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**CLEARING PERMIT APPLICATION  
(PURPOSE PERMIT)  
SUPPORTING INFORMATION**

**ESA DEEP SPACE FACILITY  
LOTS 11, 856 AND PART LOT M1991  
10353 GREAT NORTHERN HIGHWAY  
YARAWINDAH**

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**PREPARED AND SUBMITTED ON BEHALF OF**

**THE EUROPEAN SPACE AGENCY  
AND  
STRATHAM ENGINEERING CONSULTANCY SERVICE**

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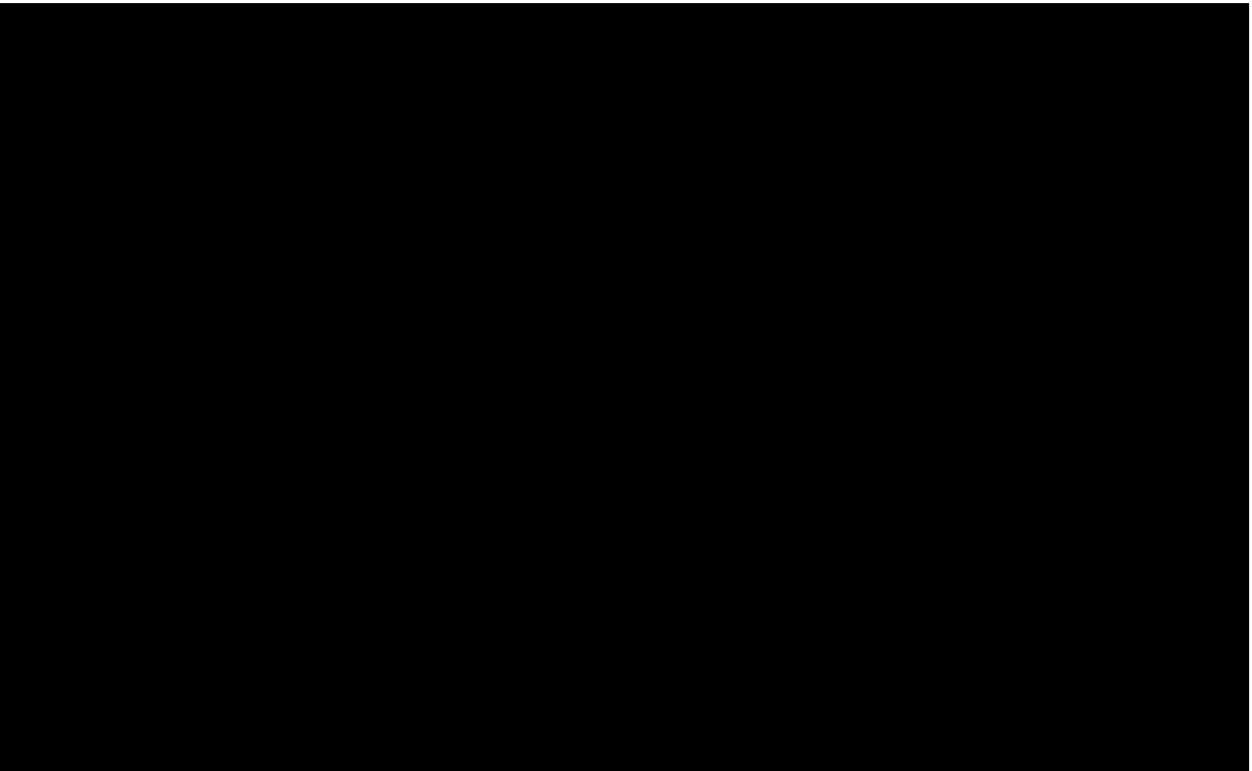
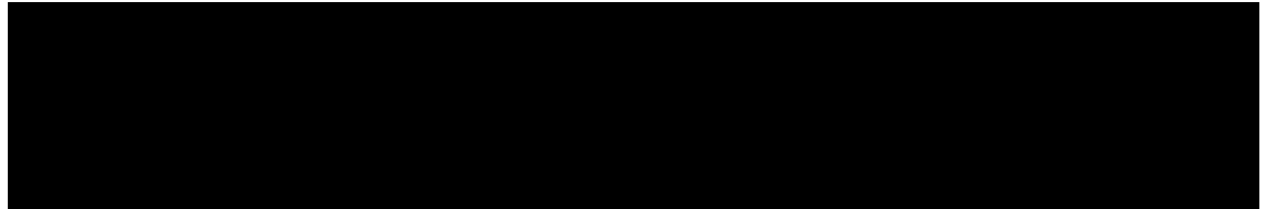
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Lots 11, 856 and M1991, 10353 Great Northern Highway, Yarawindah

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## 1. BACKGROUND INFORMATION

### 1.1 Location

Stratham Engineering Consultancy Service, on behalf of the European Space Agency (ESA), is proposing to construct additional infrastructure at the ESA's Deep Space Facility. The Facility is situated approximately 8 km south of New Norcia and 100 km north-east of Perth (**Figure 1**).

The existing Facility comprises Lot 11 Great Northern Highway, Yarawindah. In order to expand the Facility, the ESA is planning to lease a portion of Lots 856 and M1991 Great Northern Highway, Yarawindah from the current landowners. Certificates of Title for both Lots are included in **Appendix 1** and Authority to Act (Delegation of Powers) correspondence in favour of Mr Wayne Sheffield, Stratham Engineering Consultancy Service is included in **Appendix 2**.

The proposed clearing area (**Figure 2**) comprises 11.69 ha within a development footprint of 13.468 ha and is located within a 677 ha broadscale agricultural farm in which livestock grazing (sheep and cattle) and cropping (primarily cereal grasses) has historically and is being undertaken.

### 1.2 Rationale for Clearing

The proposed expansion of the Facility includes constructing an additional 35 m antenna (referred to as NNO-3) and a BIOMASS Calibration Transponder (BCT) to measure the Earth's biomass from space. While forest type and forest cover worldwide can be detected through the use of satellites, the BCT will take the information to the next level as the global mass of trees is not obtainable by ground measurement techniques. The satellite will carry the first P-band synthetic aperture radar, able to deliver accurate biomass maps of tropical, temperate and boreal forests.

The BCT is anticipated to comprise an antenna subsystem, electronic subsystem that includes up/down link radio-frequency circuitry, self-calibration equipment together with an antenna positioner subsystem and will be installed within a purpose-built building.

Additional infrastructure to be upgraded or constructed includes:

- i) Upgrading the existing Western Power 33 kV powerline infrastructure to cope with the additional power demand of the new NNO-3 Antenna and other future upgrades. The Western Power corridor between the two lots will be modified and a legal 'easement' in favour of Western Power placed on the corridor with Landgate.
- ii) A new transformer room will be constructed to cater for the infrastructure associated with the power upgrade.
- iii) Construction of an access road from the existing Facility to the proposed NNO-3 Antenna works and to the BCT. The existing access road running east to west from Great Northern Highway will be extended and upgraded to a composite asphalt surface.
- iv) A hardstand area will be constructed around the proposed NNO-3 Antenna linking it to the upgraded road.
- v) Construction of road running south to north beside the solar farm fenceline to link the existing NNO-1 to NNO-3 at the new powerhouse building and switch room and Western Power high voltage line at the transformer room.
- vi) Upgrading the existing MER building is scheduled in accordance with an approved building plan lodged with the Shire of Victoria Plains.

- vii) Construction of a 29 kL double skinned steel diesel tank mounted on a concrete slab and surrounded with bunded walls (for back-up power supply).
- viii) Construction of a 110 kL covered water tank. Fire hydrants and associated water pipelines will be trenched throughout the Facility for firefighting purposes.
- ix) Upgrading of existing security fencing and installation of additional security fencing to enclose new infrastructure.

### 1.3 Environmental Approval

To ensure that low radio frequency interference to the additional infrastructure does not occur, the proposed expansion of the Facility will require the removal of approximately 11.69 ha of Degraded to Completely Degraded native vegetation from within the development footprint. The area proposed to be cleared is identified in **Figure 2**.

In accordance with Part V of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation requires a permit except where an exemption applies under Schedule 6 of the EP Act or is prescribed by regulation in the *Environmental Protection (Clearing Native Vegetation) Regulations 2004*.

Clearing of native vegetation for the purpose of constructing additional infrastructure within parts of Lots 11, 856 and M1991 will therefore require an area clearing permit approved by the Department of Water and Environmental Regulation (DWER).

## 2. APPLICATION AREA DESCRIPTION

### 2.1 Topography

The development footprint is characterised by a gradual increase in height from 228 mAHD in the north southwards to a mesa formation (approximately 312 mAHD) before descending to 292 mAHD in the south (**Figure 3**). The proposed NNO-3 Antenna will be constructed at approximately 240 mAHD in an area of the existing farm that has already been cleared and used for cereal production. The proposed BCT will be constructed at approximately 312 mAHD on the flat-topped mesa formation.

### 2.2 Land Systems

The development footprint can be divided into three distinct land systems:

- 1) The southern portion characterised by a residual plateau that is very gently inclined with loamy gravel, some shallow gravels and sandy gravels.
- 2) The northern portion characterised by older gently inclined colluvial slopes with shallow gravelly soils over duricrust containing patches of remnant native vegetation along the southern and western edges.
- 3) The middle portion characterised by very gently inclined hills slopes and hillcrests; with loamy and sandy earths, loamy gravel, shallow loamy gravel over duricrust.

### 2.3 Wetlands

The development footprint is situated within the Eastern Darling Range hydrological zone (DBCA 2007-2020) of the Moore River catchment which is characterised by moderately to strongly dissected lateritic plateaus over granite with eastward flowing streams located in broad shallow valleys.

No wetlands or other watercourses are located within the development footprint.

### 2.4 Groundwater Dependent Ecosystems

The *Groundwater Dependent Ecosystems Atlas* (Australian Government and Bureau of Meteorology 2020) indicates that the development footprint is considered as low potential for terrestrial Groundwater Dependent Ecosystems to occur, with an GDE likelihood of low.

### 2.5 Environmentally Sensitive Areas

The development footprint does not intersect with any clearing regulations Environmentally Sensitive Areas and the nearest ESA (1362) is located approximately 800 m to the east (Government of Western Australia & Department of Water and Environmental Regulation 2020).

## 2.6 Conservation Lands

The development footprint does not intersect with any Department of Biodiversity, Conservation and Attractions (DBCA) legislated lands and waters (including national park, nature reserve, conservation park, marine park, marine nature reserve, marine management area, State forest and timber reserves).

## 2.7 Historical Land use

Located within the Jarrah Forest IBRA region in the Northern Jarrah Forest subregion (JAF01), the development footprint is characterised by land use more similar to that of the Avon Wheatbelt.

The development footprint is located within a working farm in which livestock grazing (sheep and cattle) and cropping (primarily cereal grasses) is currently conducted. Part of the development footprint is on rocky soil that has not been cleared of native vegetation, however, these areas have been intensively grazed and while most of the upper stratum trees remain much of the native understorey is no longer present.

## 2.8 Flora and Vegetation

A detailed survey conducted as a 'single-phase survey' in accordance with the *Flora and Vegetation Technical Guidance* (EPA 2016d), was undertaken by an experienced botanist in May 2020. The survey area comprised approximately 37.54 ha and included the 13.468 ha development footprint.

Targeted searches were conducted in areas of habitat suitable for Threatened Flora (TF) and Priority Flora (PF) that were identified during the desktop assessment and previous surveys conducted in the surrounding area as having the potential to occur.

As the survey was conducted outside of the period considered optimal for a primary season survey within the bioregion, a likelihood assessment was also conducted to identify whether TF and PF species have the potential to occur within survey area including the development footprint. The likelihood of a species occurring was based on attributes as listed on *FloraBase* (WAH 1998-2020; 2020).

No conservation-listed flora was identified as having been recorded previously or having a High likelihood of occurring based on the information available during the desktop assessment, taking into consideration that a preliminary site assessment was conducted on 11 February 2020 and had determined that the entire survey area had been (or was currently) heavily grazed by livestock, with few native species in the lower strata (Ecoscape (Australia) Pty Ltd., 2020).

Within the survey area, 28 vascular flora were recorded from 16 families and 23 genera. At least eight of the recorded taxa were introduced, representing at least 28.6% of all recorded taxa. The most commonly represented families were Myrtaceae with 5 taxa, Poaceae (5 taxa) and Dilleniaceae (4 taxa). The most commonly represented genera were *Hibbertia* (4 taxa), *Eucalyptus* (2 taxa) and *Melaleuca* (2 taxa). A significant portion (8%) of the flora could not be identified with certainty due to the lack of reproductive material largely due to the survey timing and intensive grazing (Ecoscape 2020).

The native vegetation consists of two woodlands dominated by different Eucalypt species and one non-native vegetation type were identified from within the survey area:



- EIW: *Eucalyptus loxophleba* subsp. *loxophleba* woodland
- EwW: *Eucalyptus wandoo* subsp. *wandoo* woodland
- TaG: \**Triticum aestivum* and \**Avena barbata* grassland



**Plate 1:** EIW: *Eucalyptus loxophleba* subsp. *loxophleba* woodland over \**Avena barbata* low isolated grasses



**Plate 2:** EwW *Eucalyptus wandoo* subsp. *wandoo* woodland over *Melaleuca marginata* and *Hibbertia hypericoides* subsp. *hypericoides* mid shrubland over \**Avena barbata* low isolated grasses



**Plate 3:** TAG \**Triticum aestivum* and \**Avena barbata* grassland

All vegetation was assessed as being in Degraded or Completely Degraded condition (**Figure 4**).

Flora and vegetation desktop, on-ground survey methodology and findings are included in **Appendix 3**.

## 2.9 Fauna

A Level 1 fauna survey, as defined by the *Technical Guidance – Sampling methods for Terrestrial vertebrate fauna* (EPA 2016f), was conducted in May 2020 which does not fall within the optimal prescribed season. Consisting of a desktop study and basic ground truthing through a reconnaissance survey, the survey focused on mapping major fauna habitat types within the survey area, particularly those habitat types likely to be utilised by conservation-listed species identified during the desktop survey.

The Level 1 field survey also comprised opportunistic surveys (active searches, scat, track and other traces surveys and bird surveys). The survey area comprised approximately 37.54 ha and included the 13.468 ha development footprint.

During the survey, fauna habitats present were identified and mapped. Fauna habitats were described as an area which is distinguishable from its surrounding area by its landform, vegetation and fauna assemblage occupying the area. In addition, the likelihood to harbour specialised fauna species which are not found in adjacent areas was taken into consideration.

Three fauna habitat types were identified: Open Woodland, Paddock, and Infrastructure, with the latter two assessed as not representing natural habitat (**Figure 5**). While the Open Woodland habitat may be suitable for some conservation-listed fauna species, it has little structural diversity other than tree canopy.

Within the survey area, 18 vertebrate fauna species were recorded (six mammals, 11 birds and one reptile), none of which are conservation-listed.

While the Carnaby's Cockatoo was assessed as being a High likelihood of occurring, the species has not been observed within the survey area for a significant period by the landowner, nor was it observed during the three-day field survey. Given the quality of the habitat present, it is unlikely that the species would be dependent upon the survey area if it did occur. Forest Red-tailed Black Cockatoo and Peregrine Falcon were assessed as being a Medium likelihood of occurring on occasion but would not be dependent upon the resources available within the survey area (Ecoscape (Australia) Pty Ltd., 2020).

Fauna desktop, on-ground survey methodology and findings are included in **Appendix 3**.

### 3. APPLICATION OF THE TEN CLEARING PRINCIPLES

To ensure that all potential environmental impacts resulting from the removal of native vegetation can be assessed, clearing applications are assessed against the Ten Clearing Principles outlined in Schedule 5 of the EP Act.

An examination of the Ten Clearing Principles applied against a desktop investigation and site-specific field surveys (**Appendix 3**) is provided in the table over the page.

Principle	Assessment	Conclusion
<p><b>(a) Native vegetation should not be cleared if it comprises a high level of biological diversity</b></p>	<p>The flora and fauna survey area, comprising 37.54 ha, is located in the Jarrah Forest IBRA region in the Northern Jarrah Forest subregion (JAF01), described as (Williams &amp; Mitchell 2001):</p> <p><i>... Duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by woodlands of Wandoo - Marri on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean.</i></p> <p>The survey area corresponds with the Mogumber 4 pre-European vegetation association described as woodlands containing: Jarrah, Marri and Wandoo (i.e., <i>Eucalyptus marginata</i>, <i>Corymbia calophylla</i> and <i>E. wandoo</i>).</p> <p>Of the pre-European vegetation association identified from the survey area (DPIRD 2018a) approximately 197,903.81 ha (32.22 %) remain.</p> <p>During the flora and vegetation survey conducted in May 2020, native vegetation within the survey area consisted of woodlands dominated by different Eucalypt species and one non-native vegetation type:</p> <ul style="list-style-type: none"> <li>- ElW: <i>Eucalyptus loxophleba</i> subsp. <i>loxophleba</i> woodland</li> <li>- EwW: <i>Eucalyptus wandoo</i> subsp. <i>wandoo</i> woodland</li> <li>- TaG: *<i>Triticum aestivum</i> and *<i>Avena barbata</i> grassland</li> </ul> <p>Vegetation condition was assessed broadly and continuously throughout the survey area and at each quadrat using the Vegetation Condition Scale for the Southwest Botanical Provinces (EPA 2016d). All vegetation was assessed as being in Degraded or Completely Degraded condition (<b>Figure 4</b>).</p> <p>Within the survey area, 28 vascular flora were recorded from 16 families and 23 genera. At least eight of the recorded taxa were introduced, representing at least 28.6% of all recorded taxa. The most commonly represented families were</p>	<p>Due to the historical land-use of the survey area, extensive clearing of the canopy and understorey has taken place. As a result, the survey area is unlikely to represent an area of higher biodiversity in either the local or regional context.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development footprint is not likely to be at variance with this Principle.</p>

Principle	Assessment	Conclusion
	<p>Myrtaceae (5 taxa), Poaceae (5 taxa) and Dilleniaceae (4 taxa). The most commonly represented genera were <i>Hibbertia</i> (4 taxa), <i>Eucalyptus</i> (2 taxa) and <i>Melaleuca</i> (2 taxa). A significant portion (8%) of the flora could not be identified with certainty due to the lack of reproductive material largely due to the survey timing and intensive grazing (Ecoscape (Australia) Pty Ltd 2020).</p> <p>No Threatened Flora (TF) pursuant to the <i>Biodiversity Conservation Act 2016</i> (BC Act) nor the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) were recorded during the survey. No Priority Flora (PF) pursuant to State legislation were recorded during the survey.</p> <p>A search of the Department of Biodiversity, Conservation and Attractions (DBCA) Threatened Fauna database using a 40 km buffer was undertaken to determine whether any species have been recorded in proximity to the survey area. The DBCA database search returned the following:</p> <ul style="list-style-type: none"> <li>- eight mammals</li> <li>- 17 birds</li> <li>- three reptiles</li> <li>- six invertebrates</li> </ul> <p>The EPBC Act <i>Protected Matters Search Tool</i> (PMST) search (Australian Government &amp; DAWE 2020) using a 10 km buffer, was used to identify conservation-listed fauna and/or fauna habitat suitable for such species within the search area buffer. The PMST search identified:</p> <ul style="list-style-type: none"> <li>two mammals: both listed as 'species or species habitat likely to occur within area'</li> <li>five birds: one 'species or species habitat known to occur within area, two 'species or species habitat likely to occur within area', two 'species or species habitat may occur within area'</li> <li>one fish: listed as 'species or species habitat likely to occur within area'</li> <li>one invertebrate: listed as 'species or species habitat known to occur within area'</li> </ul>	

Principle	Assessment	Conclusion
	<p>Within the survey area, 18 vertebrate fauna species were recorded (six mammals, 11 birds and one reptile), none of which are conservation-listed (Ecoscape 2020).</p>	
<p><b>(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.</b></p>	<p>A search of the DBCA's Threatened Fauna database was undertaken to establish whether species listed under the BC Act have been recorded in proximity to the site. The NatureMap Report identified 21 Threatened fauna species and four Priority species occurring within 40 km of the survey area.</p> <p>The EPBC Act PMST identified 25 Threatened and Migratory species that could potentially occur within or in proximity to the survey area. Given the lack of water occurring within the survey area, marine and migratory bird species are unlikely to occur.</p> <p>While no conservation-listed species were recorded, the survey area is within the mapped breeding range of Carnaby's Cockatoo (DSEWPac 2012a) thus a Black Cockatoo habitat assessment was conducted including a tree assessment. Potential breeding trees (according to the Bamford 2016 grading system) were recorded:</p> <ul style="list-style-type: none"> <li>- 259 were assessed as Class 5 (trees without suitable hollows)</li> <li>- 63 were assessed as Class 4 (trees with large hollows or broken branches, but not having the features preferred by Black Cockatoos for nesting)</li> <li>- 40 were assessed as Class 3 (trees with potentially suitable hollows but with no evidence of use by Black Cockatoos).</li> </ul> <p>Importantly, no trees were assessed as Class 2 (trees with suitable hollows and evidence of use, but not currently occupied) or Class 1 (having an active nest) (Figure 5).</p> <p>The entire survey area has been assessed as being Open Woodland that is considered to be 'near-low quality' foraging habitat according to the scoring tool in the Draft Revised Referral Guideline (Commonwealth of Australia 2017).</p>	<p>The proposed clearing of 'near low quality' foraging habitat and the absence of trees with suitable nesting hollows is unlikely to contribute to a long-term reduction in the size of a significant habitat for Carnaby's Black Cockatoo.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development is not likely to be at variance with this Principle.</p>

Principle	Assessment	Conclusion
<p><b>(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.</b></p>	<p>No Black Cockatoo species have been observed in the survey area by the landholder for at least the previous 20 years, nor have any sightings been reported by any ESA employees or contractors since 2003 when the Facility opened. The landholder has observed Carnaby's Cockatoo in the nearby Seven Mile Well Nature Reserve, approximately 1.5 km to the southeast recently (undefined). The DBCA database search includes a record of the species from Seven Mile Well Nature Reserve from 2000.</p> <p>The fauna species that are likely to occur within the survey area (Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo and Peregrine Falcon) are considered to be infrequent visitors and not be dependent on the survey area for foraging and breeding.</p> <p>The availability of foraging and breeding habitat within 10 km of the survey area is very high, comprising 'Eucalyptus Woodlands' and 'Other Shrublands' (Beard, 1981; Shepherd et al, 2002). There is approximately 7000 ha of remnant vegetation (Beard, 1981) within 10 km of the survey area (<b>Figure 6</b>). A high proportion of this habitat will more than likely be potential breeding habitat and/or foraging habitat.</p> <p>A detailed 'single phase' survey of the 37.54 ha survey area was conducted by a senior botanist in May 2020.</p> <p>Within the survey area, 28 vascular flora were recorded from 16 families and 23 genera. At least eight of the recorded taxa were introduced, representing at least 28.6% of all recorded taxa. The most commonly represented families were Myrtaceae with 5 taxa, Poaceae (5 taxa) and Dilleniaceae (4 taxa). The most commonly represented genera were <i>Hibbertia</i> (4 taxa), <i>Eucalyptus</i> (2 taxa) and <i>Melaleuca</i> (2 taxa). A significant portion (8%) of the flora could not be identified with certainty due to the lack of reproductive material largely due to the survey timing and intensive grazing (Ecoscape (Australia) Pty Ltd 2020).</p>	<p>No conservation significant flora species were identified within the survey area and due to the disturbed habitat present within the survey area are unlikely to occur.</p> <p>The proposed clearing of 11.69 ha from within the 13,468 ha development is not likely to be at variance with this Principle.</p>

Principle	Assessment	Conclusion
<p><b>(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.</b></p>	<p>No Threatened Flora pursuant to the BC Act nor the EPBC Act were recorded during the survey, nor where any Priority Flora pursuant to State legislation recorded during the survey (Ecoscape (Australia) Pty Ltd 2020).</p> <p>The PMST search (Australian Government &amp; Department of Agriculture, Water and the Environment [DAWE] 2020, search reference PMST_74QH95) using a 10 km buffer around a point approximating the centre of the survey area, identified one EPBC-listed Threatened Ecological Community (TEC) or suitable habitat for such are likely to occur within the search area buffers.</p> <p>The DBCA database search (search reference 02-0620EC using a 10 km buffer) identified one known TEC within the search area buffer but not corresponding with the survey area.</p>	<p>Although both State and Commonwealth database searches identified the likely presence of the <i>Eucalypt Woodlands of the Western Australian Wheatbelt</i> TEC within the search area buffer, the survey area is not within the Avon Wheatbelt bioregion, nor closely adjacent to it.</p> <p>The proposed clearing of 11.69 ha from within the 13,468 ha development footprint is not likely to be at variance with this Principle.</p>
<p><b>(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.</b></p>	<p>The survey area is located within the Jarrah Forest IBRA region in the Northern Jarrah Forest subregion (JAFO1), described as (Williams &amp; Mitchell 2001):</p> <p><i>... Duricrusted plateau of Yilgarn Craton characterised by Jarrah-Marri forest on laterite gravels and, in the eastern part, by woodlands of Wandoo - Marri on clayey soils. Fluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands. The climate is Warm Mediterranean.</i></p> <p>The survey area corresponds with the Mogumber 4 pre-European vegetation association described as woodlands containing: Jarrah, Marri and Wandoo (i.e., <i>Eucalyptus marginata</i>, <i>Corymbia calophylla</i> and <i>Eucalyptus wandoo</i>).</p> <p>Of the Mogumber 4, pre-European vegetation association identified from the survey area (DPIRD 2018a) approximately 197,903.81 ha (32.22 %) remains. Within the Shire of Victoria Plains, approximately 14,633.44 ha (22.83 %) remains. The DPIRD Native Vegetation Extent dataset shows that approximately 7,016ha of native vegetation remains within a 10km radius of the survey area (Figure 6).</p>	<p>Due to its historical and continued land-use (broadacre grazing and cereal cropping), the condition of the native vegetation within the survey area has been assessed as being Degraded to Completely Degraded. As such, the survey area does not represent a significant remnant of native vegetation in an area that has been extensively cleared.</p> <p>The proposed clearing of 11.69 ha from within the 13,468 ha development footprint is not likely to be at variance with this Principle.</p>



Principle	Assessment	Conclusion
	<p>Due to its historical and ongoing land use (broadacre grazing and cereal cropping), the condition of the native vegetation within the survey area has been assessed as being Degraded to Completely Degraded. As such, the area proposed to be cleared does not represent a significant remnant of native vegetation in an area that has been extensively cleared.</p>	
<p><b>(f) Native vegetation should not be cleared if it is growing in, or in association with an environmental associated with a watercourse or wetland.</b></p>	<p>The survey area is situated within the Eastern Darling Range hydrological zone in the Moore River catchment (DBCA 2007-2020) which is characterised by moderately to strongly dissected lateritic plateaus over granite with eastward flowing streams located in broad shallow valleys.</p> <p>Detailed flora and vegetation surveying conducted within the survey area did not identify the presence of native vegetation types or flora species that are generally associated with watercourses and/or wetlands within the region. Nor were any watercourses or wetlands identified as being located within the survey area.</p>	<p>The flora and vegetation survey did not identify the presence of any native vegetation usually associated with a watercourse or wetland within the surrounding area or region.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development footprint is not likely to be at variance with this Principle.</p>
<p><b>(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.</b></p>	<p>According to Department of Primary Industries and Regional Development (DPIRD 2018b) soil landscape mapping, the following land systems dominate the survey area:</p> <ul style="list-style-type: none"> <li>- Julimar Michibin cb Phase: gently inclined to steep breakaway slope; red to brown loamy earths and duplexes, some loamy gravel, acid duplexes and stony</li> <li>- Yarawindah 2a typical Phase: very gently inclined hillslopes and hillcrests; loamy and sandy earths, loamy gravel, shallow loamy gravel over duricrust.</li> <li>- Udamong 1 plateau remnant Phase: residual plateau, very gently inclined; loamy gravel, some shallow gravels and sandy gravels.</li> </ul> <p>The loamy and sandy gravels present within the survey area can be prone to water and to a greater extent wind erosion. Mapping on the DPIRD's NRinfo</p>	<p>The proposed expansion of the Facility and construction of the associated infrastructure will be undertaken in accordance with civil engineering standard operational controls in order to reduce the risk of appreciable land degradation.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development footprint is not likely to be at variance with this Principle.</p>

Principle	Assessment	Conclusion
	<p>database<sup>1</sup> shows that the risk of wind erosion hazard to soils in the northern portion of the survey area are 30 – 50 %, central portion 10 – 30 % and southern portion &gt;70 % are high extreme hazard as the slope increases in height.</p> <p>The DPIRD's database shows that the risk of water erosion hazard is &lt;3 % across the central portion of the survey area and 3 – 10 % in the northern and southern portions of the survey area.</p> <p>The design and siting of the road leading up the mesa formation to the site of the proposed BCT has taken into consideration the degree of slope and safety concerns.</p>	
<p><b>(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.</b></p>	<p>The survey area does not intersect with any clearing regulations Environmentally Sensitive Areas (ESA) and the nearest ESA (1362) is located 800 m to the east (Government of Western Australia &amp; Department of Water and Environmental Regulation 2020).</p>	<p>As the survey is not near any ESAs it is unlikely that there will be direct or anticipated indirect impacts on the environmental values of any conservation areas.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development footprint is not likely to be at variance with this Principle.</p>
<p><b>(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.</b></p>	<p>The survey area falls in the Moore River catchment within the Eastern Darling Range hydrological zone characterized by moderately to strongly dissected lateritic plateaus on granite with eastward flowing streams in broad shallow valleys (DBCA2007-2020).</p> <p>The <i>Groundwater Dependent Ecosystems Atlas</i> (Australian Government and Bureau of Meteorology 2020) indicates that the survey area is considered as low potential for terrestrial Groundwater Dependent Ecosystems to occur, with an IDE likelihood of low.</p>	<p>Detailed surveying conducted within the survey area indicates that no wetlands or watercourses are located within or adjacent to it.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development footprint is not likely to be at variance with this Principle.</p>

<sup>1</sup> Department of Primary Industries and Resource Development (2021) [Natural Resource Information \(WA\) \(agric.wa.gov.au\)](http://agric.wa.gov.au)

Principle	Assessment	Conclusion
<p><b>(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.</b></p>	<p>The development footprint is characterised by a gradual increase in height from 228 m Australian Height Datum (AHD) in the north southwards to a mesa formation (approximately 312 mAHD) before descending to 292 mAHD in the south (Figure 3).</p>	<p>Given the topography of the development footprint, and the absence of watercourses throughout the survey area, it is unlikely that clearing of native vegetation within it is likely to cause, or exacerbate, the incidence or intensity of flooding within it.</p> <p>The proposed clearing of 11.69 ha from within the 13.468 ha development is not likely to be at variance with this Principle.</p>

#### 4. SUMMARY AND CONCLUSION

Approximately 11.69 ha of native vegetation is proposed to be cleared from within a 13.468 ha development footprint. The clearing is required to enable the construction of facilities that are integral to the expansion and functioning of the ESA's Deep Space Facility.

A desktop review of published Western Australian and Commonwealth databases pertaining to the survey area was undertaken prior to field surveying being conducted. The desktop review included data and information relating to TF, PF and TECs, Threatened and Migratory fauna species, ESAs, water and wind erosion risk, groundwater dependent ecosystems, hydrology and hydrogeology.

As outlined in this report, the flora, vegetation and fauna field surveys were conducted within a 37.54 ha survey area in which the 13.468 ha development footprint is located. Vegetation mapping assessed the entire survey area as comprising *Degraded* to *Completely Degraded* vegetation. The fauna survey identified that while the survey area comprised an Open Woodland habitat that may be suitable for some conservation-listed fauna species, it has little structural diversity other than tree canopy.

Impacts associated with the proposed clearing to allow for the expansion of the ESA's Deep Space Facility has been considered with respect to the 10 clearing principles outlined in Schedule 5 of the EP Act. As discussed in the table, it is concluded that in consideration of the small-scale nature of the proposed expansion and on the basis of the information presented in this report, the proposed clearing of 11.69 ha of native vegetation from within a 13.468 ha development footprint is unlikely to be at variance with any of the ten clearing principles.

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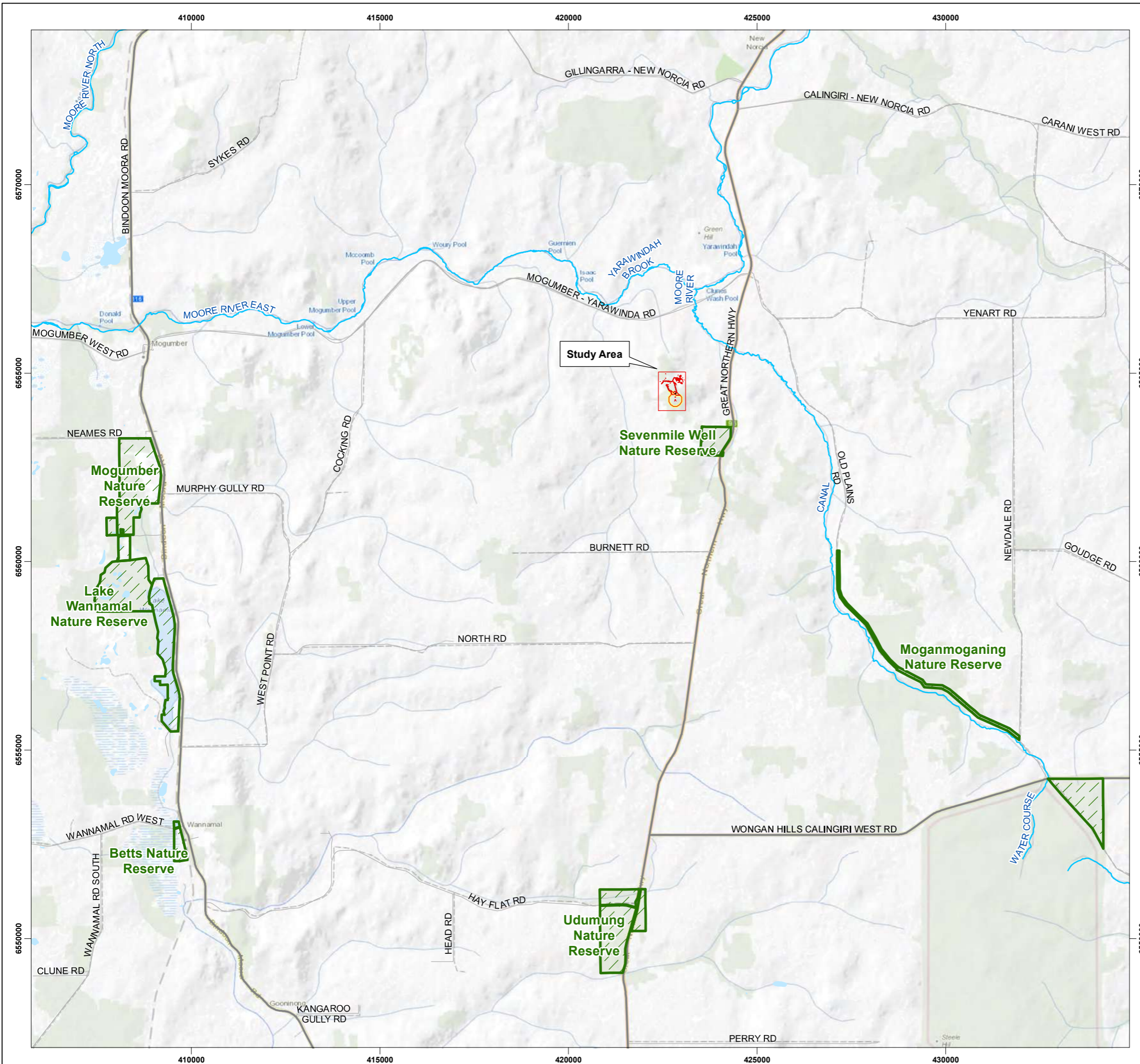
## **FIGURES**

**CLEARING PERMIT APPLICATION (PURPOSE PERMIT)**

**SUPPORTING INFORMATION**

**ESA DEEP SPACE FACILITY**

**LOTS 11, 856 AND M1991, 10353 GREAT NORTHERN HIGHWAY,  
YARAWINDAH**



**LEGEND**  
 [Red outline] Development Area  
 [Green outline] DBCA Reserve



DATASOURCES:  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS:



**REGIONAL LOCATION**

**DEEP SPACE FACILITY ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING CONSULTANCY SERVICE**

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER



PROJECT NO: 4502-19

REV	AUTHOR	APPROVED	DATE
00	SMB	LJA	24/11/2020

**FIGURE 1**





- LEGEND**
- Cadastre (Landgate, 2020)
  - ESA\_NNO3\_LCA\_01\_revB**
  - Proposed
  - Existing
  - Clearing Area
  - Vegetation within the Development Area**
  - Degraded (11.02 Ha)
  - Completely Degraded (0.66 Ha)

Development Site	Area (Ha)
Biomass	11.07
NNO	0.93
<b>Total</b>	<b>12.01</b>



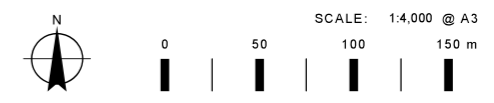
**DATASOURCES:**  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY

**EXISTING AND PROPOSED  
 INFRASTRUCTURE**

**DEEP SPACE FACILITY  
 ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING  
 CONSULTANCY SERVICE**

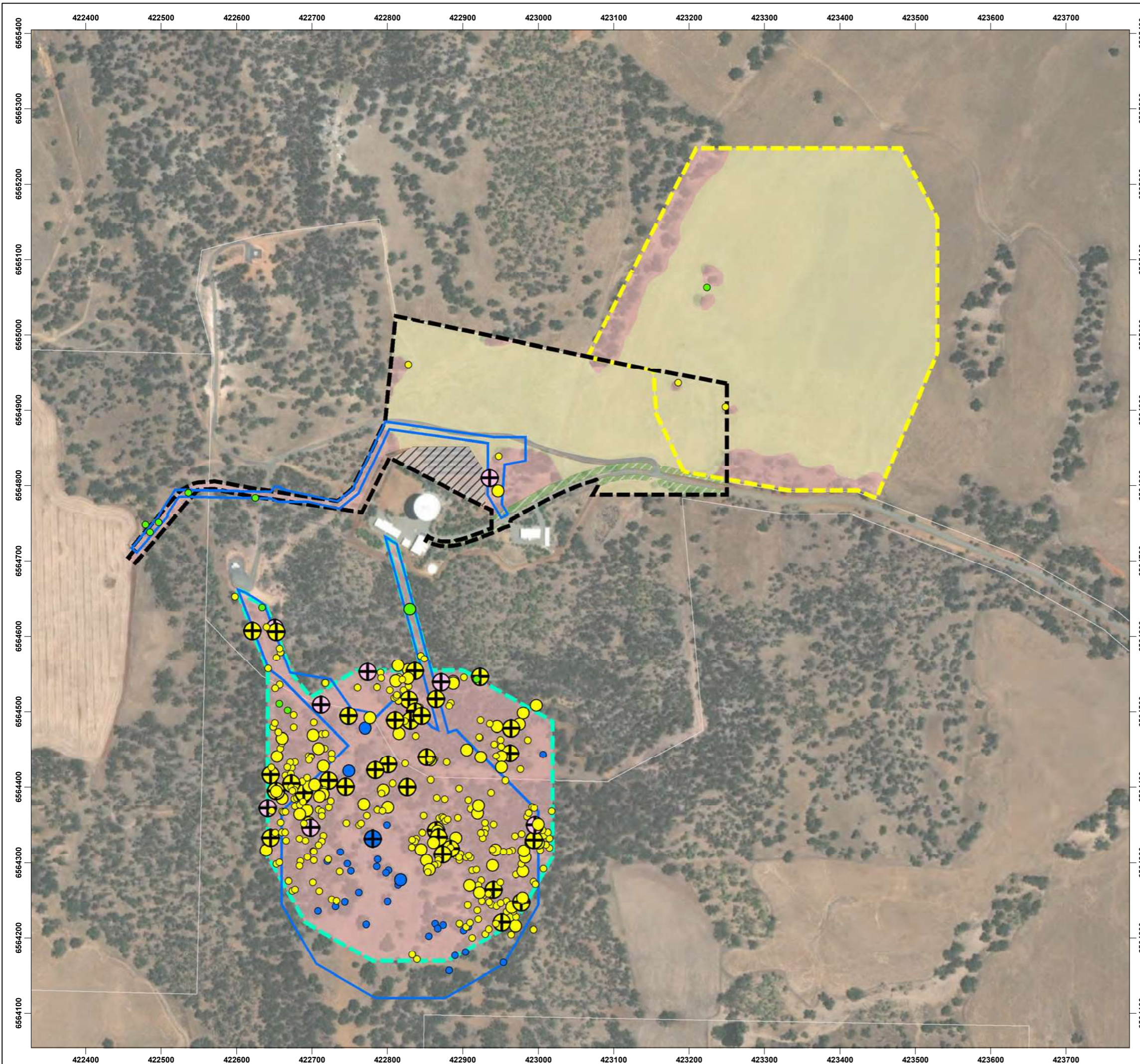
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 DATUM: GDA 1994  
 UNITS: METER



PROJECT NO: 4502-19

REV	AUTHOR	APPROVED	DATE
00	SMB	LJA	24/11/2020
01	SMB	BVDW	17/03/2021

**FIGURE  
 2**



**LEGEND**

- Cadastral (Landgate, 2020)
- Clearing Area
- Habitat Trees (Ecoscape, 2020)**
  - Option A (13.1 Ha)
  - Option B (16.2 Ha)
- Marri**
  - Class 3
  - Class 4
  - Class 5
- Wandoo**
  - Class 3
  - Class 4
  - Class 5
- York Gum**
  - Class 4
  - Class 5
- Dead trees**
  - Class 3
  - Class 4
- Survey Boundaries**
  - Infrastructure Area (9.3 Ha)
- Fauna Habitat (Ecoscape, 2020)**
  - Open Woodland
  - Paddock
- Not Habitat**
  - Planted
  - Infrastructure



**DATASOURCES:**  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY

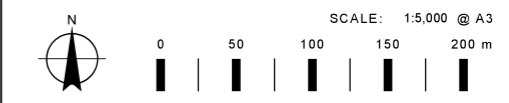


**FAUNA HABITAT**

**DEEP SPACE FACILITY**  
**ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING**  
**CONSULTANCY SERVICE**

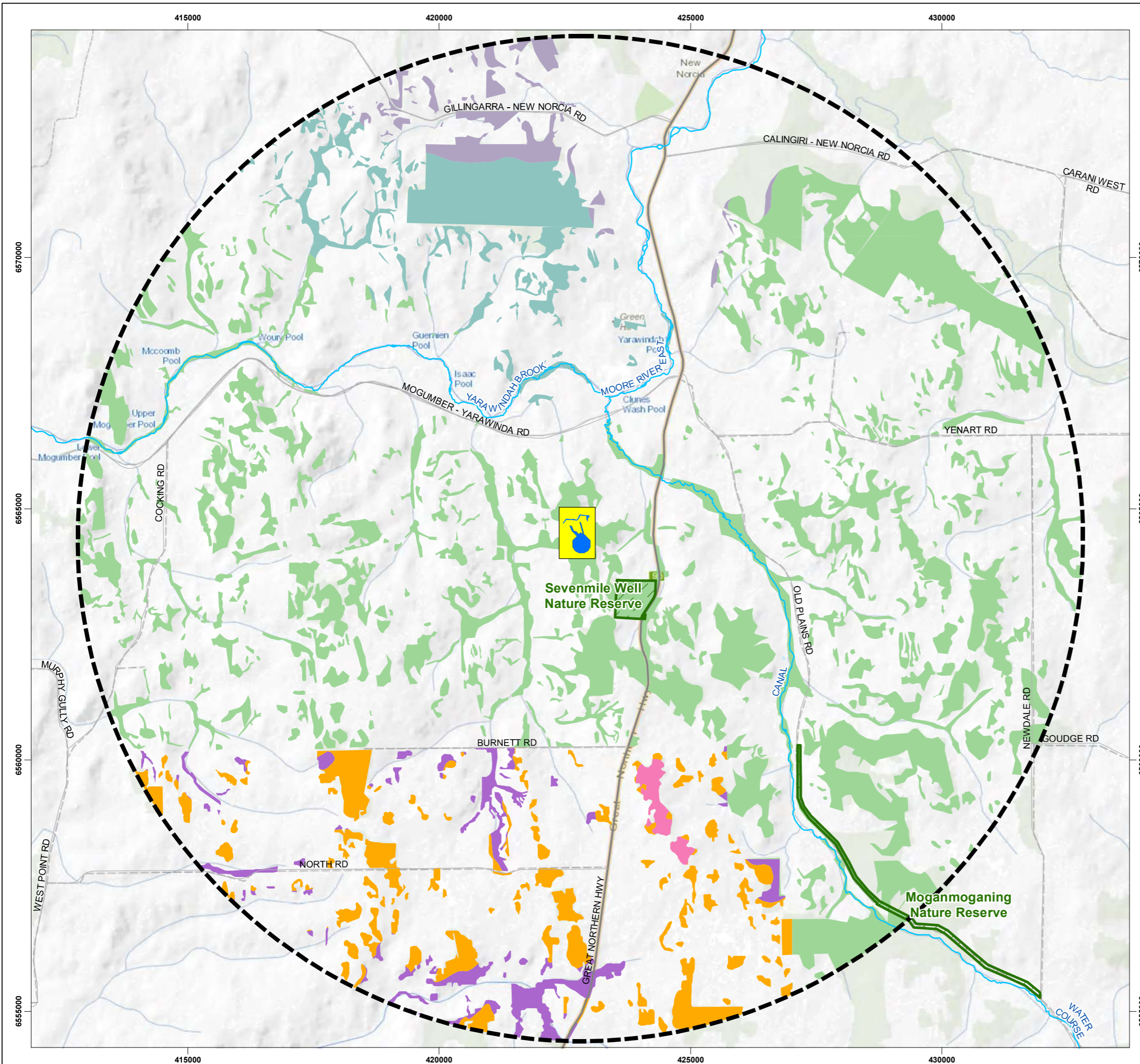
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 UNITS: METER



PROJECT NO: 4502-19

REV	AUTHOR	APPROVED	DATE
00	SMB	LJA	03/12/2020
01	SMB	BVDW	17/03/2021

**FIGURE**  
**3**



**LEGEND**

- Development Area
- Clearing Area
- 10 km Buffer of Development Area
- DBCA Reserve (DBCA, 2020)

**Potential Carnaby Cockatoo Feeding Habitat in the Jarrah Forest (DBCA, 2018)**

- Medium woodland; York gum & wandoo
- Medium woodland; marri & wandoo
- Mosaic of open forest of *Eucalyptus marginata* subsp. *marginata*-*Corymbia calophylla* (subhumid zone) and open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* (semiarid and arid zones) and on deeper soils adjacent to outcrops, closed heath of Myrtaceae-Proteaceae species and lithic complex on granite rocks and associated soils in all climate zones.
- Mosaic: Medium open woodland; wandoo & powderbark wandoo / Shrublands; dryandra heath
- Woodland of *Eucalyptus wandoo* with mixtures of *Eucalyptus patens*, *Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* on the valley slopes in arid and perarid zones.
- Woodland of *Eucalyptus wandoo*-*Eucalyptus accedens*, less consistently open forest of *Eucalyptus marginata* subsp. *thalassica*-*Corymbia calophylla* on lateritic uplands and breakaway landscapes in arid and perarid zones.



**DATASOURCES:**  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS:

**BLACK COCKATOO HABITAT**  
**DEEP SPACE FACILITY**  
**ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING**  
**CONSULTANCY SERVICE**

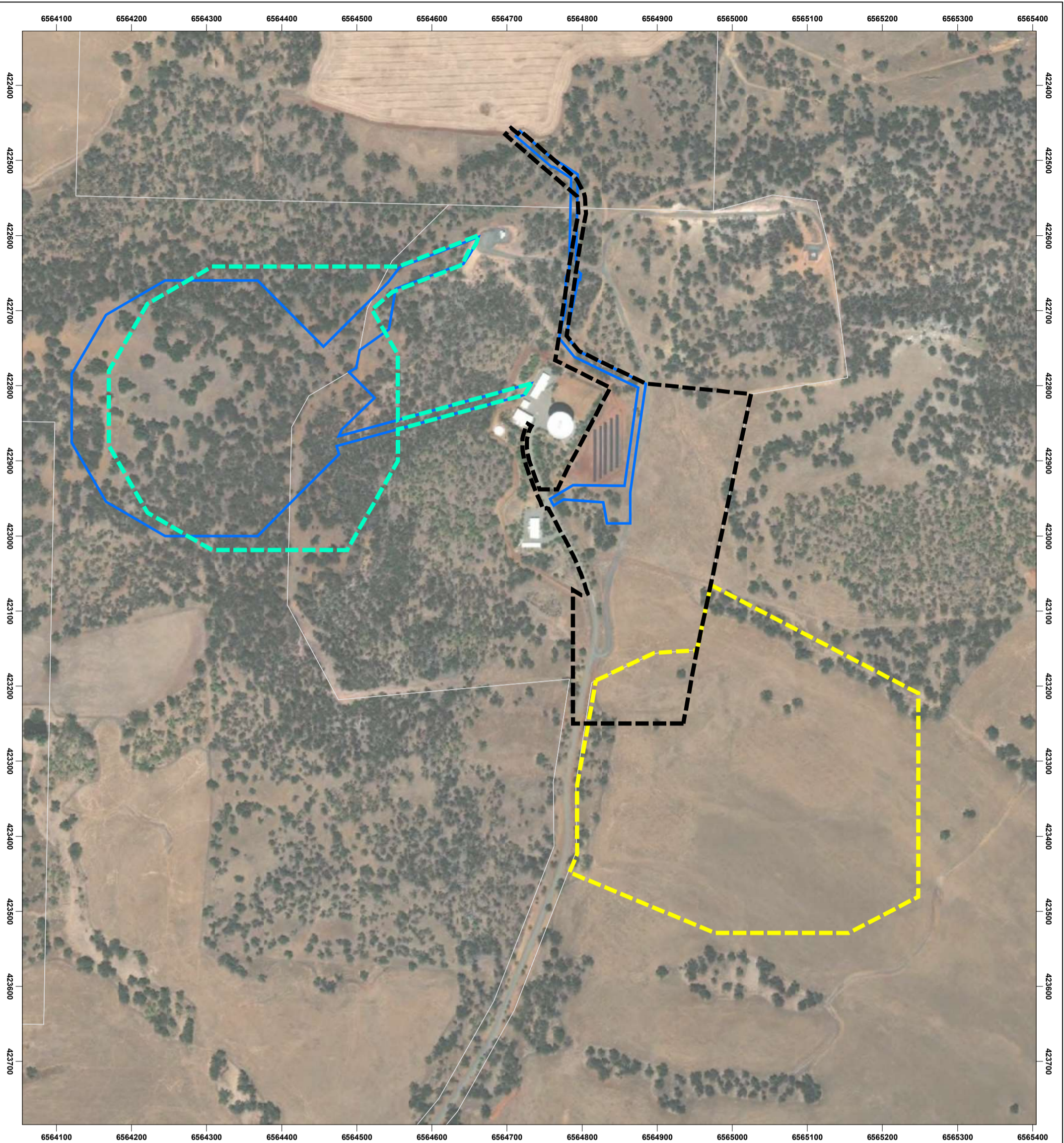
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 UNITS: METER

SCALE: 1:75,000 @ A3

PROJECT NO: 4502-19

REV	AUTHOR	APPROVED	DATE
00	SMB	LJA	03/12/2020
01	SMB	BVDW	17/03/2021

**FIGURE**  
**4**



- LEGEND**
- Cadastre (Landgate, 2020)
  - Clearing Area
  - Survey Boundaries
  - Infrastructure Area (9.3 Ha)
    - Option A (13.1 Ha)
    - Option B (16.2 Ha)



**DATA SOURCES:**  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS: SOURCE: ESRI, DIGITALGLOBE, GEOVE, EARTHSTAR GEOGRAPHICS, CENSUREBUS DS, USDA, USGS, AEROGRID, ION AND THE GIS USER COMMUNITY

**2020 FLORA AND FAUNA  
 SURVEY AREAS**

**DEEP SPACE FACILITY  
 ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING  
 CONSULTANCY SERVICE**

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METRE



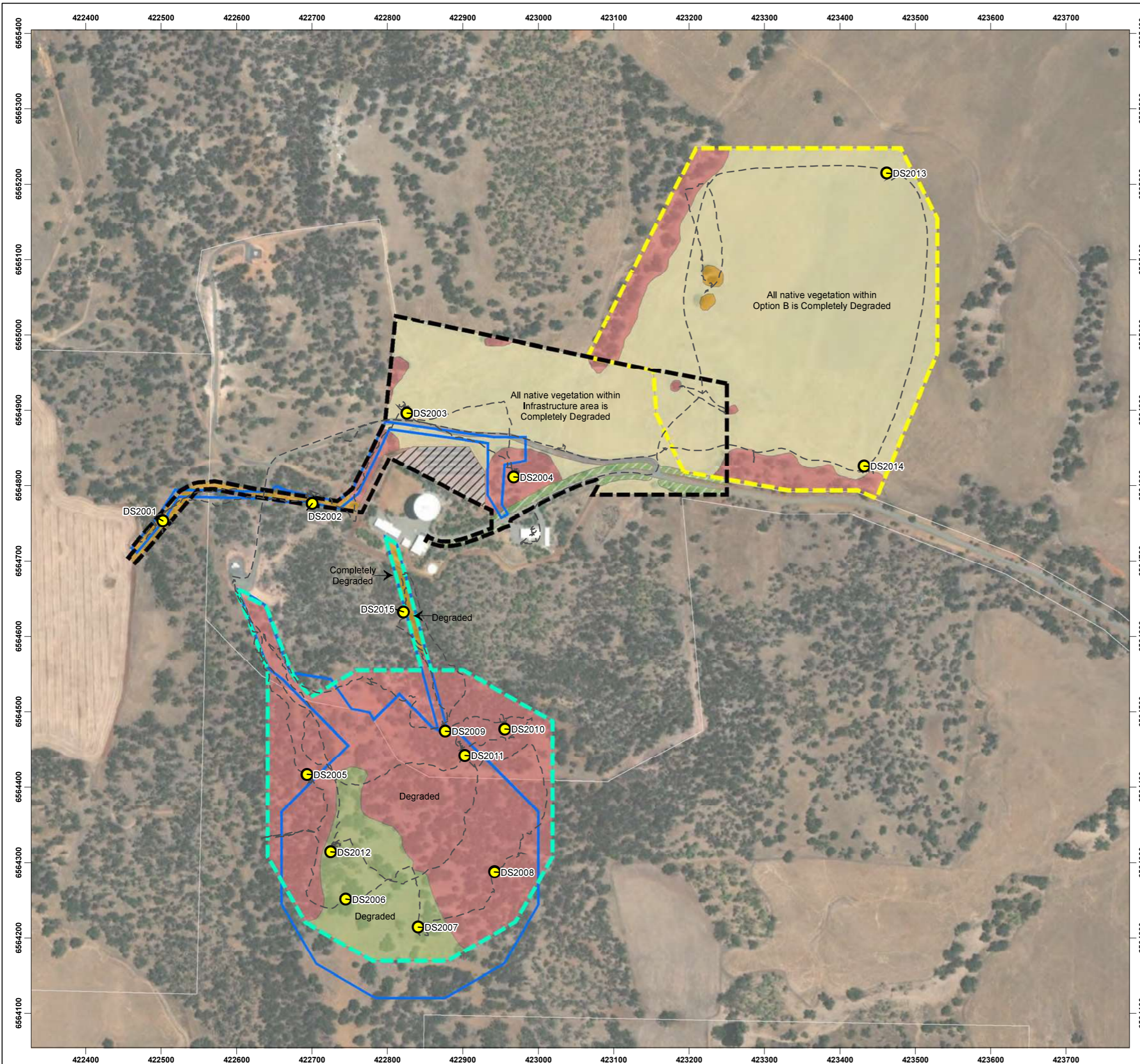
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PROJECT NO.: 4502-19

REV	AUTHOR	APPROVED	DATE
00	SMB	LJA	03/12/2020
01	SMB	BVDW	17/03/2021

**5**

**FIGURE**



**LEGEND**

- Quadrat Locations (Ecoscape, May 2020)
- Survey Tracks (Ecoscape, May 2020)
- ▭ Cadastre (Landgate, 2020)
- ▭ Clearing Area

**Survey Boundaries**

- ▭ Infrastructure Area (9.3 Ha)
- ▭ Option A (13.1 Ha)
- ▭ Option B (16.2 Ha)

**Vegetation Type (Ecoscape, 2020)**

- ▭ Marri (CcW), *Corymbia calophylla* woodland over *Avena barbata* low isolated grasses
- ▭ Wandoo (EwW), *Eucalyptus wandoo* subsp. *wandoo* woodland over *Melaleuca marginata* and *Hibbertia hypericoides* subsp. *hypericoides* mid shrubland over *Avena barbata* low isolated grasses
- ▭ York Gum (EW), *Eucalyptus loxophleba* subsp. *loxophleba* woodland over *Avena barbata* low isolated grasses

**Not native vegetation**

- ▨ Infrastructure
- ▭ Triticum (TaG), *Triticum aestivum* and *Avena barbata* grassland (Paddock)
- ▨ Planted - not native vegetation



**DATASOURCES:**  
 BASEMAP: ESRI BASEMAP 2018  
 SERVICE LAYER CREDITS:  
 SOURCE: ESRI, DIGITALGLOBE, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY

**VEGETATION TYPE AND VEGETATION CONDITION**  
**DEEP SPACE FACILITY ENVIRONMENTAL APPROVALS**

**STRATHAM ENGINEERING CONSULTANCY SERVICE**

COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER

SCALE: 1:5,000 @ A3

PROJECT NO: 4502-19

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01	SMB	BVDW	17/03/2021

**FIGURE 6**