

# JOHN HUNTER HEALTH INNOVATION PRECINCT PROJECT

Biodiversity Management Plan

**FINAL**

September 2022

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Biodiversity Management Plan

### FINAL

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on behalf of

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### **Document Status**

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# 1.0 Introduction

The John Hunter Health and Innovation Precinct (JHHIP) Project consists of the construction and operation of an eleven storey Acute Services Building (ASB) comprising of a podium with four levels of semi-basement parking and seven levels above and a rooftop helipad. The Project also includes the refurbishment of existing JHH buildings, construction of new road infrastructure and improvements to existing drop-off facilities, temporary construction access road, new pedestrian connections to the ASB and a link bridge to the Hunter Medical Research Institute (HMRI), upgrade to existing car parking facilities, landscape and public domain works, mines grouting remediation works, building services works and utility adjustments, stormwater drainage works, signage and site preparation, including bulk earthworks and tree removal.

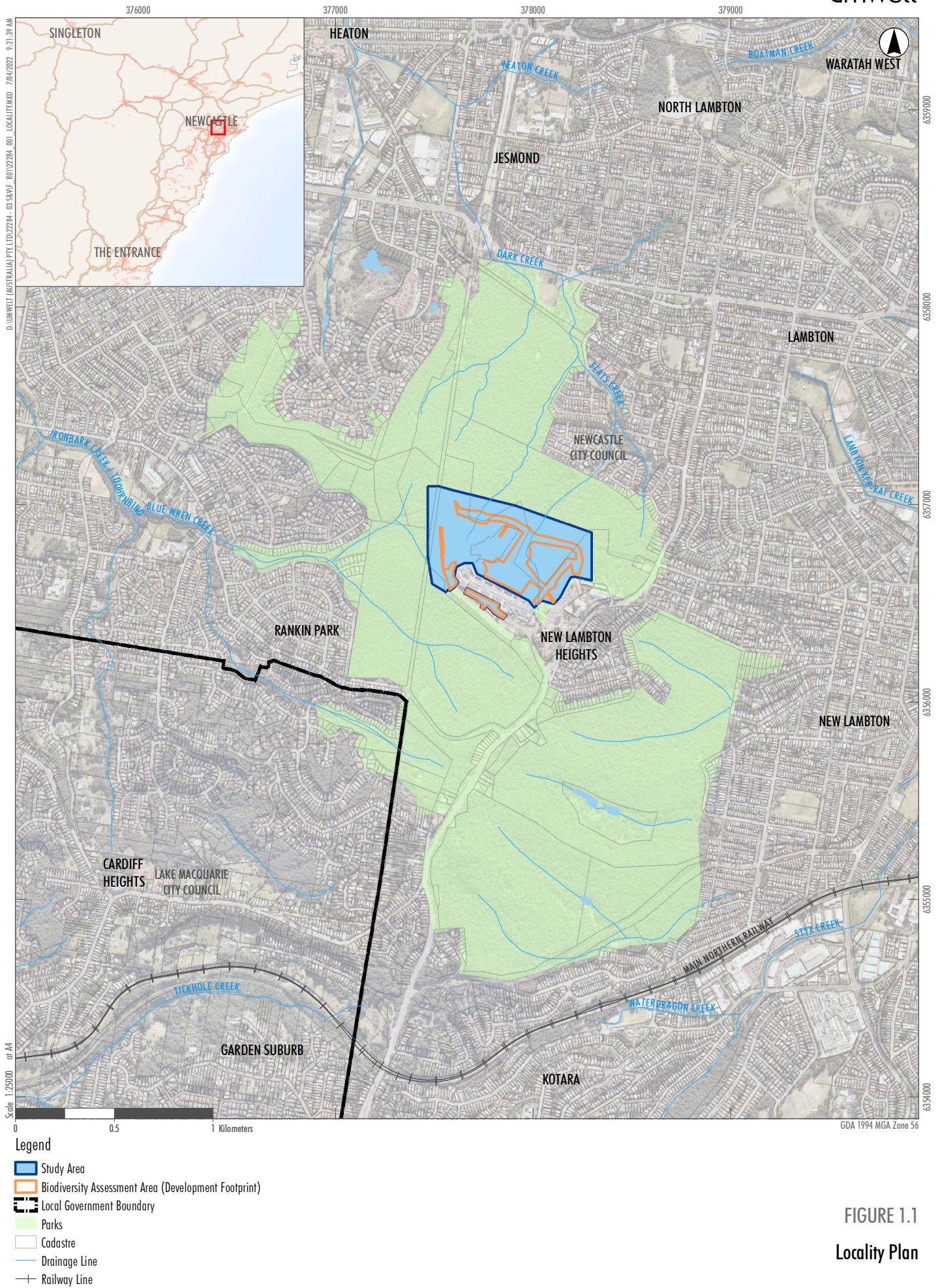
The John Hunter Hospital Campus (JHHC) comprises the John Hunter Hospital (JHH), John Hunter Children's Hospital (JHCH), Royal Newcastle Centre (RNC), the Rankin Park Rehabilitation Unit and the Nexus Unit (Children and Adolescent Mental Health). JHHC is a Level 6 Principal Referral and tertiary Hospital, providing the clinical hub for medical, surgical, child and maternity services within the Hunter New England Local Health District (HNELHD) and across northern NSW through established referral networks. Other services at the campus include the Hunter Medical Research Institute (HMRI), Newcastle Private Hospital and the HNELHD Headquarters.

The JHHC is located on Lookout Road, Lambton Heights, within the City of Newcastle Local Government Area (LGA), approximately 8km west of the Newcastle CBD (**Figure 1.1**).

Approval has been granted for a new Acute Services Building and refurbishment of existing hospital facilities at John Hunter Hospital comprising:

- construction and operation of a new seven-storey Acute Services Building (plus four semi-basement levels)
- refurbishment of existing buildings to provide additional Inpatient Units and expanded support services
- a new Hospital entry canopy and works to the existing drop off
- link bridge to the Hunter Medical Research Institute (HMRI)
- campus wayfinding and signage
- landscape works
- site preparation including bulk earthworks, tree removal, environmental clearing, cut and fill
- mines grouting remediation works
- construction of internal roads network and construction access roads and works to existing at-grade carparking
- connection to the future Newcastle Inner City Bypass and
- inground building services works and utility adjustments.







## 1.1 Purpose and Approval Requirements

The purpose of this Biodiversity Management Plan (BMP) is to outline the strategies to be employed for the management of biodiversity as part of the JHHIP Project. This BMP has been prepared in accordance with Schedule 2, Part 2, Condition B16 of the JHHIP State Significant Development (SSD-9351535), with reference to Condition C18 and the 'Flora and Fauna' conditions of Section 6.3 (Summary of Mitigation Measures) included in the Review of Environmental Factors Approval (Ethos Urban 2022).

This BMP has also been prepared to satisfy the recommendations in the Minimisation and Mitigation Measures in the Biodiversity Development Assessment Report (BDAR), prepared by Umwelt (Australia) Pty Limited, revision 6 dated 21 October 2021.

This BMP applies to all land within the Development Footprint shown on **Figure 1.1**, and indirect impacts resulting from works should be considered under the BMP within the wider Study Area boundary.

## 1.2 Roles and Responsibilities

Relevant roles and responsibilities have been developed for the implementation of this BMP. These are outlined in **Table 1.1**.



**Table 1.1 Roles and Responsibilities of this BMP**

Role	Accountabilities for this document
Operations Manager	<ul style="list-style-type: none"> <li>• Provide sufficient resources for the implementation of this plan.</li> </ul>
Site Manager	<ul style="list-style-type: none"> <li>• Oversee the implementation of this plan.</li> <li>• Have working knowledge of this plan.</li> <li>• Be aware of the environmental legislative requirements associated with the project and take measures to ensure compliance.</li> <li>• Ensure employees are competent through training and awareness programs.</li> <li>• Schedule management activities as per this plan.</li> </ul>
Project Engineer	<ul style="list-style-type: none"> <li>• Review of this plan as required.</li> <li>• Confirm that the personnel involved in undertaking the activities required under this plan are suitably qualified, licensed and experienced to undertake the task.</li> <li>• Confirm all internal and external biodiversity reporting requirements are met.</li> <li>• Ensure that all relevant records are effectively maintained on site.</li> <li>• Periodically review progress against compliance criteria in accordance with the requirements of this plan.</li> <li>• Assess the effectiveness of the management strategies and implement corrective actions as required.</li> <li>• Coordinate biodiversity-related incident investigations and reporting as required by legislation and internal standards and guidelines.</li> <li>• Manage/control access to areas covered by the BMP.</li> </ul>
All employees and contractors	<ul style="list-style-type: none"> <li>• Comply with all requirements in this Plan.</li> <li>• Receive training regarding controls on activities within the area subject to this BMP.</li> <li>• Observe boundaries of the area subject to this BMP when undertaking work on site.</li> <li>• Undertake activities in line with directions from the Site Manager or Project Engineers.</li> <li>• Report all actual or potential environmental incidents to the Site Manager immediately.</li> </ul>

## 2.0 Existing Environment

The Study Area covered by the BMP (**Figure 1.1**) is 33 hectares (ha) in size and located approximately 8 km west of the Newcastle CBD. The Study Area occurs within the Sydney Basin IBRA Bioregion and Wyong IBRA subregion. It is characterised by remnant bushland vegetation and habitats surrounding the existing John Hunter Hospital.

The Development Footprint (**Figure 1.1**) represents areas which will be subjected to a range of disturbances resulting from the Project. This includes access roads and associated batters, bushfire asset protection ones (APZs), Acute Services Building Footprint and other ancillary infrastructure. All areas of direct impact are confined to the Development Footprint, which is approximately 9.4 ha in size. This area is the focus of the management actions outlined in this BMP. The Study Area includes areas immediately adjacent to the Development Footprint that may be subject to indirect impacts which also require management under this BMP. **Table 2.1** provides details for the Study Area.

**Table 2.1 Study Area Details**

Study Area Details	
Name	JHHIP Project
Size	33 ha
Development Footprint	9.4 ha
Lot and DP	1/DP1228246 2/DP1228246 9/DP826092 11/DP826092 41/DP1176191 202/DP1176551
Current Land Use	Existing John Hunter Hospital infrastructure, with patches of the Jesmond Bushland Reserve bushland used for recreational activities.
LGA	Newcastle
LEP Zoning	Newcastle Local Environmental Plan (LEP) 2012

The JHHIP project application was supported by a BDAR prepared by Umwelt (Australia) Pty Limited (2021). A summary of the information presented in this assessment is provided in the sections below.

### 2.1 Landscape Context

The Study Area occurs within the Sydney Basin Bioregion, which extends from north of Batemans Bay to Nelson Bay, and West to Mudgee. It falls within the Gosford-Cooranbong Coastal Slopes Mitchell landscape, which comprises hills and sandstone plateau outliers of Triassic Narrabeen sandstones, with extensive rock outcrop and low cliffs along ridge margins (DECC 2008).

The 1:100,000 Soil Landscape Sheet of the Newcastle Region indicates that the Study Area is characterised mostly by the Killingworth (ki) soil landscape of undulating to rolling hills and low hills on the Newcastle Coal Measures of the Awaba Hills region. Dominant soil materials include brownish black pedal loam (topsoil), bleached hard setting loamy sand to sandy clay loam (topsoil) and pedal yellowish brown clay (subsoil) (DPIE 2020a).

The Study Area encompasses some of the existing John Hunter Hospital infrastructure and facilities, and patches of the Jesmond Bushland Reserve. Vegetation in this area is characterised by open forest and woodland and is currently used for conservation and recreational activities such as cycling and bushwalking.

Several first order (Strahler 1952) streams occur within and around the Study Area, including Jesmond Creek, Barrie Creek and Kaiyutibbin Creek. The Hunter Estuary Wetlands (Ramsar) are located approximately 7 km to the north-east of the Study Area (DPIE 2012). See **Table 2.2** for a summary of the other relevant landscape features that pertain to the Study Area.

**Table 2.2 Landscape Features within the Development Footprint**

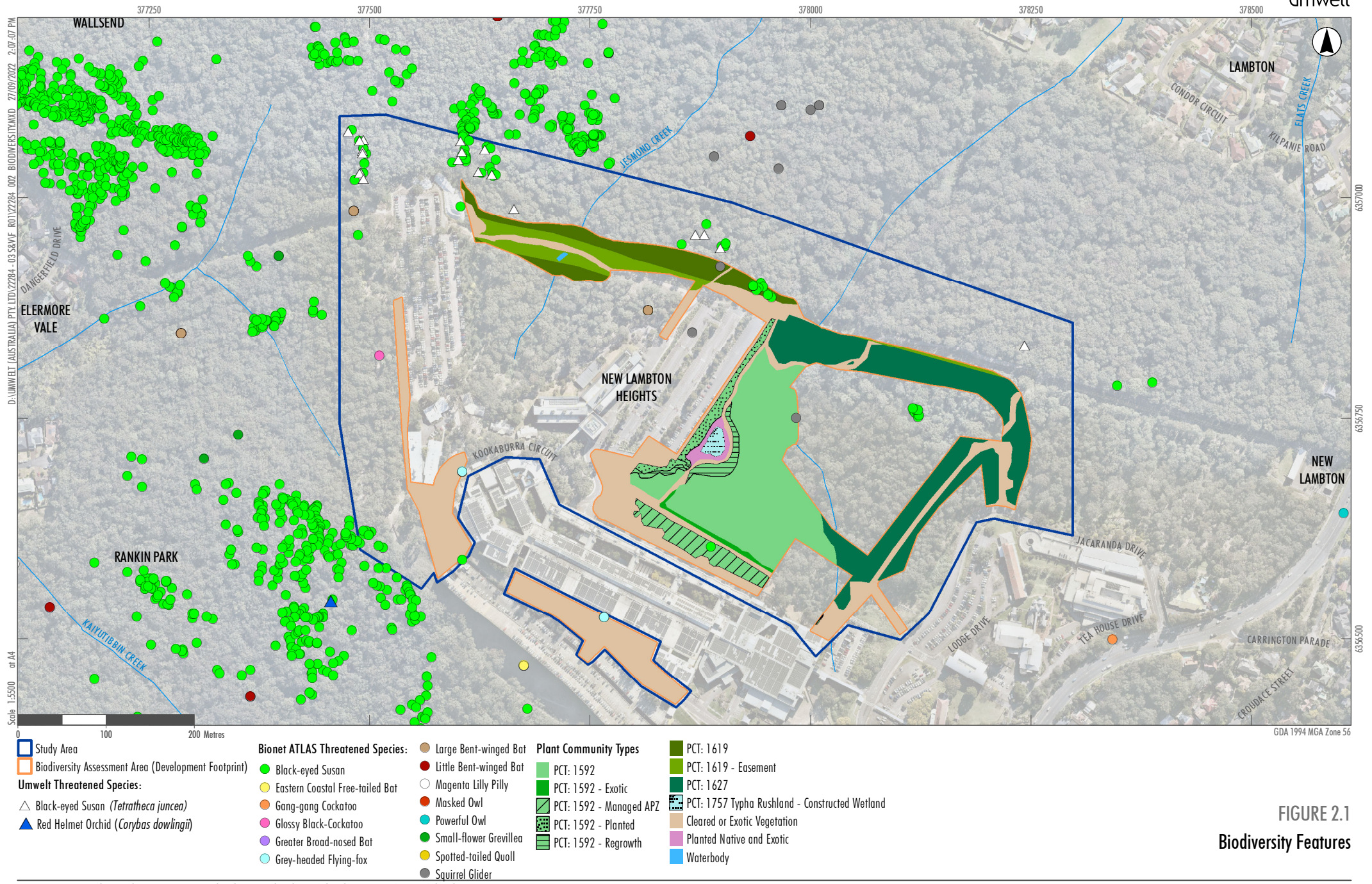
Landscape Features	
NSW Mitchell Landscape	Gosford - Cooranbong Coastal Slopes
Native Vegetation Cover	38%
Strahler Streams	Jesmond and Flats Creek – 1 <sup>st</sup> Order
Important and Local Wetlands	Nil
Areas of Geological Significance and Soil Hazard Features	Nil
Areas of Outstanding Biodiversity Value	Nil
Connectivity Features	Remnant bushland in Jesmond Bushland Reserve provides movement corridor for fauna to nearby Reserves including Blackbutt Nature Reserve to the southeast which comprises over 180 ha of native bushland.
Priority Investment Areas	Nil

## 2.2 Flora and Fauna

### 2.2.1 Vegetation Communities

The vegetation within the JHHIP project Development Footprint covered by this BMP has been somewhat modified due to historical disturbance, presence of APZs and easements, constructed wetlands and landscaping. This disturbance has also facilitated encroachment by exotic species in some areas. The vegetation identified in the Development Footprint is shown in **Figure 2.1**.





**FIGURE 2.1**  
**Biodiversity Features**



Surveys of the Study Area identified four Plant Community Types (PCTs) across multiple condition classes being:

- PCT 1592 Spotted Gum – Red Ironbark – Grey Gum shrub – grass open forest of the Lower Hunter
  - Good
  - Regrowth
  - APZ
  - Planted
  - Exotic
- PCT 1619 Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest of coastal lowlands
  - Good
  - Easement
- PCT 1627 Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast
  - Good
- PCT 1737 Typha Rushland
  - Constructed Wetland.

The approximate area of vegetation in each zone to be cleared is outlined in **Table 2.3**.

**Table 2.3 Vegetation Zones in the Development Footprint**

Veg Zone	PCT ID and Name <i>Condition Class</i>	Area to be cleared (ha)
1	PCT 1592 – Spotted Gum - Red Ironbark - Grey Gum shrub - grass open forest of the Lower Hunter - <b>Good</b>	2.18
2	PCT 1627 – Smooth-barked Apple - Turpentine - Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast - <b>Good</b>	1.98
3	PCT 1619 – Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands - <b>Good</b>	0.68
4	PCT 1592 – <b>Regrowth</b>	0.14
5	PCT 1592 – <b>APZ</b>	0.34
6	PCT 1592 – <b>Planted</b>	0.21
7	PCT 1592 – <b>Exotic</b>	0.07
8	PCT 1619 – <b>Easement</b>	0.48
11	PCT 1737 – Typha Rushland – <b>Constructed wetland</b>	0.06
-	Disturbed/Cleared/Stormwater Basin	3.14
<b>TOTAL</b>		<b>9.4</b>



One Threatened Ecological Community (TEC) was recorded within the Study Area, being the Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions Endangered Ecological Community (EEC) listed under the Biodiversity Conservation Act 2016 (BC Act). A total of 2.73 ha of this EEC occurs as PCT 1592 and will be removed as part of the JHHIP Project.

### 2.2.2 Threatened Flora

Extensive surveys of the Development Footprint only resulted in one threatened flora species being recorded, which was black-eyed Susan (*Tetralochea juncea*). This species is listed as Vulnerable under both the BC Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This species is commonly recorded from the locality. Its surveyed locations, along with other records of this species from the NSW BioNet Atlas of Wildlife (DPIE 2020b) in the Study Area and surrounds are shown on **Figure 2.1**.

### 2.2.3 Threatened Fauna

Only one species, squirrel glider (*Petaurus norfolcensis*), has been recorded from the Development Footprint, as shown in the NSW BioNet Atlas of Wildlife (DPIE 2020b) records on **Figure 2.1**. This species is listed as Vulnerable under the BC Act. Several other threatened fauna species such as grey-headed flying foxes, various micro-bats, large forest owls and cockatoos have been previously recorded within and surrounding the Study Area, which can be seen on **Figure 2.1**.

## 3.0 Biodiversity Management Strategies

The following specific management strategies as outlined in the BDAR are integral to the mitigation of impacts on the biodiversity features of the Study Area:

- workforce education and training
- fencing and access control
- a pre-clearing procedure will be implemented to minimise the potential for impacts on native fauna species (focusing on threatened species) as a result of the clearing of hollow-bearing trees. The pre-clearing procedure is designed to minimise impacts to hollow-dependent and ground-dwelling fauna
- salvage of biodiversity features, including habitat resources (e.g. hollow logs, tree hollows, fallen timber and rocks/boulders)
- weed management
- erosion and sedimentation control
- bushfire management.

These management strategies are discussed in the following sections, along with a summary of measures, timing and responsibilities.

### 3.1 Workforce Education and Training

The development of educational packages and training can help to mitigate anthropogenic impacts on biodiversity. The ability of non-ecological personnel to identify key threatened species or key ecological threats can help to mitigate impacts on threatened species. The following mitigation actions will be implemented to develop a greater understanding and awareness of biodiversity issues in non-ecological trained personnel:

- inductions for the workforce will be undertaken to make them aware of the key ecological issues present in the Development Footprint and Study Area so that they know their role and responsibilities in the protection and/or minimisation of impacts to all native biodiversity
- inductions will identify the location of sensitive flora and fauna and the policies being implemented to protect the biodiversity values of such areas.

### 3.2 Fencing and Access Control

During construction, fencing will be used to demarcate vegetation where required to avoid accidental damage to areas outside of the Development Footprint.

Access control is an important feature in protecting and demarcating areas outside the Development Footprint from vehicle access, human access, and accidental disturbance. Measures include:

- appropriate fencing and signposting of areas to prevent the uncontrolled entry of people, accidental disturbance and to minimise vehicular and human traffic

- clear and visible signage is to be appropriately located to inform the workforce and others of the restricted access or otherwise of areas outside the Development Footprint and
- locking of gates to prevent unwanted vehicle, person access and disturbance.

### **3.3 Supervision of Vegetation Clearance**

Pre-clearance surveys and tree-felling supervision recommendations will be implemented to minimise the potential for impacts on native fauna species (including threatened species) as a result of the clearing of native vegetation.

#### **3.3.1 Tree Protection**

For the duration of the construction works:

- street trees must not be trimmed or removed unless it forms a part of this development consent or is required in an emergency to avoid the loss of life or damage to property
- all trees immediately adjacent to the Development Footprint must be protected at all times during construction in accordance with Council's tree protection requirements. Any tree, which is damaged or removed during construction due to an emergency, must be replaced
- all trees that are not approved for removal are to be retained and must be suitably protected during construction as per the recommendations of the Arboricultural Impact Assessment, prepared by Aborsafe (2021)
- if access to the area within any protective barrier is required during the works, it must be carried out under the supervision of a qualified arborist. Alternative tree protection measures must be installed, as required. The removal of tree protection measures, following completion of the works, must be carried out under the supervision of a qualified arborist and must avoid both direct mechanical injury to the structure of the tree and soil compaction within the canopy or the limit of the former protective fencing, whichever is the greater
- an arborist is to be engaged to implement tree protection measures for the hollow-bearing trees and other native trees to be retained on site, and
- all project materials must be stored in cleared areas of the site.

#### **3.3.2 Pre-Clearance Surveys**

Pre-clearance surveys are to be undertaken prior to tree felling works, be undertaken by suitably qualified and experienced persons/personnel and include:

- the demarcation of areas approved for clearing to reduce risk of accidental clearing
- key habitat features, including habitat trees should be identified and marked. Habitat trees are those containing hollows, cracks or fissures and spouts, peeling bark, active nests, possum dreys or other signs of recent fauna usage. Other key habitat features to be identified include fallen timber/hollow logs, burrows, and boulder piles

- the potential presence of threatened flora and fauna species, endangered populations and TECs should be identified
- the identification of threatened species or key habitat features that are suitable for translocation or salvage
- disturbance activities should be targeted to specific times of the year to minimise impacts to threatened species usage of habitat features for breeding and roosting, where practicable
- identification of further actions required following surveys, including (but not limited to) salvage of identified key habitat features, additional surveys to determine threatened fauna usage of the area (if required), identification of active dens or burrows, any actions required to discourage fauna occupation and weed or feral fauna management requirements.

### 3.3.3 Tree-felling supervision

Tree felling will be completed as close to the completion of pre-clearance surveys as practicable to limit the potential for new issues to arise (such as new nests being built). Tree felling supervision will be undertaken by an appropriately qualified and experienced person after pre-clearance surveys have identified potential habitat features. The tree-felling process will include the following:

#### **Prior to Felling Habitat Trees (Ecologist not required)**

- completion of actions recommended from the pre-clearing surveys
- removal of non-habitat trees/vegetation as close to the habitat tree felling date as possible in order to create disturbance to discourage fauna usage of the habitat trees
- prior to removal of non-habitat trees/vegetation, a canopy inspection should be completed to search for threatened species which may have moved in since pre-clearing surveys were completed. If fauna encountered, ecologist advice should be sought
- shaking of habitat trees (with heavy machinery) the day before felling, for at least 30 seconds to encourage fauna to abandon trees.

#### **On the Day of Felling Habitat Trees (Ecologist required)**

- all habitat trees will be subject to a visual inspection to survey for threatened species prior to felling
- trees previously identified as containing fauna will be shaken and then felled as gently as possible, providing no threatened species are identified
- lowering habitat trees to be done as gently as possible with heavy machinery using bucket to slow fall
- if a threatened species is identified in a habitat tree on the day of felling, the supervising person is to advise the most appropriate method to minimise potential harm. This may include leaving the tree overnight, further shaking to encourage the animal to vacate the tree, gradual removal of branches to discourage ongoing use, soft-felling of the tree with the animal in the tree, or measures to capture and relocate the animal to nearby suitable secure habitats
- once felled, hollows will be inspected for remaining or injured fauna

- felled trees are to be rolled where appropriate so that the number of hollows blocked against the ground is minimised
- uninjured animals should be released on the day/evening of capture into nearby suitable secure habitat and should not be held for extended periods of time. Nocturnal animals should be held in suitable housing until dusk and then released
- injured animals will be triaged immediately, humanely euthanised if required, or taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment
- all felled habitat trees should remain in place for a least one night to allow any remaining fauna to escape, and
- habitat features identified for translocation or salvage operations should be extracted and stored appropriately.

### 3.4 Salvage and Installation of Compensatory Habitat Features

Resources that can be salvaged (where practical) include key habitat features such as hollow logs, fallen timber and boulders. These should be stockpiled separately to other vegetation stockpiles. Where appropriate these resources may be re-used in remnant or landscaped areas to improve revegetation outcomes and to augment habitat features.

Thirty-eight nest boxes that were previously installed within the Development Footprint will be removed and relocated to suitable nearby secure habitat prior to construction. Nest boxes will be installed in similar sized and same species tree and oriented in the same direction to replicate current conditions where possible.

In addition, 18 nest boxes will be removed from the TfNSW RP2J disturbance corridor and relocated nearby prior to construction commencing. Nest boxes will be installed in similar sized and same species tree and oriented in the same direction to replicate current conditions where possible.

It is assumed that the boxes already installed, their position and orientation meet the requirements of the TfNSW Biodiversity Guidelines so replicating that within the adjacent area will satisfy the requirements of the guidelines.

### 3.5 Weed Management

Weed species could be inadvertently brought into the Study Area or surrounding habitats with vehicle movement, imported materials or could invade naturally through removal of native vegetation. The presence of weed species has the potential to decrease the value of vegetation for native species, particularly threatened species. Weed management controls will include:

- all machinery and equipment will be cleaned thoroughly prior to entering the Study Area. Cleaning must include the removal of all mud and plant matter, followed by washing with high pressure water
- mulch containing weeds is to be placed in piles separate from clean mulch, removed from site, and disposed of in accordance with weed management guidelines as soon as practicable.



### 3.6 Erosion and Sedimentation Control

A Stormwater Management Plan has been prepared to appropriately limit post development flows and manage downstream water quality as part of the State Significant Development application for site establishment and clearing works. Measures to be implemented include:

- minimising the area of disturbance
- diverting run-off water around disturbed areas
- installation and ongoing maintenance of erosion and sediment controls (e.g. sediment fencing) throughout the duration of the Project
- stabilisation (i.e. sealing, landscaping) of all disturbed areas to reduce the potential for future erosion.

### 3.7 Bushfire Management

The vegetation that will be retained within areas adjoining of the Development Footprint will require appropriate bushfire management to protect life and property, while supporting appropriate conditions for the significant ecological features identified.

This will be achieved through the implementation of a range of measures, including:

- implementation of the requirements from the Bushfire Assessment Report (BPA 2021) for this project which outlines the required protection measures and management requirements, including:
  - maintaining a suitably equipped response to any fires on site and assisting NSW Fire and Rescue and emergency services on site in the event of a fire
  - maintaining Strategic Fire Advantage Zones (SFAZ), including strategically positioned fire breaks and access roads
  - installation and maintenance of APZs.

### 3.8 Summary of Measures, Timing and Responsibilities

Management requirements including the timing, action, outcome, and responsibility for these measures are outlined in **Table 3.1**.

**Table 3.1 Summary of Management Strategies**

Measure	Timing	Responsibility	Proposed Techniques	Outcome
<b>Before Construction</b>				
<b>Workforce education and training</b>	Pre-construction and during construction	Multiplex Constructions	Biodiversity induction	Environmental awareness for construction crews
<b>During Construction</b>				
<b>Implement Construction Environmental Management Plan</b>	Prior to clearance and during clearance activities	Multiplex Constructions	Develop plan to adequately manage environmental impacts during construction including fencing and access control, weed management and erosion and sediment control	Minimal impacts to environmental values.
<b>Demarcation of approved clearance boundaries</b>	Prior to clearance and during clearance activities	Multiplex Constructions	Clearly identify areas not proposed for clearance.	Minimisation of unnecessary impacts to surrounding vegetation and habitats.
<b>Pre-clearance and tree felling supervision</b>	Prior to clearance and during clearance activities	Project ecologist and Multiplex Constructions	Pre-clearance and tree felling in accordance with <b>Section 3.1.</b>	Minimise impacts to fauna and their habitats
<b>After Construction</b>				
<b>Weed management</b>	Construction and operation	Multiplex Constructions	Chemical and physical removal of invasive weed species in accordance with the Noxious and Environmental Weeds Handbook (DPI 2014). Regular inspection to identify potential weed infestations.	Minimisation of environmental and noxious weeds within the site Minimisation of weed spread from and into the wider locality.
<b>Fencing and access control</b>	Construction and operation	Multiplex Constructions	Temporary fencing to manage access to existing tracks and paths during construction	Provides for access control to avoid unwanted human interference and disturbance to non-operational areas. Minimisation of impacts to native fauna species from avoiding the use of barbed-wire fences.
<b>Erosion and sedimentation control</b>	Construction and operation	Multiplex Constructions	Adequate controls during works for erosion and sediment control	Avoid sediment entering local creeks

## 4.0 Compliance and Reporting

### 4.1 Compliance Assessment

**Table 4.1** compares the management strategies against the consent conditions in SSD-9351535 and 'Flora and Fauna' conditions of Section 6.3 (Summary of Mitigation Measures) included in the Review of Environmental Factors Approval (Ethos Urban 2022).

**Table 4.1 Compliance of Management Actions**

Condition	Description	Management Action
<b>SSD-9351535</b>		
<b>Construction Environmental Management Plan (B16)</b>	<p>Prior to the commencement of construction, the Applicant must submit a Construction Environmental Management Plan (CEMP) to the Certifier and provide a copy to the Planning Secretary for information. The CEMP must include, but not be limited to, the following:</p> <ul style="list-style-type: none"> <li>d) Biodiversity Management Plan incorporating the Minimisation and Mitigation Measures in the Biodiversity Development Assessment Report, prepared by Umwelt (Australia) Pty Ltd revision 6 dated 21 October 2021;</li> </ul>	<p>All management strategies outlined in <b>Section 3.0</b>. These are taken from the BDAR prepared by Umwelt (2021). This BMP is a sub-plan of the CEMP.</p>
<b>Tree Protection (C18)</b>	<p>For the duration of the construction works:</p> <ul style="list-style-type: none"> <li>a) street trees must not be trimmed or removed unless it forms a part of this development consent or is required in an emergency to avoid the loss of life or damage to property;</li> <li>b) all trees immediately adjacent to the approved disturbance area must be protected at all times during construction in accordance with Council's tree protection requirements. Any tree, which is damaged or removed during construction due to an emergency, must be replaced;</li> <li>c) all trees on the site that are not approved for removal are to be retained and must be suitably protected during construction as per the recommendations of the Arboricultural Impact Assessment, dated 12 May 2021, prepared by Aborsafe;</li> <li>d) if access to the area within any protective barrier is required during the works, it must be carried out under the supervision of a qualified arborist. Alternative tree protection measures must be installed, as required. The removal of tree protection measures, following completion of the works, must be carried out under the supervision of a qualified arborist and must avoid both direct mechanical injury to the structure of the tree and soil compaction within the canopy or the limit of the former protective fencing, whichever is the greater;</li> </ul>	<p>Management strategies for Tree Protection are outlined in <b>Section 3.3.1</b>.</p>

Condition	Description	Management Action
	e) an arborist is to be engaged to implement tree protection measures for the hollow bearing trees and other native trees to be retained on site; and f) all project materials must be stored in cleared areas of the site.	
<b>Review of Environmental Factors</b>		
<b>Section 6.3</b>	Prior to commencement of works: <ul style="list-style-type: none"> <li>perform a pre-construction inspection to identify any new sensitive habitat areas, species, and controls</li> <li>remove and relocate the two nest boxes within the Project Area. Suitable areas for relocation occur within the same landscape, adjacent to the Project Area</li> <li>weed management actions should be developed to manage weeds during the construction phase of the Project. All machinery and equipment would be received on site free of soil and organic matter to prevent the introduction of weeds or disease species into the area.</li> </ul>	Management strategies for these mitigation measures are outlined in <b>Section 3.3.2, Section 3.4</b> and <b>Section 3.5</b> respectively.
<b>Section 6.3</b>	During construction/undertaking of work: <ul style="list-style-type: none"> <li>retain mature trees where feasible and clearly mark trees prior to works as no-go zones</li> <li>do not disturb or harm fauna on site</li> <li>ensure good site housekeeping to prevent pest animals</li> <li>cover all excavations over night to prevent fauna being trapped</li> <li>if native fauna is present works should avoid the fauna until the fauna has relocated away from the site</li> <li>if native fauna is injured or trapped onsite, contact the state wildlife authority to arrange for collection/removal from site</li> <li>if previously unidentified nesting animals are found (including bats and birds) stop works in the immediate vicinity and contact your Environmental Advisor.</li> </ul>	Management strategies for these mitigation measures are outlined in <b>Section 3.3.3.</b>

## 4.2 Risk Management

There are a number of potential risks or situations where desirable biodiversity outcomes may not be achieved. A list of potential situations where biodiversity objectives of this BMP are not met are provided in **Table 4.2** along with a list of potential corrective actions.

**Table 4.2 Trigger, Action and Response Plan**

Aspect	Desirable Outcome	Trigger	Corrective Action
Pre-clearance	Key habitat features requiring supervision during felling have been identified.	Un-marked key habitat features are identified during the felling process.	Stop work immediately and demarcate a no-go zone around key habitat features. Advice from project ecologist should be sought before continuing work.
Tree Felling	Minimal fauna injury/fatality arising from tree felling.	Fauna fatality regularly occurring during tree-felling.	Investigate what stage fauna fatalities are occurring and what the cause of death is. If possible, revise tree-felling protocols to reduce injury or fatality occurrences.
Tree Protection	Protection of remnant vegetation outside clearing boundary.	Vegetation outside of approved areas is subject to clearing.	Investigate whether areas were subject to appropriate demarcation. Rehabilitate areas immediately with compatible vegetation. Reporting, as required.
Compensatory Habitat	Nest boxes are installed according to the strategy outlined in <b>Section 3.4</b> .	Subsequent checks show that nest boxes are installed in an inappropriate host species or at an inappropriate height or orientation.	Nest box to be relocated to an appropriate height, host tree or orientation.
	Available habitat materials are salvaged for compensatory habitat.	Habitat features salvaged are damaged during salvage or during stockpiling.	Investigate machinery and equipment currently being used to salvage and translocate habitat features. Update protocols based on findings. Investigate adequacy of storage emplacement areas of features. Revise locations if necessary.
Weeds	There is no significant weed infestation as a result of the works.	Evidence of weed infestation.	Adapt/modify weed control strategy. Undertake weed management strategies as necessary.
Fencing and Access	Appropriate mechanisms are established to control access and manage public safety post-closure.	Evidence of unauthorised access.	Review site security and re-secure site access points where possible. Repair site fencing.
Bushfire	Appropriate bushfire hazard controls have been implemented.	Increased bushfire hazards identified.	Liaise with RFS and adapt bushfire control measures.
Erosion and Sedimentation Control	No significant erosion is present that would constitute a safety hazard or compromise the capability of supporting the end land use.	Erosion causing a safety issue or impacting final land use. Contour banks are unstable or there is evidence of overtopping or significant scouring as a result of runoff. Sediment fences are compromised.	Adapt erosion control strategy to stabilise landform.



## 4.3 Reporting

A concise letter shall be prepared at the completion of the project which documents the compliance of management actions completed, including:

- timing, process followed and records arising from the completion of pre-clearance and tree-felling works including number of habitat trees felled, fauna encountered and their fate and any issues noted with tree protection requirements
- process followed and locations of re-located nest boxes and salvage/relocation of any key habitat features
- any weed management issues identified or recommended actions
- documentation of any recommended actions for fencing/access or erosion/sediment control works
- a record of any hazards or incidents that occurred during construction and details of how these were addressed, with reference to the Trigger Action Response Plan, if applicable
- a record of where management strategies applied differed from those outlined in this Plan, if applicable.

## 5.0 References

ArborSafe (2021) John Hunter Health and Innovation Precinct: Arboricultural Impact Assessment, May 2021.

Bushfire Planning Australia (BPA) (2020) John Hunter Hospital Innovation Precinct Bushfire Risk Assessment.

Department of Environment and Climate Change (DECC) (2008) Descriptions for NSW (Mitchell) Landscapes *Version 3*.

Department of Planning, Industry and Environment (DPIE) (2012) Ramsar Wetlands of NSW Mapping, April 2012.

Department of Planning, Industry and Environment (DPIE) (2020a) eSPADE NSW Soil and Land Information. Accessed September 2020.

Department of Planning, Industry and Environment (DPIE) (2020b) BioNet Atlas of NSW Wildlife. Accessed September 2020.

Ethos Urban (2022) Review of Environmental Factors: John Hunter Health and Innovation Precinct – HMRI Car Park Extension, January 2022.

Strahler, A. N., (1952) Hypsometric (area-altitude) analysis of erosional topography, *Geological Society of America Bulletin* 63 (11): 1117-1142.

Umwelt (2021) John Hunter Health Innovation Precinct: Biodiversity Development Assessment Report State Significant Development Application, October 2021.

