amendment does not propose any land use modifications outside of those approved under ASP 17.

A large proportion of the project area and adjacent land is designated as bushfire prone on the WA *Map of Bush Fire Prone Areas* (DFES 2016) due to the extent of on-site and adjacent vegetation. As a result, Strategen has prepared this Bushfire Management Plan (BMP) to fulfil the following key objectives:

1. Accompany submission of the proposed Structure Plan Amendment to City of Wanneroo (the City) and Department of Planning (DoP) to meet requirements triggered under *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015a).
2. Accompany Subdivision/Development Application to the City and DoP for Stages 1–5 to meet planning requirements triggered under SPP 3.7.

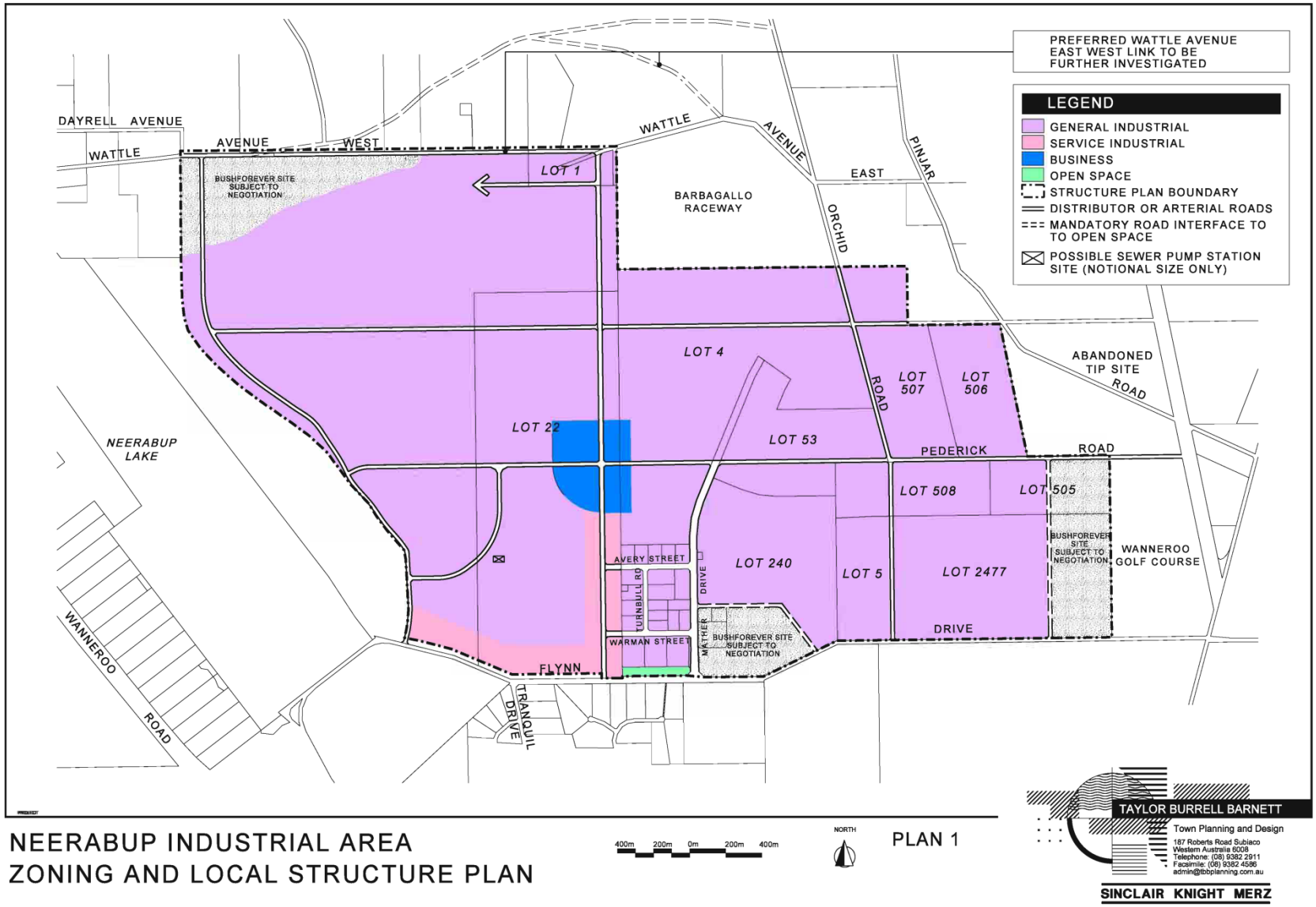
The following information is required in the form of a BMP to accompany the Structure Plan Amendment and relevant Subdivision/Development Applications under SPP 3.7 Policy Measures 6.3 and 6.4/6.5 respectively:

- results of a Bushfire Hazard Level (BHL) assessment determining the applicable hazard level(s) across the subject land in accordance with methodology set out in *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2015b) – refer to Section 2.3 and Figure 5
- where the lot layout of the proposal is known (i.e. Stages 1–5), a Bushfire Attack Level (BAL) contour map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines – refer to Section 2.5 and Figure 6
- identification of any bushfire hazard issues arising from the relevant assessments – refer to Section 2.4
- assessment against the bushfire protection criteria contained in the Guidelines demonstrating compliance within the boundary of the development site – refer to Section 4 and Table 3.

This BMP has been prepared in accordance with the Guidelines and addresses all of the above information requirements to satisfy SPP 3.7.

1.2 Purpose and application of the plan

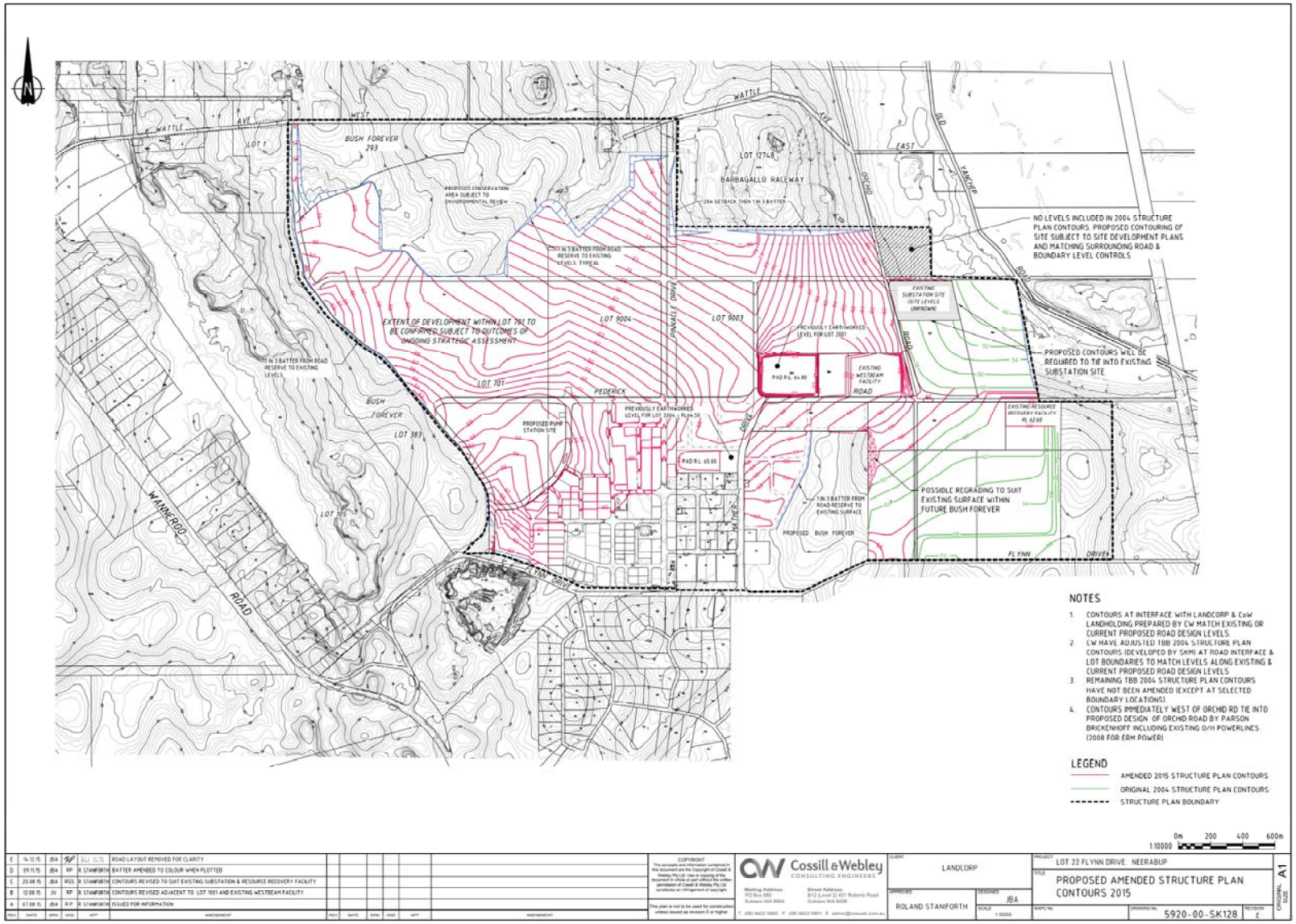
The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to future assets of the project area through implementation of a range of bushfire management measures. The BMP outlines how future on-site assets can be protected during the summer months when the threat from bushfire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer an immediate emergency suppression response; therefore, development planning and design should aim to provide mitigation strategies that protect future life and property from bushfire as a priority.



NEERABUP INDUSTRIAL AREA
ZONING AND LOCAL STRUCTURE PLAN

Source: TBB & SKM 2011

Figure 1a: Neerabup Industrial Area Zoning and Local Structure Plan



Source: Cossill & Webley 2015

Figure 1b: Proposed Amended Structure Plan Contours 2015

2. Spatial consideration of bushfire threat

2.1 Existing site characteristics

2.1.1 Location

The project area encompasses around 1000 ha of land located in Neerabup, City of Wanneroo and is situated approximately 32 km north of the Perth CBD and 6 km northeast of Joondalup. The project area is bound by the following, as depicted in Figure 2:

- Flynn Drive to the south
- Lot 700 (including Neerabup Lake) and Lot 502 (Bush Forever Site 384) to the west
- Wattle Avenue West/East and Barbagallo Raceway to the north
- Old Yanchep Road, Pinjar Park and Wanneroo Golf Club to the east.

The project area comprises the following, which are also depicted in Figure 2:

- Lot 503 Flynn Drive in the west (in accordance with DP 409677), which at this stage is the subject of precinct planning only pending detailed design (environmental approval for the initial 90 ha development area is in its final stages)
- 98 ha proposed conservation area within the northwest of Lot 503 (Bush Forever Site 293)
- Lot 1 Wattle Avenue East in the north adjacent to Barbagallo Raceway
- Lot 9005 Flynn Drive situated central to the site (in accordance with DP 409191), which comprises the following:
    - Stages 1–5 of Meridian Park Industrial Estate in the south, which are a mix of completed and constructed stages (i.e. Stages 1, 2A, 3A, 3B and 3C) and future undeveloped stages (i.e. Stages 2B, 4 and 5)
    - Stages 6–9 of Meridian Park Industrial Estate throughout central areas (currently extractive industry quarry)
    - future Stages 10 and onwards of Meridian Park Industrial Estate in the north (currently extractive industry quarry)
- approved industrial subdivision situated central south within the site
- Lot 9003 Mather Drive in the northeast
- Lot 9000 Flynn Drive situated central south
- existing extractive industry and horticultural land uses in the eastern portion of the project area along Pederick Road, Trandos Road and the eastern extent of Flynn Drive
- Lot 800 Pederick Road and Lot 902 Flynn Drive in the southeast adjacent to Wanneroo Golf Club.

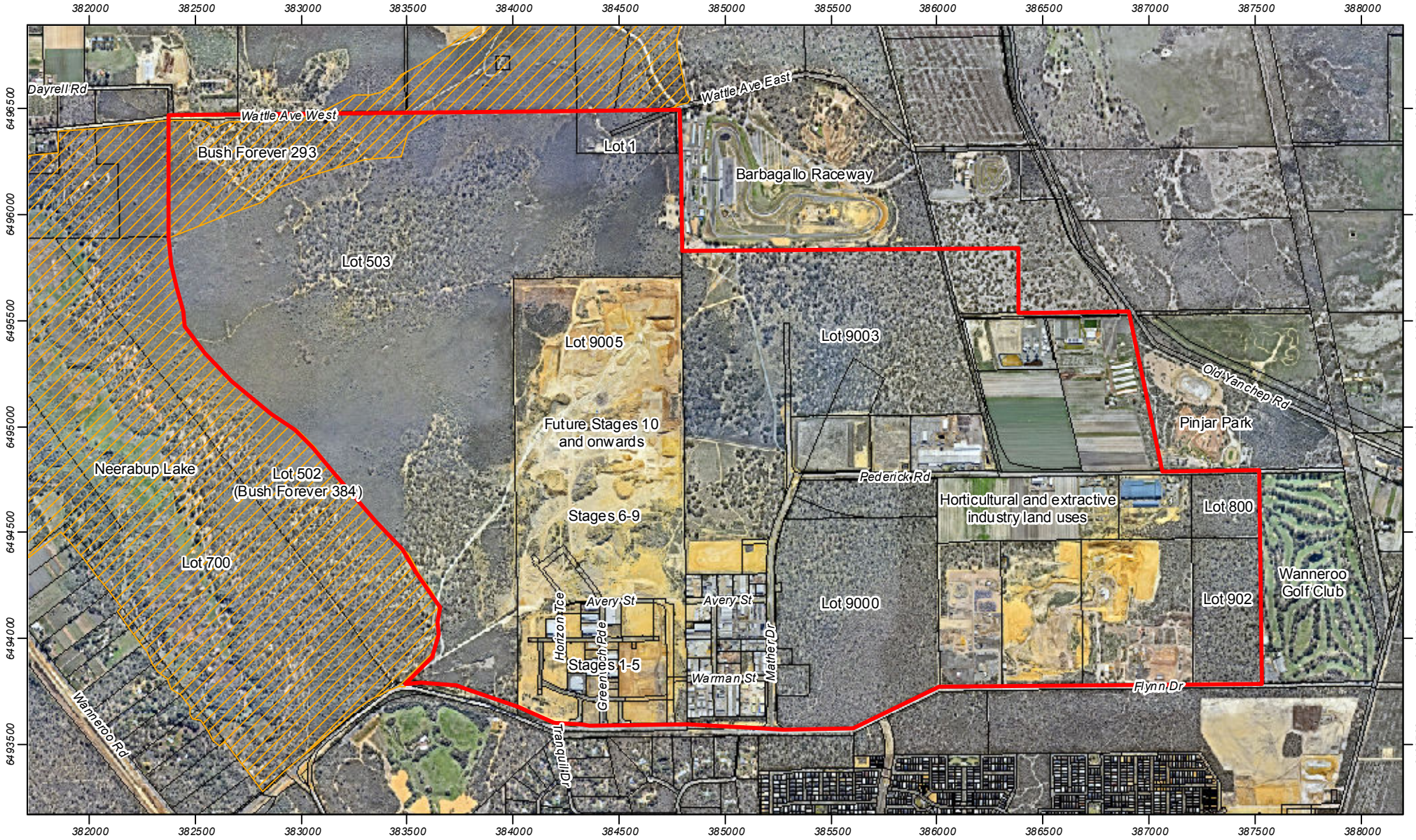


Figure 2 Site overview

Scale 1:25,000 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016. Bush Forever: DPL, 2014.
Path: Q:\Consult\2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_F002.mxd

Legend

- Project area
- Existing cadastre
- Bush Forever sites

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2.1.2 Zoning and land use

The project area is currently zoned 'Industrial' and 'Industrial Development' under the City of Wanneroo District Planning Scheme No. 2, with small pockets of local and regional 'Parks and Recreation' reserve. A large proportion of the site is currently undeveloped and vegetated, particularly in the west and northwest, whilst central and eastern portions of the site are subject to a combination of extractive industry, industrial and horticultural land uses, as well as undeveloped vegetated lots. Extractive industry is part of the sequential land development process, required due to 'Priority Resource' classification of a portion of land contained within the structure plan area.

Aside from Barbagallo Raceway, adjacent land to the north largely comprises undeveloped vegetated land. This is also the case to the west with regards to Lot 700 (including Neerabup Lake wetland vegetation) and Lot 502 (Bush Forever Site 384). Land to the south opposite Flynn Drive is a combination of larger rural residential lots and undeveloped vegetated land. Land to the east comprises a range of land uses including Wanneroo Golf Club, Pinjar Park (retained native vegetation), various motor-cross and go-kart tracks and undeveloped rural land, most of which comprises native vegetation.

2.1.3 Assets

The project area currently contains a range of assets, including life and property in the form of developed industrial, extractive industry and horticultural land uses. There is a distinct lack of high density overnight resident and visitor occupancy throughout the project area by virtue of the industrial zoning of the land.

The project area and adjacent land contains environmental assets in the form of large areas of intact native vegetation, particularly to the west and northwest in association with Neerabup Lake and Bush Forever Site 384. Lot 9000 and 902 Flynn Drive and Lot 800 Pederick Road in the south-eastern portion of the site are the other key properties that contain on-site native vegetation that are being considered for retention. Pinjar Park located east of the project area also contains retained native vegetation.

2.1.4 Access

The majority of industrial and extractive industry land uses that currently operate within the project area are accessed from the south via Flynn Drive and Mather Drive. Flynn Drive is a major connector between Wanneroo Road in the west and Old Yanchep Road in the east. Horticultural and industrial land uses located in the eastern portion of the site are accessed via Pederick Road and Trandos Road, which navigate west from Old Yanchep Road.

Connection to the west from realigned Flynn Drive and Neerabup Road to Mitchell Freeway Extension (Burns Beach Road to Hester Avenue) is currently under construction. Connection to the east from Flynn Drive to future realigned Neaves Road to Perth Darwin Highway is also currently under construction.

Access throughout western vegetated portions of the site is currently limited to firebreak access and informal tracks. This is also the case throughout the north and north-western portion of the site. Wattle Avenue West currently provides restricted access along the northern boundary of the site in the form of a limestone base track, which links to existing tracks servicing extractive industry uses and a Department of Parks and Wildlife (DPaW) monitoring station to the north. These tracks eventually link with Wattle Avenue East, which is a sealed road servicing Barbagallo Raceway to the north of the site, which in turn links with Old Yanchep Road to the northeast.

2.1.5 Servicing

The project area is connected to reticulated water and underground power supplies and these services will be expanded as staging progresses (Taylor Burrell Barnett & SKM 2011). This is also the case with sewer and gas services (sewer will be serviced by tankering prior to construction of the proposed wastewater pump station and pressure main).

2.2 Existing fire environment

2.2.1 Vegetation class

Vegetation class has been assessed for this site in accordance with methodology contained within *AS 3959–2009 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2009). Strategen assessed vegetation class within the project area and adjacent 100 m through on-ground site investigation on 30 June 2016. Results of this assessment are depicted in Figure 3, which identifies the spatial extent of classified vegetation and the location/direction of site photographs depicting the relevant vegetation classes. A detailed summary of site photographs is contained in Appendix 1.

In general, the project area and surrounding land grades from Class B banksia woodland on white, sandy soils in the east; to a mix of Class A Jarrah-Marri forest and Class B banksia woodland at high points throughout central and northern areas; to Class A Tuart forest and Class D acacia scrub at low points, around wetlands and on limestone outcrops in the west. There are also areas of Class G grassland where native vegetation has been cleared and the understorey grasses and weeds remain unmanaged.

Further to the above, a large proportion of the project area and adjacent land is currently cleared, developed or subject to ongoing management. This includes remnant regrowth currently scattered throughout the Lot 9005 quarry site consisting of small regrowth saplings, scrub and shrubs, which have been cleared and re-cleared on multiple occasions and will be cleared again as quarry activities progress. These areas have been excluded from vegetation classification under the following clauses of AS 3959:

- Clause 2.2.3.2 (e): Non-vegetated areas including waterways, roads, footpaths, buildings and rocky outcrops
- Clause 2.2.3.2 (f): Low threat vegetation including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks (note minimal fuel condition means there is insufficient fuel available to significantly increase the severity of bushfire attack, recognizable as short-cropped grass for example, to a nominal height of 100 mm).

Aside from recurring clearing being undertaken within the Lot 9005 quarry site, the vegetation extent discussed above and mapped in Figure 3 demonstrates current site conditions and does not take into account vegetation clearance proposed as part of the development. Therefore, the mapped extent of Clause 2.2.3.2 exclusions within the project area will increase as industrial development is approved and constructed progressively throughout the site.

2.2.2 Effective slope

Effective slope has been assessed for this site in accordance with methodology contained within AS 3959. Strategen assessed effective slope within the project area and adjacent 100 m through on-ground site investigation on 30 June 2016. On-ground observations and measurements of effective slope have been validated through topographic mapping, as displayed in Figure 4, which identifies the feature survey topographic contours and surface elevation across the assessed vegetation classes.

Generally, the project area and adjacent land contains undulating topography. Effective slope varies from flat land (0 degrees) throughout low lying areas to the west and developed areas central to the site; to 0–5 degrees throughout gently undulating topography in the northwest, central south and east; to 5–10 degrees throughout steeper areas to the north.

The effective slope discussed above and mapped in Figure 4 demonstrates current site conditions and does not take into account post development site levels. Strategen emphasises that on completion of the development, the bulk of the project area will be built out subject to the amended contour plan outlined in Figure 1b and effective slope for the purposes of BAL assessment will only be relevant throughout areas of retained vegetation. The designed land gradient throughout the site will not exceed 2% post bulk earthworks and will result in the majority of proposed development being situated below (i.e. not up-slope of) retained vegetated areas.

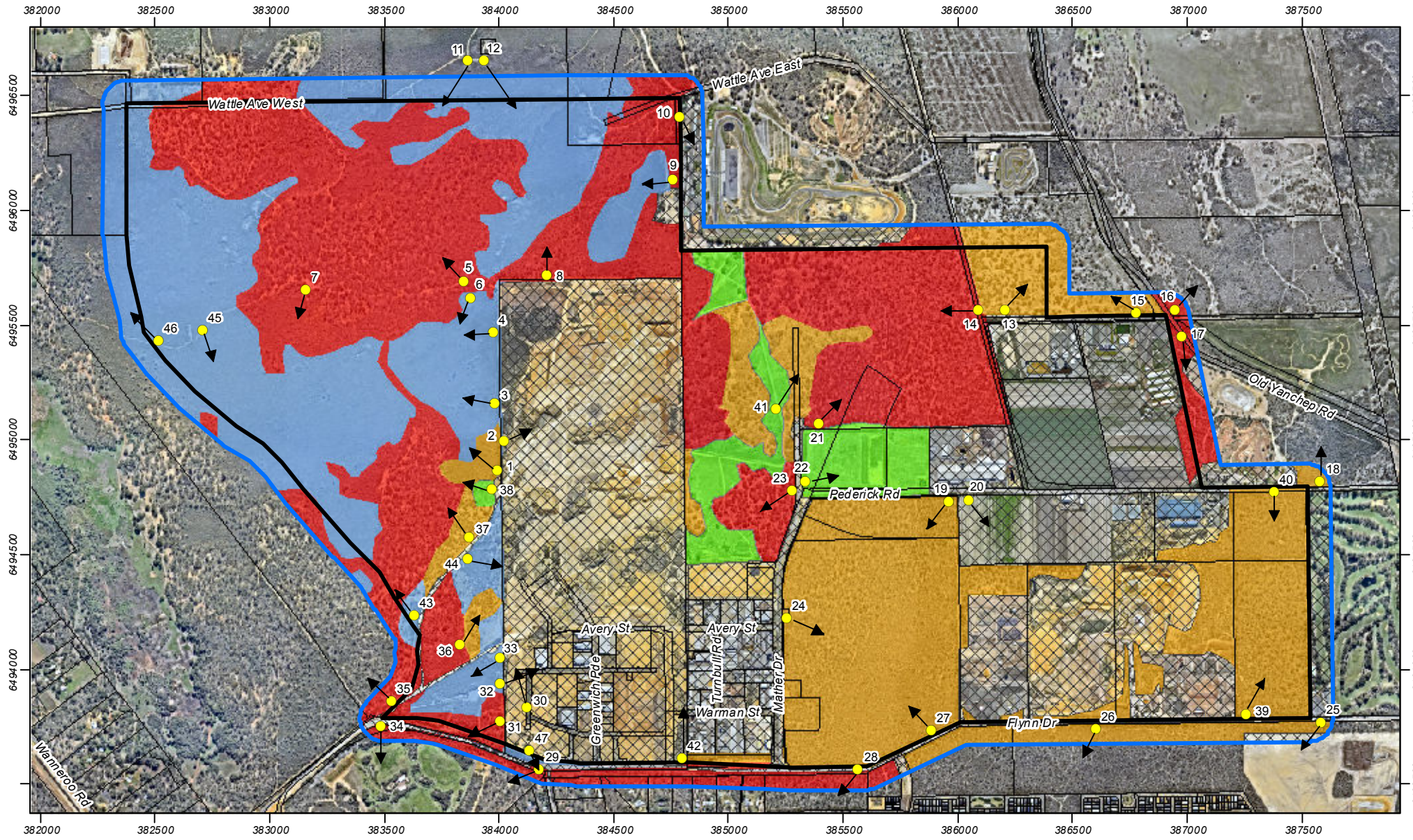

Figure 3 Vegetation class

Scale 1:23,000 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_F003.mxd

Legend

- Photo point and direction
- Project area
- Existing cadastre
- 100m wide assessment area

Vegetation class

- Class A Forest
- Class B Woodland
- Class D Scrub
- Class G Grassland
- Low threat exclusion under Clause 2.2.3.2

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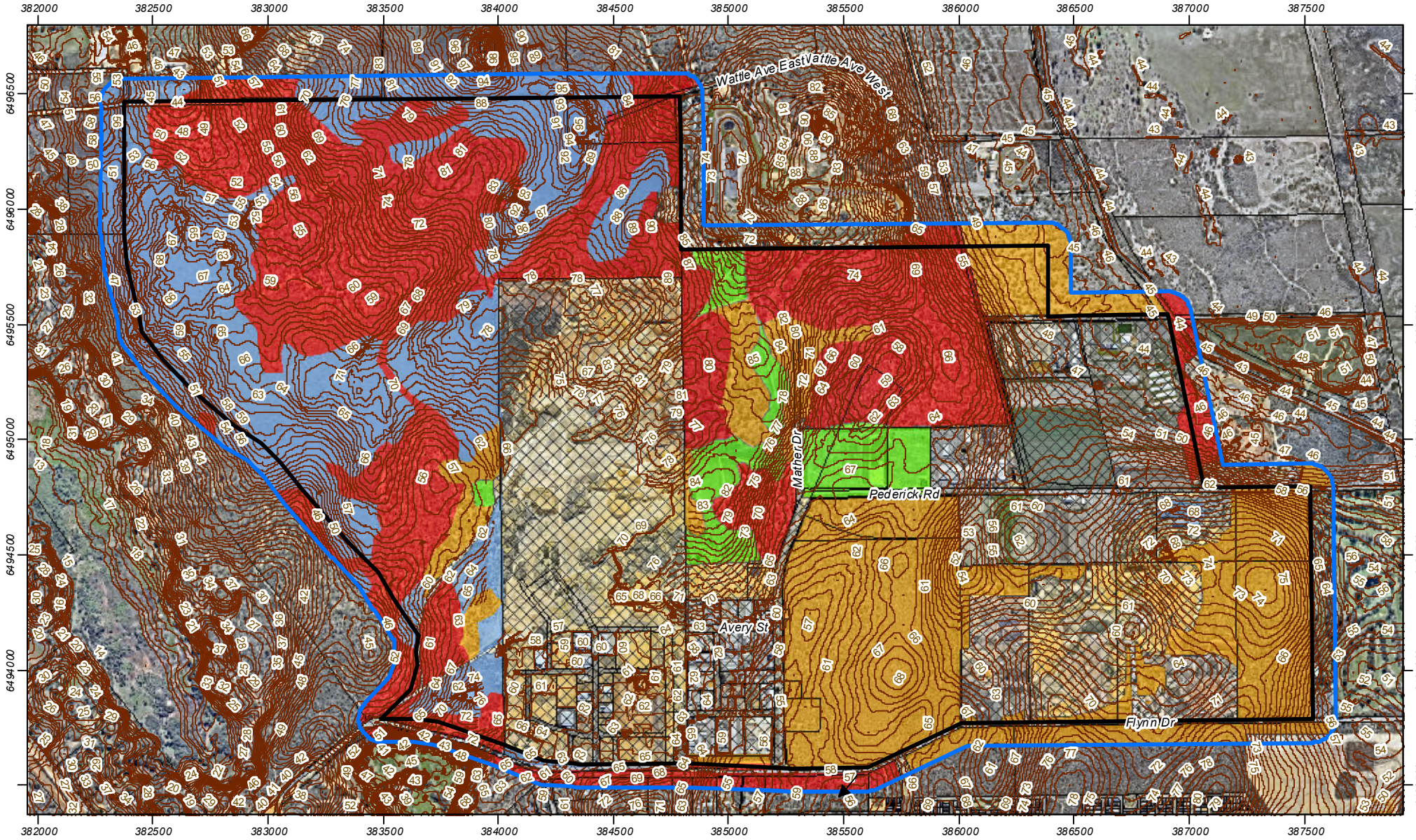

Figure 4 Effective slope

Scale 1:23,000 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016. Topography: Client 2014.
Path: Q:\Consult2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_F004.mxd

Legend

- Project area
- Existing cadastre
- 100m wide assessment area
- Surface elevation (mAHD)

Vegetation class

- Class A Forest
- Class B Woodland
- Class D Scrub
- Class G Grassland
- Low threat exclusion under Clause 2.2.3.2

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2.3 Bushfire hazard level assessment

Bushfire hazard levels have been assessed for this site in accordance with methodology contained within the Guidelines. Strategen has mapped the bushfire hazard levels within the project area and adjacent 100 m as per the conditions outlined in Figure 3 and Figure 4. A summary of results is provided below and depicted in Figure 5:

- all areas of Class A forest represent an extreme bushfire hazard level
- all areas of Class B woodland represent an extreme bushfire hazard level, except degraded areas of woodland, which represent a moderate bushfire hazard level where the fuel profile is less dense and the potential fire behaviour will be reduced
- all areas of Class D scrub represent an extreme bushfire hazard level, except degraded areas of scrub, which represent a moderate bushfire hazard level where the fuel profile is less dense and the potential fire behaviour will be reduced
- all areas of Class G grassland represent a moderate bushfire hazard level
- all non-vegetated areas and areas currently managed as low threat vegetation, which are both excluded from classification under Clause 2.2.3.2 (e) and (f) of AS 3959, represent a low bushfire hazard level (including areas of recurring clearing throughout the Lot 9005 quarry site)
- all areas located within 100 m of Class A forest, Class B woodland, Class D scrub or Class G grassland have been assigned a moderate bushfire hazard level by default to reflect the increased level of risk and 100 m wide Hazard Separation Zone (HSZ) requirements (WAPC 2015b).

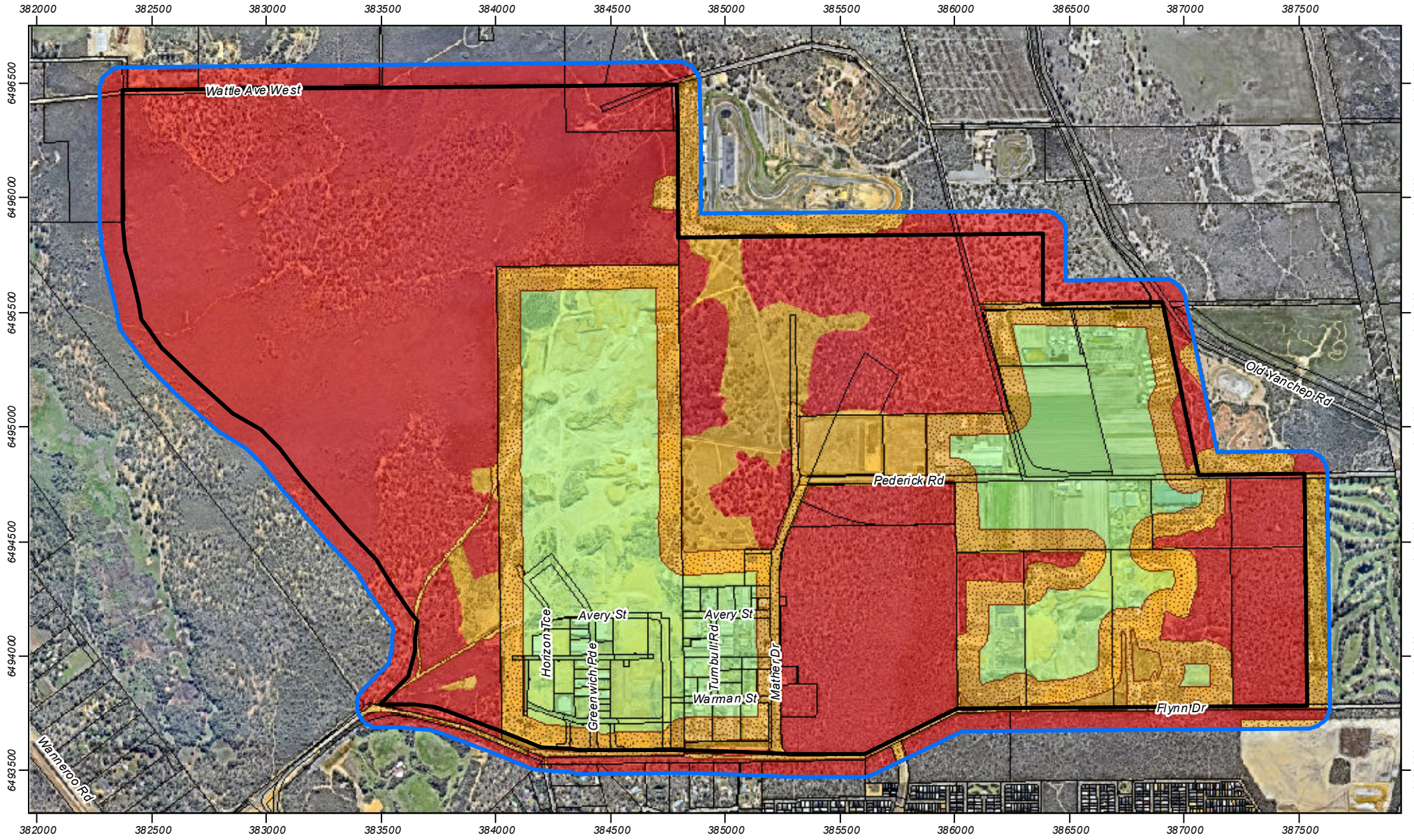

Figure 5 Bushfire hazard level assessment

Scale 1:23,033 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 2/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult\2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_F005.mxd

Legend

- Project area
- Existing cadastre
- 100m wide assessment area
- 100m wide HSZ

Bushfire hazard level

- Extreme
- Moderate
- Low

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2.4 Identification of bushfire hazard issues

The project area in its pre-development state is subject to significant landscape scale bushfire risk as a result of the vast areas of vegetation within and adjacent to the site. This is particularly relevant to the north where a very long fire run exists through dense native vegetation including forest, woodland and scrub. A bushfire approaching the site from the northern quadrant under adverse fire weather conditions in summer (i.e. days of extreme or catastrophic fire danger) is expected to result in significantly elevated levels of radiant heat and ember attack if full fire escalation is achieved. Standard fire suppression under these conditions is not likely to be achievable, as experienced in January 2015.

The project area is also subject to significant landscape scale bushfire risk to the west in association with Lot 700 (including Neerabup Lake wetland vegetation) and Lot 502 (Bush Forever Site 384). This area contains dense forest, woodland and scrub vegetation, as well as vast areas of peat material, which can exacerbate fire behaviour and prolong bushfire impacts. A bushfire approaching the site from the western quadrant, particularly under predominant afternoon fire weather conditions in summer (i.e. in association with a prevailing south-westerly sea breeze) is expected to result in elevated levels of radiant heat and ember attack if full fire escalation is achieved.

In response to the abovementioned bushfire scenarios and landscape scale risk, LandCorp is actively working with the City and Department of Fire and Emergency Services (DFES) to undertake ongoing fuel hazard reduction works in the form of mosaic cell burning and the upgrade and maintenance of emergency access. The City and DFES have prepared a working Fire Management Plan document that outlines a proposed burn plan over the site to create low fuel areas at strategic interfaces and provide an increased level of bushfire risk mitigation to current and future life, property and environmental assets. The indicative cell burn plan is provided in Plate 1. Strategen emphasises that although low intensity prescribed fire reduces fuel loads and potential fire behaviour, it does not alter vegetation class.

On completion of the development, there will be a significantly reduced bushfire risk to future assets of the site as a result of the scale of vegetation clearing that will be undertaken to facilitate industrial development. Vegetation clearing throughout project staging will play an important role in managing the bushfire risk posed by on-site temporary vegetation during roll out of individual development stages. This is discussed as a key management measure in Section 3.1.

On this basis, Strategen considers the bushfire hazards within and adjacent to the project area and the associated bushfire risk to be readily manageable through standard management responses outlined in the Guidelines and AS 3959. These responses will be factored in to proposed industrial development early in the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life, property and environmental assets.

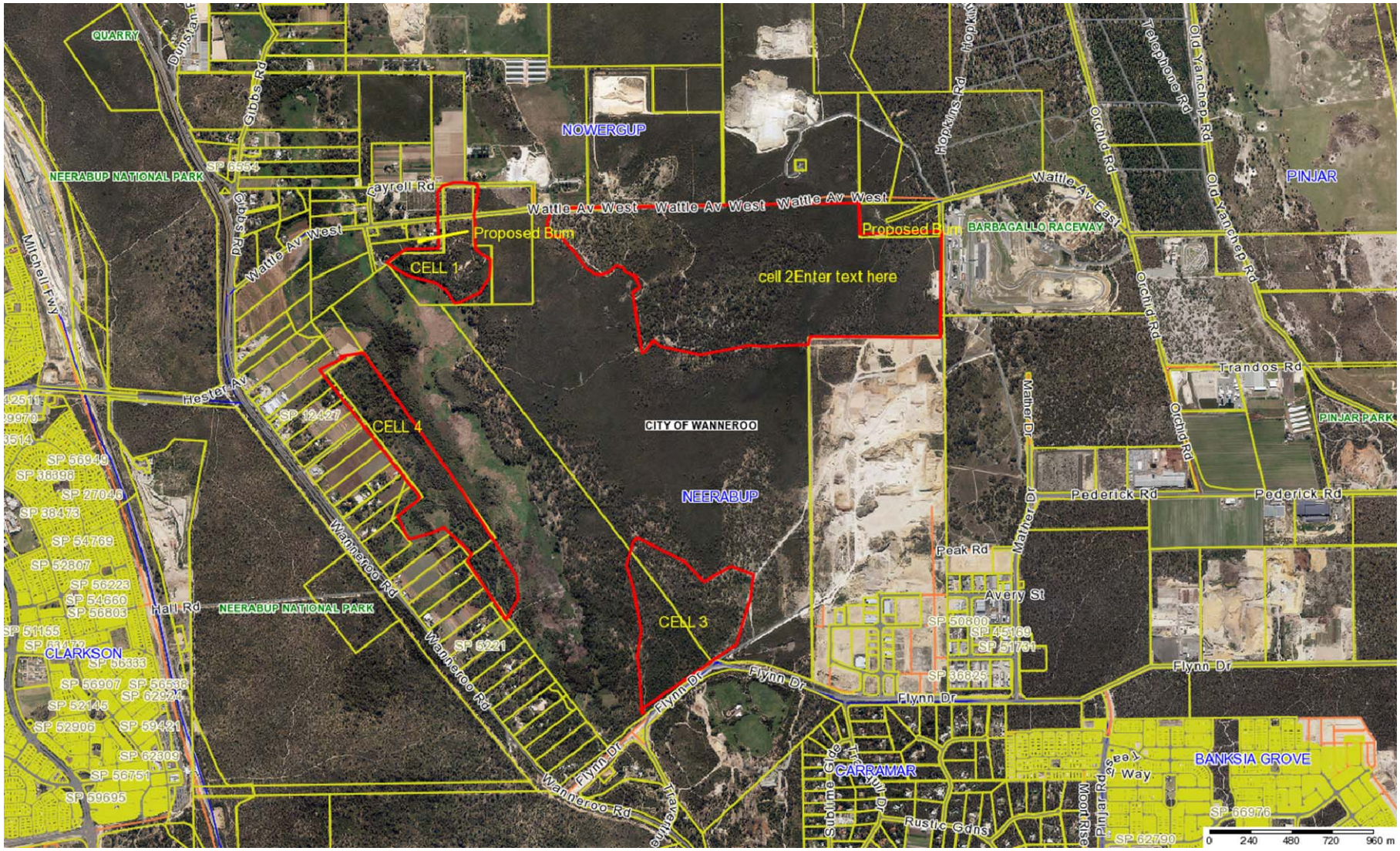

Plate 1: Indicative cell burn plan for LandCorp-owned land at Neerabup (Source: City of Wanneroo 2015)

2.5 BAL assessment

Strategen has undertaken a Method 1 BAL assessment in accordance with AS 3959 for existing and proposed subdivision areas of Stages 1–5 Meridian Park Industrial Estate. The BAL assessment is based on post-development conditions in line with the existing and proposed subdivision lot layout for Stages 1–5. BAL assessment will need to be undertaken at the relevant subdivision stage for areas of the site where subdivision lot layout is yet to be confirmed.

The Method 1 procedure for calculating the BAL (as outlined in AS 3959) incorporates the following factors:

- state-adopted FDI rating
- vegetation class
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

Based on the specified BAL, building construction/separation requirements for proposed buildings can then be assigned. A Method 1 BAL calculation for proposed development within Stages 1–5 is outlined in the following subsections.

2.5.1 Fire Danger Index

A blanket rating of FDI 80 is adopted for Western Australian environments, as outlined in AS 3959 and endorsed by Australasian Fire and Emergency Service Authorities Council.

2.5.2 Vegetation class as per AS 3959

Vegetation class is described in Section 2.2.1 (Figure 3). In consideration of the proposed clearing extent required to facilitate development in accordance with the existing/proposed subdivision lot layout for Stages 1–5, the post-development vegetation extent will consist of:

- Class D scrub located adjacent south of the site within the northern Flynn Drive road verge
- Class A forest located adjacent southwest and south of the site within the northern and southern Flynn Drive road verges
- Class A forest located adjacent south of the site opposite Flynn Drive within private lots
- low threat vegetation excluded from classification under Clause 2.2.3.2 (e) located adjacent west and east of the site following creation of a 100 m wide low threat buffer throughout on-site temporary vegetation.

2.5.3 Effective slope

Effective slope is described in Section 2.2.2 (Figure 4). For the classified vegetation affecting proposed development within Stages 1–5, Class D scrub and Class A forest areas are located on flat land (0 degrees) or up-slope except for the far eastern portion of Class A forest, which has an effective slope of 0–5 degrees and is down-slope.

2.5.4 Distance between proposed development areas and the classified vegetation

Minimum separation distances for a BAL–29 rating or lower can be achieved for all proposed development within Stages 1–5. This equates to a minimum separation distance of 21 m adjacent to Class A forest and 13 m adjacent to Class D scrub. The required separation distances will be achieved in the form of minimum 20 m wide Asset Protection Zones (APZs) comprising road reserves at the vegetation interface and building setbacks where required.

2.5.5 Method 1 BAL calculation

A Method 1 BAL calculation has been completed for existing/proposed development within Stages 1–5 that are located within the 100 m wide HSZ in accordance with AS 3959 methodology (Table 1). The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed buildings and subsequently informs the standard of building construction required to increase building tolerance to potentially withstand such impacts in line with the assessed BAL.

The assessed BAL ratings are depicted as BAL contours in Figure 6. A detailed depiction of the BAL contours is provided in Appendix 2. All proposed lots situated outside of the 100 m wide HSZ are BAL–Low, where there is insufficient risk to warrant specific building construction requirements. However, the extent of BAL–Low application relies on successful implementation of the management measures documented in this BMP.

Table 1: Method 1 BAL calculation

Classified vegetation	Effective slope	Hazard separation distance	BAL rating	Comment
Class A forest	All up-slopes and flat land (0 degrees)	<16 m	BAL–FZ	No development is proposed in this area
		16–<21	BAL–40	No development is proposed in this area
		21–<31	BAL–29	Development may occur in this area
		31–<42	BAL–19	Development may occur in this area
		42–<100	BAL–12.5	Development is likely to occur in this area
Class A forest	Down-slope >0–5 degrees	<20 m	BAL–FZ	No development is proposed in this area
		20–<27	BAL–40	No development is proposed in this area
		27–<37	BAL–29	Development may occur in this area
		37–<50	BAL–19	Development may occur in this area
		50–<100	BAL–12.5	Development is likely to occur in this area
Class D scrub	All up-slopes and flat land (0 degrees)	<10 m	BAL–FZ	No development is proposed in this area
		10–<13	BAL–40	No development is proposed in this area
		13–<19	BAL–29	No development is proposed in this area
		19–<27	BAL–19	Development may occur in this area
		27–<100	BAL–12.5	Development is likely to occur in this area

The above BAL contours are based on the vegetation class and effective slope assessed at the time of inspection and take into consideration the proposed clearing extent and separation distances achieved in line with proposed subdivision and development. Should there be any changes in development/subdivision design or vegetation/hazard extent that requires a modified bushfire management response, then the above BAL contours will need to be reassessed for the affected areas and documented in a brief addendum to this BMP prepared to accompany a future planning/building application.

3. Bushfire management measures

Strategen has identified a range of bushfire management measures that on implementation will enable proposed development to be implemented with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959. The bushfire management measures are discussed in the following subsections and depicted in Figure 6 where applicable.

3.1 Separation distances and fuel management

3.1.1 APZs

APZs will be implemented at the interface between all proposed development areas and the classified vegetation extent. The width of the APZs will be a minimum of 20 m and can be accommodated within existing/proposed road reserves and building setbacks where required.

APZs are required to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round. This may include regular slashing of road verges and grassland fuels where applicable. Individual trees can be retained within the APZ provided the understorey is managed through regular slashing to achieve a low threat vegetation minimal fuel condition. No buildings are permitted in the APZ.

Alignment and width of the APZs may be reassessed through a BMP addendum in response to any modifications to lot layout, changes to the vegetation extent currently affecting the site or as an accompaniment to subdivision applications for new development stages.

3.1.2 HSZs

Formal HSZs in accordance with Acceptable Solution A 2.2 of the Guidelines are not required around the proposed APZs in this instance since building construction within each proposed lot will meet the standard appropriate to the BAL for that location (WAPC 2015b).

3.1.3 On-site staging buffers

Clearing will occur throughout the project area on a staged basis and in advance where necessary to ensure building construction is not inhibited by a temporary vegetation extent located on an adjacent development stage that is yet to be cleared. This can be achieved by ensuring each approved stage subject to construction is surrounded by a 100 m wide, on-site cleared or low threat vegetation buffer prior to development (not including vegetation proposed to be retained).

A proportion of the required 100 m wide staging buffers will be achieved through battering, whereby, due to differences between proposed development levels and the natural surface levels of retained Bush Forever and conservation sites, the resultant cut batters will be cleared of vegetation.

Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage. This will manage the bushfire risk from on-site temporary vegetation during development staging. .

3.1.4 POS management

Development within 100 m of on-site vegetation retained within POS, proposed conservation areas or Bush Forever sites will require BAL contour assessment in accordance with AS 3959. Results will need to be provided in the form of a brief BMP addendum to accompany the relevant subdivision application.

The location and size of Drainage POS (if required) is yet to be confirmed. Some planting may occur throughout Drainage POS; however, LandCorp has confirmed that these areas will be subject to an ongoing management commitment by the responsible authority. The required works will include slashing of understorey grasses and weeds on a regular and ongoing basis to maintain fuel loads at less than 2 t/ha and achieve a low threat minimal fuel condition all year round.

Should the final Drainage POS concept result in introduction of vegetation that triggers application of AS 3959, then BAL assessment will be required to determine the necessary separation requirements and building construction standards for affected development areas.

3.2 Increased building construction standards

Strategen acknowledges that the bushfire construction provisions under AS 3959 and the National Construction Code do not apply to Class 4–9 buildings, which are likely to be the dominant types of buildings constructed throughout the proposed industrial development. Therefore, the applicant has the discretion to utilise any or all of the elements of AS 3959 in the construction of the building that they deem appropriate if the building is a Class 4–9 building (WAPC 2015b).

Whilst acknowledging the above, Strategen considers however that to achieve a best practice outcome for protection of future life and property assets from potential bushfire, building design measures be applied for all proposed buildings situated within the 100 m wide HSZ to ensure the building construction standard aligns with the assessed BAL under AS 3959 as far as reasonably practicable, regardless of building class. This measure intends to address the deemed provisions relating construction of habitable buildings[1] in bushfire prone areas as outlined in Section 78B of the *Planning and Development (Local Planning Schemes) Amendment Regulations 2015*.

Strategen has assigned BAL contours throughout the 100 m wide HSZ for Stages 1–5 only, as depicted in Figure 6 and Appendix 2, as these are the only stages where subdivision lot layout is known. BAL contours have been assigned in accordance with AS 3959 on the basis of the existing/proposed subdivision layout and parameters assessed at time of inspection (refer to the Method 1 BAL calculation outlined in Section 2.5). The BAL contour assessment indicates that all proposed development within these stages can achieve a BAL–29 rating or lower and no development is proposed within BAL–FZ or BAL–40 areas. If a lot is affected by more than one BAL, then the worst case BAL shall apply unless it can be demonstrated that the worst case BAL can be avoided through strategic building location at the building permit stage.

All proposed lots within these stages that are situated outside of the 100 m wide HSZ are BAL–Low, where there is insufficient risk to warrant specific building construction requirements. The extent of BAL–Low throughout these stages relies on the separation distances and fuel management measures being implemented as per Section 3.1. BALs may be reassessed through a BMP addendum or individual lot BAL assessment in response to any modifications to lot layout or changes to the vegetation extent currently affecting the site.

Strategen reiterates that BAL assessment will need to be undertaken at the relevant subdivision stage for areas of the site where subdivision lot layout is yet to be confirmed.

[1] 'Habitable building' is defined as any permanent or temporary structure that is fully or partially enclosed and has at least one wall and a roof of solid material and is used for a purpose that involves the use of the interior of the structure by people for living, working, studying or being entertained.

3.3 Vehicular access

3.3.1 Public roads

The proposed road network will provide at least two different points of vehicular access for all development stages at all times. This will be achieved initially through multiple connections with Flynn Drive to the south and links with the existing road network to the east, such as Warman Street. All public roads constructed as part of the development will comply with technical requirements of the Guidelines, as outlined in Table 2.

Where applicable, each stage of subdivision will include a requirement for provision of fire service access routes in accordance with acceptable solution A3.7, or an appropriate performance-based solution in accordance with P3 of the bushfire protection criteria set out in the Guidelines. Any proposed fire service access routes will be required to meet the technical requirements of the Guidelines, as outlined in Table 2.

Table 2: Vehicular access technical requirements

Technical requirement	Public road	Fire service access route
Minimum trafficable surface (m)	6*	6*
Horizontal distance (m)	6	6
Vertical clearance (m)	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10
Minimum weight capacity (t)	15	15
Maximum crossfall	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5
* Refer to E3.2 Public roads: Trafficable surface		

Source: WAPC 2015b

3.3.2 Individual lot firebreaks

Following creation of lots, internal lot boundary firebreaks will need to be created and maintained to meet compliance with the current City of Wanneroo annual firebreak notice (refer to Appendix 3). The relevant firebreak provisions currently state that:

- for any lot greater than 2000 m^2, a minimum 3 m wide firebreak with 3 m high vertical clearance is required immediately inside and around all external boundaries of the lot
- for any lot less than 2000 m^2, a minimum 2 m wide firebreak with 2 m high vertical clearance is required immediately inside and around all external boundaries of the lot.

These provisions are required unless a firebreak variation stating otherwise is approved by the City.

3.4 Reticulated water supply

All proposed development areas will be provided a reticulated water supply. The reticulated system will ensure an all year round supply of water is provided for each lot to meet minimum industrial and emergency water supply requirements.

A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements, in particular the Water Corporation Design Standard DS 63 'Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250'. This standard will guide construction of the internal reticulated water supply system and fire hydrant network, including spacing and positioning of fire hydrants so that the maximum distance between a hydrant and the rear of a building envelope (or in the absence of a building envelope, the rear of the lot) shall be 120 m and the hydrants shall be no more than 200 m apart.

3.5 Additional measures

Strategen makes the following additional recommendations to inform ongoing stages of development:

1. High risk land uses: proposed industrial development has the potential to establish high risk land uses[2] throughout the project area. Where possible, high risk land uses should be avoided throughout the 100 m wide HSZ. Where they can't be avoided, high risk land uses located in areas of BAL–12.5 to BAL–29 will require the following documentation in addition to this BMP to accompany submission of the Development Application (DA) or building permit application (whichever is deemed more appropriate) in order to address Policy Measure 6.6.1 of SPP 3.7:
   (a) Emergency Evacuation Plan
   (b) Risk Management Plan that addresses bushfire risk management measures for any flammable on-site hazards.
2. Notification on Title: notification is to be placed on the Title of all proposed lots with a designated BAL rating (either through condition of subdivision or other head of power) to ensure all landowners/proponents and prospective purchasers are aware that their lot is currently in a designated bushfire prone area and that increased building construction standards may apply to future buildings as determined by this BMP. The notification on title is also to include that the site is subject to a Bushfire Management Plan.
3. Updated BMP or individual lot BAL assessment: the BAL assessment contained within this BMP is considered sufficient to inform future development and building construction within Stages 1–5. However, an updated BMP will be required to accompany each future subdivision application within the project area. Further BMP addendums or individual lot BAL assessment may be prepared at a later date to demonstrate reassessment of the management measures documented in this BMP (such as the APZ and/or BALs) in response to any modifications to development design or changes to the vegetation extent currently affecting the site.
4. Compliance with current City of Wanneroo annual firebreak notice: the developer/land manager and prospective land purchasers are to comply with the current City of Wanneroo annual firebreak notice, as documented in Appendix 3.

[2] High risk land uses may include, but are not limited to: service stations, landfill sites, bulk storage of hazardous materials, fuel depots and certain heavy industries as well as military bases, power generating land uses, saw-mills, highways and railways, among other uses meeting the definition.

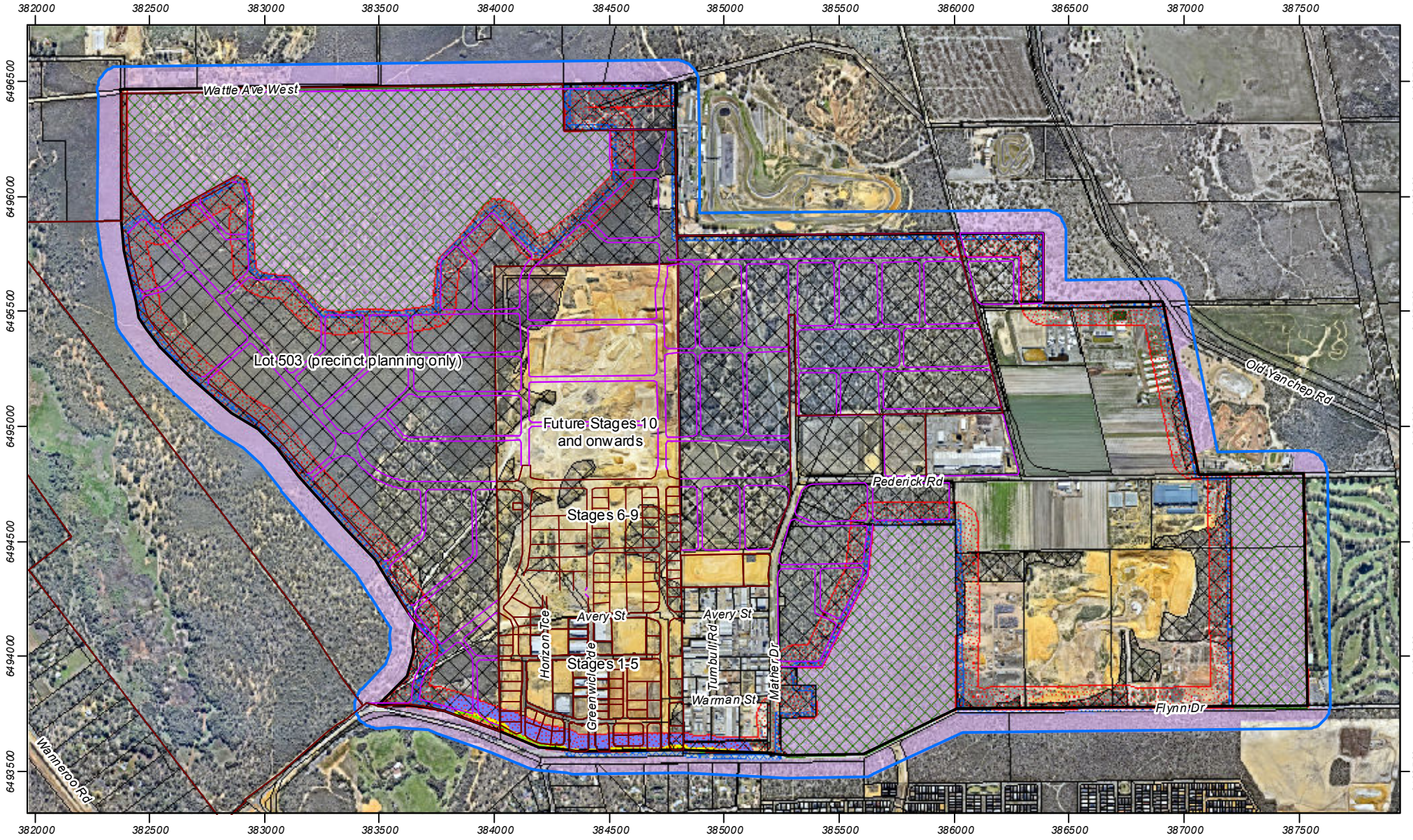

Figure 6 Bushfire Management Plan: Neerabup Industrial Area

Scale 1:23,000 at A4

0 100 200 300 400 500 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 3/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult\2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_F006.mxd

Legend

- Cell structure plan layout
- Subdivision plan layout
- Project area
- Existing cadastre
- 100m wide assessment area
- 100m wide HSZ
- POS, proposed conservation/ Bush Forever sites
- Indicative 20m wide APZ
- Classified vegetation (permanent vegetation extent)
- On-site temporary vegetation to be managed via staging works

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

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4. Proposal compliance and justification

Proposed development within the project area is required to comply with SPP 3.7 under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

a) Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.

b) Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

c) This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.3 Information to accompany strategic planning proposals

Any strategic planning proposal to which policy measure 6.2 applies is to be accompanied by the following information prepared in accordance with the Guidelines:

a) (i) the results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or

a) (ii) where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and

b) the identification of any bushfire hazard issues arising from the relevant assessment; and

c) clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.

This information can be provided in the form of a Bushfire Management Plan or an amended Bushfire Management Plan where one has been previously endorsed.

6.4/6.5 Information to accompany subdivision applications/development applications

Any subdivision application/development application to which policy measure 6.2 applies is to be accompanied by the following information in accordance with the Guidelines:

a) a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines. BAL Contour Maps should be prepared by an accredited Bushfire Planning Practitioner

b) the identification of any bushfire hazard issues arising from the BAL Contour Map

c) an assessment against the bushfire protection criteria requirements contained within the Guidelines demonstrating compliance within the boundary of the subdivision/development site.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

5.1 Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.

5.2 Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.

5.3 Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.

5.4 Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7, the bushfire management measures, as outlined in Section 3, have been devised for the proposed development in accordance with acceptable solutions of the Guidelines to meet compliance with bushfire protection criteria. An 'acceptable solutions' assessment is provided in Table 3 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 3: Acceptable solutions assessment against bushfire protection criteria

Bushfire protection criteria	Intent	Acceptable solutions	Proposed bushfire management measures	Compliance statement
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure	A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	Refer to Section 3.2, which demonstrates that development will only occur in areas of BAL–29 or lower. No development will occur in BAL–FZ or BAL–40 areas.	The measures proposed are considered to comply and meet the intent of Element 1 Location.
Element 2: Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact	A2.1 Asset Protection Zone Every building is surrounded by an APZ, depicted on submitted plans, which meets detailed requirements (refer to the Guidelines for detailed APZ requirements).	Refer to Section 3.1, which demonstrates that a minimum 20 m wide APZ will be provided at all development-vegetation interfaces.	The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development
		A2.2 Hazard Separation Zone Every building and its contiguous APZ is surrounded by an HSZ, depicted on submitted plans, that meets detailed requirements (refer to the Guidelines for detailed HSZ requirements). An HSZ may not be required if the proposed construction meets the standard appropriate to the BAL for that location, and does not exceed BAL–29.	HSZs are not proposed since individual building construction meets the standard appropriate to the BAL for that location.	
Element 3: Vehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event	A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	Refer to Section 3.3, which demonstrates that a minimum of two different vehicular access routes will be provided for the proposed development at all times via the existing/proposed road network.	The measures proposed are considered to comply and meet the intent of Element 3 Vehicular access
		A3.2 Public road A public road is to meet the requirements in Table 4 Column 1 of the Guidelines.	Refer to Section 3.3, which demonstrates that all proposed public roads will meet requirements of the Guidelines (refer to Table 2).	
		A3.3 Cul-de-sac (including a dead-end-road) A cul-de-sac and/or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved as per Table 4 Column 2 of the Guidelines.	N/A No cul-de-sacs are proposed as part of the development.	
		A3.4 Battle-axe Battle-axe access legs should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved as per Table 4 Column 3 of the Guidelines.	N/A No battle-axe lots are proposed as part of the development.	

		A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements as per Table 4 Column 3 of the Guidelines.	N/A No private driveways longer than 50 m are proposed as part of the development.	
		A3.6 Emergency access way An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements as per Table 4 Column 4 of the Guidelines.	N/A No emergency access ways are required as part of the development.	
		A3.7 Fire service access routes (perimeter roads) Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for fire fighting purposes. Fire service access routes are to meet detailed requirements as per Table 4 Column 5 of the Guidelines.	Where applicable, fire service access routes will be required at the subdivision stage in accordance with A3.7 or an appropriate performance based solution in accordance with P3 of the Guidelines.	
		A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government	Refer to Section 3.3, which demonstrates that all proposed lots will be required to comply with the firebreak requirements prescribed in the annual firebreak notice issued by the local government.	
Element 4: Water	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	Refer to Section 3.4, which demonstrates that all proposed lots will be provided a reticulated water supply and network of hydrants in accordance with local water authority, City and DFES requirements.	The measures proposed are considered to comply and meet the intent of Element 4 Water
		A4.2 Non-reticulated areas Water tanks for fire fighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas)	N/A The proposed development will not occur within a non-reticulated area.	
		A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively) Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10 000 litres.	N/A The proposed development will not occur within a non-reticulated area.	

5. Implementation and enforcement

Implementation of the BMP applies to LandCorp, prospective landowners and the relevant land authority/manager (such as the City or future land purchasers) to ensure bushfire management measures are adopted and implemented on an ongoing basis. A summary of the bushfire management measures described in Section 3, as well as a works program, is provided in Table 4. These measures will be implemented to ensure the ongoing protection of proposed life and property assets is achieved. Timing and responsibilities are also defined to assist with implementation of each measure.

Table 4: Proposed works program

Bushfire management measure	Timing for application	Responsibility
Creation and ongoing maintenance of APZs as per Section 3.1.1	APZs are to be created for each development stage where required, prior to development within that stage, and maintained as required to ensure they are kept in a low threat minimal fuel condition on a regular and ongoing basis	LandCorp during development of each relevant stage, relevant land authority/manager where required following completion of each relevant stage
Creation and maintenance of on-site staging buffers as per Section 3.1.3	Staging buffers are to be created in advance around each development stage where required, prior to development within that stage, and maintained as required to ensure they are kept in a low threat minimal fuel condition on a regular and ongoing basis until developed	LandCorp
Ongoing maintenance of Drainage POS as per Section 3.1.4	If created, Drainage POS is to be maintained, in advance where required, prior to development within that stage to ensure the POS is kept in a low threat minimal fuel condition on a regular and ongoing basis	LandCorp during development of each relevant stage, relevant land authority/manager where required following completion of each relevant stage
Building construction to the recommended BAL ratings as far as reasonably practicable as per Section 3.2	At the building construction stage	Prospective landowner, builder
Construction of public roads and fire service access routes (if required) as per Section 3.3.1	Prior to building construction for each relevant stage	LandCorp
Creation and ongoing maintenance of firebreaks as per Section 3.3.2	Firebreaks are to be created for each relevant lot following creation of lots and maintained as required in accordance with the current City of Wanneroo annual firebreak notice	LandCorp prior to lot sale, prospective landowner following lot sale
Provision of reticulated water supply and network of hydrants as per Section 3.4	Prior to building construction for each relevant stage	LandCorp
Preparation of Emergency Evacuation Plan and Risk Management Plan as per Section 3.5	At the Development Application stage or building permit application stage (whichever is deemed more appropriate) for any high risk land uses proposed in areas of BAL–12.5 to BAL–29	Prospective landowner
Notification on Title as per Section 3.5	Following subdivision approval	LandCorp
Updated BMP or individual lot BAL assessment as per Section 3.5	An updated BMP is required to support each future subdivision application within the project area. Further BMP addendums and/or individual lot BAL assessments may be required at future planning/ building stages to demonstrate reassessment of the management measures documented in this BMP (such as the APZ and/or BALs) in response to any modifications to development design or changes to the vegetation extent currently affecting the site.	LandCorp or prospective landowner depending on the applicant

Bushfire management measure	Timing for application	Responsibility
Compliance with current City of Wanneroo annual firebreak notice as per Section 3.5	All year round as specified in the current firebreak notice	LandCorp, prospective landowner, relevant land authority/manager

5.1 Document review

This BMP will be updated as necessary following the date of approval to ensure:

1. Implementation is assessed and corrective actions are applied in cases of non-compliance.
2. The effectiveness and impact of fire prevention work is evaluated and any significant changes in development design or the surrounding environment are reassessed in a BMP addendum.

LandCorp will be responsible for updating and revising the BMP as required until such time that the development is complete, after which time the City will be the authority responsible for updating and revising the BMP as required.

5.2 Stakeholder consultation

Strategen has undertaken consultation with LandCorp, the City and DFES to ensure aims and objectives of the BMP are in accordance with stakeholder expectations and the BMP maintains compliance with the Guidelines.

6. References

City of Wanneroo 2016, *Fire Management Plan: LandCorp Land at Neerabup*, plan prepared for the City and DFES, February 2015.

Department of Fire and Emergency Services (DFES) 2016, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: *http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx*, [11/07/2016].

Standards Australia (SA) 2009, *Australian Standard AS 3959–2009 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Taylor Burrell Barnett and Sinclair Knight Merz (SKM) 2011, *Neerabup Industrial Area Agreed Structure Plan (As Amended)*, report prepared for LandCorp, November 2011.

Western Australian Planning Commission (WAPC) 2015a, *State Planning Policy 3.7 Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2015b, *Guidelines for Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Appendix 1
Photo points (refer to Figure 3 for spatial location of photo points)

Photo No.	Vegetation class	Comment	Photo
1	Class B woodland	Banksia overstorey, scrub understorey, adjacent west of Lot 9005	
2	Class D scrub	Temporary vegetation within Lot 9005	
3	Class D scrub	Adjacent west of Lot 9005, eucalyptus overstorey in background signifies narrow band of Class A forest	

Photo No.	Vegetation class	Comment	Photo
4	Class D scrub	Adjacent west of Lot 9005	
5	Class A forest	Adjacent northwest of Lot 9005, subject to recent prescribed burn by DFES/City of Wanneroo brigades (Cell 2)	
6	Class D scrub	Adjacent west of Lot 9005, south of prescribed burn (Cell 2) boundary	

Photo No.	Vegetation class	Comment	Photo
7	Class A forest	Central north within Lot 503, south of prescribed burn (Cell 2) boundary	
8	Class A forest	Adjacent north of Lot 9005, subject to recent prescribed burn by DFES/City of Wanneroo brigades (Cell 2)	
9	Class D scrub	Adjacent west of Barbagallo Raceway	

Photo No.	Vegetation class	Comment	Photo
10	Low threat vegetation Clause 2.2.3.2 (e) and (f)	Within western boundary of Barbagallo Raceway	
11	Class D scrub	View to southwest from DPaW station, north of site	
12	Class D scrub	View to southeast from DPaW station, north of site	

Photo No.	Vegetation class	Comment	Photo
13	Class B woodland	Sparse banksia and casuarina canopy over grassland, within northeast portion of site	
14	Class A forest	Three tiered vegetation with eucalyptus overstorey, banksia/casuarina midstorey and shrub/scrub understorey, within northeast portion of site	
15	Class B woodland	Sparse melaleuca canopy over grassland, within northeast portion of site	

Photo No.	Vegetation class	Comment	Photo
16	Class A forest	Eucalyptus regrowth, will become forest in mature state, northeast of site	
17	Class A forest	Roadside vegetation east of site, eucalyptus overstorey	
18	Class B woodland	Predominant banksia woodland within Pinjar Park, east of site	

Photo No.	Vegetation class	Comment	Photo
19	Class B woodland	Predominant banksia and casuarina woodland, proposed for on-site retention within central southern portion of site	
20	Low threat vegetation Clause 2.2.3.2 (f)	Managed horticulture within central eastern portion of site	
21	Class A forest	Very recently burnt, eucalyptus overstorey with regeneration of understorey within northeast portion of site	

Photo No.	Vegetation class	Comment	Photo
22	Class G grassland	Unmanaged grassland plot, central to site	
23	Class A forest	Three tiered vegetation with eucalyptus overstorey, banksia/casuarina midstorey and shrub/scrub understorey, central to site	
24	Class B woodland	Predominant banksia and casuarina woodland, proposed for on-site retention within central southern portion of site	

Photo No.	Vegetation class	Comment	Photo
25	Class B woodland	Roadside vegetation, southeast of site	
26	Class B woodland	Roadside vegetation, southeast of site	
27	Class B woodland	Predominant banksia and casuarina woodland, proposed for on-site retention within central southern portion of site	

Photo No.	Vegetation class	Comment	Photo
28	Class A forest	Greater proportion of eucalyptus overstorey over banksia and casuarina midstorey over shrubs/scrub, south of site opposite Flynn Drive	
29	Class A forest	South of site within adjacent larger rural residential lots	
30	Low threat vegetation Clause 2.2.3.2 (e)	Within Stages 1–5 subdivision area	

Photo No.	Vegetation class	Comment	Photo
31	Class A forest	Three tiered vegetation with eucalyptus overstorey, banksia/casuarina midstorey and shrub/scrub understorey, southwest of Stages 1–5 subdivision area	
32	Low threat vegetation Clause 2.2.3.2 (e)	Within Stages 1–5 subdivision area	
33	Class D scrub	West of Stages 1–5 subdivision area	

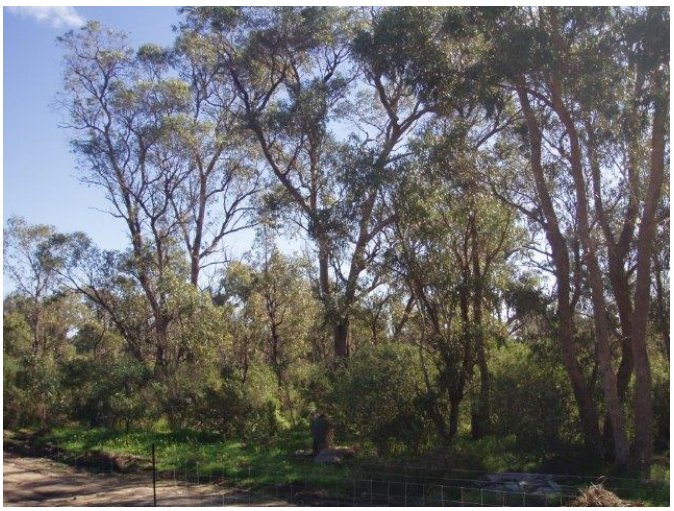
Photo No.	Vegetation class	Comment	Photo
34	Class A forest	Three tiered vegetation with eucalyptus overstorey, banksia/casuarina midstorey and shrub/scrub understorey, southwest of site opposite Flynn Drive	
35	Class A forest	Three tiered vegetation with eucalyptus overstorey, banksia/casuarina midstorey and shrub/scrub understorey, west of site opposite quarry access road	
36	Class B woodland	Predominant banksia overstorey with scrub understorey, west of Stages 1–5 subdivision area	

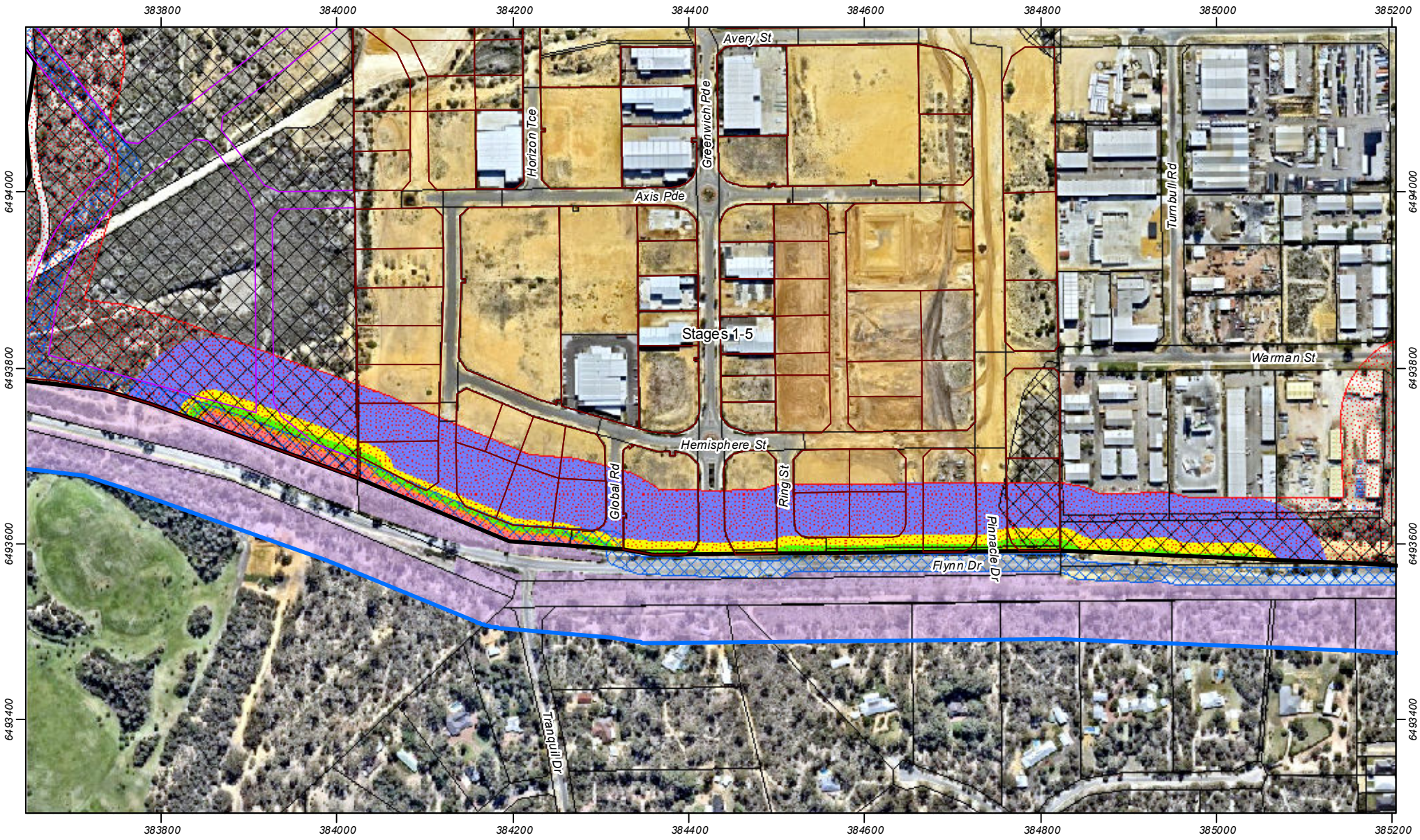
Photo No.	Vegetation class	Comment	Photo
37	Class B woodland	Sparse banksia/eucalyptus overstorey over grassland, west of quarry access road	
38	Class G grassland	Unmanaged grassland plot west of quarry access road	
39	Class B woodland	Banksia and casuarina woodland proposed for on-site retention within eastern portion of site	

Photo No.	Vegetation class	Comment	Photo
40	Class B woodland	Banksia and casuarina woodland proposed for on-site retention within eastern portion of site	
41	Class B woodland	Banksia woodland in background beyond predominant grassland plot within central northern portion of site	
42	Class B woodland	Predominant banksia and casuarina woodland with some minor eucalyptus incursion within southern portion of site	

Photo No.	Vegetation class	Comment	Photo
43	Class D scrub	West of quarry access road	
44	Class D scrub	East of quarry access road	
45	Class D scrub	Low lying contiguous scrub within Lot 503	

Photo No.	Vegetation class	Comment	Photo
46	Class D scrub	Low lying contiguous scrub within Lot 502	
47	Class D scrub	Adjacent south of Stages 1–5 subdivision area, north of Flynn Drive	

Appendix 2
BAL contour assessment for Stages 1–5



Appendix 2 BAL contour assessment for Stages 1-5

Scale 1:6,000 at A4

0 50 100 150 m

Coordinate System: GDA 1994 MGA Zone 50
Note that positional errors may occur in some areas
Date: 3/08/2016
Author: JCrute
Source: Aerial image and plan: Client 07/2016. Existing cadastre: SLIP, Landgate 2016.
Path: Q:\Consult\2016\LAN\LAN16242\ArcMap_documents\R001\Rev0\LAN16242_01_R001_Rev0_Appendix2.mxd

Legend

- Cell structure plan layout
- Subdivision plan layout
- Project area
- Existing cadastre
- 100m wide assessment area
- 100m wide HSZ
- POS, proposed conservation/ Bush Forever sites
- Classified vegetation (permanent vegetation extent)
- On-site temporary vegetation to be managed via staging works
- Indicative 20m wide APZ

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5

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382900 383600 384300

6495300 6494600 6493900

F/US
DS >0-5°
Flynn Dr
Avery St
Horizon Tce
Axis Pde
Global Rd
Greenwich Pde
Hemisphere St
Ring St
Tranquil Dr

Figure 2: Neerabup Phase 1 BAL contour map

N

Scale 1:7,500 at A3

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 7/08/2018

Legend

- Project area
- Existing cadastre
- 100m assessment area
- 150m assessment area
- Bush Forever site
- Classified vegetation

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

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Data source: Nearmap: Aerial image, flown 06/2018. Landgate: Cadastre, 11/2017. Client: Development layout, 08/2018. Created by: jcrute

382900 383600 384300

6495300 6494600 6493900

F/US DS >0-5° Avery St Horizon Ice Axis Pde Global Rd Greenwich Pde Hemisphere St Ring St Flynn Dr Tranquil Dr

Figure 1: Classified vegetation and effective slope

N

Scale 1:7,500 at A3

0 100 200 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 7/08/2018

Legend

- Project area
- Existing cadastre
- Surface elevation (mAHD)
- 100m assessment area
- 150m assessment area
- Bush Forever site

Vegetation class

- Class A Forest
- Class D Scrub
- Class G Grassland
- To be modified to low threat state
- Low threat exclusion under Clause 2.2.3.2

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Data source: Nearmap: Aerial image, flown 06/2018. Landgate: Cadastre, 11/2017. Client: Development layout, 08/2018. Created by: jcrute

Appendix 3
City of Wanneroo annual firebreak notice

Protect your home and property from bushfires

NOTICE TO ALL OWNERS OR OCCUPIERS OF LAND IN THE DISTRICT OF THE CITY OF WANNEROO REGARDING FIREBREAKS.

The City of Wanneroo hereby gives notice pursuant to Section 33 of the **Bush Fires Act 1954** to all owners or occupiers of land in its district that they are required on or before 15 November, or within 14 days of becoming the owner or occupier of the land if that occurs after the 15 November, to annually plough, cultivate, scarify, or otherwise clear firebreaks as specified in this Notice and thereafter up to, and including the 30 April, annually, to maintain the firebreaks clear of flammable matter.

1. Land having an area of 2000m2 or more
A firebreak not less than 3 metres wide and 3 metres high immediately inside and around all external boundaries of the land must be cleared.

2. Land having an area of less than 2000m²
A firebreak not less than 2 metres wide and 2 metres high immediately inside and around all external boundaries of the land must be cleared.

3. Buildings
A firebreak not less than 3 metres wide immediately around all external walls of every building must be cleared. Whenever a firebreak is cleared by burning the provisions of the Act and Regulations made thereunder must be observed. If pursuant to Item (2) of this Notice, mowing or slashing is carried out the height of vegetation thereafter must not exceed, as far as is reasonably practicable, 20mm over the entire area of the firebreak. The use of chemicals is subject to all restrictions imposed by the Department of Agriculture. Attention is drawn to the Flammable Liquids Regulations made under the Explosives and Dangerous Goods Act 1961,which requires a site on which flammable liquid is stored to be totally cleared of all flammable material for a minimum distance of 5 metres surrounding the site.

If it is considered to be impracticable for any reason to comply with the provisions of this Notice, application may be made not later than the 1st day of November annually to the Council or its authorised officer for permission to provide alternative fire protection measures. If permission is not granted the requirements of this Notice must be complied with.

Penalty
An owner or occupier of land who fails or neglects in any respect to comply with the requirements of this Notice is liable to a maximum fine of $5,000.

DATES TO REMEMBER

- **Firebreaks must be cleared by 15 November (AND KEPT CLEAR UNTIL APRIL 30)**
- **Burning permits required all year round**
- **Burning prohibited between 1 December to 31 March**

When and how to obtain a fire permit

Permits are available from the City of Wanneroo at the following locations:

WANNEROO ANIMAL CARE CENTRE
Located at the rear of the Ashby Operations Centre, 1204 Wanneroo Road, Ashby
The City's Rangers / Fire Control Officers are available to issue permits 7 days a week* from 4pm - 6pm
*Except Good Friday

CITY OF WANNEROO CIVIC CENTRE
23 Dundebar Road, Wanneroo
The City's Fire Control Officers / Permit Issuing Officers are available to issue permits Monday to Friday 9am - 4pm

NEED ADVICE?
Further advice about how to protect your home, constructing firebreaks, and when and how to burn off, is available from the City of Wanneroo during office hours on 9405 5000.

City of Wanneroo
23 Dundebar Road, Wanneroo, WA 6065
Locked Bag 1, Wanneroo, WA 6946
T : (08) 9405 5000 F : (08) 9405 5499
After Hours : 1300 13 83 93
E : enquiries@wanneroo.wa.gov.au
wanneroo.wa.gov.au

PROTECT YOUR HOME AND PROPERTY FROM BUSHFIRES

City of Wanneroo

Keeping your home safe from fire

There are a number of ways you can help keep your home safe from fire:

- Install smoke detectors in your home
- Clear vegetation away from the walls of your home
- Clear all rubbish and flammable material from around your home to create a 20 metre circle of safety
- Store firewood, timber, petrol, and kerosene well away from your home
- Prior to summer, clean all leaves and debris from your gutters
- Don't have flammable trees such as conifers near buildings
- Have branches trimmed that overhang the house or powerlines
- Fit wire insect screens or shutters to windows and glass doors

If a firebreak is impractical along your boundary for environmental or other reasons notify the City of Wanneroo by 1 October to obtain permission to install firebreaks in alternative positions, or of a different nature.

ALTERNATIVE METHODS OF REDUCING FIRE HAZARDS ON VACANT LAND

- For urban land less than 2000m², if mowing or slashing is carried out, the height of the vegetation must not exceed, as far as is reasonably practical, 20mm over the entire area of the firebreak
- The use of chemicals is subject to all restrictions imposed by the Department of Agriculture
- Mulching • Disposal at an authorised rubbish tip site

When and how to burn

NO BURNING FROM 1 DECEMBER - 31 MARCH

Burning off - that is, bush/running fire including grass, on any land is totally prohibited between 1 December and 31 March. Fire permits for burning material other than garden rubbish are required all year round.

A person in control of the fire must stay with the fire until it is completely extinguished.

GARDEN RUBBISH AND REFUSE

The burning of garden refuse is permitted between the hours of 6pm and 11pm, provided the fire danger rating is not VERY HIGH, SEVERE, EXTREME or CATASTROPHIC or a TOTAL FIRE BAN has been declared.

Fire danger rating signs are located at the following locations:

- Corner of Joondalup Drive and Wanneroo Road
- Wanneroo Road, south of the Yanchep Beach Road turn off
- Wanneroo Road, Carabooda • Marmion Avenue, Jindalee
- Neaves Road, Mariginiup • Old Yanchep Road, Pinjar
- Gnangara Road, Landsdale • Country Side Drive, Two Rocks

Other points to remember when burning garden refuse and rubbish are:

- All bush and flammable material must be thoroughly cleared within two metres of all points of the site of the fire
- The material must be on the ground, and be no more than one metre wide and one metre high

Only one heap may be burnt at any one time Incinerators may be used providing:

- The incinerator is properly constructed and designed to prevent the escape of sparks of burning material
- The incinerator is situated not less than two metres away from a building or fence
- An area of two metres surrounding the incinerator is clear of all flammable material

BARBECUES

Only gas or electric barbecues may be lit during VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger rating or declared TOTAL FIRE BAN. The lighting of solid fuel barbecues is not permitted on these days.

SMOKE NUISANCES

City of Wanneroo residents are advised to be mindful of smoke issues associated with any burning that they conduct. Steps should be taken to avoid undue smoke impact to neighbours and adjacent roads. Smoke across roadways can severely impact motorists' visibility and therefore road safety. Issues of smoke nuisance are regulated by the Waste Avoidance and Resource Recovery Act 2007.

CAMPFIRES

Campfires must not be lit on VERY HIGH, SEVERE, EXTREME or CATASTROPHIC fire danger days or declared TOTAL FIRE BAN. A person must remain in attendance at the site during the whole time the fire is burning. The user must extinguish the fire using water or earth before leaving the area.

Hints for safer burning

- Don't light a fire on a hot or windy day
- Don't burn more than you can control
- Let your neighbours know you'll be burning material
- Make sure smoke and sparks will not affect your neighbour's washing or enter open windows
- Cut or rake long grass around trees, building and fences before burning
- Burn against the wind
- On a sloping block, burn from the top down
- Keep a hose or spray pack at hand to dampen down fierce fires
- If in doubt, don't burn material yourself - call the Volunteer Fire Brigade
- Stay with the fire until it is completely extinguished
- Where possible, don't burn any closer than 20 metres from your home or other buildings

Penalties

Under the Bush Fires Act 1954, failing to comply with regulations can result in a fine ranging from $250 to $250,000 or imprisonment.

Failure to maintain 2/3 metre firebreak as per firebreak order	$250
Offence relating to lighting fire in the open air	$250
Setting fire to bush during prohibited burning times	$250
Failure of occupier to extinguish bush fire	$250

Major offences result in Court action with fines ranging from $250 to $250,000 or imprisonment for 14 years.

THE BIGGEST PENALTY OF ALL

The biggest penalty of all would be losing your loved ones or home to fire. Please ensure you, your family and your home are kept safe by taking the necessary precautions.

Special rural and residential land

Owners and occupiers of special rural and special residential land should be aware of their responsibilities to take bush fire prevention measures, while ensuring they do not contravene Town Planning Scheme provisions which control the removal of vegetation in Special Residential and Special Rural Zones.

These special rural zones were created in areas of natural flora, and the Scheme recognises the importance of preserving the natural environment in these areas. Anyone found cutting down, lopping or damaging trees in these areas without City approval may be guilty of an offence.

However, bush fire prevention, including the installation of firebreaks, is essential regardless of the zoning of the land.

Below are some guidelines for installing firebreaks in special rural zones to prevent bush fires, while minimising damage to the natural environment.

- A 3 metre wide and 3 metre high firebreak should be cleared around the perimeter of special rural or special residential lots
- These firebreaks need not be strictly around the perimeter, but may deviate according to the flora
- The firebreak does not have to be ploughed but can instead be created by clearing and removing all flammable material
- Care should be taken to avoid damaging or removing significant trees and shrubs
- Avoid the build up of undergrowth and leaf litter