Clearing Permit Application Supporting Document

Proposed Baldivis District Sporting Complex

August 2018

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1 Introduction

The City of Rockingham proposes to develop the Baldivis District Sporting Complex (BDSC) at the following lots ('the study area' shown in Figure 1):

- Lot 4 on Plan D031062 (9.7 ha)
- Lot 103 on Plan D050627 (3.24 ha)
- Lot 104 on Plan D050627 (3.24 ha)
- Lot 105 on Plan D050627 (3.23 ha)

The study area is a total of 19.4 ha and exists approximately 44 km to the south of the Perth central business district (CBD). Photos of the study area can be found in Appendix A.

The BDSC is required to meet the current and future demand for organised sporting spaces in the locality. The project will include five large playing fields (consisting of cricket, AFL and soccer ovals), cricket nets, two club rooms, change rooms, 18 outdoor hard courts, an indoor recreation centre, an outdoor youth recreation space, a nature play area, a maintenance shed and car parking. A plan of the future BDSC development layout can be found in Appendix B.

The BDSC does not require planning approval from the Western Australian Planning Commission (WAPC) as the development is considered public works. Correspondence from the WAPC confirming this is included in Appendix C.

1.1 Purpose of the Document

The purpose of this document is to present the results of an assessment of the clearing proposal against the ten clearing principles as outlined in Department of Water and Environmental Regulations (DWER) guidance document 'A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the Environmental Protection Act 1986'. This report identifies the potential environmental impacts associated with the clearing of native vegetation for the proposed BDSC and includes management measures to mitigate the environmental impacts.

2 Assessment Methodology

2.1 Desktop Assessment

An initial desktop assessment included a review of current and relevant literature sources, databases and GIS Information (constraints mapping) to determine:

- The possible impacts, environmental sensitivities and the environmental risk associated with the proposed clearing; and
- Whether the proposed clearing is exempt under the *Environmental Protection Act 1986* (EP Act) or the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The desktop assessment included considering whether the proposed clearing will likely be at variance to any of the ten clearing principles defined in 'A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the EP Act'.

2.2 Field Assessments

A range of field assessments were undertaken to inform the design of the BDSC and to assess the proposed clearing against the ten clearing principles. The field surveys are discussed in the below sections.

2.2.1 Flora and Vegetation Report

A targeted and detailed flora and vegetation survey was undertaken in accordance with the Environmental Protection Authority (EPA) Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EIA) on the 11th of October 2017. The survey was undertaken by an ecologist at GHD with over ten years' experience.

Field survey methods involved a combination of sampling quadrats (10 m x 10 m) in identified vegetation units and traversing the study area by foot and vehicle. A relevé was conducted in areas that were too small or too degraded to establish a quadrat. Searches for conservation significant flora or ecological communities were undertaken.

The flora and vegetation survey identified three vegetation types within the study area ranging from a degraded to completely degraded condition:

- Tuart/Jarrah woodland
- Grevillea shrubland (re-established after historical clearing)
- Parkland cleared

Since the flora and vegetation survey was undertaken, the City constructed a firebreak along the perimeter of the site to reduce the bushfire risk. This included the removal of the Grevillea shrubland (0.19 ha). This clearing was determined by the City to be exempt under Schedule 6, Clause 10 under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

The figures accompanying this document show the vegetation currently present in the study area following fire management works.

Lot 105 is completely devoid of vegetation, whereas Lots 103, 104 and half of Lot 4 are parkland cleared, consisting mostly of scattered trees/shrubs over introduced grasses and herbs. The other half of Lot 4 contains remnant Tuart/Jarrah woodland.

The study area is highly modified due to historical clearing, logging, grazing, fencing, tracks and weed invasion. The vegetation structure has been significantly altered with an understorey completely dominated by common weeds. A total of 87 flora species were identified in the study area, which consisted on 45 introduced species.

No conservation significant flora species were identified during the field survey or considered likely to occur within the study area. No threatened ecological communities (TECs) were identified however, one priority ecological community (PEC) may occur and another PEC is considered likely to occur:

- Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain (Priority 3 PEC)- likely to occur
- Southern *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands (Priority 3 PEC)- may occur

The full Flora and Vegetation Assessment Report can be found in Appendix D.

2.2.1 Tree Survey

A survey was undertaken of all trees between 100 mm diameter at breast height (DBH) and 500 mm DBH (referred to as 'non-significant trees') to inform tree retention. A total of 409 non-significant native trees were identified during the tree survey, consisting of *Eucalyptus marginata*, *E. gomphocephala*, *Banksia attenuata*, *B. grandis*, *B. menziesii*, *B. sessilis*, *Corymbia calophylla* and *Allocasuarina fraseriana*.

2.2.2 Fauna Survey and Black Cockatoo Habitat Assessment

A targeted black cockatoo habitat assessment was undertaken on the 2nd August 2017 and a Level 1 (reconnaissance) fauna survey was undertaken on the 11th of October 2017. The surveys were undertaken by an ecologist at GHD with over ten years' experience.

The Level 1 fauna survey was undertaken with reference to the EPA Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA 2016a) and Technical Guidance – Terrestrial Fauna Surveys (EPA 2016b). The black cockatoo habitat assessment was conducted in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral guidelines for three threatened black cockatoo species (Department of Sustainability, Environment, Water, Populations, and Communities [DSEWPaC] 2012).

A total of 30 fauna species, including 21 birds, five reptiles and four mammals, were recorded in the survey area. Of these, three species are introduced. All species recorded during the survey are generally common and are known to occur in the locality.

The study area contains suitable foraging, roosting and breeding habitat for all three species of black cockatoos: Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and Forest Red-tailed Black Cockatoo [FRBC] (*Calyptorhynchus banksii naso*). The Carnaby's Cockatoo and FRBC were recorded as part of the fauna assessments. A total of 4.84 ha of potential foraging habitat and 175 potential breeding trees were identified in the parts of the study area containing native vegetation.

The full Fauna Assessment Report, including the black cockatoo habitat assessment can be found in Appendix E.

3 Clearing Footprint

The development has been designed in an environmentally sensitive manner to reduce clearing of native vegetation as much as possible. The majority of the study area will have minimal differences in pre and post development site levels which enables vegetation retention to be maximised (Appendix F). There is a large patch of vegetation in the north-western portion of the site that will be retained and left in its natural state. A path and interpretive shelter will be installed through this large retained patch of vegetation, however these will be strategically placed in areas devoid of native vegetation.

The development will achieve a positive environmental outcome, with 61.77% of native vegetation proposed to be retained. A breakdown of the clearing footprint and the vegetation proposed to be retained is shown in Tables 1 and 2 below and Figure 2. The development layout may be subject to minor changes, however the clearing footprint will remain unchanged.

Table 1. Breakdown of native vegetation to be retained vs cleared

	To be cleared (ha)	To be retained (ha)	Total (ha)
Native Vegetation *	1.85	2.99	4.84

*Only remnant native vegetation or naturally re-established native vegetation has been assessed as part of this application. Planted vegetation has been excluded from the assessment.

Table 2. Breakdown of trees to be retained vs cleared

	To be cleared (No.)	To be retained (No.)	Total (No.)
Potential breeding trees (≥ 500 mm DBH)	78	94	172
Trees <500 mm DBH	102	307	409

It must be noted that the City will engage a qualified arborist to undertake an assessment of all the trees to be retained around future developed areas prior to clearing to ensure they are safe for retention. If any of the trees identified for retention around the developed areas are found to be dead, diseased or dangerous they will be removed under Clause 4.11.2(b) of the City's Town Planning Scheme No. 2. All trees within the Tuart/Jarrah Woodland in the north-western portion of the study area identified for retention will remain.

4 Mitigation Measures

The City is committed to minimising the environmental impacts from the proposed BDSC development. Mitigation measures that will be undertaken as part of the development are discussed below.

4.1 Enhancement of environmental values as part of the future BDSC

The retained patch of Tuart/Jarrah woodland in the north-western portion of the study area and the Conservation Category Wetland (CCW) buffer in the south-western portion of the study area will be actively managed by the City. This will include revegetation, weed control, and controlled access with fencing and paths where appropriate.

The entirety of the CCW buffer within the study area will be revegetated with native species at a density of one plant per m^2 (except a small proportion which may contain infrastructure for recreation such as a footpath around the perimeter). The CCW buffer adjoins the City managed Baldivis Children's Forest (Reserve 30269), which is also managed to enhance the integrity of the CCW.

Revegetation within the Tuart/Jarrah woodland will be progressively implemented on an ongoing basis, at an average density of one plant per m^2.

Landscaping along the boundaries of the development will consist of native trees known to provide habitat for black cockatoos and trees listed as 'Plants Used by Carnaby's Black Cockatoo' (DEC 2011). Planting within car parks will endeavour to also consist of native trees known to provide habitat for black cockatoos, if suitable. It is estimated that a minimum of 90

trees will be planted as part of the landscaping in car parks and along site boundaries. Landscape planting will also consist of middle and understorey species where suitable. Bio-retention swales will be planted with native nutrient stripping species.

The proposed species list for the future revegetation areas and tree species proposed for the general landscaping at the site are provided in Table 3 below.

Table 3. Proposed revegetation species for the study area

Location	Proposed species
Retained Tuart/Jarrah woodland in the north-western portion of the study area	*Allocasuarina fraseriana*, *Banksia attenuata*, *B. grandis*, *B. menziesii*, *B. sessilis*, *Corymbia calophylla*, *Eucalyptus gomphocephala*, *E. marginata*, *Hardenbergia comptoniana, Jacksonia furcellata, Macrozamia riedlei*, *Xanthorrhoea gracilis, Xanthorrhoea preissii, Spyridium globulosum*
CCW Buffer in the south-western portion of the site	*Enchylaena tomentosa var. tomentose, Gahnia trifida, Lepidosperma gladiatum, Melaleuca rhaphiophylla, Melaleuca incana* subsp. *incana, Rhagodia baccata* subsp. *baccata, Spyridium globulosum.*
Landscaping around the development	*Agonis flexuosa, B. attenuata*, *B. grandis, B. menziesii, Corymbia calophylla, E. gomphocephala*, *E. marginata, E. rudis, E, caesia, E. todtiana*

4.2 Fauna Relocation

The City will engage a Contractor to undertake fauna relocation prior to commencement of site works. This will include trapping for reptiles and mammals and searching trees for active nests prior to clearing. If clearing takes place between May and August then active foraging and searching for reptiles will be undertaken. A qualified zoologist will be present on-site during clearing works to ensure the clearing procedure is followed and to capture any fauna present or attend to injured fauna. The relocation works will be completed within four days of clearing to ensure native fauna do not re-colonise within the study area.

4.3 Installation of Artificial Nesting Boxes for Black Cockatoos

The City will install five artificial nesting boxes for black cockatoos in the patch of vegetation being retained in the north-western portion of the site. The artificial nesting boxes will be installed in areas away from the main sporting complex activities where there will be less

disturbance to the black cockatoos during breeding. Optimal breeding size nesting boxes for the FRBC and Carnaby's Cockatoo as recommended by the Department of Biodiversity, Conservation and Attractions (DBCA) will be installed.

5 Assessment against the Ten Clearing Principles

The proposed clearing activities have been assessed against the ten clearing principles using the methods defined in Section 2. The assessment is presented in Table 4 below.

Table 4. Assessment against the ten clearing principles for the study area

Principle	Assessment
Principle (a) – Native vegetation should not be cleared it if comprises a high level of biological diversity	Two vegetation types are present within the study area (Figure 3): • **Tuart/Jarrah woodland**: *Eucalyptus gomphocephala*, *E. marginata* and *Banksia attenuata* woodland over *Macrozamia riedlei* and *Xanthorrhoea gracilis* isolated shrubs over *Iridaceae* sp. and **Lupinus* spp. open herbland over **Ehrharta calycina*, **Briza maxima* and **Bromus diandrus* grassland (3.08 ha). • **Parkland cleared:** Cleared paddocks where the understorey has been completely cleared of native vegetation. Consists of scattered individual or clumps of native and introduced trees and/or tall shrubs over introduced grasses and herbs. The natural structure of the vegetation is no longer intact (1.76 ha). The 'Tuart/Jarrah woodland' consisted of degraded to completely degraded vegetation, whereas the 'Parkland cleared' areas were completely degraded (GHD 2018a) The DBCA threatened and priority ecological communities database identified six PECs within 5km of the study area (see Table 8 in Appendix D). The flora and vegetation survey found that one PEC may occur and another PEC is considered likely to occur within the study area: • Tuart (*Eucalyptus gomphocephala*) woodlands of the Swan Coastal Plain (Priority 3 PEC)- likely to occur • Southern *Eucalyptus gomphocephala* and/or *Agonis flexuosa* woodlands (Priority 3 PEC)- may occur

Principle	Assessment
	Only 0.8 ha of 'Tuart/Jarrah woodland' representing potential PECs are proposed to be cleared as part of the development and majority (2.28 ha; 74%) will be retained. A breakdown of the vegetation types to be cleared vs retained is shown in Table 5 below: **Table 5. Vegetation types to be cleared vs retained** A NatureMap database search identified 180 flora taxa, representing 60 families and 128 genera previously recorded within 5 km of the study area. This total comprised 140 native flora taxa and 40 naturalised (introduced) flora taxa. The flora and vegetation survey identified 87 flora taxa (including subspecies and varieties) representing 41 families and 71 genera in the study area (GHD 2018a). This total included 42 native taxa and 45 introduced taxa. The survey area is not considered representative of the floristic diversity in the area due to the highly degraded nature of the site. A search of the DBCA Threatened and Priority Flora database and NatureMap identified12 Priority flora species as potentially occurring within the study area (See Appendix D within Appendix D). A likelihood assessment found that all Priority flora species are either 'unlikely' or 'highly unlikely' to occur within the study area. No Priority flora were recorded during the spring 2017 field survey (GHD 2018a). A revised NatureMap report in July 2018 did not identify any additional conservation significant flora not considered as part of the flora and vegetation assessment (DBCA 2018a). The Priority flora species locations and PECs in close proximity to the site are shown in Figure 4.

	To be cleared (ha)	To be retained (ha)	Total (ha)
Tuart/Jarrah Woodland (potential PECs)	0.80	2.28	3.08
Parkland Cleared	1.05	0.71	1.76

<table>
<tr><th>Principle</th><th>Assessment</th></tr>
<tr><td></td><td>Due to the proposed clearing footprint being 1.85 ha of degraded to completely degraded vegetation that is significantly altered with very limited floristic diversity it is unlikely that it will comprise a high level of biological diversity.

Assessed Outcome: Unlikely to be at variance to the principle</td></tr>
<tr><td>Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significant habitat for fauna indigenous to Western Australia</td><td>A search of the DBCA Threatened and Priority Fauna database, DBCA NatureMap database and DotEE Protected Matters Search Tool (PMST) identified 44 conservation significant fauna as potentially occurring within the study area (see Appendix C within Appendix E). This consisted of:
16 fauna species listed as Threatened under the EPBC Act and/or Wildlife Conservation Act 1950 [WC Act] (including six also listed as Migratory)
17 bird species listed as Migratory only (terrestrial and wetland) under the EPBC Act and/or WC Act
One species listed as other specially protected fauna under the WC Act
11 Priority fauna species
A revised NatureMap report using a 5 km buffer of the study area in July 2018 identified one additional conservation significant fauna species that was not considered as part of the fauna assessment, the Brush-tailed Phascogale (Phascogale tapoatafa subsp. wambenger) (DBCA 2018a). The Brush-tailed Phascogale, classified as other specially protected fauna under the WC Act was identified approximately 2.3 km to the south-east of the study area.

A likelihood assessment found the following eight fauna species are likely to occur within the study area (see Appendix D within Appendix E):

Table 6. Conservation significant fauna likely to occur within the study area<table><tr><th>Species</th><th>Conservation Status</th></tr><tr><td>FRBC</td><td>Vulnerable under the EPBC Act and WC Act</td></tr><tr><td>Carnaby’s Cockatoo</td><td>Endangered under the EPBC Act and WC Act</td></tr><tr><td>Baudin’s Cockatoo</td><td>Vulnerable under the EPBC Act and WC Act</td></tr><tr><td>Peregrine Falcon (Falco peregrinus)</td><td>Other specially protected fauna under the WC Act</td></tr></table></td></tr>
</table>

Principle	Assessment

Rainbow Bee-eater (*Merops ornatus*)	Marine under the EPBC Act and International Agreement under the WC Act
Perth Slider (*Lerista lineata*)	Listed as Priority 3 by DBCA
Black-striped Snake (*Neelaps calonotos*)	Listed as Priority 3 by DBCA
Brush-tailed Phascogale	Other specially protected fauna under the WC Act

All other conservation significant fauna identified in the State and Federal database searches are considered either 'unlikely' or 'highly unlikely' to occur within the study area (GHD 2018b).

The fauna assessment identified two conservation significant fauna species, including the FRBC and Carnaby's Cockatoo within the study area (GHD 2018b). The FRBC was identified by foraging evidence and calls in a nearby bushland and the Carnaby's Cockatoo was identified by calls also in a nearby bushland.

The development has been designed to maximise the retention of native vegetation, in particular the larger potential black cockatoo breeding trees. A breakdown of the black cockatoo habitat being cleared vs retained is shown in Table 7 below and on Figure 5.

Table 7. Potential black cockatoo habitat to be cleared vs retained

	To be cleared	To be retained	Total
Potential breeding trees (No.)	78	94	172
Potential breeding trees with hollows (No.)	8	16	24
Potential foraging habitat (ha)	1.85	2.99	4.84

It is unlikely the removal of 1.85 ha of potential black cockatoo foraging habitat and 78 potential black cockatoo breeding trees will significantly impact on the three species of black cockatoos in the locality or the wider region. The City is committed to installing five artificial nesting boxes for black cockatoos and undertaking revegetation in the retained Tuart/Jarrah Woodland and landscaping with known black cockatoo trees throughout the development. These measures will mitigate the impacts associated with removing

Principle	Assessment
	potential black cockatoo habitat as part of the development. In addition, 45% of potential breeding trees and 66% of trees with hollows will be retained as part of the development. Although the study area may provide habitat for the Rainbow Bee-eater, the Perth Slider, the Black-striped Snake and the Brush-tailed Phascogale it is unlikely to be significant habitat for these species. Majority of the most suitable habitat to support these species, the Tuart/Jarrah Woodland, will be retained as part of the development. In addition, the City is committed to undertaking fauna relocation prior to clearing to ensure any fauna species present on-site are safely captured released into suitable habitat. The City engaged Eco Logical Australia in 2017 to undertake a Natural Areas Technical Assessment to inform its future Local Planning Strategy and Environmental Planning Strategy. As part of this assessment ecological linkages were defined. As shown in Figure 6, the western portion of the study area forms part of an ecological linkage that provides an extensive north-south corridor for fauna (Eco Logical Australia 2017). Majority of the vegetation within the ecological linkage will be retained as part of the development. **Assessed Outcome: Unlikely to be at variance to the principle**
Principle (c) – Native vegetation should not be cleared if it includes, or is necessary for the continued existence of rare flora.	A search of the DBCA Threatened and Priority Flora database, DBCA NatureMap database and DotEE PMST identified 11 Threatened flora as potentially occurring within the study area (see Appendix C within Appendix D). The closest known record of a Threatened flora species to the study area is in excess of 9 km (DBCA 2017). A likelihood assessment found all of the Threatened flora species identified in State and Federal database searches are highly unlikely to occur within the study area (GHD 2018a). No Threatened flora were recorded during the spring 2017 field survey. **Assessed Outcome: Unlikely to be at variance to the principle**
Principle (d) – Native vegetation should not be cleared if it comprises the whole or a part of, or is	A search of the DBCA Threatened and Priority Ecological Communities database and DotEE PMST identified two TECs as potentially occurring within the study area (see Figure 4): • Banksia dominated woodlands of the Swan Coastal Plain (Endangered – EPBC Act) • Sedgelands in Holocene dune swales of the southern Swan Coastal Plain (Endangered – EPBC Act and Critically Endangered – WC Act)

<table>
<tr><th>Principle</th><th>Assessment</th></tr>
<tr><td>necessary for the maintenance of a Threatened Ecological Community (TEC).</td><td>
Woodlands over Sedgelands in Holocene Dune Swales of the southern Swan Coastal Plain (Endangered – EPBC Act and Critically Endangered – WC Act)
No TECs were identified during the flora and vegetation survey (GHD 2018a).

Assessed Outcome: Unlikely to be at variance to the principle
</td></tr>
<tr><td>Principle (e) – Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared</td><td>
The EPA considers that vegetation complexes that have a current representation of between 10-30% may be regionally significant (DER 2014).

Vegetation mapping of the Perth region of Western Australia was completed on a broad scale by Beard (1979). The pre-European mapping has been adapted and digitised by Shepherd et al. (2002). The study are contains one Beard vegetation association:
Spearwood_998- medium woodland; Tuart
A summary of the pre-European extent and current extent regionally and locally from the 2017 Statewide Vegetation Statistics is shown in Table 8 below. The statistics identified that vegetation association 998 that exists within the study area contains over 30% of the pre-European extent at a regional level and within the City of Rockingham.

Table 8. Extent of pre-European vegetation remaining (Beard 1979) based on the 2017 Statewide Vegetation Statistics (GoWA 2018a)
<table>
<tr><th>Vegetation association</th><th>Scale</th><th>Pre-European extent (ha)</th><th>Current extent (ha)</th><th>Remaining (%)</th><th>% Current extent remaining in all DBCA managed lands</th></tr>
<tr><td colspan="2">Swan Coastal Plain IBRA Bioregion</td><td>1,501,221.93</td><td>578,997.37</td><td>38.57</td><td>38.47</td></tr>
<tr><td colspan="2">Perth IBRA Subregion</td><td>1,117,757.03</td><td>465,508.54</td><td>41.65</td><td>39.32</td></tr>
</table>
</td></tr>
</table>

Principle	Assessment

998	**State: Western Australia**	51,015.33	18,412.03	36.09	48.58
	IBRA bioregion: Swan Coastal Plain	50,867.50	18,411.73	36.20	48.58
	IBRA subregion: Perth	50,867.50	18,411.73	36.20	48.58
	LGA: City of Rockingham	5,319.33	1,691.70	31.80	-

Regional vegetation has been mapped by Heddle et al. (1980) based on major geomorphic units on the Swan Coastal Plain. The mapping by Heddle et al. (1980) identified the following vegetation complexes on Aeolian Deposits of the Swan Coastal Plain within the survey area:

- Karrakatta complex- central and south: Predominantly open forest of *E. gomphocephala - E. marginata - E. calophylla* and woodland of *E. marginata - Banksia* spp.
- Herdsman complex: is dominated by sedgelands and a woodland of *E. rudis* - *Melaleuca* spp., with the species of *Melaleuca* depending on the local drainage and adjacent soils.

A summary of the pre-European extent and current extent within the Swan Coastal Plain IBRA bioregion and the City of Rockingham from the 2017 South West Vegetation Complex Statistics is shown in Table 9 below. The statistics identified that the Herdsman complex contains over 30% of the pre-European extent within the Swan Coastal Plain and within the City of Rockingham, however the Karrakatta complex- central and south contains less than 30% but greater than 10% of its pre-European extent.

Principle	Assessment
	Table 9. Extent of pre-European vegetation complexes remaining based on the 2017 South West Vegetation Complex Statistics (GoWA 2018b)

Vegetation complex	Pre-European extent (ha)	Current extent (ha)	% Remaining	Current % remaining within all DBCA managed land
Swan Coastal Plain				
Karrakatta complex – central and south	53,080.99	12,465.24	23.48	8.06
Herdsman Complex	9,665.15	3,081.05	31.88	10.97
City of Rockingham				
Karrakatta complex – central and south	4,275.59	1,140.32	26.67	8.05
Herdsman Complex	531.85	294.80	55.43	5.50

Majority of the vegetation proposed to be cleared consists of highly disturbed vegetation dominated by weeds and is not considered representative of the pre-European vegetation complexes. The proposed clearing areas are not considered to form part of significant native vegetation remnants. The majority of the vegetation consisting of the larger potential breeding trees will be retained in the north-western portion of the study area.

Assessed Outcome: Unlikely to be at variance to the principle

Principle	Assessment
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.	The study area does not contain any watercourses or wetlands, however it is surrounded by a number of wetlands mapped under the Geomorphic Wetlands of the Swan Coastal Plain Dataset (DBCA 2018b). Lake Walyungup, a large CCW managed by DBCA that forms part of the Rockingham Lakes Regional Park exists approximately 460 m to the west of the study area. The study area forms part of the generic 50 m buffer of a Conservation Category Wetland (CCW), Outridge Swamp (UFI: 6394) in the south-western corner (Figure 7). No development is proposed within the CCW buffer. The entirety of the CCW buffer is currently devoid of vegetation but it will be revegetated with native species at a density of one plant per m^2 (except a small proportion may contain infrastructure for recreation such as a footpath around the perimeter). The revegetation will be undertaken prior to the opening of the facility, which is projected to be in 2022. The CCW buffer adjoins a City managed Baldivis Children's Forest (Reserve 30269). The City endeavours to enhance the entirety of the CCW and its buffer within both of the adjoining reserves. No vegetation typically associated with wetlands (seasonally waterlogged soils) is present on site. As the proposed BDSC development will not encroach within 50 m of any of the surrounding CCWs and given the City will enhance the value of the CCW and its buffer in the south-western portion of the study area it is unlikely to adversely impact any of the surrounding wetlands. The City has applied for a groundwater licence (Application No. 012936) with the DWER. The City proposes to install two production bores within the study area for the construction and operation of the BDSC (see Figure 4 of Appendix G). It is expected that the City will need approximately 150,000 kL/year of groundwater for the irrigating the BDSC, with a flow rate of approximately 17 L/second per bore for 200 days a year. A Groundwater Pumping Assessment undertaken in 2018 by JDA Consultant Hydrologists demonstrates that the proposed groundwater pumping will not impact on the two surrounding CCW's, Outridge Swamp and Fount Swamp located to the north and south-west of the study area (Appendix G).

Principle	Assessment
	The City will prepare a Nutrient and Irrigation Management Plan (NIMP) at detailed design stage to the satisfaction of DWER to ensure groundwater and surface water quality and quantity are not adversely impacted from the development. **Assessed Outcome: Unlikely to be at variance to the principle**
Principle (g) – Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	The Department of Primary Industries and Regional Development (DPIRD) soil subsystems mapping identified three soil subsystems within the study area (Figure 8): • **Spearwood S1b Phase**- Dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil and slopes up to 15% • **Spearwood S2a Phase**- Lower slopes (1-5%) of dune ridge with moderately deep to deep siliceous yellow-brown sands or pale sands with yellow-brown subsoils and minor limestone outcrop • **Spearwood S4a Phase**- Flat to gently undulating sandplain with deep, pale and sometimes bleached sands with yellow-brown subsoils (DPIRD 2016). Lithological logs from groundwater bore installation confirmed the regional soil mapping (JDA 2017). Review of DWER's acid suphate soils (ASS) risk mapping for the Swan Coastal Plain identified that the study area has no ASS risk (DWER 2018a). The elevation of the study area ranges from 3.5 m Australian Height Datum (AHD) in the south-western portion of the study area and 3.7 m AHD in the northern portion of the study area to 24.5 m AHD in the north-western portion of the study area (Figure 9). There is a significant increase in elevation in the north-western portion of the study area which forms part of a natural ridgeline. This ridgeline will be retained as part of the proposed development (Figure 9), therefore there will be no significant cut and fill required. The parts of the site proposed to be cleared will contain a gentle slope, therefore there is minimal risk of erosion associated with the final site level proposed (Appendix F). The sandy nature of the soil and the proposed field space means the site will have high infiltration and will not experience overland flow. The proposed clearing of native vegetation within the study area is unlikely to cause erosion as the areas of vegetation to be retained will be enhanced through revegetation and weed

Principle	Assessment
	control and the areas to be cleared will be built and landscaped and will not leave soil exposed to erode. Construction activities will ensure dust is minimised through appropriate management measures such as use of water carts. Water quality testing undertaken from five bores tested on-site in August 2017 found the salinity ranged from 350 to 520 mg/L (JDA 2017). This groundwater beneath the site is classified as fresh water and is therefore suitable for irrigation. The small amount of clearing proposed for the development and the extraction of fresh groundwater for irrigation is highly unlikely to increase the risk of land salinisation. The City will prepare a NIMP at detailed design stage to the satisfaction of DWER to ensure quality and quantity from the development are not adversely impacted from the development. The use of fertilisers for maintaining the field space and landscaping will be minimised to ensure the nutrients are absorbed by plants and do not infiltrate into the groundwater (see Principle I for further details). Water Sensitive Urban Design (WSUD) infrastructure and principles will be applied to the study area. The development will ensure 100 year ARI rainfall events are appropriately detained on-site. WSUD principles will include: • Tree infiltration pits • Vegetated swales • Parkland infiltration/sediment basins • Car parks landscaped with native plants, open kerbing and vegetated swales to contain and manage their own drainage flow **Assessed Outcome: Unlikely to be at variance to the principle**
Principle (h) – Native vegetation should not be cleared if the clearing of the vegetation is likely to	There are no conservation areas such as Bush Forever, DBCA managed lands City managed natural area reserves, Regional Parks or environmentally sensitive areas (ESA's) within the clearing footprint. A City managed reserve 'Baldivis Children's Forest' which contains a CCW, Outridge Swamp, exists directly to the south-west of the study area (Figure 6). There is an ESA associated with the 50 m buffer to Outridge Swamp in the south-western portion of the study area that will be retained and enhanced as part of the development

Principle	Assessment
have an impact on the environmental values of any adjacent or nearby conservation area	(DWER 2018b). The ESA mapping incorrectly classifies the northern portion of the study area as being part of an ESA as it forms part of a TEC buffer, not an actual TEC. TEC buffers are not ESAs, therefore the only ESA within the study area is in the south-western portion of the study area that is devoid of vegetation. As shown in Figure 6, the western portion of the study area forms part of an ecological linkage defined in the City's Natural Areas Technical Assessment (2017) which provides an extensive north-south vegetated corridor. Majority of the vegetation within the ecological linkage will be retained as part of the development, therefore it is unlikely the proposed clearing will have an adverse impact on the environmental values within the ecological linkage. Revegetation within the ecological linkage in the north-western portion of the study area to be retained will improve the environmental values within the corridor. **Assessed Outcome: Unlikely to be at variance to the principle**
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	The study area experiences a Mediterranean climate with cold, wet winters and warm, dry summers. The Bureau of Meteorology (BoM) Medina station (site number 9194) is the nearest weather station to the survey area with continuous long-term data (approximately 10 km from Baldivis). The mean annual rainfall is 745.5 mm with an average of 89 rain days per year (BoM 2018). The Perth Groundwater Map identifies the depth to groundwater below ground level (bgl) within the study area ranges from 2.5 m in the northern portion in the Tuart/Jarrah Woodland to be retained to 7 m in the southern portion (DWER 2018a). Water quality testing undertaken from five bores tested on-site in August 2017 found the salinity ranged from 350 to 520 mg/L (JDA 2017). This groundwater beneath the site is classified as fresh water and is therefore suitable for irrigation. The small amount of clearing proposed for the development and the extraction of fresh groundwater for irrigation will not increase the risk of salinity in the catchment. A NIMP will be prepared to the satisfaction of DWER at detailed design stage to ensure the quality of surface water and groundwater within the catchment do not deteriorate as a result of the development. The BDSC will ensure fertiliser use for maintaining the field space and landscaping is limited to provide the

6 Summary of Assessment

In summary, the assessment identified the proposed clearing of approximately 1.85 ha of native vegetation within the study area for the purpose of developing the BDSC is unlikely to be at variance to any of the ten clearing principles listed under Schedule 5 of the EP Act.

7 References

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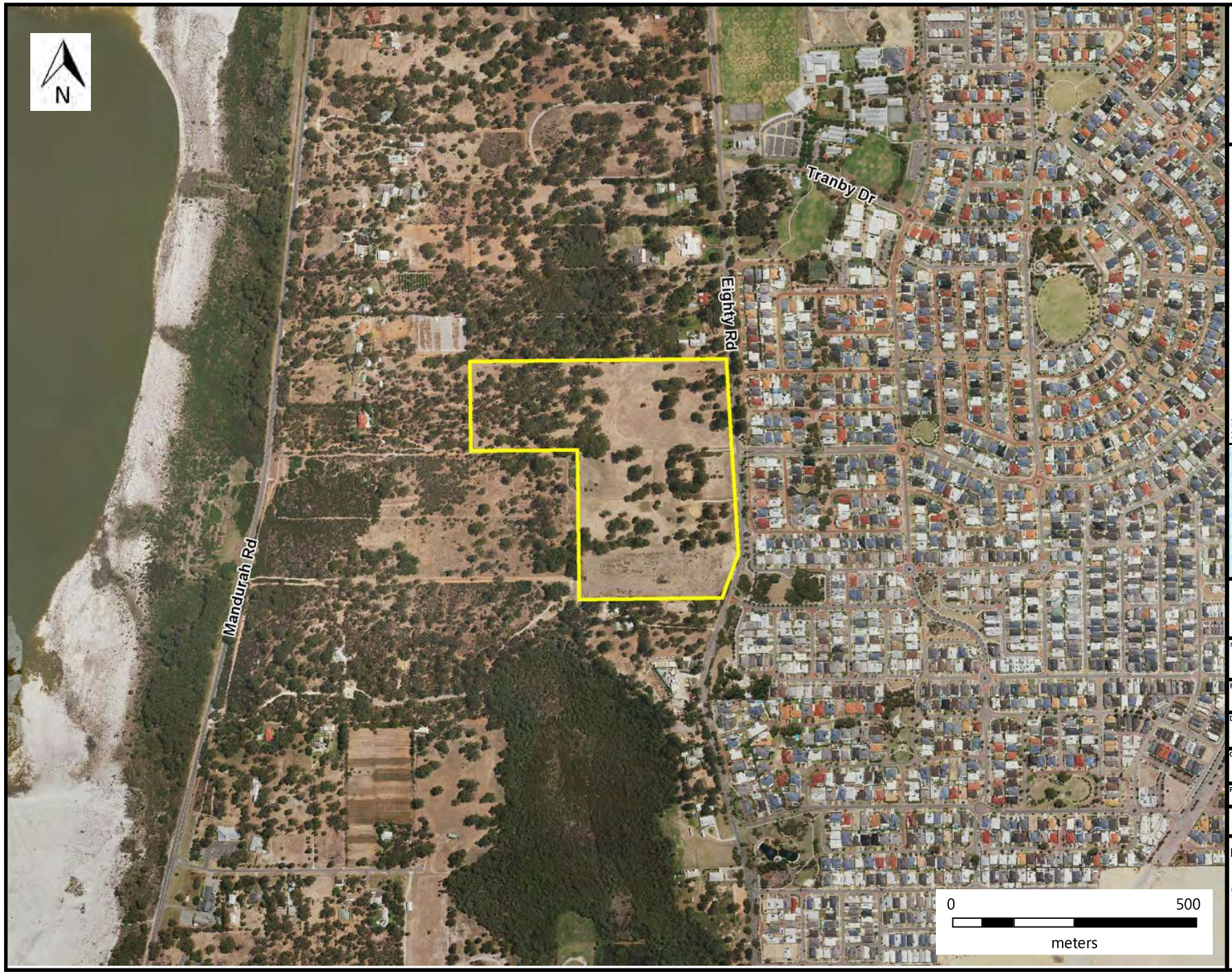
FIGURES



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Clearing Permit Application

Legend

Study Area (19.4ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 1 - Site Location

SCALE
1:10,000 @ A4

PROJECTION
MGA 94 ZONE 50

DATUM
GDA 94
AHD

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PLAN No.

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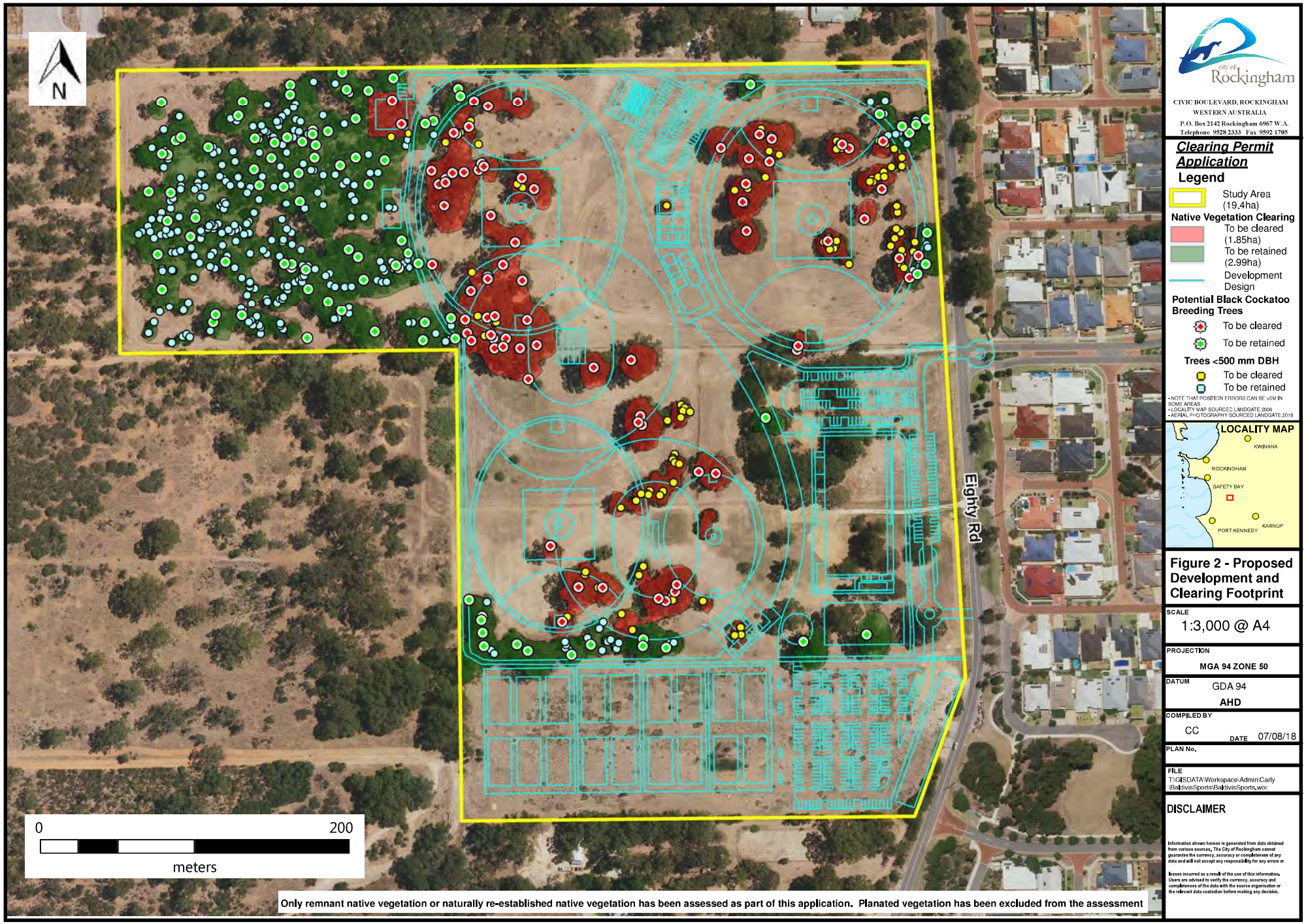

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Clearing Permit Application

Legend

- Study Area (19.4ha)

Native Vegetation Clearing

- To be cleared (1.85ha)
- To be retained (2.99ha)
- Development Design

Potential Black Cockatoo Breeding Trees

- To be cleared
- To be retained

Trees <500 mm DBH

- To be cleared
- To be retained

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 2 - Proposed Development and Clearing Footprint

SCALE
1:3,000 @ A4

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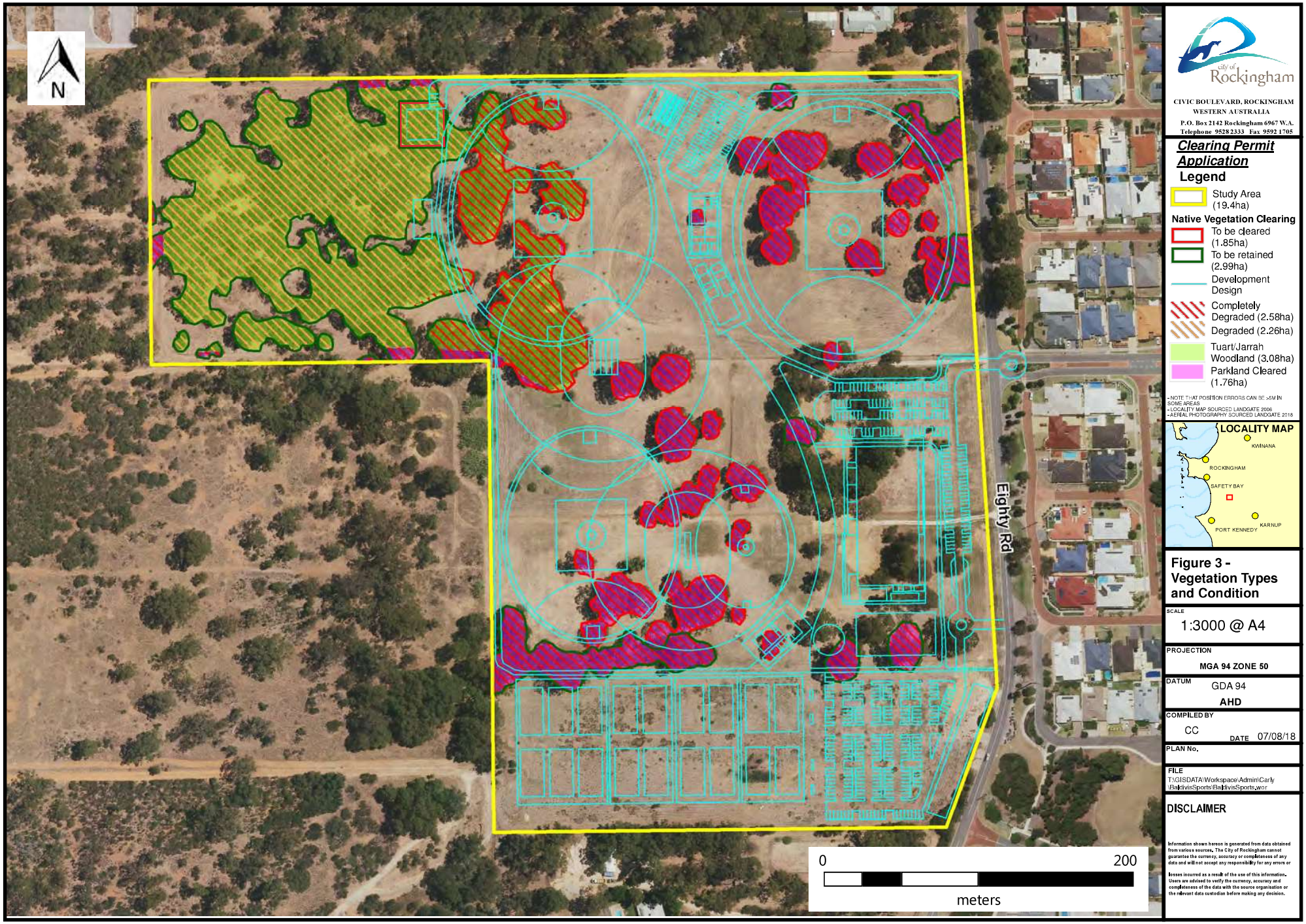

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Clearing Permit Application

Legend

- Study Area (19.4ha)

Native Vegetation Clearing

- To be cleared (1.85ha)
- To be retained (2.99ha)
- Development Design
- Completely Degraded (2.58ha)
- Degraded (2.26ha)
- Tuart/Jarrah Woodland (3.08ha)
- Parkland Cleared (1.76ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 3 - Vegetation Types and Condition

SCALE
1:3000 @ A4

PROJECTION
MGA 94 ZONE 50

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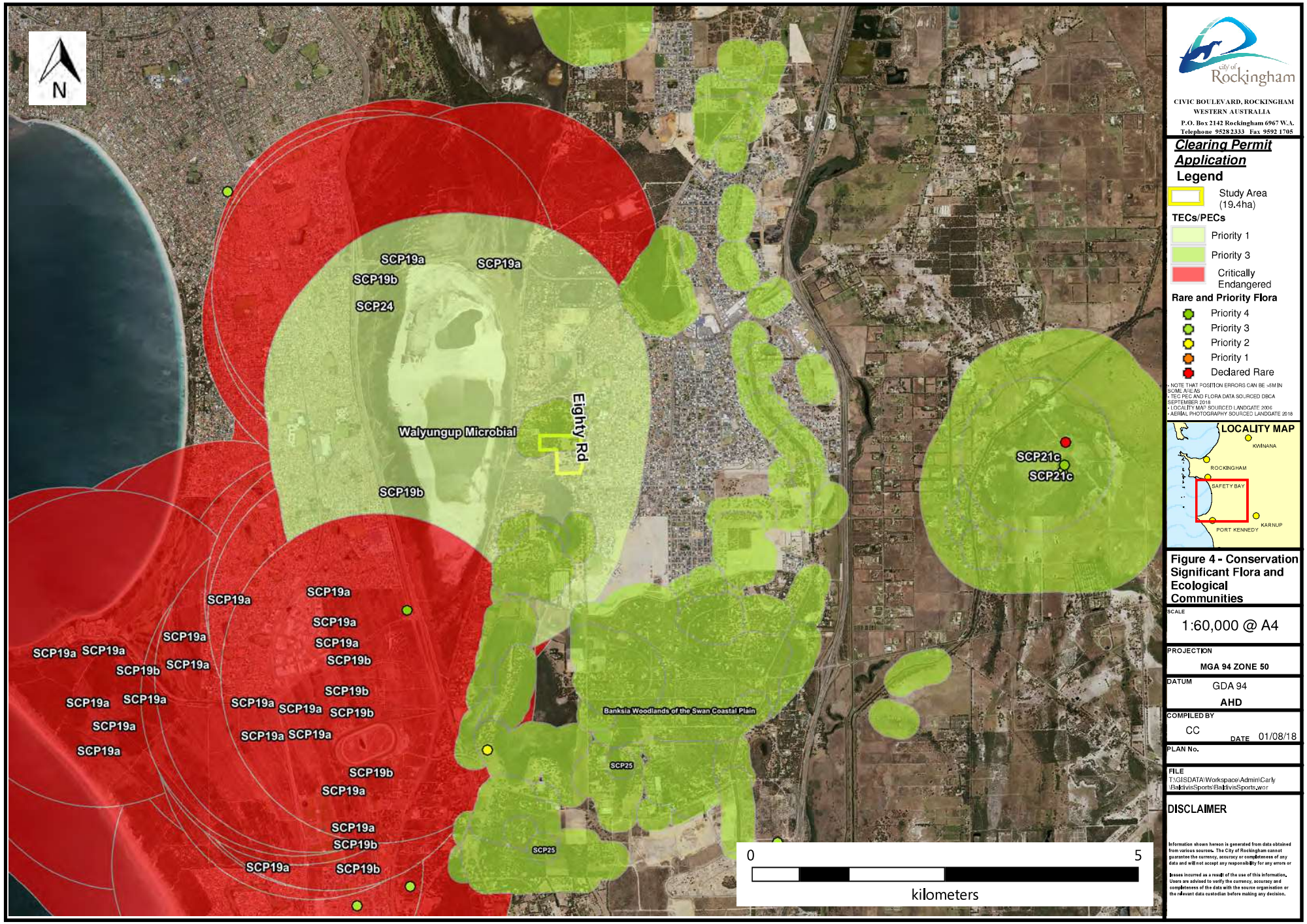

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Legend

- Study Area (19.4ha)

TECs/PECs

- Priority 1
- Priority 3
- Critically Endangered

Rare and Priority Flora

- Priority 4
- Priority 3
- Priority 2
- Priority 1
- Declared Rare

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- TEC PEC AND FLORA DATA SOURCED DBCA SEPTEMBER 2018
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 4 - Conservation Significant Flora and Ecological Communities

SCALE
1:60,000 @ A4

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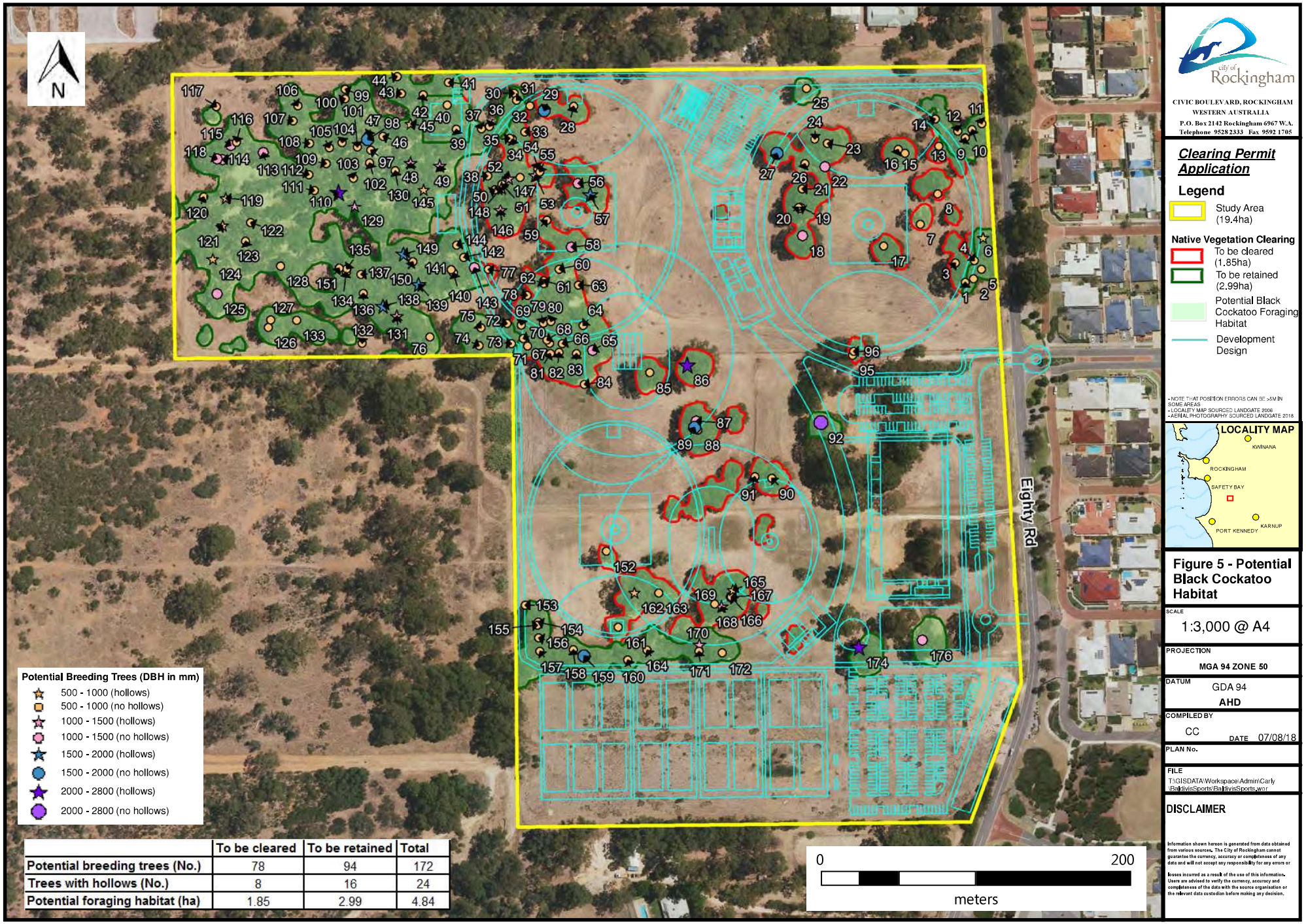

	To be cleared	To be retained	Total
Potential breeding trees (No.)	78	94	172
Trees with hollows (No.)	8	16	24
Potential foraging habitat (ha)	1.85	2.99	4.84

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Legend

- Study Area (19.4ha)

Native Vegetation Clearing

- To be cleared (1.85ha)
- To be retained (2.99ha)
- Potential Black Cockatoo Foraging Habitat
- Development Design

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 5 - Potential Black Cockatoo Habitat

SCALE: 1:3,000 @ A4

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DATUM: GDA 94 AHD

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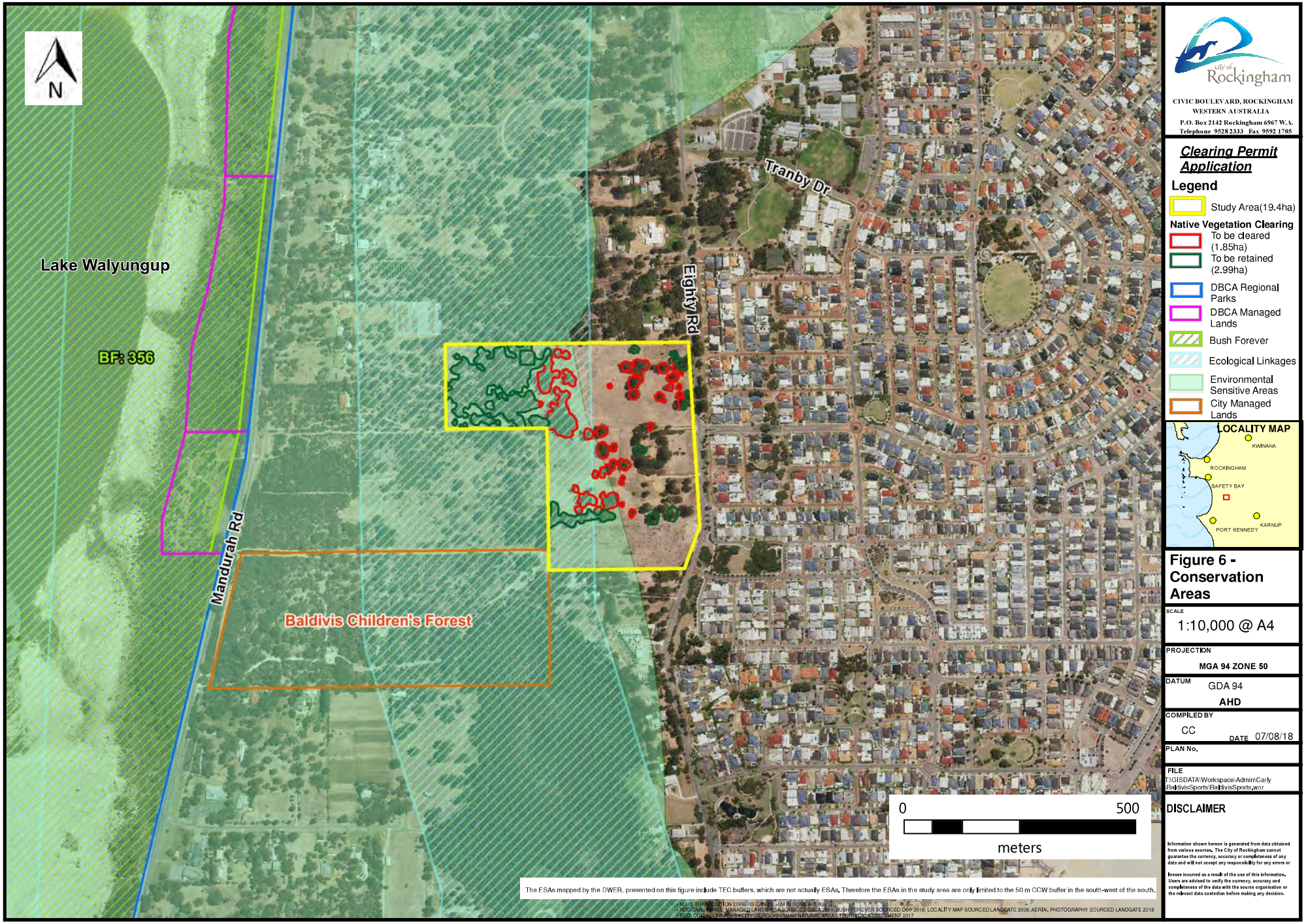

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- Study Area(19.4ha)

Native Vegetation Clearing

- To be cleared (1.85ha)
- To be retained (2.99ha)
- DBCA Regional Parks
- DBCA Managed Lands
- Bush Forever
- Ecological Linkages
- Environmental Sensitive Areas
- City Managed Lands

LOCALITY MAP

KWINANA
ROCKINGHAM
SAFETY BAY
PORT KENNEDY
KARNUP

Figure 6 - Conservation Areas

SCALE
1:10,000 @ A4

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The ESAs mapped by the DWER, presented on this figure include TEC buffers, which are not actually ESAs. Therefore the ESAs in the study area are only limited to the 50 m CCW buffer in the south-west of the south.

- NOTE: TRANSCRIPTION ERRORS CAN BE >5M IN SOME AREAS
- REGIONAL PARKS, MANAGED LANDS ESA SOURCED DBCA 2015, BUSH FOREVER SOURCED DOP 2018, LOCALITY MAP SOURCED LANDGATE 2006, AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018
- ECOLOGICAL LINKAGES = CITY OF ROCKINGHAM NATURAL AREAS TECHNICAL ASSESSMENT 2017

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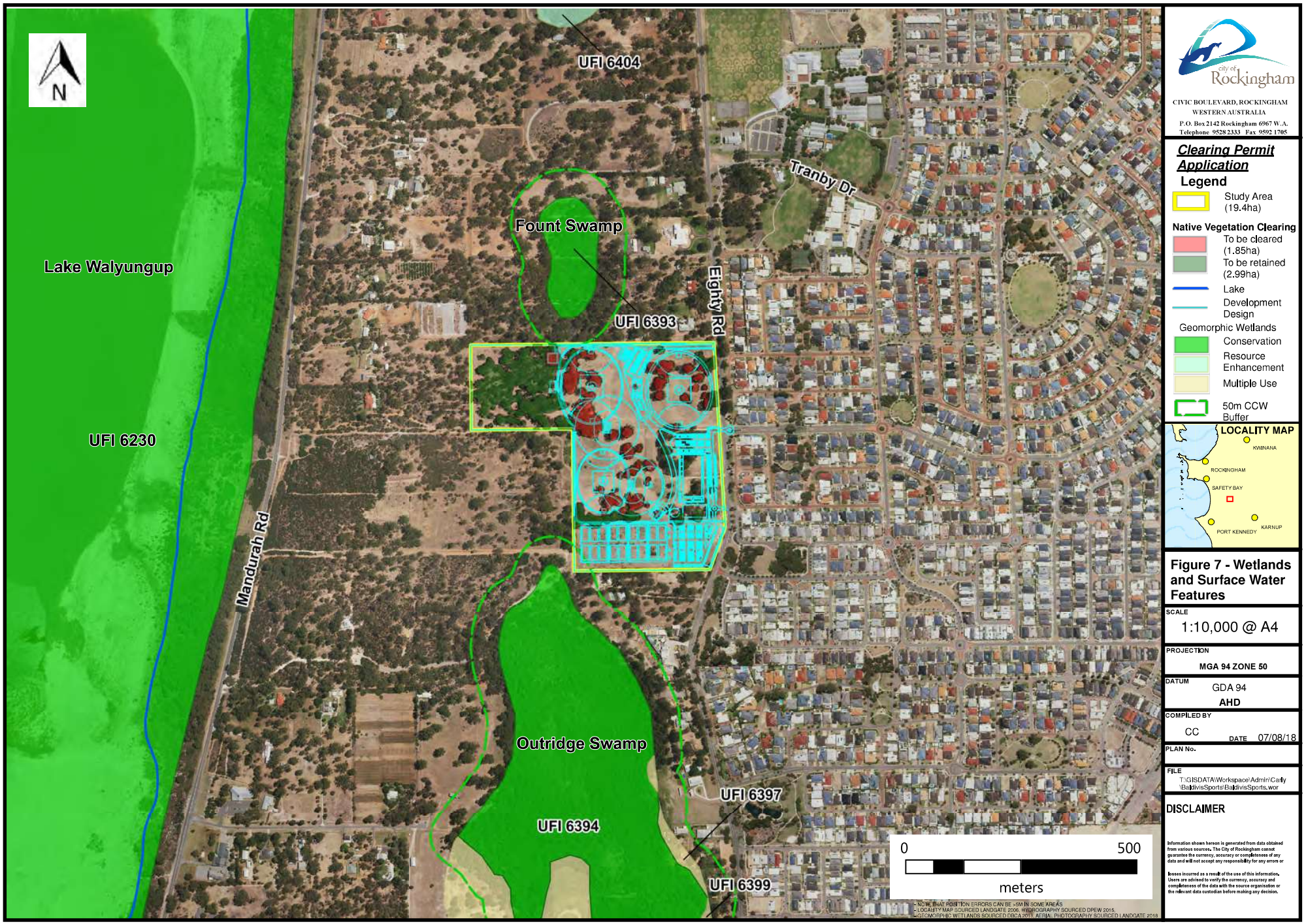

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Clearing Permit Application

Legend

- Study Area (19.4ha)

Native Vegetation Clearing

- To be cleared (1.85ha)
- To be retained (2.99ha)
- Lake
- Development Design

Geomorphic Wetlands

- Conservation
- Resource Enhancement
- Multiple Use
- 50m CCW Buffer

LOCALITY MAP

Figure 7 - Wetlands and Surface Water Features

SCALE
1:10,000 @ A4

PROJECTION
MGA 94 ZONE 50

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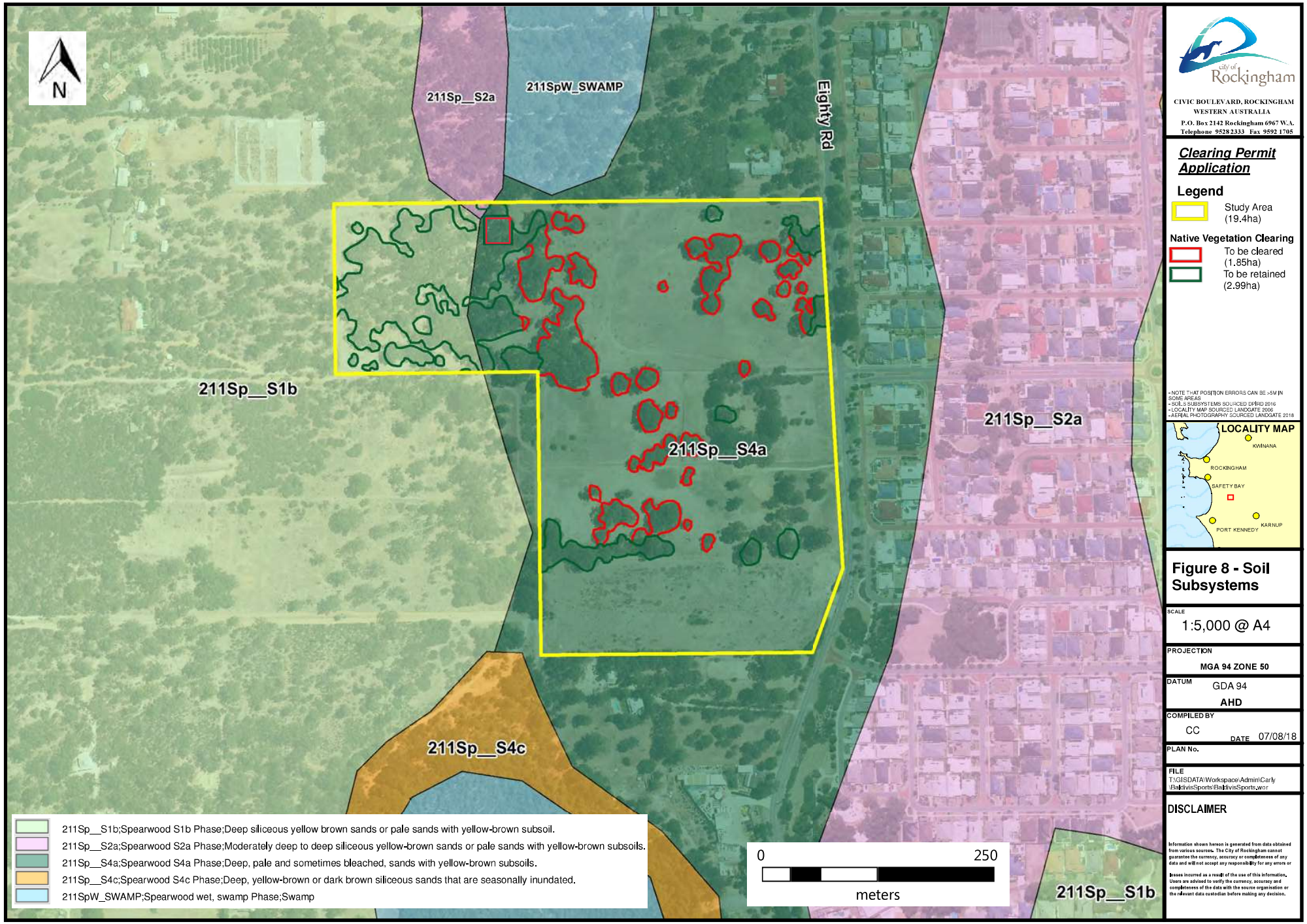

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Clearing Permit Application

Legend

Study Area (19.4ha)

Native Vegetation Clearing

To be cleared (1.85ha)

To be retained (2.99ha)

- NOTE THAT POSITION ERRORS CAN BE >5V IN SOME AREAS
- SOILS SUBSYSTEMS SOURCED DPIRD 2016
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2016

Figure 8 - Soil Subsystems

SCALE: 1:5,000 @ A4

PROJECTION: MGA 94 ZONE 50

DATUM: GDA 94 AHD

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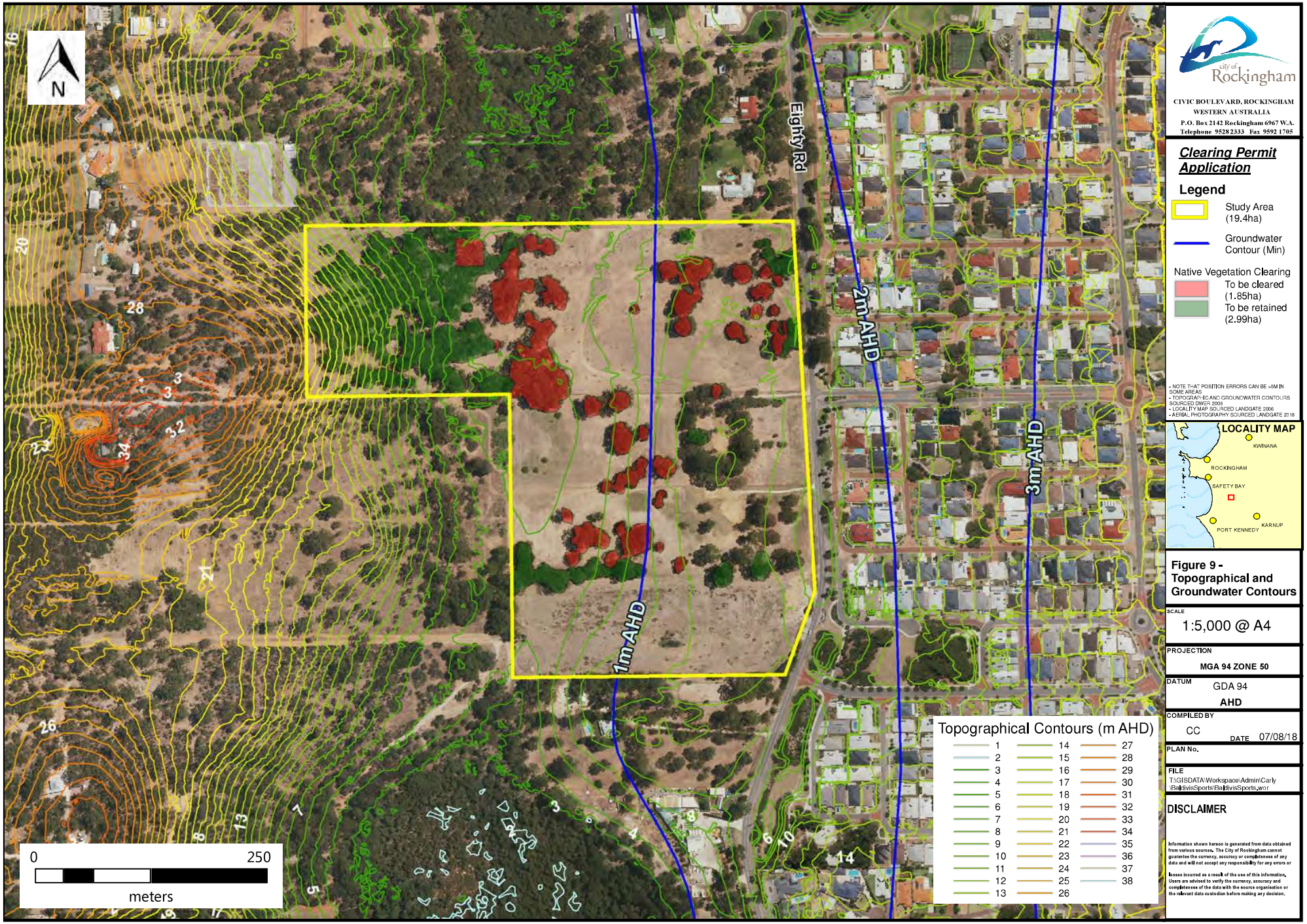

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Clearing Permit Application

Legend

- Study Area (19.4ha)
- Groundwater Contour (Min)

Native Vegetation Clearing
- To be cleared (1.85ha)
- To be retained (2.99ha)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- TOPOGRAPHIC AND GROUNDWATER CONTOURS SOURCED DWER 2009
- LOCALITY MAP SOURCED LANDGATE 2006
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2018

Figure 9 - Topographical and Groundwater Contours

SCALE
1:5,000 @ A4

PROJECTION
MGA 94 ZONE 50

DATUM
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