# Hammond Park High School

# Flora, Vegetation and Threatened Black-cockatoo Assessment

## Prepared for WSP Parsons Brinckerhoff on behalf of Department of Treasury

**June 2016**

Anders Environmental Consulting

Hammond Park High School flora, vegetation and threatened Black-cockatoo assessment prepared for WSP Parsons Brinckerhoff on behalf of Department of Treasury

Final Report

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Client: WSP Parsons Brinckerhoff

Submitted to: Katherine Fox

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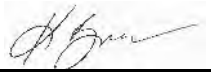
| Kellie Bauer-Simpson | Review | 1.2 | April 2016 |  |
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# EXECUTIVE SUMMARY

The proposed Hammond Park School site (project area) underwent a Level 1 flora and fauna assessment in 2013. Since that time the project area footprint changed and part of the original extent was not surveyed.

The initial 2013 assessment identified the presence of threatened Black-cockatoo habitat and the development of the school would involve clearing native vegetation. To progress the environmental approvals for the project, a subsequent flora, vegetation and threatened Black-cockatoo assessment of the areas not surveyed during the 2013 assessment was undertaken by Anders Environmental Consulting in March 2016.

The key ecological findings from the assessments of the project area included:

- 9.5 ha of threatened Black-cockatoo foraging habitat
- Potential breeding habitat; 24 potential breeding trees, seven of which contain suitable hollows for cockatoo occupancy
- No evidence of cockatoo use within the project area
- Fauna habitat linkages within 4 km of the project area
- One occurrence of two cockatoo individuals flying over the project area in 2013
- The occurrence of one Priority Ecological Community within the project area
- One Priority 4 flora species, *Stylidium striatum,* recorded during the 2013 assessment
- One Declared Pest plant, Bridal creeper, recorded at one location within the project area.

The assessment of the project against the Environmental Protection Authority's (EPA's) 10 Clearing Principles considered the project is:

- likely to be at variance with Clearing Principle (b)

- may be at variance with Clearing Principle (a).

It is recommended that the proposed clearing be referred to the Commonwealth Department of the Environment (DotE) due to the potential localised impact on threatened Black-cockatoo habitat (foraging and potential breeding).

# Contents

# 1 INTRODUCTION

## 1.1 PROJECT BACKGROUND

The Department of Treasury is planning to develop a number of potential new schools within the Perth metropolitan area. One of the proposed school sites is the proposed new Hammond Park High School (the project area) located in the south metropolitan region. The project area is located approximately 25 km south of Perth within the City of Cockburn (Figure 1).

The project area is approximately 10 hectares (ha) and consists of four semi-rural lots containing remnant vegetation (Lots 31, 32, 33 and 47 Barfield Road).

In 2013 a Level 1 flora, fauna and vegetation assessment was undertaken by GHD (GHD 2014) for the project area (2013 assessment). Due to access issues to the southern-most lot (Lot 47), this area was unable to be surveyed. In addition, the edge of the western boundary was not surveyed.

The project area alignment has changed since the 2013 survey. It originally included a fifth lot, Lot 14 Barfield Road, however this lot has been excluded as it forms part of a separate *Environment Protection and Biodiversity Conservation Act 1999 Act* (EPBC Act) referral (EPBC 2012/6524). An entry road to the site from Barfield Road has been included in the project area plan.

The 2013 assessment identified that native vegetation and EPBC listed threatened Black-cockatoo habitat was likely to be cleared (GHD 2014). The environmental approvals for the project is expected to be undertaken as a bilateral approvals process, where an EPBC referral for the impacts on Commonwealth listed Black-cockatoo species and a Native Vegetation Clearing Permit under Part V, Division 2 of the *Environmental Protection Act 1986* (EP Act) would be required.

## 1.2 OBJECTIVE AND SCOPE OF WORKS

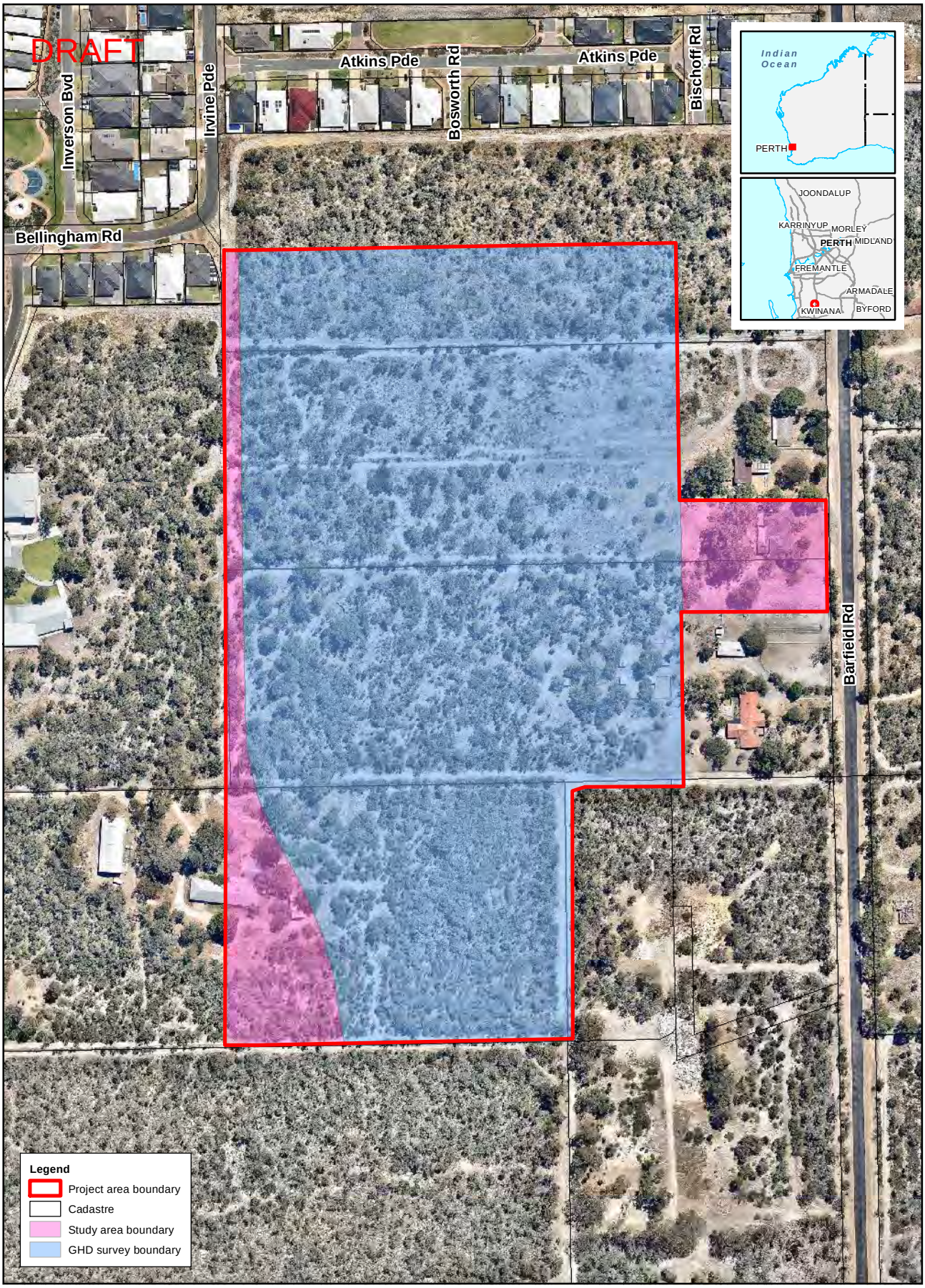
The objective of the 2016 assessment was to undertake a flora, vegetation and threatened Black-cockatoo survey of areas not included in the 2013 assessment, resulting in a complete assessment of relevant ecological values of the project area. The areas surveyed in the 2016 assessment included the:

- western boundary of the project area
- south-western corner of Lot 47
- new entry road from Barfield Road.

To ensure sufficient information was collected to progress the bilateral referrals, the following scope of works was undertaken:

- a desktop assessment and gap analysis of the 2013 assessment (GHD 2014)
- Level 1 flora and vegetation survey of the areas not surveyed in the 2013 assessment
- threatened Black-cockatoo habitat assessment.

The assessment addressed in this report includes the assessment of flora, vegetation and threatened Black-cockatoo values of areas not surveyed during 2013 assessment as well as the consolidated results from the 2013 assessment. This report should be read in conjunction with the 2013 assessment (GHD 2014).

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Projection: Transverse Mercator
Coord sys: GDA 1994 MGA Zone 50

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**Figure 1**
Project study area

# 2 METHODOLOGY

## 2.1 DESKTOP ASSESSMENT AND GAP ANALYSIS

The gap analysis involved reviewing the 2013 assessment (GHD 2014) and associated mapping against the updated project area footprint to determine outstanding areas which required assessment.

The desktop assessment was conducted prior to the field survey which involved reviewing previous flora and fauna reports to determine the likelihood of any conservation significant species and ecological communities occurring within the project area. Environmental values identified in the reports were reviewed with particular emphasis on any identified Matters of National Environmental Significance (MNES). The reports reviewed included:

- *Hammond Park High School Flora Fauna and Vegetation Assessment* (GHD 2014)
- *Lot 31 Barfield Road, Hammond Park Flora and Fauna Assessment* (Bayley Environmental Services 2013).

## 2.2 FIELD SURVEY

### 2.2.1 Flora and vegetation

The Level 1 flora and vegetation survey was conducted in accordance with the guidelines specified in Environmental Protection Authority (EPA) Guidance Statement 51, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004) and the new EPA Technical Guide – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA & DPaW 2015). A survey methodology similar to the 2013 assessment was followed to ensure consistency.

The survey involved mapping vegetation types based on the National Vegetation Information System (NVIS) classification framework (NVIS 2003), to Level 5. The NVIS Framework provides a comprehensive means of describing and classifying vegetation based on vegetation structure, floristic composition and landform.

Quadrats were established within areas of mature native vegetation of best available quality, where possible, which were removed from vegetation unit transition zones and disturbed areas. A minimum of two 10 x 10 m quadrats were established within each vegetation type. Additional quadrats were established within previously mapped (2013 assessment) vegetation types to ensure an overall minimum of two quadrats per vegetation type. One of the quadrats, Q7, was located outside of the project area but is indicative of the vegetation in the northern portion of the project area. The following information was recorded within each quadrat:

- location with GPS coordinates
- photograph taken from north-west corner
- landform and soil description
- dominant growth form, height, cover and species for the three traditional strata (upper, mid and ground) compatible with NVIS Level 5 (description of NVIS categories provided in Appendix A)
- percentage of litter, bare ground and rocks
- fire history
- assessment of vegetation condition and description of disturbances
- species present (including weeds) and the estimated average height and percentage foliage cover.

Species that were unable to be identified in the field were collected and pressed for identification at the Western Australian Herbarium (WA Herbarium) using a combination of taxonomic keys and comparison with the WA Herbarium specimens. Nomenclature of the species recorded follows the protocol of the WA Herbarium.

Vegetation condition was mapped throughout the survey area based on the Keighery (1994) scale. Both the 2013 and 2016 assessments used the Keighery scale to ensure consistency and comparison of vegetation condition across the project area. The Keighery scale has been superseded by the vegetation condition scale within the new flora and vegetation technical guidelines (EPA & DPaW 2015). A description of the vegetation condition categories of the Keighery scale and the new technical guidelines vegetation condition scale is provided in Appendix B.

### 2.2.2 Threatened Black-cockatoo assessment

The threatened Black-cockatoo habitat assessment was conducted using a similar methodology to the 2013 assessment to maintain consistency, and was conducted in accordance with the assessment methods outlined in the *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo* (DotE 2012).

The assessment involved mapping the amount of foraging and breeding habitat for threatened Black-cockatoos. For breeding habitat, trees of species known to support breeding were recorded. Data collected for breeding habitat (suitable trees) included:

- categorising suitable trees into:
  - actual nesting trees: confirmed nesting with evidence of cockatoos
  - potential nesting trees with available hollows: hollows of size large enough to be used by Black-cockatoos
  - potential nesting trees that may form hollows in the future: trees with diameter at breast height (DBH) of 500 mm or greater
- identification, description and recording of size and height from ground of existing tree hollows and evidence of use by Black-cockatoos
- identification, description and mapping of potential night roosting habitat
- identification, description and mapping of potential foraging habitat.

## 2.3 LIMITATIONS

A number of limitations relating to the survey methods and ecological assessment of the project area as outlined in EPA Guidance Statement 51 (EPA 2004) were identified. The limitations and constraints for the survey are addressed in Table 1.

**Table 1 Limitations and constraints for the survey**

| Limitation | Constraint | Description |
|---|---|---|
| Sources of information and availability of contextual information | No | Sufficient information was available prior to conducting the survey including two reports (Bayley Environmental Services 2013, GHD 2014) of surveys undertaken within the project area. |
| Scope - what life forms were sampled | No | All terrestrial flora species present at the time of survey were recorded. |
| Proportion of flora collected and identified | Maybe | Some flora taxa could not be identified to species level due to insufficient fruiting and flowering characteristics present. The indeterminate taxa were not considered to be either Threatened or Priority listed species. |
| Completeness and further surveys required | No | The project area was fully surveyed and no further work is required. |
| Mapping reliability | No | Current and high resolution aerial imagery was available and field mapping was conducted to a high level of detail and at high resolution. |
| Timing, weather, season, cycle | Maybe | The survey was conducted outside the peak flowering period in Autumn (March) and several taxa could not be identified to species level. The 2013 assessment was conducted in spring (October 2013). |
| Disturbances | No | No disturbances were present which prevented the survey being undertaken. |
| Intensity of survey | No | A minimum of two quadrats were established within remnant vegetation types of 'good' condition or better, which is the standard specified in EPA Guidance Statement 51. Vegetation type VT3 was degraded and only one quadrat was able to be established. |
| Resources | No | All resources required to conduct the survey were available. |
| Access problems | No | The project area was accessible by vehicle and foot. |
| Experience levels | No | A senior botanist with over nine years experience conducted the assessment. |

# 3 RESULTS

## 3.1 DESKTOP ASSESSMENT

The significant environmental values identified in the 2013 assessment of the project area were the presence of threatened Black-cockatoo habitat and clearing of native vegetation.

**Threatened Black-cockatoo habitat**

Threatened Black-cockatoo habitat was determined to be present within the project area. Approximately 9.3 ha of foraging habitat and 13 potential breeding trees, one with hollows of suitable size for threatened Black-cockatoo occupancy were recorded.

**Native vegetation clearing**

The development of the school would require clearing of native vegetation. An assessment against the EPA's Clearing Principles determined the project was considered to:

- may be at variance with Clearing Principle (a)
- likely to be at variance with Clearing Principle (b)
- may be at variance with Clearing Principle (f).

A summary of the existing environmental values of the project area are detailed below in Table 2.

**Table 2 Summary of environmental values of the project area and surrounds**

| Environmental value | Details |
|---|---|
| Bioregion | Swan Coastal Plain IBRA<br>Perth sub-region |
| Environmentally Sensitive Areas | None within the project area<br>Four ESAs within 2 km of the project area |
| Conservation estates and reserves | Five reserves were identified within 5 km of the project area:<br>- Harry Waring Marsupial Reserve (0.74 km west)<br>- Thompson Lake Nature Reserve (1.38 km north-west)<br>- Conservation Park R48291 (1.9 km north-west)<br>- Wandi Nature Reserve (3 km south-east)<br>- Conservation Park R49561 (3 km north-west) |
| Bush Forever sites | Four Bush Forever sites occur within 2 km of the project area:<br>- Site 392, Harry Waring Marsupial Reserve (0.74 km west)<br>- Site 492, Lyon Road Bushland (1.3 km north-east)<br>- Site 391, Thomsons Lake Nature Reserve (1.38 km north-west)<br>- Site 268, Mandogalup Road Reserve (1.75 km south-west) |
| Geomorphology and soils | The project area occurs within the Bassendean Dune System.<br>Broad scale soil mapping by Tille (1996) identified two soil sub-units or phases occur within the project area:<br>- 212Bs_B1 – Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; *banksia* dominant.<br>212Bs_B2 – Flat to very gently undulating sandplain with well to moderately well-drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic hardpan 12 m. |

| Environmental value | Details |
|---|---|
| Hydrology | No *Rights in Water and Irrigation Act 1914* (RIWI) groundwater areas present<br>No RIWI surfacewater areas present<br>No RIWI irrigation districts present<br>No RIWI rivers present<br>No public drinking water source areas present<br>No waterway management areas present |
| Wetlands | Two Wetlands of International Importance (Ramsar) occur within 5 km of the project area:<br>- Forestdale and Thomsons lakes (within Ramsar site).<br>- Peel-Yalgorup system (upstream from Ramsar).<br><br>No Lakes covered under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes) occur within the project area.<br>Thirty six EPP Lakes occur within 5 km of the project area.<br>No geomorphic wetlands occur within the project area.<br>Twenty three geomorphic wetlands occur within approximately 2 km of the project area. |
| Broad scale vegetation | Broad scale mapping by Beard (1979) indicates one vegetation association within the project area:<br>- Association 1001, Bassendean – Medium very sparse woodland; jarrah, with low woodland; banksia & casuarinas; the extent of pre-European association 1001 remaining at the state level is 24.65% - below the 30% threshold.<br><br>Regional vegetation mapping of the Swan Coastal Plain by Heddle (1980) indicates one vegetation complex within the project area:<br>- Bassendean complex – Central and south: Vegetation ranges from woodland of *E. marginata – C. fraseriana – Banksia* spp. to low woodland of *Melaleuca* species, and sedgelands on the moister sites. This area includes the transition of *E. marginata* to *E. todtiana* in the vicinity of Perth; the extent of the pre-European Bassendean complex remaining is 27.7% - below the 30% threshold. |

## 3.2 VEGETATION AND FLORA SURVEY

### 3.2.1 Vegetation types

Four vegetation types were mapped within the project area:

- VT1: Low Open Forest of *Banksia* spp. and *Allocasuarina fraseriana*
- VT2: Low Woodland of *Banksia* spp. over Open Low Heath of *Scholtzia involucrata*
- VT3: Low Open Woodland of *Melaleuca rhaphiophylla*
- VT4: Low Open Forest of *Eucalyptus marginata* and *Banksia* spp.

The 2013 assessment described and mapped the first three vegetation types, VT1, VT2 and VT3. Three additional quadrats (Q6, Q7 and Q8) were established during the 2016 survey. Two quadrats were sampled within the unmapped western boundary (new area) and one within VT2 representing the second quadrat for this vegetation type. A second quadrat was not established for VT3 as the majority of this vegetation type was highly degraded. The quadrat (Q5, 2013 assessment) for this vegetation type was established in a section representing the best condition.

The fourth vegetation type, VT4, was mapped in the southern section of the project area. This was found to be a similar vegetation type to VT1; however it is denser and dominated by Jarrah (*Eucalyptus marginata)* and *Banksia* species overstorey rather than *Allocasuarina fraseriana* and *Banksia* species overstorey.

Several sections of the Study area no longer support any remnant vegetation. The south-west corner within Lot 47 has been cleared. The new access road from Barfield Road is within existing urban infrastructure (house and gardens) and consists of planted non-native or non-endemic species. These areas were mapped as 'urban – planted/cleared' and represent 0.7 ha of the project area.

A summary of the four vegetation types is provided in Table 3 and their spatial extent is illustrated in Figure 2.

### 3.2.2 Conservation significant vegetation

The 2013 assessment identified five Priority Ecological Communities (PECs) within 5 km of the project area:

- SCP21c – Low lying *Banksia attenuata* woodlands or shrublands (Priority 3)
- SCP22 – *Banksia ilicifolia* woodlands (Priority 3)
- SCP24 – Northern Spearwood shrublands and woodlands (Priority 3)
- Banksia dominated woodlands of the Swan Coastal Plain IBRA region (Priority 3).

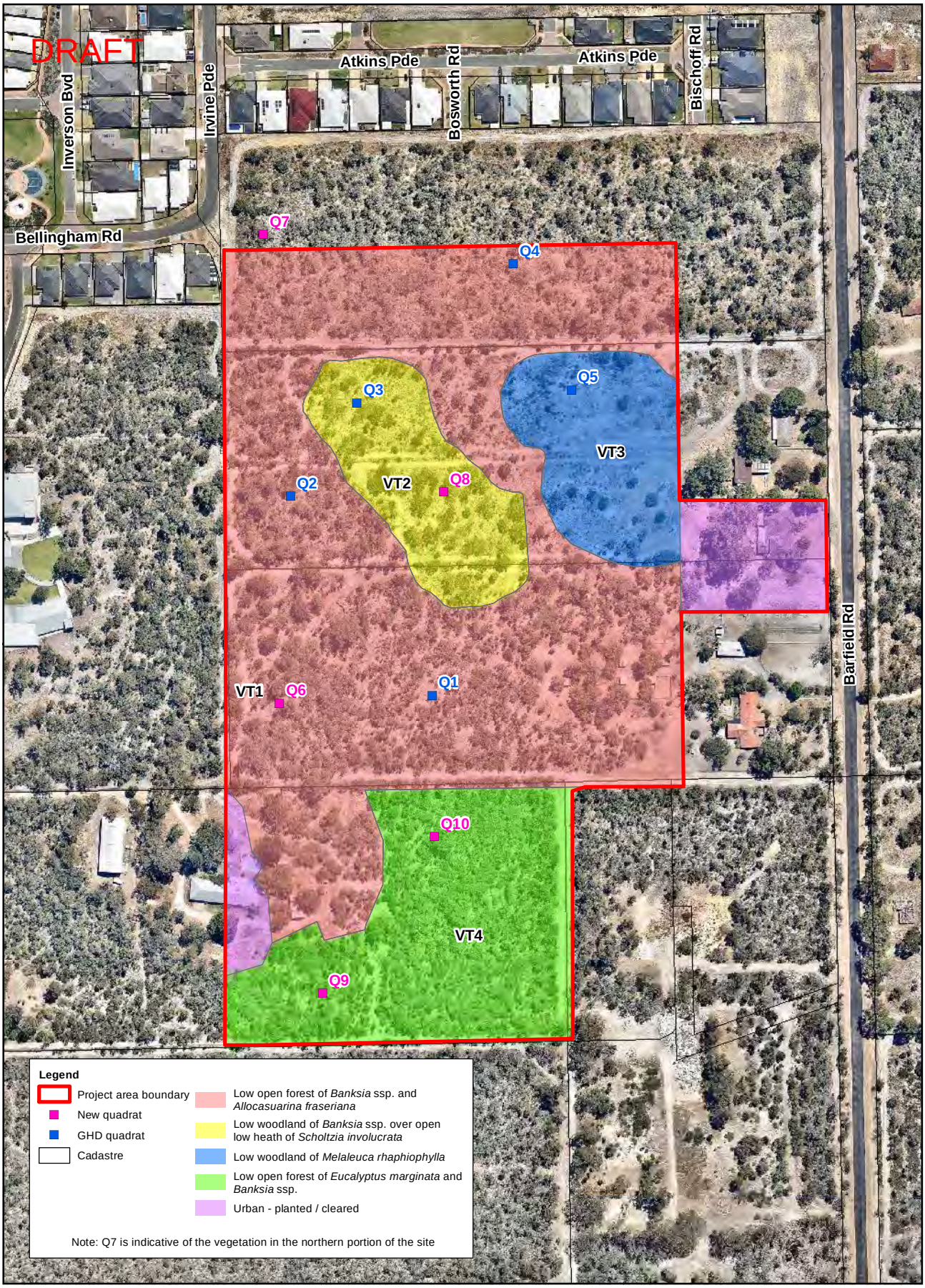
It is likely that Vegetation types VT1 - Low Open Forest of *Banksia* spp. and *Allocasuarina fraseriana* and VT2 – Low Woodland of *Banksia* spp. over Open Low Heath of *Scholtzia involucrata* represent the fourth PEC, Banksia dominated woodlands of the Swan Coastal Plain IBRA region. Vegetation type VT4 is not likely to represent any of the PECs relevant to the area.

No Threatened Ecological Communities (TECs) are known to occur within 5 km of the project area. None of the vegetation types within the project area are considered to align with any TEC.

**Table 3 Vegetation types within the project area**

| Vegetation type and description | Area of project area | Potential corresponding Gibson *et al*. (1994) Floristic Community Type | Photograph |
|---|---|---|---|
| **VT1: Low Open Forest of *Banksia* spp. and *Allocasuarina fraseriana*.**<br><br>Low Open Forest of *Banksia attenuata, Banksia menziesii* and *Allocasuarina fraseriana* over Tall Shrubland of *Kunzea glabrescens* over Shrubland of *Xanthorrhoea preissii* and *Eremaea pauciflora* var. *pauciflora* over Open Low Heath of *Hibbertia racemosa, Calytrix fraseri* and *Leucopogon polymorphus* over Sedgeland of *Lepidosperma pubisquameum* and *Schoenus curvifolius* over a Herbland of *Phlebocarya ciliata, Desmocladus flexuosus, Dasypogon bromeliifolius* and assorted herbs and weedy grass spp. | 6.3 ha | SCP23a – Central *Banksia attenuata – B. menziesii* woodlands. |  |
| **VT2: Low Woodland of *Banksia* spp. over Open Low Heath of *Scholtzia involucrata*.**<br><br>Low Woodland of *Banksia menziesii* and *Banksia illicifolia* over Tall Open Shrubland of *Kunzea glabrescens* over Open Low Heath of *Scholtzia involucrata, Conostephium pendulum* and *Calytrix fraseri* over Open Herbland of *Dasypogon bromeliifolius, Phlebocarya ciliata* and *Desmocladus flexuosus*. | 0.9 ha | SCP23a – Central *Banksia attenuata – B. menziesii* woodlands. |  |

| Vegetation type and description | Area of project area | Potential corresponding Gibson *et al*. (1994) Floristic Community Type | Photograph |
|---|---|---|---|
| **VT3: Low Open Woodland of *Melaleuca rhaphiophylla*.**<br><br>Low Open Woodland of *Melaleuca rhaphiophylla* over Tall Open Scrub of *Kunzea glabrescens* and *Astartea scoparia* over Open Low Heath of *Hypocalymma angustifolium* over Grassland of **Ehrharta calycina* and herbaceous weed species. | 0.9 ha | SCP4 – *Melaleuca preissiana* damplands. |  |
| **VT4: Low Open Forest of *Eucalyptus marginata* and *Banksia* spp.**<br><br>Low Open Forest of *Eucalytpus marginata* over Low Woodland of *Banksia attenuata, B. menziesii and B. illicifolia* over Tall Shrubland of *Kunzea glaberescens* over Mid Shrubland of *Stirlingia latifolia* and *Xanthorrhoea preissii.* | 2.0 ha | SCP21a – Central *Banksia attenuata - Eucalyptus marginata* woodlands |  |




Data source: GHD, Landgate, MRWA (2016)



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Projection: Transverse Mercator
Coord sys: GDA 1994 MGA Zone 50

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**Figure 2**
Vegetation type in the project study area

### 3.2.3 Vegetation condition

The majority of the project area is in 'good-very good condition' (6.0 ha). The best condition was found to be in the southern section of the project area where it was rated as 'very good – excellent'condition. Disturbance was greatest in areas close to existing houses and tracks and consisted of rubbish dumping, weeds, lopped *Banksia's,* clearing and grazing (goats, sheep). In areas further away from tracks, more than 20 metres, very low weed coverage was present (<2%).

The vegetation condition of the project area is summarised in Table 3. Both the 2016 and 2013 condition ratings are provided for comparison. The vegetation condition for the project area is illustrated in figure 3.

**Table 3 Vegetation condition for the project area**

| Condition (Keighery 1994) | 2016 assessment Total area (ha) | 2013 assessment Total area (ha) |
|---|---|---|
| Excellent | - | 2.5 |
| Very good – excellent | 1.5 | 2.17 |
| Very good | 0.5 | - |
| Good – very good | 6.0 | - |
| Good | 0.9 | 3.15 |
| Degraded | 1.9 | 2.14 |
| Completely degraded | - | 0.26 |

### 3.2.4 Flora diversity

A total of 139 species were recorded during the 2013 and 2016 survey. This was represented by 38 families and 95 genera. The most dominant families were Fabaceae (19 taxa), Myrtaceae (13 taxa), Poaceae (12 taxa) and Proteaceae (11 taxa).

Six taxa could not be identified to species level as there was insufficient fruiting and flowering material available. The six specimens were confirmed at the WA Herbarium to not be either Threatened or Priority flora and are likely to be a common species of the region.

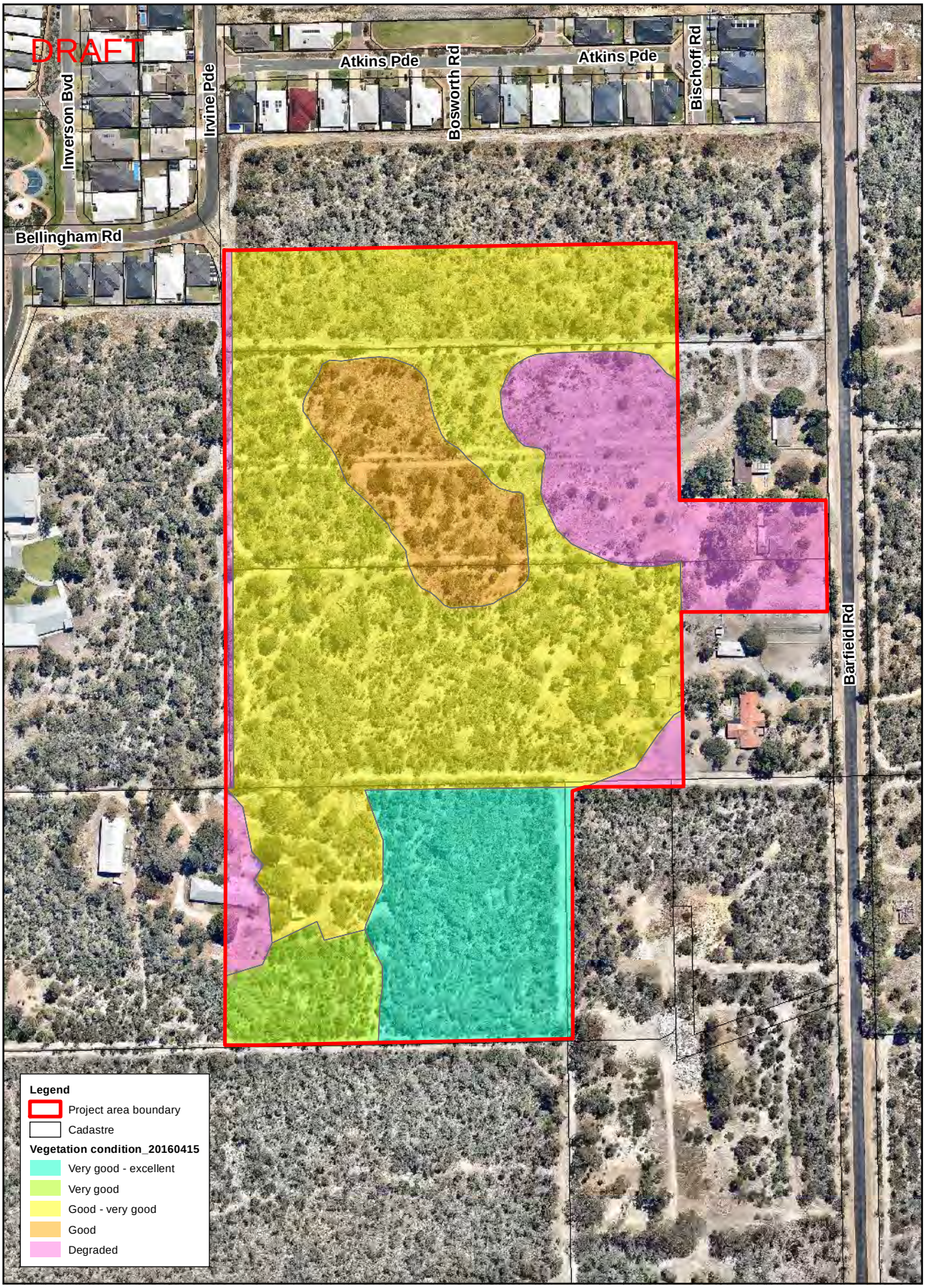
### 3.2.5 Conservation significant flora

The 2013 assessment identified 16 conservation significant species previously recorded within 5 km of the project area. This included nine Commonwealth and State listed Threatened species and seven Priority listed species.

No Threatened or Priority flora species were recorded during the 2016 survey. The one Priority 4 species, *Stylidium striatum*, recorded during the 2013 survey was not recovered. This is an annual species and may not have been present at the time of the survey (in March). All Stylidiums observed during the survey were collected for identification at the WA herbarium. None of the samples collected were confirmed to be *Stylidium striatum.*

### 3.2.6 Introduced flora

A total of 20 weeds were recorded during the 2013 and 2016 surveys. One of the weeds, Bridal Creeper (*Asparagus asparagoides*), is a declared pest plant (weed) under the *Biosecurity and Agricultural Management Act 2007* (BAM Act). Bridal creeper was recorded in one location during the 2013 survey. It was not recorded during the 2016 survey in any of the quadrats or during opportunistic searches.

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Projection: Transverse Mercator
Coord sys: GDA 1994 MGA Zone 50

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**Figure 3**
Vegetation condition in the project study area

## 3.3 THREATENED BLACK-COCKATOO HABITAT ASSESSMENT

### 3.3.1 Threatened Black-cockatoo occurrence

During the 2013 survey, two individual Carnaby's Black-cockatoos were observed flying over the project area.

No sightings of any threatened Black-cockatoo individuals or flocks were observed within or flying over the project area during the time of the 2016 survey. No evidence of use was recorded including chewed nuts, feathers or scratchings.

### 3.3.2 Foraging habitat

A total of 9.5 ha of threatened Black-cockatoo foraging habitat were mapped during the 2016 survey.

The fauna habitat suitable for threatened Black-cockatoo foraging within the project area is *Banksia* woodland and aligns with vegetation communities VT1, VT2 and VT4. The *Banksia* woodland fauna habitat consists of a range of species in which the cockatoo's are able to feed. Suitable foraging species include *Banksia*, *Euclayptus* (Jarrah) and *Allocasuarina*.

The extent of suitable foraging habitat within the project area is shown in Figure 4.

### 3.3.3 Breeding habitat

Suitable potential breeding habitat was recorded within the project area and includes 24 potential breeding trees of suitable DBH. Thirteen of the trees were recorded during the 2013 assessment and a further 11 were recorded during the 2016 assessment. All of the trees are Jarrah or dead stags likely to have been Jarrah. Of the 24 potential breeding trees, seven contain hollows of suitable size for cockatoo occupancy. There was no evidence of use by cockatoos at the time of the survey. Bees were recorded to be occupying one of the trees, however not within the hollow that was present.

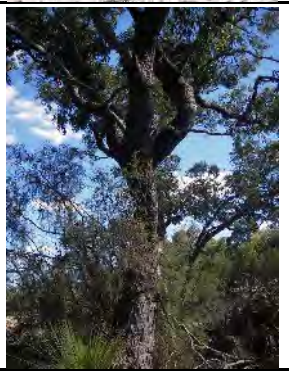
A summary of the potential breeding trees recorded during the 2016 assessment is provided in Table 4. The location of all potential breeding trees recorded within the project area (2013 and 2016), are shown in Figure 4.

### 3.3.4 Fauna linkages

There are a number of reserves also with suitable foraging habitat within 5 km of the project area. These areas could provide a corridor or linkages where the project area provides a stepping stone or a rest area for cockatoos between the other reserves.

The largest reserve is also the closest, the Harry Waring Marsupial Reserve, which is less than 1 km west of the project area and contains similar habitat (*Banksia* woodland) to that of the project area. The reserves within 4 km of the project area are shown in Figure 5.

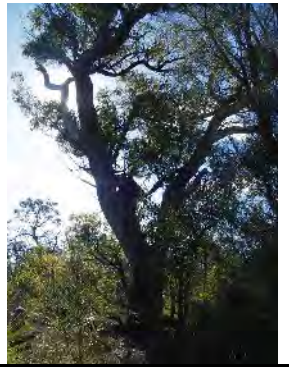
**Table 4 Potential Threatened Black-cockatoo breeding trees recorded during the 2016 assessment**

| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391550<br>Northing – 6439702 | 1 000 | 12 | 1 | 1 | | | Fire scarring |  |
| Jarrah | Easting – 391565<br>Northing – 6439712 | 600 | 10 | | | 1 | | Fire scarring |  |

| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391566<br>Northing – 6439721 | 950 | 15 | 2 | | | | Fire scarring |  |
| Jarrah | Easting – 391569<br>Northing – 6439615 | 1,600 | 10 | | | | | |  |

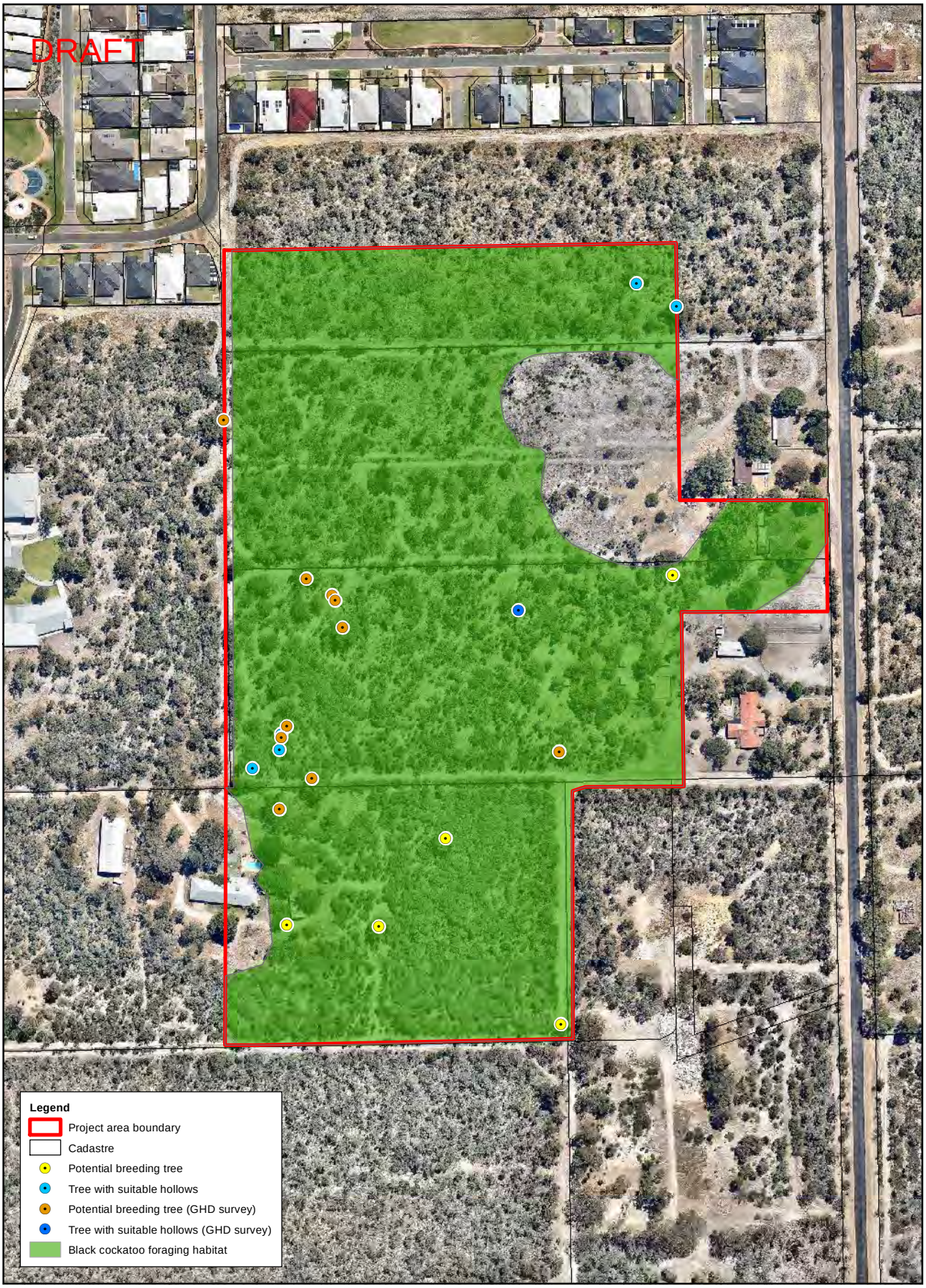
| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391620<br>Northing – 6439614 | 1800 | 15 | | | | | |  |
| Jarrah | Easting – 391783<br>Northing – 6439809 | 1,400 | 8 | | | | | |  |

| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391785<br>Northing – 6439958 | 1,900 | 15 | 1 | 1 | | | Fire scarring |  |
| Stag | Easting – 391805<br>Northing – 6439970 | 700 | 10 | | | | 1 | Fire scarring, bees present |  |

| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391763<br>Northing – 6439971 | 1,900 | 12 | | 6 | 1 | | Fire scarring |  |
| Jarrah | Easting – 391657<br>Northing – 6439663 | 1,500 | 15 | | | | | Fire scarring |  |

| Species | Location | DBH (mm) | Height (m) | Hollows | | | | Comments | Photograph |
|---|---|---|---|---|---|---|---|---|---|
| | | | | T | B | F | S | | |
| Jarrah | Easting – 391721<br>Northing – 6439560 | 600 | 8 | | | | | |  |

Hollow codes: T – trunk hollow, B – branch hollow, F – fissure hollow, S – sprout hollow.




Data source: GHD, Landgate, MRWA (2016)



Map no: 2202942A_GIS_004_A3

Author: SH

Approved by: CK

Date: 20/04/2016

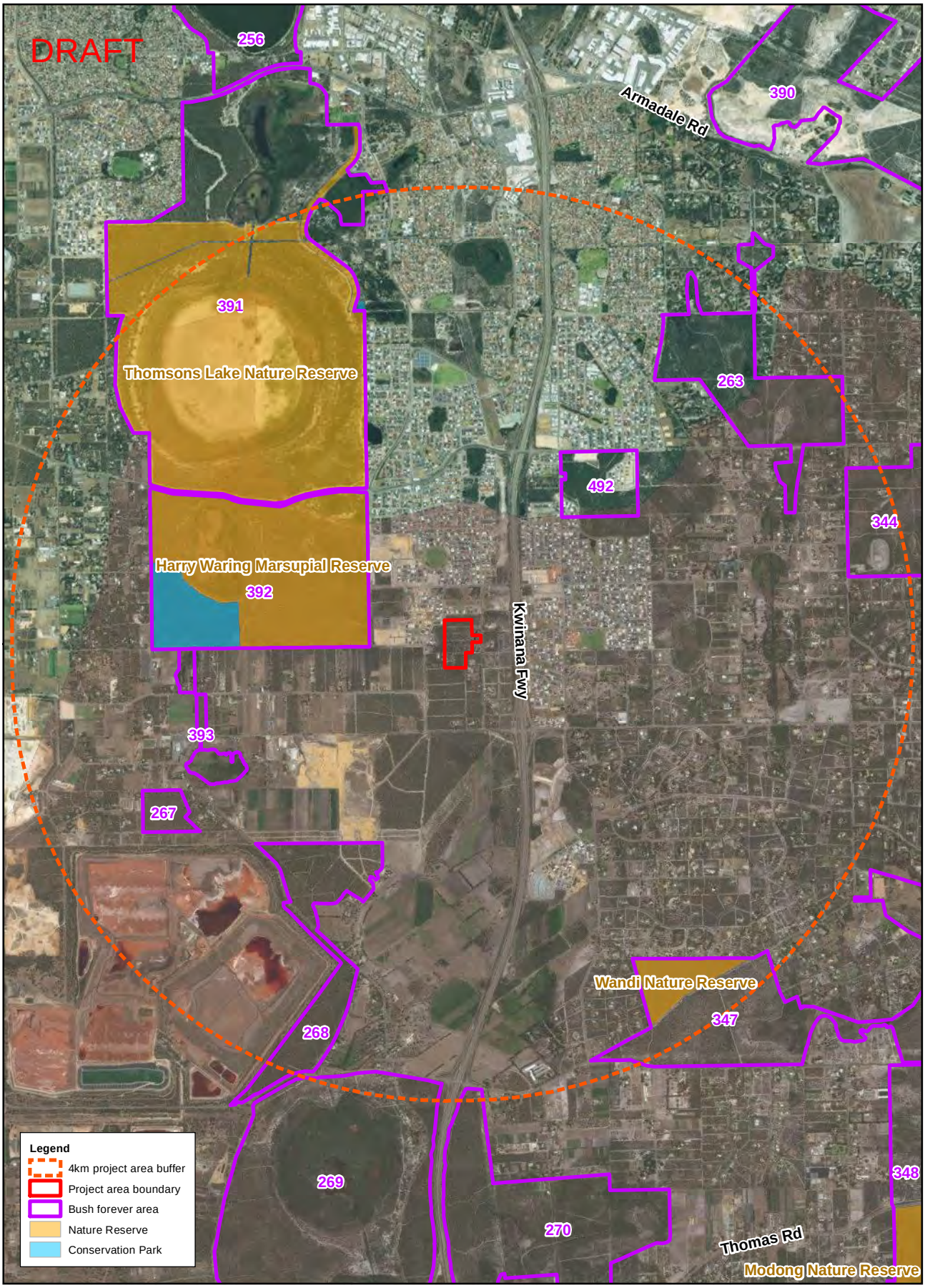
0 10 20
m

1:3,000

Scale ratio correct when printed at A4

Projection: Transverse Mercator
Coord sys: GDA 1994 MGA Zone 50

**Environmental Consultancy Services**
**Hammond Park**
**Figure 4**
Significant fauna habitat in the project study area




Data source: Landgate, MRWA, DOP, DPAW, ESRI (2016)



Map no: 2202942A_GIS_005_A2

Author: SH

Approved by: CK

Date: 18/04/2016

0 230 460 m

N

1:50,000

Scale ratio correct when printed at A4

Projection: Transverse Mercator
Coord sys: GDA 1994 MGA Zone 50

**Environmental Consultancy Services**
**Hammond Park**
**Figure 5**
Black cockatoo connectivity

# 4 ENVIRONMENTAL APPROVALS

## 4.1 COMMONWEALTH

An assessment of the impacts on Matter of National Environmental Significance (MNES) by the development of the school (the project) was undertaken during the 2013 assessment. Referral to the Department of the Environment (DotE) under the EPBC Act is triggered if there are any significant impacts on MNES resulting in the project considered a Controlled Action.

The project is likely impact on one MNES; threatened Black-cockatoo habitat. A summary of the project's potential impacts on MNES is provided in Table 5.

**Table 5 Project impacts on MNES**

| MNES | Present | Impact |
|---|---|---|
| World Heritage Places | No | None |
| National Heritage Places | No | None |
| Wetlands | No | None |
| Threatened species and/or ecological communities | Yes | Localised impact on Black-cockatoo foraging habitat and potential breeding habitat |
| Migratory species | Maybe | Not significant |
| Commonwealth marine area | No | None |
| Great Barrier Reef | No | None |
| Nuclear actions | No | None |
| Water reserves | No | None |

## 4.2 STATE

**Assessment against the 10 clearing principles**

An assessment of the proposed project against the "10 Clearing Principles" was undertaken in the 2013 assessment to determine whether the project is likely to be at variance to the Principles. The Principles aim to ensure that all potential impacts resulting from removal of native vegetation can be assessed in an integrated way.

The 2013 assessment identified that the project was

- likely to be at variance with Clearing Principle (b); comprises the whole or part of a significant habitat for fauna (threatened Black-cockatoo's)
- may be at variance with Clearing Principle (a); comprises a high level of biological diversity
- may be at variance with Clearing Principle (f); native vegetation is growing in, or in association with, an environment associated with a watercourse or wetland.

Following the 2016 assessment, it is considered that project is not likely to be at variance with Clearing Principle (f). This Principle aims to conserve vegetation associated with watercourses and wetlands including damplands. There are no known wetlands, watercourse or associated buffers within the project area. Vegetation type VT3 is likely to be a dampland based on it consisting of species associated with a dampland. Vegetation type VT3 is highly degraded and has a low wetland functional value based on the biophysical criteria outlined in Department of Environment Regulation's *A guide to the assessment applications to clear native vegetation* (DER 2014). Clearing native

vegetation associated with the dampland (VT3) is not likely to alter surface water or groundwater regimes.

# 5 CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

### 5.1.1 Flora and vegetation

The assessment of the 2013 and 2016 survey identified the following key aspects:

- one PEC occurs within the project area
- one Priority 4 flora species, *Stylidium striatum,* was recorded within the project area
- four vegetation types occur within the project area
- one Declared Pest plant, *Asparagus asparagoides,* was recorded.

### 5.1.2 Fauna

The assessment of the 2013 and 2016 survey identified the following key aspects:

- approximately 9.5 ha of threatened Black-cockatoo foraging habitat
- twenty-four potential breeding trees, seven of which have suitable hollows
- one fly over sighting of two threatened Black-cockatoos during the 2013 assessment
- no evidence of use within the site by threatened Black-cockatoo's
- potential habitat linkages between several reserves within 5 km of the project area.

### 5.1.3 Environmental approvals

Based on the potential impact on threatened Black-cockatoos, the project is likely to be required to be referred to the Commonwealth DotE due to the presence of potential breeding habitat (24 trees) and 9.5 ha of foraging habitat.

It is anticipated that this project will require a Native Vegetation Clearing Permit due to the project at variance with the 10 Clearing Principles.

## 5.2 RECOMMENDATIONS

It is recommended that the Department of Treasury initiate consultation with DotE and refer the project if development of the school requires clearing of threatened Black-cockatoo foraging and potential breeding habitat.

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## Appendix A NVIS (2003) vegetation community structure classifications

| Growth form | Height range (m) | Structural formation classes | | | | | |
|---|---|---|---|---|---|---|---|
| Foliage cover % | | 70–100% | 30–70% | 10–30% | <10% | 0–5% | ≈0% |
| tree, palm | <10,10–30,>30 | open forest | woodland | open woodland | isolated trees | isolated clumps of trees | tree, palm |
| tree mallee | <3, <10, 10–30 | closed mallee forest | open mallee forest | mallee woodland | open mallee woodland | isolated mallee trees | isolated clumps of mallee trees |
| shrub, cycad, grass-tree, tree-fern | <1,1–2,>2 | closed shrubland | shrubland | open shrubland | sparse shrubland | isolated shrubs | isolated clumps of shrubs |
| mallee shrub | <3, <10, 10–30 | closed mallee shrubland | mallee shrubland | open mallee shrubland | sparse mallee shrubland | isolated mallee shrubs | isolated clumps of mallee shrubs |
| heath shrub | <1,1–2,>2 | closed heathland | heathland | open heathland | sparse heathland | isolated heath shrubs | isolated clumps of heath shrubs |
| chenopod shrub | <1,1–2,>2 | closed chenopod shrubland | chenopod shrubland | open chenopod shrubland | sparse chenopod shrubland | isolated chenopod shrubs | isolated clumps of chenopod shrubs |
| samphire shrub | <0.5,>0.5 | closed samphire shrubland | samphire shrubland | open samphire shrubland | sparse samphire shrubland | isolated samphire shrubs | isolated clumps of samphire shrubs |
| hummock grass | <2,>2 | closed hummock grassland | hummock grassland | open hummock grassland | sparse hummock grassland | isolated hummock grasses | isolated clumps of hummock grasses |
| tussock grass | <0.5,>0.5 | closed tussock grassland | tussock grassland | open tussock grassland | sparse tussock grassland | isolated tussock grasses | isolated clumps of tussock grasses |
| other grass | <0.5,>0.5 | closed grassland | grassland | open grassland | sparse grassland | isolated grasses | isolated clumps of grasses |
| sedge | <0.5,>0.5 | closed sedgeland | sedgeland | open sedgeland | sparse sedgeland | isolated sedges | isolated clumps of sedges |
| rush | <0.5,>0.5 | closed rushland | rushland | open rushland | sparse rushland | isolated rushes | isolated clumps of rushes |

| Growth form | Height range (m) | Structural formation classes | | | | | |
|---|---|---|---|---|---|---|---|
| Foliage cover % | | 70–100% | 30–70% | 10–30% | <10% | 0–5% | ≈0% |
| forb | <0.5,>0.5 | closed forbland | forbland | open forbland | sparse forbland | isolated forbs | isolated clumps of forbs |
| fern | <1,1-2,>2 | closed fernland | fernland | open fernland | sparse fernland | isolated ferns | isolated clumps of ferns |
| bryophyte | <0.5 | closed bryophyteland | bryophyteland | open bryophyteland | sparse bryophyteland | isolated bryophytes | isolated clumps of bryophytes |
| lichen | <0.5 | closed lichenland | lichenland | open lichenland | sparse lichenland | isolated lichens | isolated clumps of lichens |

# Appendix B Vegetation condition categories

## Keighery vegetation condition scale

| Vegetation condition | Description |
|---|---|
| Pristine | No obvious signs of disturbance. |
| Excellent | Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. |
| Very good | Vegetation structure altered, obvious signs of disturbance. |
| Good | Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it. |
| Degraded | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not in a state approaching good condition without intensive management. |
| Completely degraded | The structure of the vegetation is no longer intact and the area is completely or almost without native species. |

**Vegetation condition scale from the *Technical Guide – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA & DPaW 2015)**

| Vegetation condition | South West and Interzone Botanical Provinces | Eremaean and Northern Botanical Provinces |
|---|---|---|
| 1 | Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement. | NA |
| 2 | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks. | Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement. |
| 3 | Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. | Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks. |
| 4 | Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing. | More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds. |
| 5 | - | Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds. |
| 6 | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing. | Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species. |
| 7 | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs. | Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or ‘parkland cleared’ with their flora comprising weed or crop species with isolated native trees or shrubs. |

## Appendix C Species recorded within the project area

| Family | Species |
|---|---|
| Aizoaceae | **Carpobrotus edulis* |
| Anarthriaceae | *Lyginia barbata* |
| Anarthriaceae | *Lyginia imberbis* |
| Apiaceae | *Homalosciadium homalocarpum* |
| Araliaceae | *Trachymene pilosa* |
| Asparagaceae | **Asparagus asparagoides* |
| | *Laxmannia squarrosa* |
| | *Lomandra caespitosa* |
| | *Lomandra maritima* |
| | *Lomandra preissii* |
| | *Thysanotus* sp. |
| Asteraceae | **Arctotheca calendula* |
| | **Conyza bonariensis* |
| | **Conyza sumatrensis* |
| | **Hypochaeris* sp. |
| | *Pithocarpa pulchella* var. *pulchella* |
| | *Podolepis gracilis* |
| | *Podotheca gnaphalioides* |
| | **Ursinia anthemoides* |
| Casuarinaceae | *Allocasuarina fraseriana* |
| Colchicaceae | *Burchardia congesta* |
| Cyperaceae | Cyperaceae sp. A |
| | Cyperaceae sp. B |
| | *Mesomelaena pseudostygia* |
| | *Schoenus brevisetis* |
| | *Schoenus curvifolius* |
| | *Baumea juncea* |
| | *Lepidosperma pubisquameum* |
| Dasypogonaceae | *Dasypogon bromeliifolius* |
| Dilleniaceae | *Hibbertia hypericoides* |
| | *Hibbertia racemosa* |
| | *Hibbertia subvaginata* |
| Droseraceae | *Drosera erythrorhiza* |
| | *Drosera menziesii* |

| Family | Species |
|---|---|
| Ericaceae | *Astroloma pallidum* |
| | *Conostephium pendulum* |
| | *Leucopogon conostephioides* |
| | *Leucopogon polymorphus* |
| | *Leucopogon* sp. |
| Euphorbiaceae | **Euphorbia terracina* |
| Fabaceae | *Acacia alata* |
| | *Acacia cyclops* |
| | *Acacia huegelii* |
| | *Acacia pulchella* |
| | *Acacia saligna* |
| | *Acacia* sp. |
| | *Acacia stenoptera* |
| | *Bossiaea eriocarpa* |
| | *Daviesia physodes* |
| | *Daviesia triflora* |
| | *Daviesia nudiflora* subsp. *nudiflora* |
| | *Gastrolobium capitatum* |
| | *Gompholobium tomentosum* |
| | *Hovea pungens* |
| | *Hovea trisperma* |
| | *Jacksonia floribunda* |
| | *Jacksonia sternbergiana* |
| | *Jacksonia furcellata* |
| | *Kennedia* sp. |
| Goodeniaceae | *Dampiera linearis* |
| | *Scaevola canescens* |
| | *Scaevola* sp. |
| Haemodoraceae | *Conostylis setosa* |
| | *Conostylis aculeata* subsp. *aculeata* |
| | *Conostylis setigera* subsp. *setigera* |
| | *Phlebocarya ciliata* |
| Haloragaceae | *Gonocarpus paniculatus* |
| Hemerocallidaceae | *Caesia micrantha* |
| | *Dianella revoluta* |
| | *Agrostocrinum hirsutum* |

| Family | Species |
|---|---|
| Hemerocallidaceae cont. | *Tricoryne elatior* |
| Iridaceae | **Gladiolus caryophyllaceus* |
| | *Patersonia occidentalis* |
| Lamiaceae | *Hemiandra pungens* |
| Loranthaceae | *Nuytsia floribunda* |
| Molluginaceae | *Macarthuria australis* |
| Myrtaceae | *Calothamnus* sp. |
| | *Calytrix fraseri* |
| | *Calytrix* sp. |
| | *Eremaea asterocarpa* |
| | *Eremaea pauciflora* var. *pauciflora* |
| | *Eucalyptus marginata* |
| | *Kunzea glabrescens* |
| | *Melaleuca rhaphiophylla* |
| | *Melaleuca thymoides* |
| | *Astartea scoparia* |
| | *Hypocalymma angustifolium* |
| | *Hypocalymma robustum* |
| | *Scholtzia involucrata* |
| Orchidaceae | *Caladenia flava* |
| | *Caladenia paludosa* |
| | *Caladenia* sp. |
| | *Elythranthera brunonis* |
| | *Leptoceras menziesii* |
| | *Microtis media* |
| | *Pyrorchis nigricans* |
| | *Thelymitra crinita* |
| | *Thelymitra* sp. |
| Orobanchaceae | **Orobanche minor* |
| Papaveraceae | **Fumaria* sp. |
| Poaceae | *Amphipogon turbinatus* |
| | *Austrostipa compressa* |
| | **Avena barbata* |
| | **Briza maxima* |
| | **Bromus diandrus* |
| | **Bromus hordeaceus* |

| Family | Species |
|---|---|
| Poaceae cont. | **Ehrharta calycina* |
| | *Ehrharta* sp. |
| | **Eragrostis curvula* |
| | **Lolium* sp. |
| | Poaceae sp. |
| | **Vulpia bromoides* |
| Proteaceae | *Adenanthos cygnorum* |
| | *Persoonia saccata* |
| | *Petrophile linearis* |
| | *Petrophile macrostachya* |
| | *Petrophile striata* |
| | *Stirlingia latifolia* |
| | *Banksia attenuata* |
| | *Banksia grandis* |
| | *Banksia menziesii* |
| | *Banksia ilicifolia* |
| | *Banksia littoralis* |
| Restionaceae | *Desmocladus fasciculatus* |
| | *Desmocladus flexuosus* |
| | *Hypolaena exsulca* |
| Rubiaceae | *Opercularia vaginata* |
| Rutaceae | *Boronia crenulata* |
| | *Philotheca spicata* |
| Solanaceae | **Solanum nigrum* |
| Stylidiaceae | *Stylidium piliferum* |
| | *Stylidium repens* |
| | *Stylidium schoenoides* |
| | *Stylidium* sp. |
| | *Stylidium striatum* |
| Thymelaeaceae | *Pimelea lehmanniana* |
| Violaceae | *Hybanthus calycinus* |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* |
| Zamiaceae | *Macrozamia riedlei* |

* Denotes an introduced species

## Appendix D Species recorded within each quadrat

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Acacia alata* | | | | | | + | + | | + | + | |
| *Acacia cyclops* | | | | | | | | | + | | |
| *Acacia huegelii* | | | | | | | | + | | | |
| *Acacia pulchella* | | | | | | | | | + | | |
| *Acacia saligna* | | | | | | | | | | | + |
| *Acacia stenoptera* | | | | | | | | | + | + | |
| *Acacia* sp. | | | | | | | | | | | + |
| *Adenanthos cygnorum* | | | | | | | | + | | | |
| *Agrostocrinum hirsutum* | + | | | | | | | | | | |
| *Allocasuarina fraseriana* | + | | | | | + | + | | + | + | |
| *Amphipogon turbinatus* | | | | | | | + | + | | | |
| **Arctotheca calendula* | + | | | | + | | | | + | | |
| **Asparagus asparagoides* | | | | + | | | | | | | |
| *Astartea scoparia* | | | | | + | | | | | | |
| *Astroloma pallidum* | | | | | | | | | | + | |
| *Austrostipa compressa* | | | + | | | | | | | | |
| *Boronia crenulata* | | | | | | | | | | | + |
| **Avena barbata* | | | | + | + | | | | | | |
| *Banksia attenuata* | + | + | | + | | + | + | + | + | + | |
| *Banksia grandis* | | | | | | | | + | | | |
| *Banksia ilicifolia* | | + | + | + | | + | + | + | + | + | |
| *Banksia littoralis* | + | | + | | | | | | + | + | |

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Banksia menziesii* | + | + | + | + | | + | + | + | + | + | |
| *Baumea juncea* | | | | | | | | | | | + |
| *Bossiaea eriocarpa* | | + | + | + | | + | + | | + | + | |
| **Briza maxima* | | + | + | + | | + | + | + | + | | |
| **Bromus diandrus* | | | | | | | | | | | + |
| **Bromus hordeaceus* | + | | | | | | | | | | |
| *Burchardia congesta* | | + | + | + | | | + | | + | + | |
| *Caesia micrantha* | | + | | + | | + | | | | | |
| *Caladenia flava* | + | | | | | | | | | | |
| *Caladenia paludosa* | | | | | | | | | | | + |
| *Caladenia* sp. | | + | | | | | | | | | |
| *Calothamnus* sp. | | | | | | | | | | + | |
| *Calytrix fraseri* | | | + | + | | | + | + | | | |
| *Calytrix* sp. | | + | | | | | | | | | |
| **Carpobrotus edulis* | | | | | | | + | + | + | | |
| *Conostephium pendulum* | | | + | | | | + | | | + | |
| *Conostylis aculeata* subsp. *aculeata* | | + | | + | | | + | + | + | + | |
| *Conostylis setigera* subsp. *setigera* | | | | | | | + | + | | | |
| *Conostylis setosa* | | | | | | + | + | | | + | |
| **Conyza bonariensis* | | | | | | | | + | | | |
| **Conyza sumatrensis* | | | | | | | | + | | | |
| Cyperaceae sp. A | | | | | | + | | | | | |
| Cyperaceae sp. B | | | | | | | | + | | | |
| *Dampiera linearis* | | | + | | | | + | | | + | |

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Dasypogon bromeliifolius* | + | + | + | + | | + | + | + | + | | |
| *Daviesia nudiflora* subsp. *nudiflora* | | | | | | | | | | + | |
| *Daviesia physodes* | | | | | | + | | | | + | |
| *Daviesia triflora* | | | | | | | + | | | | |
| *Desmocladus flexuosus* | + | | + | + | | + | + | + | + | + | |
| *Desmocladus fasciculatus* | | | | | | | | | + | + | |
| *Dianella revoluta* | | | | | | | | + | | | |
| *Drosera erythrorhiza* | | + | | + | | | | | | | |
| *Drosera menziesii* | + | | | | | | | | | | |
| **Ehrharta calycina* | | | + | + | + | | + | + | + | | |
| *Ehrharta* sp. | | + | | | | | | | | | |
| *Elythranthera brunonis* | | | | | | | | | | | + |
| **Eragrostis curvula* | | | | | | | | | | | + |
| *Eremaea pauciflora* var. *pauciflora* | | | | + | | | + | + | + | + | |
| *Eremaea asterocarpa* | | | | | | | + | | | + | |
| *Eucalyptus marginata* | | | | | | + | + | + | | + | |
| **Euphorbia terracina* | | | | | | | | | | | + |
| **Fumaria* sp. | | | | | | | | | | | + |
| *Gastrolobium capitatum* | | | | | | | | | + | | |
| **Gladiolus caryophyllaceus* | | + | + | + | + | | + | + | | + | |
| *Gompholobium tomentosum* | | + | + | | | + | | | | + | |
| *Gonocarpus paniculatus* | | + | | | | | | | | | |
| *Hemiandra pungens* | | | | | | | | | | | + |
| *Hibbertia hypericoides* | + | | | | | + | | + | | + | |

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Hibbertia racemosa* | | + | + | | | + | | + | + | | |
| *Hibbertia subvaginata* | | | | | | | | + | | | |
| *Homalosciadium homalocarpum* | | | | | | | | + | | | |
| *Hovea pungens* | | | | | | | | | | | + |
| *Hovea trisperma* | | + | | | | + | + | | | + | |
| *Hybanthus calycinus* | | | | | | | | | | + | |
| **Hypochaeris* sp. | | + | + | | + | | | | | | |
| *Hypocalymma angustifolium* | | | | | + | | | | | | |
| *Hypocalymma robustum* | | | | | | | | | | | + |
| *Hypolaena exsulca* | | + | | + | | | | | + | | |
| *Jacksonia floribunda* | | | + | | | | | + | | | |
| *Jacksonia sternbergiana* | | | | | | | | + | + | + | |
| *Jacksonia furcellata* | | | | | | | | + | + | + | |
| *Kennedia* sp. | | | | | | | | | | | + |
| *Kunzea glabrescens* | + | + | + | | + | + | | + | + | + | |
| *Lepidosperma pubisquameum* | | | + | + | | + | + | + | + | + | |
| *Leptoceras menziesii* | + | + | | | | | | | | | |
| *Leucopogon conostephioides* | | | | | | | | + | | | |
| *Leucopogon polymorphus* | | + | | | | | | | | | |
| *Leucopogon* sp. | | + | | | | | | | | | |
| *Laxmannia squarrosa* | | | | | | | | | | | + |
| **Lolium* sp. | | | | | | | | | | | + |
| *Lomandra caespitosa* | + | | | + | + | + | | | + | + | |
| *Lomandra maritima* | | | | | | | | + | | | |

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Lomandra preissii* | | + | + | | | | | | | | |
| *Lyginia barbata* | | | | | | | | | | | + |
| *Lyginia imberbis* | | | + | + | | | + | + | + | | |
| *Macarthuria australis* | | | | | | | | | | | + |
| *Macrozamia riedlei* | | | | | | | + | + | | | |
| *Melaleuca rhaphiophylla* | | | | | + | | | | | | |
| *Melaleuca thymoides* | | + | | | | | + | | | | |
| *Mesomelaena pseudostygia* | | | | | | | | | + | | |
| *Microtis media* | | | | + | | | | | | | |
| *Nuytsia floribunda* | | | | | | | | | + | | |
| *Opercularia vaginata* | | | | + | | | | | | | |
| **Orobanche minor* | | + | | | | | | | + | | |
| *Patersonia occidentalis* | | | + | + | + | | + | + | + | + | |
| *Persoonia saccata* | | | | | | | | | | | + |
| *Petrophile linearis* | | + | + | | | | + | + | + | + | |
| *Petrophile macrostachya* | | | | | | | | | + | | |
| *Petrophile striata* | | | | | | | | + | | | |
| *Philotheca spicata* | | | | | | | | | | | + |
| *Phlebocarya ciliata* | | + | + | + | | | | | | | |
| *Pimelea lehmanniana* | | | | | | | | | | | + |
| *Pithocarpa pulchella* var. *pulchella* | | | | | | | | + | | | |
| Poaceae sp. | | | | | | | | | + | | |
| *Podolepis gracilis* | | | | | | | | | | | + |
| *Podotheca gnaphalioides* | | | + | | | | | + | | | |

| Species | 2013 Survey (GHD) | | | | | 2016 Survey (Anders) | | | | | Opportunistic |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | |
| *Pyrorchis nigricans* | | + | + | + | | | | | | | |
| *Scaevola canescens* | | | | | | | | | | + | |
| *Scaevola* sp. | | | | | | | | | | | + |
| *Schoenus brevisetis* | | | | | | | + | | | + | |
| *Schoenus curvifolius* | + | | + | + | | + | + | + | + | + | |
| *Scholtzia involucrata* | | | + | | | | | + | | | |
| **Solanum nigrum* | | | | + | | | | | | | |
| Stirlingia latifolia | | | | | | | + | | + | + | |
| *Stylidium piliferum* | | | | | | | | + | | + | |
| *Stylidium repens* | | + | | | | | | | | + | |
| *Stylidium schoenoides* | | + | | + | | | | | | | |
| *Stylidium striatum* | | | + | | | | | | | | |
| *Stylidium* sp. | | | | | | | | | | | + |
| *Thelymitra crinita* | | | | | | | | | | | + |
| *Thelymitra* sp. | | + | | + | | | | | | | |
| *Thysanotus* sp. | | + | | | | | | | | | |
| *Trachymene pilosa* | + | + | + | + | | + | + | | | | |
| *Tricoryne elatior* | | | | + | | | + | | | | |
| **Ursinia anthemoides* | | + | + | | | + | | + | | | |
| **Vulpia bromoides* | + | | + | | | | | + | | | |
| *Xanthorrhoea preissii* | + | + | + | + | | + | + | + | + | + | |

*Denotes an introduced species

## Appendix E Quadrat data

| Site | Q6 | Project | Hammond Park |
|---|---|---|---|
| Type: | Quadrat | Size: | 10 x 10 m |
| Date: | 24/03/2016 | Described by: | CK & DK |
| Co-ordinates: | MGA 50 | mE 391565 | mN 6439738 |
| Location: | Hammond Park | | |
| Landform: | Flat | | |
| Drainage: | Good drainage | | |
| Soil colour and type: | Grey sand | | |
| Vegetation type: | *Banksia* woodland | | |
| Fire age and intensity: | > 5 years | | |
| Condition: | Good – very good | Disturbances: | Weeds, rubbish dumping, adjacent to track |
| Bare ground (%): | 2-10 | Litter (%): | >90 |
| Logs (%): | 2-10 | Rocks (%): | 0 |

**Species list**

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Casuarinaceae | *Allocasuarina fraseriana* | | U1 | 10 to 30 | 10.0 |
| Myrtaceae | *Eucalyptus marginata* | | U1 | 30 to 70 | 12.0 |
| Proteaceae | *Banksia attenuata* | | U2 | 30 to 70 | 4.5 |
| Proteaceae | *Banksia menziesii* (Juvenile) | | U2 | <2 | 0.5 |
| Proteaceae | *Banksia ilicifolia* | | U2 | 2 to 10 | 4.0 |
| Myrtaceae | *Kunzea glabrescens* | | M1 | <2 | 3.5 |
| Araliaceae | *Trachymene pilosa* | | G1 | <2 | 0.3 |
| Asparagaceae | *Lomandra caespitosa* | | G1 | <2 | 0.1 |
| Asteraceae | *Ursinia anthemoides* | * | G1 | <2 | 0.05 |
| Cyperaceae | Cyperaceae sp. | | G1 | <2 | 0.1 |
| Cyperaceae | *Schoenus curvifolius* | | G1 | <2 | 0.1 |
| Cyperaceae | *Lepidosperma pubisquameum* | | G1 | <2 | 0.2 |
| Dasypogonaceae | *Dasypogon bromeliifolius* | | G1 | 2 to 10 | 0.4 |
| Dilleniaceae | *Hibbertia hypericoides* | | G1 | <2 | 0.2 |
| Dilleniaceae | *Hibbertia racemosa* | | G1 | <2 | 0.3 |
| Fabaceae | *Acacia alata* | | G1 | <2 | 0.1 |
| Fabaceae | *Bossiaea eriocarpa* | | G1 | <2 | 0.1 |
| Fabaceae | *Daviesia physodes* | | G1 | <2 | 0.05 |
| Fabaceae | *Gompholobium tomentosum* | | G1 | <2 | 0.1 |
| Fabaceae | *Hovea trisperma* | | G1 | <2 | 0.1 |
| Haemodoraceae | *Conostylis setosa* | | G1 | <2 | 0.1 |
| Hemerocallidaceae | *Caesia micrantha* | | G1 | <2 | 0.05 |
| Poaceae | *Briza maxima* | * | G1 | <2 | 0.1 |
| Poaceae | *Bromus diandrus* | * | G1 | <2 | 0.1 |
| Poaceae | *Ehrharta calycina* | * | G1 | <2 | 0.3 |
| Restionaceae | *Desmocladus flexuosus* | | G1 | <2 | 0.1 |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | | G1 | 30 to 70 | 1.0 |

* Denotes an introduced species

| Site | Q7 | Project | Hammond Park |
|---|---|---|---|
| Type: | Quadrat | Size: | 10 x 10 m |
| Date: | 24/03/2016 | Described by: | CK & DK |
| Co-ordinates: | MGA 50 | mE 391556 | mN 6439998 |
| Location: | Hammond Park | | |
| Landform: | Flat | | |
| Drainage: | Good drainage | | |
| Soil colour and type: | Grey sand | | |
| Vegetation type: | Jarrah / *Banksia* woodland | | |
| Fire age and intensity: | > 5 years | | |
| Condition: | Good – very good | Disturbances: | Weeds, rubbish dumping, near track |
| Bare ground (%): | 5 | Litter (%): | >90 |
| Logs (%): | <2 | Rocks (%): | 0 |

**Species list**

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Myrtaceae | *Eucalyptus marginata* | | U1 | <2 | 10.0 |
| Casuarinaceae | *Allocasuarina fraseriana* | | U2 | 2 to 10 | 4.5 |
| Proteaceae | *Banksia attenuata* | | U2 | 30 to 70 | 4.5 |
| Proteaceae | *Banksia menziesii* | | U2 | <2 | 4.5 |
| Proteaceae | *Banksia ilicifolia* | | U2 | <2 | 5.0 |
| Myrtaceae | *Melaleuca thymoides* | | M1 | 2 to 10 | 1.2 |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | | M1 | 30 to 70 | 1.8 |
| Aizoaceae | *Carpobrotus edulis* | * | G1 | <2 | 0.2 |
| Anarthriaceae | *Lyginia imberbis* | | G1 | <2 | 0.4 |
| Araliaceae | *Trachymene pilosa* | | G1 | <2 | 0.3 |
| Colchicaceae | *Burchardia congesta* | | G1 | <2 | 0.4 |
| Cyperaceae | *Schoenus brevisetis* | | G1 | 2 to 10 | 0.6 |
| Cyperaceae | *Schoenus curvifolius* | | G1 | <2 | 0.1 |
| Cyperaceae | *Lepidosperma pubisquameum* | | G1 | <2 | 0.4 |
| Dasypogonaceae | *Dasypogon bromeliifolius* | | G1 | 2 to 10 | 0.6 |
| Ericaceae | *Conostephium pendulum* | | G1 | <2 | 0.3 |
| Fabaceae | *Acacia alata* | | G1 | <2 | 0.3 |
| Fabaceae | *Bossiaea eriocarpa* | | G1 | 10 to 30 | 0.2 |
| Fabaceae | *Daviesia triflora* | | G1 | <2 | 0.7 |
| Fabaceae | *Hovea trisperma* | | G1 | <2 | 0.2 |
| Goodeniaceae | *Dampiera linearis* | | G1 | <2 | 0.1 |
| Haemodoraceae | *Conostylis setosa* | | G1 | <2 | 0.1 |
| Haemodoraceae | *Conostylis aculeata* subsp. *aculeata* | | G1 | 2 to 10 | 0.3 |
| Haemodoraceae | *Conostylis setigera* subsp. *setigera* | | G1 | <2 | 0.3 |
| Hemerocallidaceae | *Tricoryne elatior* | | G1 | <2 | 0.5 |
| Iridaceae | *Gladiolus caryophyllaceus* | * | G1 | <2 | 0.6 |
| Iridaceae | *Patersonia occidentalis* | | G1 | <2 | 0.5 |
| Myrtaceae | *Calytrix fraseri* | | G1 | <2 | 0.4 |
| Myrtaceae | *Eremaea asterocarpa* | | G1 | 2 to 10 | 0.5 |
| Myrtaceae | *Eremaea pauciflora* var. *pauciflora* | | G1 | <2 | 0.3 |
| Poaceae | *Amphipogon turbinatus* | | G1 | 30 to 70 | 0.5 |
| Poaceae | *Briza maxima* | * | G1 | <2 | 0.1 |
| Poaceae | *Ehrharta calycina* | * | G1 | <2 | 0.5 |
| Proteaceae | *Petrophile linearis* | | G1 | 2 to 10 | 0.4 |
| Proteaceae | Stirlingia latifolia | | G1 | <2 | 0.4 |
| Restionaceae | *Desmocladus flexuosus* | | G1 | 30 to 70 | 0.2 |
| Zamiaceae | *Macrozamia riedlei* | | G1 | <2 | 0.4 |

* Denotes an introduced species

| Site | Q8 | Project | Hammond Park |
|---|---|---|---|
| Type: | Quadrat | Size: | 10 x 10 m |
| Date: | 24/03/2016 | Described by: | CK & DK |
| Co-ordinates: | MGA 50 | mE 391656 | mN 6439855 |
| Location: | Hammond Park | | |
| Landform: | Flat | | |
| Drainage: | Good drainage | | |
| Soil colour and type: | Grey sand | | |
| Vegetation type: | *Banksia* woodland | | |
| Fire age and intensity: | > 5 years | | |
| Condition: | Good | Disturbances: | Tracks, lopped *Banksias,* weeds, rubbish |
| Bare ground (%): | 60 | Litter (%): | 40 |
| Logs (%): | 10-20 | Rocks (%): | 0 |

**Species list**

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Myrtaceae | *Eucalyptus marginata* | | U1 | <2 | 10.0 |
| Proteaceae | *Banksia attenuata* | | U2 | 2 to 10 | 5.0 |
| Proteaceae | *Banksia grandis* | | U2 | <2 | 4.0 |
| Proteaceae | *Banksia menziesii* | | U2 | 30 to 70 | 6.0 |
| Proteaceae | *Banksia ilicifolia* | | U2 | 30 to 70 | 5.0 |
| Myrtaceae | *Kunzea glabrescens* | | M1 | <2 | 2.0 |
| Proteaceae | *Adenanthos cygnorum* | | M1 | 2 to 10 | 3.5 |
| Fabaceae | *Jacksonia sternbergiana* | | M2 | <2 | 1.2 |
| Fabaceae | *Jacksonia furcellata* | | M2 | <2 | 1.2 |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | | M2 | 2 to 10 | 1.0 |
| Zamiaceae | *Macrozamia riedlei* | | M2 | <2 | 1.2 |
| Aizoaceae | *Carpobrotus edulis* | * | G1 | <2 | 0.2 |
| Anarthriaceae | *Lyginia imberbis* | | G1 | <2 | 0.3 |
| Apiaceae | *Homalosciadium homalocarpum* | | G1 | <2 | 0.05 |
| Asparagaceae | *Lomandra maritima* | | G1 | <2 | 0.1 |
| Asteraceae | *Conyza bonariensis* | * | G1 | <2 | 0.1 |
| Asteraceae | *Conyza sumatrensis* | * | G1 | <2 | 0.1 |
| Asteraceae | *Pithocarpa pulchella* var. *pulchella* | | G1 | <2 | 0.4 |
| Asteraceae | *Podotheca gnaphalioides* | | G1 | <2 | 0.1 |
| Asteraceae | *Ursinia anthemoides* | * | G1 | <2 | 0.3 |
| Cyperaceae | Cyperaceae sp. | | G1 | <2 | 0.05 |
| Cyperaceae | *Schoenus curvifolius* | | G1 | <2 | 0.2 |
| Cyperaceae | *Lepidosperma pubisquameum* | | G1 | <2 | 0.3 |
| Dasypogonaceae | *Dasypogon bromeliifolius* | | G1 | 10 to 30 | 0.4 |
| Dilleniaceae | *Hibbertia hypericoides* | | G1 | <2 | 0.2 |
| Dilleniaceae | *Hibbertia racemosa* | | G1 | 2 to 10 | 0.3 |
| Dilleniaceae | *Hibbertia subvaginata* | | G1 | 2 to 10 | 0.3 |
| Ericaceae | *Leucopogon conostephioides* | | G1 | 2 to 10 | 0.2 |
| Fabaceae | *Acacia huegelii* | | G1 | <2 | 0.3 |
| Fabaceae | *Jacksonia floribunda* | | G1 | <2 | 0.3 |
| Haemodoraceae | *Conostylis aculeata* subsp. *aculeata* | | G1 | 2 to 10 | 0.3 |
| Haemodoraceae | *Conostylis setigera* subsp. *setigera* | | G1 | 2 to 10 | 0.4 |
| Hemerocallidaceae | *Dianella revoluta* | | G1 | <2 | 0.4 |
| Iridaceae | *Gladiolus caryophyllaceus* | * | G1 | <2 | 0.6 |
| Iridaceae | *Patersonia occidentalis* | | G1 | 2 to 10 | 0.4 |
| Myrtaceae | *Calytrix fraseri* | | G1 | <2 | 0.4 |
| Myrtaceae | *Eremaea pauciflora* var. *pauciflora* | | G1 | <2 | 0.4 |
| Myrtaceae | *Scholtzia involucrata* | | G1 | 30 to 70 | 0.4 |
| Poaceae | *Amphipogon turbinatus* | | G1 | <2 | 0.4 |
| Poaceae | *Briza maxima* | * | G1 | <2 | 0.1 |

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Poaceae | *Ehrharta calycina* | * | G1 | 2 to 10 | 0.4 |
| Poaceae | *Vulpia bromoides* | * | G1 | <2 | 0.4 |
| Proteaceae | *Petrophile linearis* | | G1 | <2 | 0.4 |
| Proteaceae | *Petrophile striata* | | G1 | <2 | 0.5 |
| Restionaceae | *Desmocladus flexuosus* | | G1 | <2 | 0.1 |
| Stylidiaceae | *Stylidium piliferum* | | G1 | <2 | 0.05 |

* Denotes an introduced species

| Site | Q9 | Project | Hammond Park |
|---|---|---|---|
| Type: | Quadrat | Size: | 10 x 10 m |
| Date: | 30/03/2016 | Described by: | CK & DK |
| Co-ordinates: | MGA 50 | mE 391589 | mN 6439577 |
| Location: | Hammond Park | | |
| Landform: | Lower slope | | |
| Drainage: | Good drainage | | |
| Soil colour and type: | Grey sand | | |
| Vegetation type: | Jarrah / *Banksia* forest | | |
| Fire age and intensity: | > 5 years | | |
| Condition: | Very good | Disturbances: | Weeds |
| Bare ground (%): | 2 | Litter (%): | >90 |
| Logs (%): | <2 | Rocks (%): | 0 |

**Species list**

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Myrtaceae | *Eucalyptus marginata* | | U1 | 2 to 10 | 12.0 |
| Casuarinaceae | *Allocasuarina fraseriana* | | U2 | <2 | 4.0 |
| Loranthaceae | *Nuytsia floribunda* | | U2 | 2 to 10 | 4.5 |
| Proteaceae | *Banksia attenuata* | | U2 | 30 to 70 | 6.0 |
| Proteaceae | *Banksia menziesii* | | U2 | 10 to 30 | 5.0 |
| Proteaceae | *Banksia ilicifolia* | | U2 | 10 to 30 | 7.0 |
| Proteaceae | *Banksia littoralis* | | U2 | <2 | 2.0 |
| Myrtaceae | *Kunzea glabrescens* | | M1 | 30 to 70 | 4.5 |
| Fabaceae | *Acacia cyclops* | | M2 | <2 | 1.0 |
| Fabaceae | *Jacksonia sternbergiana* | | M2 | <2 | 1.2 |
| Fabaceae | *Jacksonia furcellata* | | M2 | <2 | 1.2 |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | | M2 | 30 to 70 | 1.5 |
| Aizoaceae | *Carpobrotus edulis* | * | G1 | <2 | 0.2 |
| Anarthriaceae | *Lyginia imberbis* | | G1 | <2 | 0.5 |
| Asparagaceae | *Lomandra caespitosa* | | G1 | <2 | 0.1 |
| Asteraceae | *Arctotheca calendula* | * | G1 | <2 | 0.1 |
| Colchicaceae | *Burchardia congesta* | | G1 | <2 | 0.5 |
| Cyperaceae | *Mesomelaena pseudostygia* | | G1 | 2 to 10 | 0.4 |
| Cyperaceae | *Schoenus curvifolius* | | G1 | <2 | 0.2 |
| Cyperaceae | *Lepidosperma pubisquameum* | | G1 | <2 | 0.2 |
| Dasypogonaceae | *Dasypogon bromeliifolius* | | G1 | <2 | 0.3 |
| Dilleniaceae | *Hibbertia racemosa* | | G1 | <2 | 0.3 |
| Fabaceae | *Acacia alata* | | G1 | <2 | 0.2 |
| Fabaceae | *Acacia pulchella* | | G1 | <2 | 0.5 |
| Fabaceae | *Acacia stenoptera* | | G1 | <2 | 0.4 |
| Fabaceae | *Bossiaea eriocarpa* | | G1 | <2 | 0.2 |
| Fabaceae | *Gastrolobium capitatum* | | G1 | <2 | 0.05 |
| Haemodoraceae | *Conostylis aculeata* subsp. *aculeata* | | G1 | <2 | 0.2 |
| Iridaceae | *Patersonia occidentalis* | | G1 | <2 | 0.3 |
| Myrtaceae | *Eremaea pauciflora* var. *pauciflora* | | G1 | <2 | 0.5 |
| Orobanchaceae | *Orobanche minor* | * | G1 | <2 | 0.1 |
| Poaceae | *Briza maxima* | * | G1 | <2 | 0.1 |
| Poaceae | *Ehrharta calycina* | * | G1 | 2 to 10 | 0.5 |
| Poaceae | Poaceae sp. | | G1 | <2 | 0.2 |
| Proteaceae | *Petrophile linearis* | | G1 | 2 to 10 | 0.4 |
| Proteaceae | *Petrophile macrostachya* | | G1 | <2 | 0.5 |
| Proteaceae | *Stirlingia latifolia* | | G1 | 10 to 30 | 0.8 |
| Restionaceae | *Desmocladus fasciculatus* | | G1 | 2 to 10 | 0.2 |
| Restionaceae | *Desmocladus flexuosus* | | G1 | <2 | 0.1 |
| Restionaceae | *Hypolaena exsulca* | | G1 | <2 | 0.4 |

| Site | Q10 | Project | Hammond Park |
|---|---|---|---|
| Type: | Quadrat | Size: | 10 x 10 m |
| Date: | 30/03/2016 | Described by: | CK & DK |
| Co-ordinates: | MGA 50 | mE 391651 | mN 6439664 |
| Location: | Hammond Park | | |
| Landform: | Lower slope | | |
| Drainage: | Good drainage | | |
| Soil colour and type: | Grey sand | | |
| Vegetation type: | Jarrah / *Banksia* forest | | |
| Fire age and intensity: | > 5 years | | |
| Condition: | Very good – excellent | Disturbances: | |
| Bare ground (%): | 5 | Litter (%): | >90 |
| Logs (%): | <2 | Rocks (%): | 0 |

**Species list**

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Myrtaceae | *Eucalyptus marginata* | | U1 | >70 | 15.0 |
| Casuarinaceae | *Allocasuarina fraseriana* | | U2 | 2 to 10 | 6.0 |
| Proteaceae | *Banksia attenuata* | | U2 | 10 to 30 | 5.0 |
| Proteaceae | *Banksia menziesii* | | U2 | 30 to 70 | 5.0 |
| Proteaceae | *Banksia ilicifolia* | | U2 | 30 to 70 | 6.0 |
| Proteaceae | *Banksia littoralis* | | U2 | <2 | 1.5 |
| Fabaceae | *Jacksonia sternbergiana* | | M1 | <2 | 3.0 |
| Myrtaceae | *Kunzea glabrescens* | | M1 | 30 to 70 | 4.0 |
| Fabaceae | *Jacksonia furcellata* | | M2 | <2 | 1.5 |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | | M2 | 10 to 30 | 1.5 |
| Asparagaceae | *Lomandra caespitosa* | | G1 | <2 | 0.2 |
| Colchicaceae | *Burchardia congesta* | | G1 | <2 | 0.4 |
| Cyperaceae | *Schoenus brevisetis* | | G1 | 2 to 10 | 0.5 |
| Cyperaceae | *Schoenus curvifolius* | | G1 | <2 | 0.1 |
| Cyperaceae | *Lepidosperma pubisquameum* | | G1 | <2 | 0.5 |
| Dilleniaceae | *Hibbertia hypericoides* | | G1 | <2 | 0.4 |
| Ericaceae | *Astroloma pallidum* | | G1 | <2 | 0.1 |
| Ericaceae | *Conostephium pendulum* | | G1 | 2 to 10 | 0.3 |
| Fabaceae | *Acacia alata* | | G1 | <2 | 0.2 |
| Fabaceae | *Acacia stenoptera* | | G1 | <2 | 0.2 |
| Fabaceae | *Bossiaea eriocarpa* | | G1 | <2 | 0.3 |
| Fabaceae | *Daviesia physodes* | | G1 | <2 | 0.5 |
| Fabaceae | *Daviesia nudiflora* subsp. *nudiflora* | | G1 | <2 | 0.4 |
| Fabaceae | *Gompholobium tomentosum* | | G1 | 2 to 10 | 0.4 |
| Fabaceae | *Hovea trisperma* | | G1 | <2 | 0.05 |
| Goodeniaceae | *Dampiera linearis* | | G1 | <2 | 0.1 |
| Goodeniaceae | *Scaevola canescens* | | G1 | <2 | 0.1 |
| Haemodoraceae | *Conostylis setosa* | | G1 | <2 | 0.1 |
| Haemodoraceae | *Conostylis aculeata* subsp. *aculeata* | | G1 | <2 | 0.3 |
| Iridaceae | *Gladiolus caryophyllaceus* | * | G1 | <2 | 0.7 |
| Iridaceae | *Patersonia occidentalis* | | G1 | 2 to 10 | 0.5 |
| Myrtaceae | *Calothamnus* sp. | | G1 | <2 | 0.5 |
| Myrtaceae | *Eremaea asterocarpa* | | G1 | <2 | 0.4 |
| Myrtaceae | *Eremaea pauciflora* var. *pauciflora* | | G1 | <2 | 0.2 |
| Proteaceae | *Petrophile linearis* | | G1 | <2 | 0.3 |
| Proteaceae | Stirlingia latifolia | | G1 | 2 to 10 | 0.5 |
| Restionaceae | *Desmocladus fasciculatus* | | G1 | <2 | 0.1 |
| Restionaceae | *Desmocladus flexuosus* | | G1 | <2 | 0.1 |
| Stylidiaceae | *Stylidium piliferum* | | G1 | <2 | 0.3 |
| Stylidiaceae | *Stylidium repens* | | G1 | <2 | 0.05 |

| Family | Species | Status | Stratum | Cover (%) | Height (m) |
|---|---|---|---|---|---|
| Violaceae | *Hybanthus calycinus* | | G1 | <2 | 0.2 |

* Denotes an introduced species