

# APPENDIX A :

## Compliance Tables

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## A.1. Compliance with Biodiversity Requirements

This report was prepared with reference to requirements provided by State Government Agencies and Sutherland Shire Council (SCC). The agencies included Department of Planning and Environment (DPE), Environment and Heritage Group (EHG) & Biodiversity Conservation Division (BCD), Fisheries and National Parks and Wildlife Service (NPWS).

The tables in this appendix reproduce Council and agency requirements related to biodiversity and indicate how they are dealt with in this report.

**Table 10 Compliance Table for DPE Requirements**

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report		Response by Cumberland Ecology
<b>DPE Feedback</b>		
<b>6. State Environmental Planning Policies</b>		
The proposal must demonstrate consistency with all relevant State Environmental Planning Policies (SEPPs), including	The BAR has considered all relevant SEPPs for biodiversity as set out below.	
<ul style="list-style-type: none"> <li>• State Environmental Planning Policy (Precincts—Central River City) 2021;</li> <li>• State Environmental Planning Policy (Resilience and Hazards) 2021;</li> <li>• State Environmental Planning Policy (Industry and Employment) 2021;</li> <li>• State Environmental Planning Policy (Biodiversity and Conservation) 2021;</li> <li>• State Environmental Planning Policy (Exempt and Complying Development Codes) 2008;</li> <li>• State Environmental Planning Policy (Housing) 2021; and</li> <li>• State Environmental Planning Policy No 65—Design Quality of Residential Apartment Development.</li> </ul>	The BAR has been prepared with detailed consideration of SEPP 2021.	

**Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report      Response by Cumberland Ecology**

Where the proposal is inconsistent with any of the relevant SEPPs, those inconsistencies must be specifically explained and justified in the proposal.

State Environmental Planning Policy (Precincts—Central River City) 2021  
 The proposal should address the transition of the site from the SEPP (Precincts—Central River City) 2021 to the Sutherland Shire LEP 2015. This should include addressing the suitability of transitioning any existing provisions in Chapter 5 – Kurnell Peninsula into the Sutherland Shire LEP 2015.

State Environmental Planning Policy (Biodiversity and Conservation) 2021  
 • The site is identified in the Coastal Environment Area, Coastal Use Area and Coastal Wetlands Maps under SEPP (Resilience and Hazards) 2021. • The proposal should address the requirements of this SEPP in alignment with other relevant discussions in this advice, including Sections 10 and 11.

The BAR recognises that the site is identified in the Coastal Environment Area, Coastal Use Area and Coastal Wetlands Maps under SEPP (Resilience and Hazards) 2021. The proposal has been developed to comply with the requirements of this SEPP in alignment with other relevant discussions in this advice, including Sections 10 and 11.

**10. Coastal Management**

• It is long-standing NSW Government policy that NSW beaches be in public ownership, to protect these sensitive ecosystems, and maximise public benefit and access for current and future generations. It is recommended the proposal identify a limited number of publicly accessible paths through dune and other coastal environments to allow for the restoration of the vegetation, nesting sites and habitat for Little Terns and other endangered species. This should also address vehicle access onto the beaches, which is generally not supported.

The BAR recognises the ecological sensitivities of adjacent coastal environments and that such environments provide habitat for threatened species including Little Terns. Recommendations for mitigation are provided in the BAR and these include recommendations for restoration and active management of the dune environment. It is also recommended that vehicle access to the beach should be prohibited for the public. The Ecological and Cultural Management Strategy (ECMS) will guide future management of current and future ecological values of the site and surrounds.

**Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report**

**Response by Cumberland Ecology**

- Bate Bay includes extensive beach habitat and rocky intertidal habitats, suitable for shorebirds and other marine and oceanic species. Although the natural regeneration potential is very low for most vegetated areas present, several important habitat features are present on and adjoining the site. The proposal should give consideration to matters raised in Bate Bay Coastal Management Program (CMP) and future management actions that would inform preparation of a CMP for the site to ensure consistency with Local Planning Direction 4.2 Coastal Management.

The proposal has been designed to be consistent with the requirements of the Bate Bay Coastal Management Program, and the Bate Bay Coastline Management Plan (2003). The BAR recognises the ecological values of Bate Bay, including both terrestrial and aquatic values. The ECMS will serve to guide restoration and management of dune areas on site in a manner that is consistent with the Bate Bay Coastal Management Program.

Coastal Wetlands and Littoral Rainforests (Chapter 2, Resilience and Hazards SEPP)

The BAR has been prepared with regard to Chapter 2 of the Resilience and Hazards SEPP.

- The rehabilitation, protection, and dedication of additional areas on Lot 2 South and Lot 8 is recommended and would be consistent with the NSW government’s policy intend under the Coastal Management Act 2016.

This will be done within Lot 2 South and Lot 8. Threatened Ecological Communities that exist at present will be protected and enhanced, while substantial additional vegetation and wetland habitat will be created on rehabilitated quarry land, within open space corridors. A suite of plant communities will be replanted, including threatened ecological communities such as littoral rainforest, freshwater wetlands, Kurnell Dune Forest and Bangalay Sand Forest. The most significant existing wetlands will be dedicated once restored. The ECMS will guide the restoration and management of existing and future biodiversity areas.

- The DPE Environment Policy team is finalising a technical guideline to inform the identification, protection, and mapping of these environments within the State Environmental Planning Policy (Resilience and Hazards) 2021 (RH SEPP). Once published, these technical guidelines can be provided to assist in any reviews of coastal wetlands and littoral rainforest mapping under the RH SEPP as part of this process.

Noted, but these were not available at the time of preparation of the BAR. Once available, they will be used to further guide the preparation of the ECMS and Biodiversity Management Plan (to be prepared in future).

Coastal Processes

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
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• It is noted that the Biodiversity Assessment Report prepared by Cumberland Ecology (dated 27 May 2020) requires various minimum buffers. The required setbacks and buffers to areas of high ecological value should be informed by pre-Gateway agency consultation, including with Department of Primary Industries – Fisheries (DPI-Fisheries) and the Natural Resources Access Regulator (NRAR). Any setbacks or buffers required by these agencies need to be adequately addressed prior to a request for a Gateway determination.

The proposal provides for an extensive buffer system within north-south and east-west corridors. These buffers vary in width but generally comply with or exceed agency requirement. This is discussed in **Chapter 5** of the BAR and illustrated in **Figure 26**.

## 11. Environmental Impacts

### General Comments

• Identification, protection and management of existing native trees and vegetation on the site should be prioritised. The proposal should specify how open space areas, street planting, and landscaping on private land is to use indigenous landscaping species and allow for the movement of native fauna across the site.

The BAR identifies and maps existing native vegetation, as set out in Chapter 3. Chapter 6 of the BAR sets out mitigation measures that include replanting of local native species. The ECMS provides a strategy for development of extensive areas of additional native vegetation within open space corridors. The intent of the ECMS is to provide for an effective system of habitat corridors, vegetated with local native species that can allow for the movement of native fauna across the site.

• Rehabilitation, retention and incorporation of the coastal wetlands and adjoining communities into green linkages and habitat corridors is supported, including the Towra Point Aquatic Reserve which is classified as a Wetland of International importance (Ramsar listed).

Existing wetlands that adjoin Towra Point Aquatic Reserve will be rehabilitated and will be dedicated to add additional habitat and buffer lands to the reserve. This is further explained in Chapter 6 of the BAR.

### Marine parks and aquatic reserves - Towra Point Aquatic Reserve

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
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<ul style="list-style-type: none"> <li>The site is located in close proximity to the Towra Point Aquatic Reserve. Future development applications will be required to address section 56 of the Marine Estate Management Act 2014 and the relevant marine estate Ministers will need to be consulted as the development is on land in the locality of an aquatic reserve, including the DPI - Fisheries.</li> </ul>	<p>The proximity of the site to Towra Point Aquatic Reserve is noted in the BAR and mitigation measures are proposed to protect the reserve in Chapter 6 of the BAR, within the ECMS and within the Stormwater Assessment (Shrestha 2023).</p>
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Marine Estate	
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<ul style="list-style-type: none"> <li>The NSW Marine Estate Threat and Risk Assessment identified water pollution from diffuse sources and stormwater discharge as the number one threat to the marine estate. Other priority threats include physical disturbance from clearing riparian vegetation and foreshore development. The mitigation measures to address these threats should be made clear in the proposal.</li> </ul>	<p>Chapter 7 of the BAR and the ECMS provide a suite of measures that address physical disturbance from clearing riparian vegetation and foreshore development. The Stormwater Assessment provides detailed information about plans for management of stormwater to provide for high quality management of stormwater discharge in a way that protects the marine estate.</p>
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Water Quality	
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<ul style="list-style-type: none"> <li>The Department suggests that additional consideration be paid to how stormwater treatment will be managed on the site.</li> </ul>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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<p>The proposal should aim to go beyond Council's standard DCP requirements and any requirements of the Botany Bay Catchment Water Quality Improvement Plan to protect the surrounding sensitive environments, including the Towra Point Aquatic Reserve.</p>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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<ul style="list-style-type: none"> <li>Integrated on-site treatment through water sensitive urban design (WSUD) mechanisms are supported if provided during staged release of subdivisions, rather than relying on individual development site provisions.</li> </ul>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
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<ul style="list-style-type: none"> <li>• Consideration of the ongoing management and maintenance of bioswales, bio-retention basins and the like should be considered and costed for the life of the project, and early discussions should occur if these areas are to be dedicated to Council or another public authority. This is to ensure ongoing water quantity and quality leaving the site does not impact on surrounding sensitive environments and is properly maintained into the future.</li> </ul>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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<ul style="list-style-type: none"> <li>• The proposal should include information specifying how the Integrated Water Management Strategy is to be implemented to ensure WSUD provisions are sufficient to address water quantity and quality from development within the site for the life of the development, mitigating any potential off-site impacts on sensitive environments such as the identified coastal wetlands and adjoining marine park.</li> </ul>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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<ul style="list-style-type: none"> <li>• The report(s) should detail how water quality impacts during construction will be managed to protect Towra Point Aquatic Reserve. Consideration should be given to staging works along with compliance with the Managing Urban Stormwater: Soils and construction prepared by Landcom.</li> </ul>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023).</p>
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<p>Water NSW should be consulted with in regard to the dewatering of the existing sand quarry stormwater ponds which are intended to be filled.</p>	<p>This has been dealt with by the Stormwater Assessment. (Shrestha 2023). Also, a Biodiversity Management Plan is to be prepared and that will outline mitigation measures to protect biodiversity during dewatering and subsequent development.</p>
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<ul style="list-style-type: none"> <li>• The C1 National Parks and Nature Reserves zone to the immediate north of the site should not be relied on as a stormwater mitigation measure. Vegetation buffers should be provided on site to mitigate the site's stormwater impacts.</li> </ul>	<p>As explained in Chapters 5 and 7 of the BAR, and within the Stormwater Assessment, the National Parks and Nature Reserves zone will be protected and buffered from impacts as development takes place. Such lands and the biodiversity within them will not be used as a buffer. Extensive vegetation buffers will be provided on site,</p>
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**Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report**      **Response by Cumberland Ecology**

particularly within the large open space corridors that are to be revegetated with local native plant species. This is also explained in the ECMS.

• The design and maintenance of an integrated water management system for the site should consider the impacts of climate change and coastal processes beyond the (2120) 100yr planning horizon to ensure water quantity and quality from the site does not impact on surrounding sensitive receiving environments.

This has been dealt with by the Stormwater Assessment. (Shrestha 2023).

**Table 11 Compliance Table for EHG and BCD**

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
<p><b>1. Justification and Outcomes of the Planning Proposal</b></p>	
<ul style="list-style-type: none"> <li>• EHG considers the proposed SEPP zoning is not adequately justified. There are significant gaps in many of the reports and the identified key issues with the Planning Report such as the failure to consider relevant strategic documents and statutory controls. The strategic documents that need to be considered include: - the Towra Point Nature Reserve Plan of Management, - the Towra Point Nature Reserve Ramsar Site Ecological Description (noting it is a Ramsar Site) and - international agreements for migratory birds noting that the Reserve is also a JAMBA, CAMBA, ROKAMBA site.</li> </ul>	<p>The BAR has considered the Towra Point Nature Reserve Plan of Management, - the Towra Point Nature Reserve Ramsar Site Ecological Description (noting it is a Ramsar Site) and - international agreements for migratory birds noting that the Reserve is also a JAMBA, CAMBA, ROKAMBA site.</p>
<ul style="list-style-type: none"> <li>• It is disappointing that the Biodiversity Assessment Report (BAR) prepared by Cumberland Ecology dated 27 May 2020 appears to consider biodiversity as a constraint to development and does not adequately consider opportunities to conserve biodiversity. The Planning proposal should consider zoning and land use options which include opportunities to create, restore and enhance biodiversity values of the lands and waterways.</li> </ul>	<p>This BAR recognises the extensive opportunities to improve biodiversity outcomes when the quarry is rehabilitated and the development takes place. Existing biodiversity will be conserved and enhanced by active management, and large areas of open space will be planted out with local native plant species, and also designed with foraging and breeding sites for Green and Golden Bell Frogs, and other native fauna. This is discussed across the document, but particularly in Chapter 7 and the ECMS. The recognition of such opportunities is given in the ECMS, which will serve to guide the ecological and cultural management of the open space network in the future.</p>
<ul style="list-style-type: none"> <li>• The planning proposal avoids, or remains obscure about, the idea that the rezoning provides an opportunity for strategically rezoning parts of those lots for environmental protection, within which, following the cessation of quarrying, habitat for fauna and flora movement could be created.</li> </ul>	<p>The proposal entails rezoning of the site to allow for dedication of high conservation value areas following the cessation of quarrying and the rehabilitation of the site. As stated above, extensive additional habitats are to be created.</p>
<p><b>2. Biodiversity Assessment for the Subject Land</b></p>	

**Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report**

**Response by Cumberland Ecology**

EHG is concerned about the likely biodiversity impacts of the proposal. Despite areas of degradation, the site retains some pockets of native vegetation, some of which are classed as endangered ecological communities (EECs) including Coastal Saltmarsh, Estuarine Reedland and Swamp Oak Floodplain Forest. There is also a patch of Freshwater Wetlands on site, which the submitted BAR states does not constitute the Freshwater Wetlands EEC. EHG considers the assessment of whether this patch is an EEC should be reviewed given the length of time since survey.

The nature and extent of native vegetation on site has been reviewed during the preparation of this BAR. The subject land is an active quarry site and some of the wetlands mapped in the previous BAR have since been quarried and removed. Those wetlands were marginal quality areas of rushes, etc that had grown along the existing quarry pool. However, there are areas of Coastal Saltmarsh, Estuarine Reedland and Swamp Oak Floodplain Forest that exist on site and these are proposed for retention. Lot 8 has now also been added to the total land area and it also contains TECs.

As stated in the BAR, the Kurnell Peninsula includes coastal habitats which are structurally and floristically diverse and so provide habitats for a range of fauna species, including threatened species. The site contains terrestrial, wetland and shore habitats with a diversity of fruiting and flowering species. Surveys for the BAR identified five threatened species including bats and birds. It is also noted 27 birds were recorded including migratory species. The Little Tern was also recorded on site and its location will be impacted by the proposal. In addition, BioNet shows recordings of numerous threatened species on site.

The site previously considered in the 2020 BAR was just the active quarry site, excluding Lot 8, which has now been added to the total area. The 2020 BAR acknowledged the presence or potential presence of threatened species, including the Little Tern. With the additional area of Lot 8, significant natural and semi-natural habitats still exist on site and these have been discussed in **Chapter 3. Chapter 7** provides a suite of mitigation measure to protect threatened flora and fauna, and to augment habitat for such species. The ECMS also provides guidance about how the ecology and cultural heritage of the site will be managed in future. Substantial areas of open space will be created in the rehabilitated quarry area, adding significant areas of habitat as vegetation is planted. Such plantings will include species from TECs including littoral rainforest, freshwater wetlands, Kurnell Dune Forest and Bangalay Sand Forest. The proposal will be to manage such areas for conservation in the long term. Such corridors will restore corridor connections consistent with the Kurnell 2020 Corridor Delineation Plan prepared by DECC. In the long term, habitats and habitat opportunities will be increased for threatened species on site, and into adjacent areas.

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
<p>The biodiversity values of the site also include its landscape position adjacent to highly sensitive and significant environments of Towra Point Nature Reserve, Kamay Botany Bay National Park and native habitats within the La Perouse LALC land and Lucas Reserve.</p>	<p>Noted and discussed within the BAR and within the ECMS.</p>
<p>Key Deficiencies with existing Amendments to SEPP (Kurnell Peninsula) 1989 – Biodiversity Assessment Report (Cumberland Ecology 27 May 2020)</p>	
<ul style="list-style-type: none"> <li>• EHG considers the Biodiversity Assessment Report (BAR) deficient as it does not adequately address the matters provided by the PCG in February 2019 on the Urbis methodologies, some (but not all) of which are noted in Appendix A: Compliance Table. These matters include:</li> </ul>	
<ul style="list-style-type: none"> <li>o the biodiversity values of the site prior to sand quarrying and other activities.</li> </ul>	<p>These values are now described in <b>Chapter 3</b> of the BAR.</p>
<ul style="list-style-type: none"> <li>o opportunities for restoring previous ecosystems, enhancing biodiversity values, or for dedicated corridors to ensure the permeability of the site and the movement of flora and fauna from east to west and north to south.</li> </ul>	<p>These values are now described in <b>Chapter 5</b> of the BAR.</p>
<ul style="list-style-type: none"> <li>• Green and Golden Bell Frog Surveys (GGBF): EHG considers that the surveys conducted by Cumberland Ecology in 2018 aren't sufficient to demonstrate GGBF aren't present on site, given that:</li> </ul>	<p>Ross Wellington, the accredited expert in Green and Golden Bell Frogs, has been engaged to further assess the species on site. He has conducted additional targeted surveys for the species in 2023, but has not found any. Notwithstanding that, the BAR has assumed that the species could occupy parts of the site in the future, including wetlands within Lot 8 and wetland habitats to be specially created for the species in open space corridors when the quarry is rehabilitated.</p>
<p>there is evidence that a local population is still present. GGBF have been recently recorded (Sep 2021) by experts in two nearby locations, i.e., 1 km west and 1.4 km west of Area 3.</p>	<p>As explained in <b>Chapter 3</b> the species has never been found on site. However, provision is made for the creation of new habitats and the active management of existing habitats for the species within the Landscape and Open Space Management Plan, and within the ECMS.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
<p>the survey effort is lower than the effort recommended in the 'NSW survey guide for threatened frog species' which states that four repeat surveys should be conducted over 480 minutes for a 500m transect (i.e., 120 minutes per survey of a 500m transect). The consultants have done:</p>	<p>This has been augmented with the assistance of Ross Wellington who has conducted additional surveys in Lot 8 and in Lot 2 North. Neither Cumberland Ecology nor Ross Wellington have found the species on site.</p>
<p>four repeat surveys for three out of the four areas, but for the fourth area they have only done three repeat surveys.</p>	<p>This has been dealt with by Ross Wellington.</p>
<p>transects of 30 minutes each, not the recommended 120 minutes</p>	<p>As above.</p>
<p>no detail has been provided on the survey method, so the extent of the survey area is not clear. 500 m transects should be undertaken at each survey area.</p>	<p>As above.</p>
<p>EHG also notes that according to this article, hundreds of GGBF have been introduced into the Sydney Desalination Plant conservation area which connects to Kamay Botany Bay National Park, with the aim of helping to repopulate the peninsula. Therefore, some of these GGBF may also be repopulating the subject land.</p>	<p>This is noted in the BAR and discussed by Ross Wellington. No frogs have been found on site, but extensive provisions will be made for them in the long term.</p>
<p>Updated surveys carried out in accordance with the 'NSW survey guide for threatened frog species' are required.</p>	<p>See explanation above.</p>
<p>• Assessment of Lot 8 DP 586986 (282 Captain Cook Drive): The BAR is considered incomplete as it does not assess the biodiversity values Lot 8 DP 586986 (282 Captain Cook Drive) which is known to contain assets of high environmental value, including threatened ecological communities, wetlands and threatened species habitat including TECs and wetlands and GGBF habitat (supported by records from 2010). Lot 8 also contains assets of high Aboriginal cultural heritage value, including a very extensive shell midden.</p>	<p>These values have now been considered in the report within <b>Chapter 3</b>. The cultural heritage values associated with the midden will be protected in the long term, and cultural heritage values are covered by the guidance in the ECMS.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
<ul style="list-style-type: none"> <li>Impacts to Ramsar site in Towra Point Nature Reserve: Throughout the BAR direct and indirect impacts to the Ramsar Site within Towra Point Nature Reserve has not been addressed.</li> </ul>	<p>These have now been updated extensively within the new BAR.</p>
<ul style="list-style-type: none"> <li>Shorebirds</li> </ul> <p>The BAR does not adequately recognise that Quibray Bay is a significant roosting sites for migratory shorebirds that are protected under the JAMBA &amp; CAMBA agreements.</p>	<p>This is recognised and dealt with in the BAR.</p>
<p>Little Tern have been recorded on BioNet as a breeding site in the quarry area. An Eastern Osprey is recorded on BioNet on the 4WD road out to Boat Harbour. Little Terns, fledglings and other shorebirds use the sandy area in front of the rock at boat harbour for roosting and foraging</p>	<p>Noted and discussed in <b>Chapter 4</b> of the BAR.</p>
<p>it is recommended the BAR considers relevant data held by Birdlife Australia in addition to BioNet.</p>	<p>This has now been considered in the new BAR.</p>
<p>Habitat Connectivity</p>	
<p>Habitat corridors are to be provided to facilitate movement across and through the proposed development site both in a north south and east west direction. Corridor widths are to have regard to the ecology of the species that occur/will occur within and/or utilise the corridors and seek to provide habitat that will not be impacted by edge effects.</p>	<p>Extensive habitat corridors will be provided on site. Substantial areas of open space will be created in the rehabilitated quarry area, adding significant areas of habitat as vegetation is planted. Such plantings will include species from TECS including littoral rainforest, freshwater wetlands, Kurnell Dune Forest and Bangalay Sand Forest. The proposal will be to manage such areas for conservation in the long term. Such corridors will restore corridor connections consistent with the Kurnell 2020 Corridor Delineation Plan prepared by DECC. In the long term, habitats and habitat opportunities will be increased for threatened species on site, and into adjacent areas.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
<p>Both Lot 1 North and parts of Lot 1 South and Lot 8 DP 586986 are key in contributing to functional west-to-east wildlife corridors on Kurnell peninsula.</p>	<p>Noted. This has now been provided for in <b>Chapter 5</b> of the BAR, and within the Landscape and Open Space Plan.</p>
<p>In relation to the habitat corridor along the southern (Bate Bay) boundary between Lucas Reserve in the south west and Boat Harbour Aquatic Reserve (identified on Figure 15 of the submitted Biodiversity Assessment Report (BAR)) EHG supports the recommendation of the Kurnell 2020: Corridor Delineation report (DECC 2009) and the view of Sutherland Council that this corridor of width 400 metres through this area would be necessary to provide, including by restoration, the secondary and tertiary dunal vegetation required to facilitate movement of the range of fauna identified in the report.</p>	<p>Noted. This has now been provided for in <b>Chapter 5</b> of the BAR, and within the Landscape and Open Space Plan. .</p>
<p>Nature Reserve (in “established” ‘Corridor 4 – Quibray Bay foreshore’ of DECC 2009), in the north-west, to the conservation area on the Sydney Desalination Plant land (“established” ‘Corridor 5 – Desalination plant’ and the land owned by the La Perouse LALC on the eastern side of the Boat Harbour access track (“provisional” ‘Corridor 8’).</p>	<p>Noted. This has now been provided for in <b>Chapter 5</b> of the BAR, and within the Landscape and Open Space Plan.</p>
<ul style="list-style-type: none"> <li>• For planning proposals, that have the potential to result in development that will significantly impact upon biodiversity values such as this one, EHG recommends that they are supported by a Biodiversity Development Assessment Report (BDAR) prepared by an accredited assessor in accordance with Stages 1 and 21 of Biodiversity Assessment Method 2020 (BAM).</li> </ul>	<p>There is no need to prepare a BDAR at this stage, and this BAR has been provided instead. The proposed development will provide for substantial improvements to biodiversity and large areas within open space corridors will be revegetated with TEC plant species as explained above. As intended for the Kurnell 2002 Corridor Delineation Plan, there will be substantial reconnections in north-south and east-west directions. No significant negative impact is likely. Moreover, a BDAR cannot be prepared at this stage as the development proposal is in the conceptual stage.</p>

## 6. Legislative Changes/Changes to Environmental Planning Instruments

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response by Cumberland Ecology
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EHG notes that there have been a range of legislative changes since the documents that have been submitted with the Scoping Planning Proposal have been prepared including but not limited to the following:

<ul style="list-style-type: none"> <li>• State Environmental Planning Policy (SEPP) – Kurnell Peninsula 1989 (now Chapter 5 Kurnell Peninsula of the Precincts – Central River City SEPP 2021).</li> </ul>	<p>This has now been covered by <b>Chapter 1</b> of the new BAR.</p>
<ul style="list-style-type: none"> <li>• SEPP (Coastal Management) 2018 (now Chapter 2 'Coastal Management' of the Resilience and Hazards SEPP).</li> </ul>	<p>This has now been covered by <b>Chapter 1</b> of the new BAR.</p>
<ul style="list-style-type: none"> <li>• SEPP 71 Coastal Protection (now part of Chapter 2 'Coastal management' of the Resilience and Hazards SEPP).</li> </ul>	<p>This has now been covered by <b>Chapter 1</b> of the new BAR.</p>



Table 12 Compliance Table for Requirements of Fisheries

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response
<p>1. The Department of Primary Industries, Fisheries is responsible for the <i>Marine Estate Management Act 2014</i> (MEM Act) and the <i>Fisheries Management Act 1994</i> (FM Act). Neither of these Acts have been considered in this proposal and DPI Fisheries has not been consulted on the scoping proposal or the masterplan. This proposal triggers the MEM Act and is also likely to trigger the FM Act.</p>	<p>This has been acknowledged and dealt with in <b>Chapter 1</b> of the BAR.</p>
<p>2. Application of the <i>Environmental Planning and Assessment Act 1979</i> for development affecting and/or in the locality of aquatic reserves is set out in s.56 of the <i>Marine Estate Management Act 2014</i>, including obligations for consent authorities and determining authorities.</p>	<p>This has been acknowledged and dealt with in <b>Chapter 1</b> of the BAR.</p>
<p>3. Two aquatic reserves exist adjacent to the site – Towra Point Aquatic Reserve and Boat Harbour Aquatic Reserve. Under the MEM Act, the primary purpose of aquatic reserves is to protect the biological diversity in these areas or components of biological diversity (such as specific ecosystems, communities or species). The MEM Act states that other purposes are secondary and must be consistent with the primary purpose. Any proposals to develop the land adjacent to an aquatic reserve or proposals intending to access the aquatic reserves must be consistent with the primary purpose of aquatic reserves.</p>	<p>Both marine reserves are extensively recognised in the BAR, including within <b>Chapter 4</b>. The proposal will provide for the cessation of sand quarrying. It will also entail cessation of horse grazing to the north of Captain Cook Drive. As the sand quarry is rehabilitated, there will be extensive revegetation work, including revegetation with wetland species in many areas of the site. Moreover, in the north of the site, areas of wetland adjacent to the Towra Point Aquatic Reserve will be rehabilitated, augmented and then dedicated. Storm water will be managed to provide for a neutral or beneficial outcome. Such measures will provide for improvements of water quality emanating from the site to the marine reserves. Additionally, as per <b>Chapter 7</b> on mitigation measures, there will be various mitigation measures designed to ensure that the peoples activities are managed in a sustainable way that does not negatively impact the reserves and constituent marine species.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response
<p><b>4. The planning documents have not identified or considered the presence of the aquatic reserves, nor have they been mapped as ecological assets or coastal wetlands. Within the Coastal Management SEPP mapping, much of the foreshore of Quibray Bay is mapped as wetlands or buffer zones to those wetlands. Approximately half of Lot 2 north is included in this protected area mapping. The aquatic reserves and adjacent foreshore communities, including saltmarsh, must be a priority ecological issue in the scoping proposal, planning proposals and development applications. The aquatic reserves, adjacent foreshore communities, Ramsar wetland and the SEPP-identified buffer zones need to be part of any mapping presented and particularly maps of the 'ecological assets'.</b></p>	<p>As explained above the BAR maps and discusses both marine reserves within <b>Figures 3 and 18.</b></p>
<p><b>5. In particular, the northern section of the proposed site is adjacent to Quibray Bay which is a Sanctuary Zone within Towra Point Aquatic Reserve. This zone includes and is adjacent to numerous sensitive, threatened and protected species, communities and populations, and key fish habitat including fish nurseries. These are important socially and economically as well as environmentally for a range of reasons including the importance of fish habitat to local fisheries. Many of the species protected here do not tolerate disturbance. The Sanctuary Zone also links with a Ramsar wetland, the only one in the Sydney region.</b></p>	<p>As explained above the BAR maps and discusses both marine reserves. The proximity of sensitive marine species to the site has been considered in the BAR and extensive measures are proposed for mitigation to protect such species from impacts.</p>
<p><b>6. Best practice development of this site should ensure the conservation and improvement of aquatic biodiversity by:</b></p> <ul style="list-style-type: none"> <li>- Best practice development of this site should ensure the conservation and improvement of aquatic biodiversity by:</li> <li>- Protecting all aquatic habitats including intertidal habitats.</li> </ul>	<p>Noted. This will be done and is explained in <b>Chapter 7</b> of the BAR.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response
<p>- Protecting and improving foreshore communities to enhance the biodiversity values of the aquatic reserves.</p>	<p>Noted. This will be done and is explained in <b>Chapter 7</b> of the BAR.</p>
<p>- Allowing for setbacks/buffer zones from the aquatic reserves and Towra Point Nature Reserve by dedicating land adjacent to the aquatic reserves and nature reserve, to NP&amp;WS or Council. This would involve rezoning to E1 and E2. This would help protect and enhance the biodiversity and fish habitat values of these important wetland areas and allow for upslope movement of protected aquatic and foreshore communities with sea level rise (SLR). Currently, with different SLR mapping scenarios, there will be a significant loss of valuable wetland communities in Botany Bay and dedicated retreat areas are needed to reduce this loss.</p>	<p>Noted. This will be done and is explained in <b>Chapter 7</b> of the BAR. Conservation zoning to C2 is proposed in the BAR to protect ecological values, including the biodiversity within the marine reserves.</p>
<p>- Planning for ecological connectivity between freshwater, groundwater, land and estuarine/marine environments. Noting that some estuarine species rely groundwater flows, particularly saltmarsh communities fringing Quibray Bay.</p>	<p>This has been acknowledged and dealt with in <b>Chapter 7</b> of the BAR. It is also dealt with in the Storm Water and Ground Water reports.</p>
<p>- Protecting or improving water quality through water sensitive urban design, adequate stormwater treatment and best practice erosion and sediment control measures during construction.</p>	<p>This has been acknowledged and dealt with in <b>Chapter 7</b> of the BAR. It is also dealt with in the Storm Water and Ground Water reports.</p>
<p>- Keeping stormwater treatment structures, pathways, cycle paths and other infrastructure etc outside the buffer zones mentioned above to maximise biodiversity values and therefore set back more than 100m from the aquatic reserves.</p>	<p>This has been acknowledged and dealt with in <b>Chapter 7</b> of the BAR. It is also dealt with in the Storm Water and Ground Water reports.</p>

Government Agency Responses to Proposed SEPP Amendment relevant to Biodiversity Assessment Report	Response
<p><b>7. Access is not permitted through Towra Point Nature Reserve and the section of access that exists adjacent to Lot 2 North is encouraging illegal entrance into the nature reserve, damaging endangered saltmarsh communities and disturbing nesting shorebirds. 'Restoring connections to coast' for human activity on the Botany Bay side or any 'beach access' to Botany Bay would be detrimental to the sensitive and protected species and environments in and adjacent to Quibray Bay. Human connectivity to the coast should focus on the Bate Bay side.</b></p>	<p>This has been acknowledged in the BAR and is dealt with as a mitigation measure in Chapter 6.</p>
<p><b>8. It has been identified in the document "Ecological Constraints Assessment, Captain Cook Drive, Kurnell" that road widening activities may impact marine vegetation such as mangroves and saltmarsh. It is unclear if upgrades to services such as power, sewer and water may also impact marine vegetation. Harm to marine vegetation is a prohibited activity and would not be permitted within aquatic reserves. Harm in adjacent areas is not appropriate due to a reduction in biodiversity and fish habitat values within the locality of an aquatic reserve and loss of areas for retreat with SLR. Alternative designs need to be determined. Permits for harm to marine vegetation would be required under the FM Act.</b></p>	<p>This is dealt with in the Ecological Constraints Assessment by Ecoplanning for the road widening.</p>
<p><b>11. The tourism area proposed adjacent to Boat Harbour Aquatic Reserve, will increase visitation to and use of the Aquatic Reserve. This will have additional negative impacts which must be assessed, and avoidance or mitigation measures proposed as a part of an ecological assessment.</b></p>	<p>This has been acknowledged in the BAR and is dealt with as a mitigation measure in <b>Chapter 7</b>.</p>

**Table 13 Compliance Table for Requirements of NPWS**

Issue and assessment requirement	Response
<b>1. Towra Point Nature Reserve Ramsar Site.</b>	
<ul style="list-style-type: none"> <li>Towra Point Nature Reserve is an iconic wetland in NSW and is of international conservation significance (not just 'National significance' as described in Section 4.8.3 of the SEPP Amendment). The nature reserve provides habitat for endangered and migratory wading birds and other wetland species. For that reason, Australia has obligations under 4 international agreements to protect the Towra wetlands and its birdlife. These are the Ramsar convention and the bilateral migratory bird agreements with Japan, China and South Korea (known as JAMBA, CAMBA and ROKAMBA respectively).</li> </ul>	This has been acknowledged in the BAR.
<ul style="list-style-type: none"> <li>Towra Point Nature Reserve and the Ramsar site adjoins Lot 2 DP 1030269 ('Lot 2 North') on its eastern, western and northern sides. Lot 2 North is not 'nestled between Quibray Bay and Towra Point Nature Reserve' as described in Section 2.3 of the SEPP Amendment. There is no direct access to Quibray Bay from Lot 2 North.</li> </ul>	This has been acknowledged in the BAR.
<ul style="list-style-type: none"> <li>The documentation supporting the Planning Proposal has failed to identify there are potential direct, indirect and cumulative impacts on the ecological character of the Towra Point Nature Reserve Ramsar Site that may result from the development of Lot 2 DP 1030269 ('Lot 2 North'). These impacts could arise from changes to hydrology, changes to fire regimes and disturbance of birds (including migratory waders and shorebirds). The significant import of fill to raise ground levels so that the area is suitable for residential development will undoubtedly lead to changes in hydrology for nearby wetlands.</li> </ul>	<p>The BAR has considered these potential impacts extensively and has noted that the proposal would not significantly impact upon Towra Point Nature Reserve. The proposal is not predicted to significantly impact the hydrology of the wetlands, as explained in the Storm Water Assessment. Mitigation measures have been developed to protect the reserve from impacts, and extensive areas of the site will be rehabilitated and replanted, which should complement some of the functions of the reserve. The strategy for such rehabilitation and replanting is summarised in the ECMS.</p>

Issue and assessment requirement	Response
<ul style="list-style-type: none"> <li>The main threats to reserve's values arise due to human activity, including recreational use. For this reason, apart from Quibray Bay viewing platform, access to the land areas within the nature reserve is generally restricted to education and research purposes only or via consent from NSW National Parks and Wildlife Service (NPWS). Access by non-motorised vessels of the waterways in the reserve is permitted.</li> </ul>	<p>Access will be restricted and prevented for Quibray Bay from the proposed development. This is explained in Chapter 6 of the BAR.</p>
<ul style="list-style-type: none"> <li>The Planning Proposal should be assessed against the following relevant strategic documents:               <ul style="list-style-type: none"> <li>The Towra Point Nature Reserve Plan of Management (NPWS 2001)</li> </ul> </li> </ul>	<p>The BAR assesses the proposal against the Towra Point Nature Reserve Plan of Management.</p>
<ul style="list-style-type: none"> <li>The Towra Point Nature Reserve Ramsar site: Ecological character description (DECCW 2010).</li> </ul>	<p>The BAR assesses the proposal against the Towra Point Nature Reserve Ramsar site: Ecological.</p>
<ul style="list-style-type: none"> <li>The Ramsar Site boundaries shown in Figure 5 of the Captain Cook Drive Ecological Constraints Assessment is not consistent with the Australian Government's mapping at <a href="http://www.environment.gov.au/water/topics/wetlands/database/maps/pubs/23-0-s.pdf">www.environment.gov.au/water/topics/wetlands/database/maps/pubs/23-0-s.pdf</a></li> </ul>	<p>This has now been corrected in the Ecological Constraints Assessment for Captain Cook Drive.</p>
<ul style="list-style-type: none"> <li>The proposed wording of the amendment must refer to the reserve by its correct name (i.e. Towra Point Nature Reserve, not Towra Point National Park).</li> </ul>	<p>Noted. The correct name is used in the BAR.</p>
<p><b>2. Easement over Lot 1 DP1030269 (part Towra Point Nature Reserve)</b></p>	
<ul style="list-style-type: none"> <li>It is agreed an easement 100 metres wide benefits both Lot 2 North and Lot 2 South and enables access for purposes related to tourist and other similar purposes across this section of Towra Point Nature Reserve. The wording in the easement does not appear to provide access for purposes related to general residential use of the land.</li> </ul>	<p>Noted.</p>
<ul style="list-style-type: none"> <li>Any use of the easement must comply with the legislative framework applicable to the land, including the <i>National Parks and Wildlife Act 1974</i> (NPW Act) and its regulations. Any conduct that would be permissible under the terms of the easement, but not the NPW Act, cannot be carried out on the easement in the absence of a specific authorisation under the NPW Act.</li> </ul>	<p>Noted.</p>

Issue and assessment requirement	Response
<ul style="list-style-type: none"> <li>This would, for example, include any vegetation management or dog walking along the easement (which are both prohibited under the NPW Act in nature reserves). Smoking is prohibited in all parks under the NPW Regulation.</li> </ul>	<p>Mitigation measures that cover these matters are dealt with in <b>Chapter 7</b> of the BAR.</p>
<p><b>4. Sea level rise and climate change</b></p>	
<ul style="list-style-type: none"> <li>The Strategic Framework identifies the following strategic context and drivers in relation to sea level rise and climate change:</li> </ul>	<p>An assessment of the level of fill required to be imported to the site and the nature and scale of potential impacts on the biophysical, hydrological or ecological integrity of the adjacent coastal wetlands, and any changes in the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland.</p>
<p>– Adapting to the impacts of ... natural hazards and climate change (Planning Priority S18 – South District Plan)</p>	
<p>– Manage risks from hazards (Planning Priority 23 – Sutherland Shire Local Strategic Planning Statement)</p>	
<ul style="list-style-type: none"> <li>This is a particular hazard for Lot 2 North, all of which is low- lying. Section 4.10 of the SEPP Amendment identifies Lot 2 North to be at risk of inundation under predicted future elevated water levels and that future development on the site would require the raising of the ground levels to a minimum level of 2.6m AHD.</li> </ul>	
<ul style="list-style-type: none"> <li>Importing this amount of fill and the land modification that will result (including presumably construction of retaining walls) is likely to have significant impacts on the surrounding coastal wetlands and management of the interface with Towra Point Nature Reserve.</li> </ul>	<p>As explained above, the sand quarry will be rehabilitated and will have extensive corridors, including wetland habitats, that are recreated. Land containing existing wetlands will be improved via management and then dedicated, augmenting and buffering the land that</p>

Issue and assessment requirement	Response
	is already in the nature reserve. No retaining walls will be created in an area that will impact upon the nature reserve.
<ul style="list-style-type: none"> <li>Section 1.3.2 of the Biodiversity Assessment Report identifies that there are areas mapped as 'proximity to coastal wetlands' surrounding the coastal wetlands on Lot 2 North and in the adjoining Lot 8. This description minimises how much of Lot 2 North is subject to this mapping – less than 40% of this lot is not mapped as either a coastal wetland or in the proximity area of a coastal wetland.</li> </ul>	
<ul style="list-style-type: none"> <li>As this fill is essential to enable Lot 2 North to be made suitable for residential development it is unacceptable that the consideration of its impacts will be the subject of future development applications.</li> <li>This approach means that the significance of the cumulative impacts on the biophysical, hydrological or ecological integrity of the coastal wetlands in and adjacent to the development site will be difficult to assess, contrary to the requirements of section 2.8 of the Resilience and Hazards SEPP.</li> </ul>	The BAR has considered the potential impact of the fill in <b>Chapter 6</b> .
<h3>5. Biodiversity Assessments</h3>	
NPWS supports statements made by the Biodiversity Conservation Division, identifying discrepancies and deficiencies in the ecological assessments supporting the Planning Proposal and proposed widening of Captain Cook Drive.	These have been dealt with in responses to the BCD in the preceding table.
NPWS advises the following concerns:	
<ul style="list-style-type: none"> <li>The mapping of threatened species in the SEPP Amendment, the Biodiversity Assessment Report and the Captain Cook Drive Ecological Constraints Assessment are not correct and do not appear to be based on publicly available information from BioNet. Current BioNet data reveal several more species being recorded in proximity to Captain Cook Drive and the development site.</li> </ul>	These have now been dealt with in the mapping for this BAR. It is also important to note that the current BAR recognises the proposed development as creating opportunities for biodiversity. Biodiversity is not seen as a constraint. As set out in <b>Chapter 5</b> , extensive areas of the quarry site are to be turned into terrestrial and



Issue and assessment requirement	Response
	aquatic habitats and managed as such for the long term. This is predicted to benefit many native species.
<ul style="list-style-type: none"> <li>- Notable examples include Little Terns (known to breed on Lot 2 South), Eastern Osprey and a wide range of shorebirds (recorded in Lot 2 South) and White-fronted Chat (recorded in Towra Point Nature Reserve).</li> </ul>	Noted and dealt with above.
<ul style="list-style-type: none"> <li>- Road widening of Captain Drive is likely to destroy more than the 6 Endangered Magenta Lilly Pilly trees identified in the assessments – this species occurs along a more extensive area of roadside than indicated in Figure 2 of the Ecological Constraints Assessment, Captain Cook Drive.</li> </ul>	This is dealt with in the updated Ecological Constraints Assessment, Captain Cook Drive (Ecoplanning 2023).
<ul style="list-style-type: none"> <li>- The wet conditions experienced in the past few years may have assisted the spread of Green and Gold Bell Frogs in the local area, and that targeted survey (last conducted in 2018 but not to the effort required under public guidelines)</li> </ul>	This has been dealt with in <b>Chapter 3</b> of the BAR, which has drawn upon the experience of Ross Wellington, the accredited expert in the species. Despite extra surveys by Ross Wellington, no frogs have been found on the site. Notwithstanding this, there will be additional
<ul style="list-style-type: none"> <li>- The description of parts of Towra Point Nature Reserve as ‘weed infested’ may not be current as NPWS has spent over \$300,000 in the past 4 years, conserving the area for migratory shorebirds.</li> </ul>	Noted.
<h3>6. Referral to Australian Government</h3>	
<p>Development of this site is likely to be identified as a controlled action under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 due to potential impacts on:</p>	<p>At a later stage in the planning process, a referral may be prepared. However, as stated above, the development of the site is intended to be nature positive, with large additional areas of habitat to be created, and extensive considerations made to ensure water emanating from the site will achieve a neutral or beneficial effect. As such it is unlikely that the proposal will have detrimental impacts on matters of national environmental significance.</p>

Issue and assessment requirement	Response
<ul style="list-style-type: none"> <li>- the ecological integrity of the adjacent Ramsar Site</li> </ul>	<p>As explained above and within <b>Chapter 5</b> of the BAR, the ecological integrity of the Ramsar Site is predicted to be maintained.</p>
<ul style="list-style-type: none"> <li>- important roosting and foraging habitat for migratory species listed in international agreements.</li> </ul>	<p>Important roosting and foraging habitat for migratory species listed in international agreements is predicted to be maintained, as explained within <b>Chapter 5</b> of the BAR.</p>

**Table 14 Compliance table for requirements of Sutherland Shire Council**

Issue	Response
<b>Biodiversity</b>	
<p>1. Wildlife corridors need to be provided in both the east-west and north-south direction. Corridors need to be of sufficient width to encompass a range of vegetation types, including sedges, shrubs, forests and wetlands, (e.g. not just foredune sedges/grasses), to provide for maximum movement of a variety of species. Consideration shall be given to the 2020: Kurnell Delineation corridor study (Department of Environment and Climate Change NSW, 2009) and the recommended widths within.</p>	<p>The proposal provides for north-south and east-west corridors of substantial width, as discussed in <b>Chapter 5</b> of the BAR. Consideration has also been given to compliance with the 202: Kurnell Delineation Corridor Study and all of the corridors recommended by that study would be provided by the proposal.</p>
<p>2. Recommend that the entire area to the north of Captain Cook Drive, (including the horse stables area), be rehabilitated and conserved as a wildlife corridor, with development potential for this area to be achieved elsewhere on the development e.g. the more degraded areas of Lot 8.</p>	<p>Not all of this area is proposed for rehabilitation. However, a substantial area, including wetlands will be regenerated and form part of a rezoned area, rezoned as C2, and dedicated. This will augment the existing conservation area of the Towra Point Nature Reserve.</p>
<p>3. Sensitive groundwater dependent/estuarine ecosystems exist on Lot 2 North. Here the freshwater-saline water interface is critical to maintenance of these ecosystems. As above, freshwater groundwater recharge systems shall be installed to maintain this interface at its current location.</p>	<p>This has been noted in <b>Chapter 5</b> of the report. Consideration of this has also been made within the groundwater report and the stormwater report. No significant detrimental impact is predicted for the freshwater-saline water interface.</p>
<p>4. Wildlife connectivity and water infiltration systems in the proposed development of Lot 2 South would be best achieved around the perimeter, including the foreshore and the entirety of the western and eastern boundaries. These wildlife corridors and water infiltration systems will require careful design and must be of a size to create appropriate hollows, shelters, and waterbodies/infiltration systems to provide suitable habitat and conditions.</p>	<p>This is discussed in the BAR in <b>Chapter 7</b> and the Stormwater Assessment (Shrestha 2023). The wildlife corridors and water management will be carefully managed to promote both biodiversity and water quality. This is further explained in the ECMS. Furthermore, a detailed Biodiversity Management Plan is proposed to be prepared and will prescribe the creation of hollows, shelters and waterbodies in detail.</p>
<p>5. In addition to dedicated wildlife corridors, there shall be wildlife permeability and green spaces throughout the development.</p>	<p>This has been recommended as a mitigation measure in <b>Chapter 7</b> of the BAR.</p>

<p>6. Groundwater dependent ecosystems occur around the perimeter of the whole site. Maintenance of groundwater levels in this area will be critical to their long-term survival. Groundwater recharge systems shall be developed and installed in appropriate locations to maintain groundwater levels and quality.</p>	<p>This has been covered in the Groundwater Assessment (Shrestha 2023).</p>
<p>7. Offsite discharges of stormwater to sensitive ecosystems shall be avoided, with reuse and infiltration options being pursued.</p>	
<p>8. While Lot 2 South has little remnant vegetation, the required widening of Captain Cook Drive will require removal of significant vegetation, including endangered ecological communities. Provision of any required offsets shall be within the Kurnell peninsula, particularly within Lot 2 North and areas of Lot 2 South, rather than at a remote site under the BOS.</p>	<p>Offsetting for the impacts of the project, if required, will be addressed as required under the Biodiversity Offset Scheme. However, <b>Chapter 5</b> of the BAR notes that there will be large areas of terrestrial and wetland habitat that will be created as the quarried area is rehabilitated and replanted. This will include littoral rainforest, freshwater wetlands, swamp oak floodplain forest, Kurnell Dune Forest and Bangalay Sand Forest areas of replanting. There will be a net increase in the habitats on site as a result.</p>
<p>9. Consideration shall be given to the Grey-headed Flying-fox camp located in the Conservation Area of the Sydney Desalination Plant directly to the east of the subject land (figure 1). This is a planning constraint and will require careful management (e.g. inclusion of visual buffers, minimal artificial light, and noise attenuation measures) at the DA stage. The camp shall be isolated from human habitation by a management zone &gt; 300 m wide (Draft National Recovery Plan for the Grey-headed Flying-fox <i>Pteropus poliocephalus</i>, Department of Environment, Climate Change and Water NSW, Sydney, 2009 p.15).</p>	<p><b>Chapter 3</b> of the BAR has given consideration to Grey-headed Flying-foxes, including the camp in the Conservation Area of the desalination plant. It is important to note, as explained above, that there will be extensive replanting in the open space corridors using local native plant species. This, combined with replanting in the residential areas will provide for significantly increased foraging habitat for flying foxes and other native species.</p>
<p>10. The Conservation Area is also home to threatened microbat species, including Eastern Bentwing, Little Bentwing, and Southern Myotis, and the endangered Green and Golden Bellfrog.</p>	<p>As set out in <b>Chapter 5</b> of the BAR and within the ECMS, extensive areas of habitat will be created in the open space corridors and will be actively managed for conservation. This will afford habitat to these and other species.</p>
<p>11. Lot 2 North is on the boundary of a RAMSAR Wetland and a known feeding site of migratory shorebirds (figure 2). Risks from development here include: artificial light impacts, increased energy expenditure from birds, increased foot</p>	<p>These risks have been considered in the BAR and mitigation measures are provided for these in <b>Chapter 6</b>.</p>

traffic on foreshore area, and increased chance of dog attacks. Birds known to use the foreshore area include:

<ul style="list-style-type: none"> <li>• Whimbrels (listed: EPBC Act, Bonn, CAMBA, JAMBA, ROKAMBA)</li> </ul>	<p>Noted. As set out in <b>Chapter 5</b> of the BAR and within the ECMS, extensive areas of habitat will be created in the open space corridors and will be actively managed for conservation. This will help to buffer and protect adjacent habitats within the RAMSAR Wetland that provide habitats for this species. .</p>
<ul style="list-style-type: none"> <li>• Bar Tailed Godwits (listed: EPBC Act, Bonn, CAMBA, JAMBA, ROKAMBA)</li> </ul>	<p>As above.</p>
<ul style="list-style-type: none"> <li>• Double-banded Plovers (listed: EPBC Act, Bonn)</li> </ul>	<p>As above.</p>
<ul style="list-style-type: none"> <li>• Pied Oyster Catchers (listed: NSW Endangered)</li> </ul>	<p>As above.</p>
<ul style="list-style-type: none"> <li>• Eastern Curlews (listed: EPBC Act, Bonn, CAMBA, JAMBA, ROKAMBA)</li> </ul>	<p>As above.</p>
<p>12. Future development in any lots shall comply with the Department of Climate Change, Energy, the Environment and Water's (2023) 'National Light Pollution Guidelines for Wildlife' in respect to mitigating impacts on migratory shorebirds, bats, and other fauna.</p>	<p>Potential impacts of light spill have been considered and discussed in <b>Chapter 6</b> of the BAR. Mitigation measures are covered in <b>Chapter 7</b>. Mitigation measures for light are prescribed and will follow the National Light Pollution Guidelines for Wildlife.</p>
<p>13. <i>Petalura gigantea</i> (giant dragonfly) is an Endangered Species, listed under the Biodiversity and Conservation Act in NSW. The Australian Museum has records of this species in Towra Point nature reserve (figure 3). The larvae of the giant dragonfly make long burrows under swamps. Larvae are slow growing and develop over 6 to 10 years, theories suggest it could be weather/rainfall dependent. This species is not referenced in any of the biodiversity reports.</p>	<p>As set out in <b>Chapter 5</b> of the BAR and within the ECMS, extensive areas of habitat will be created in the open space corridors and will be actively managed for conservation. This will afford habitat to these and other species.</p>
<p>14. Appropriate buffers shall be provided to wetlands in accordance with the Resilience and Hazardous SEPP as well as Council's DCP Chapter 39 Natural Resource Management.</p>	<p>The BAR considers wetland buffers in <b>Chapters 5</b> and <b>7</b> and notes that with the rehabilitation of the sand quarry, there will be extensive buffers created to the existing wetlands. Moreover, all such wetlands, and newly created terrestrial habitats will be actively managed for conservation as outlined in the ECMS.</p>

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# APPENDIX B :

## Threatened Flora and Fauna Likelihood of Occurrence Assessment



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**Table 15 Threatened flora species recorded in the locality (EES, 2020) and an assessment of the likelihood of occurrence on the subject land**

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence	
Asteraceae	<i>Senecio spathulatus</i>	Coastal Groundsel	E	-	Found on frontal dunes and shorelines. Associated with coastal dry sclerophyll forests that occur on sand, and grasslands, and heathlands.	Low potential to occur. Some habitat present in the form of frontal dunes.	
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>	Port Jackson Heath	V	-	Grows in a range of habitat types, particularly those on shale soils or with a strong shale influence. Associated with open heath or dry sclerophyll forests on sandy soils and is found in slightly disturbed areas	Unlikely to occur. No suitable habitat present in the subject land.	
Fabaceae	<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E	E	Coastal scrub and dry sclerophyll woodland on sandy soils.	Unlikely to occur. No suitable habitat present in the subject land	
Lamiaceae	<i>Prostanthera densa</i>	Villous Mint-bush	V	V	Sclerophyll forest and shrubland on coastal headlands and near coastal ranges, mainly on sandstone, and rocky slopes near the sea.	Unlikely to occur. No suitable habitat present in the subject land.	
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Brush	Bottle	V	-	Grows in dry sclerophyll forest on the coast and adjacent ranges.	Unlikely to occur. No suitable habitat present in the subject land.
Myrtaceae	<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E	V	Associated with open heath or dry sclerophyll forests on sandy soils and is found in slightly disturbed areas	Unlikely to occur. No suitable habitat present in the subject land.	

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	On south coast of NSW occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Unlikely to occur. No suitable habitat present in the subject land.
Orchidaceae	<i>Pterostylis Botany Bay</i> sp.	Botany Bay Bearded Orchid	E	E	Occupies moist level sites on skeletal sandy soils derived from sandstone. Often associated with coastal heath dominated by 'Melaleuca nodosa' and 'Baeckea imbricata'.	Unlikely to occur. No suitable habitat present in the subject land.
Orchidaceae	<i>Thelymitra atronitida</i>	Black-hooded Sun Orchid	CE	-	Known from only two localities in NSW, Cape Solander in Botany Bay National, and Bago State Forest. Cape Solander population inhabits shallow black peaty soil in coastal heath on sandstone. Bago population inhabits open forest with a heathy understorey on well-drained sand or clay-loam soils.	Unlikely to occur. No suitable habitat present in the subject land. No records for 20 years.

Key: Legal Status - CE = Critically Endangered, E = Endangered, V = Vulnerable

**Table 16 Threatened fauna species recorded in the locality (EES, 2020) and an assessment of the likelihood of occurrence on the subject land**

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
<b>Amphibia</b>						
Hylidae	<i>Litoria aurea</i>	Green and Golden Bell Frog	E	V	Inhabits a wide range of water bodies, particularly ephemeral ponds for breeding, with the exception of fast-flowing streams. Terrestrial habitat includes grassy low vegetation and diurnal shelter sites. In NSW, this species is commonly found in disturbed areas although vegetation diversity is positively associated with presence.	Low potential to occur. Previous records of species presence, marginal suitable habitat present on the subject land.
Myobatrachidae	<i>Crinia tinnula</i>	Wallum Froglet	V		Found in a wide range of habitats, usually associated with acidic swamps on coastal sand plains. They typically occur in sedgeland and wet heathlands. They can also be found along drainage lines within other vegetation communities and disturbed areas, and occasionally in swamp sclerophyll forests.	Low potential to occur. Previous records of species presence, marginal suitable habitat on the subject land.
Myobatrachidae	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V		Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					occur in dense vegetation and debris beside ephemeral creeks and gutters.	
<b>Aves</b>						
Accipitridae	<i>Circus assimilis</i>	Spotted Harrier	V		Occurs throughout mainland Australia except in densely forested or wooded habitats of the coast, escarpment, and ranges. It inhabits open grassy woodland, shrubland, and grassland. It nests in trees and preys on terrestrial mammals, birds, and reptiles, and will occasionally consume carrion.	Unlikely to occur. No suitable habitat present on the subject land.
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	M	Found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands	Moderate potential to occur. Highly mobile, aerial species that may utilise the subject land and surrounds as part of a wider foraging range on occasion. No nesting habitat present.
Accipitridae	<i>Lophoictinia isura</i>	Square-tailed Kite	V		Found in a variety of timbered habitats including dry woodlands and open forests. It is a specialist hunter preying on passerine birds, especially honeyeaters and targets predominately nestlings and insects occurring in the tree canopy. It nests in tree forks or on large horizontal tree limbs located mostly along or near watercourses	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey	V	M,B	Found at littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands	Low potential to occur. Highly mobile, aerial species that may utilise the subject land and surrounds as part of a wider foraging range on occasion. No nesting habitat present.
Anatidae	<i>Oxyura australis</i>	Blue-billed Duck	V		Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. This species is completely aquatic.	Unlikely to occur. No suitable habitat present on the subject land.
Apodidae	<i>Apus pacificus</i>	Fork-tailed Swift		M,C,J,K	Forages aerially over a variety of habitats usually over coastal and mountain areas with a preference for wooded areas.	Unlikely to occur. Highly mobile, aerial species that may pass over the subject land but unlikely to utilise it directly.
Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail		M,C,J,K	Almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Occur over most types of habitat, particularly above wooded areas including open forest and rainforest, between trees or in clearings and below the canopy.	Unlikely to occur. Highly mobile, aerial species that may pass over the subject land but unlikely to utilise it directly.
Ardeidae	<i>Ardea ibis</i>	Cattle Egret		M	Found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. Will also forage at	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					garbage dumps, and is often seen with cattle and other stock.	
Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes ( <i>Typha</i> spp.) and spikerushes ( <i>Eleocharis</i> spp.).	Low potential to occur. Marginal suitable habitat present on the subject land.
Ardeidae	<i>Egretta sacra</i>	Eastern Reef Egret		M	Inhabits intertidal zone, rocks, coral reefs, mangroves and mudflats.	Moderate potential to occur. Some suitable habitat present on the subject land.
Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V		Inhabits terrestrial and estuarine wetlands, generally in areas containing permanent water and dense vegetation. The species can occur in flooded grassland, woodland, rainforest, and mangroves. It feeds on frogs, reptiles, fish, and invertebrates such as snails, dragonflies, shrimp and crayfish. It roosts during the day on the ground amongst dense reeds or within trees. It nests in branches overhanging water.	Low potential to occur. Marginal suitable foraging habitat present on the subject land, no nesting habitat present.
Artamidae	<i>Artamus cyanopterus</i>	Dusky Woodswallow	V		Found in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations.	Unlikely to occur. No suitable habitat present on the subject land.
Burhinidae	<i>Esacus magnirostris</i>	Beach Stone-curlew	CE	M	Found exclusively along the coast; on a wide range of beaches, islands, reefs and in estuaries, and may often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on	Low potential to occur. Marginal suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves.	
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew		E	Lives in open forest and woodlands with a sparse, grassy ground layer, and fallen timber. It feeds on insects and small insects and vertebrates including frogs, lizards, and snakes. Nesting is undertaken in a scrape or small bare patch.	Unlikely to occur. No suitable habitat present on the subject land.
Cacatuidae	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo		V	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. In NSW, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes.	Unlikely to occur. No suitable habitat present on the subject land.
Cacatuidae	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo		V	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak ( <i>Allocasuarina littoralis</i> ), Forest She-oak ( <i>A. torulosa</i> ) or Drooping She-oak ( <i>A. verticillata</i> ) occur.	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Cacatuidae	<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V		Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Nesting, in tree hollows, occurs throughout the second half of the year.	Unlikely to occur, no suitable habitat present on the subject land.
Charadriidae	<i>Charadrius leschenaultii</i>	Greater plover	Sand- V	V,M,B,C,J,K	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Rare on the east coast, usually found singly.	Low potential to occur. Marginal suitable habitat present on the subject land.
Charadriidae	<i>Charadrius mongolus</i>	Lesser plover	Sand- V	E,M,B,C,J,K	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Highly gregarious, frequently seen in flocks exceeding 100 individuals; also often seen foraging and roosting with other wader species.	Moderate potential to occur. Some suitable habitat present in the Kurnell Peninsula
Charadriidae	<i>Charadrius veredus</i>	Oriental Plover		M,B,C,J,K	Occurs mostly in northern Australia as a non-breeding visitor to coastal and inland areas, rarely recorded in the southern half Australia. Inhabits beaches, tidal mudflats and grassland.	Unlikely to occur. No suitable habitat present on the subject land.



Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Charadriidae	<i>Pluvialis fulva</i>	Pacific Golden Plover		M,B,C,J,K	Occurs in coastal habitats and occasionally around inland wetlands. Inland areas usually consist of wetlands with muddy margins and short emergent vegetation.	Moderate potential to occur. Some suitable habitat present on the subject land.
Charadriidae	<i>Pluvialis squatarola</i>	Grey Plover		M,B,C,J,K	Found in coastal areas. Breeds in the northern hemisphere, usually only females winter in Australia. Forage on beaches and tidal flats.	Low potential to occur. Marginal suitable habitat present in the subject land.
Charadriidae	<i>Thinornis rubricollis</i>	Hooded Plover	CE	V,M	The species inhabits coastal areas, on or near high energy sandy beaches. They are generally found close to the shore but may visit coastal lakes.	Unlikely to occur. No suitable habitat present on the subject land.
Diomedeidae	<i>Thalassarche melanophris</i>	Black-browed Albatross	V	V,M,B	Marine species that breeds on subantarctic and peri-antarctic islands. Species is rarely sighted over land away from its breeding islands.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Diomedeidae	<i>Thalassarche cauta</i>	Shy Albatross	V	V,M,B	Species is marine occurring in subantarctic and subtropical waters.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Diomedeidae	<i>Diomedea exulans</i>	Wandering Albatross	E	V,M,B	Marine and pelagic species that nests on islands near coastal or inland ridges, slopes, plateaux and plains, often on marshy ground.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Estrildidae	<i>Neochmia ruficauda</i>	Star Finch	Ex	E	Presumed extinct in NSW. Occurred in grasslands and woodlands close to freshwater bodies.	Unlikely to occur. Presumed extinct in NSW, single record from 1986.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Estrildidae	<i>Stagonopleura guttata</i>	Diamond Firetail	V		Occurs in grassy eucalypt woodland, open forest and riparian areas.	Unlikely to occur. No suitable habitat present on the subject land.
Falconidae	<i>Falco subniger</i>	Black Falcon	V		Inhabits woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. They are generally associated with streams or wetlands, visiting them in search of prey and often using standing trees as lookout posts zones.	Unlikely to occur. No suitable habitat present on the subject land.
Frigatidae	<i>Fregata ariel</i>	Lesser Frigatebird		M,C,J,K	Inhabits tropical and subtropical seas and nests in trees on Christmas Island. Are nearly always flying; rarely swim and cannot walk. Usually only spotted from the coast at the onset of a cyclone.	Unlikely to occur. No suitable habitat present on the subject land.
Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V		Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	High potential to occur. Suitable habitat present on the subject land, observed during surveys.
Haematopodidae	<i>Haematopus longirostris</i>	Pied Oystercatcher	E		Prefers intertidal flats of inlets and bays, open beaches and sandbanks. Nests primarily on coastal or estuarine beaches.	High potential to occur. Suitable habitat present on the subject land.
Laridae	<i>Chlidonias leucopterus</i>	White-winged Black Tern		M,C,J,K	Species occurs primarily in fresh, brackish or saline, and coastal or sub coastal wetlands. The species does not breed in Australia but	Low potential to occur. Marginal suitable habitat present in the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					roosts near the in branches and other debris near wetland edges.	
Laridae	<i>Chlidonias niger</i>	Black Tern		M	Found in coastal environments, including sheltered lagoons and estuaries, and on a rock platform near a coastal embayment. Black Terns often forage and roost with other terns, especially other marsh terns. Only four accepted records of individual Black Terns in NSW exist, one in Boat Harbour in 1990.	Unlikely to occur. Not observed for >25yrs.
Laridae	<i>Gelochelidon nilotica</i>	Gull-billed Tern		M,C	Occurs in colonies on lakes, marshes and coasts. Breeds in Australia (and overseas), making nests in a scrape on the ground.	Unlikely to occur. No suitable habitat present on the subject land.
Laridae	<i>Gygis alba</i>	White Tern	V	M	Occurs mostly in tropical and subtropical seas and islands, nesting in a depression or damaged area on the high branches of trees. Vagrant birds occur in coastal NSW waters, particularly after storm events	Unlikely to occur. No suitable habitat present on the subject land.
Laridae	<i>Hydroprogne caspia</i>	Caspian Tern		M, J	Prefers sheltered coastal embayments but is known to occur in near-coastal or inland terrestrial wetlands. Builds nests in open areas or areas with low vegetation.	Moderate potential to occur. Some suitable habitat present on the subject land.
Laridae	<i>Procelsterna cerulea</i>	Grey Ternlet	V	M	Forages on crustacean and fish on the ocean surface, nesting on Lord Howe Island. Vagrant birds occasionally occur in coastal NSW waters, particularly after storm events.	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Laridae	<i>Stercorarius parasiticus</i>	Arctic Jaeger		M,C,J,K	Summer migrant which breeds in the northern hemisphere. Oceanic, coastal, occasionally enters sheltered bays and sub-coastal wetlands.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Laridae	<i>Sternula albifrons</i>	Little Tern	E	M,B,C,J,K	Occurs in sheltered coastal environments. Nests located on open sand in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. Forage in the shallow channels, estuaries and along the beach shoreline.	High potential to occur. Suitable habitat present on the subject land, observed during surveys.
Laridae	<i>Sterna fuscata</i>	Sooty Tern	V	M	Occurs over tropical and sub-tropical seas. In NSW only known to breed at Lord Howe Island. Occasionally seen along coastal NSW, especially after cyclones. Large flocks may be present in off shore waters.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Laridae	<i>Sterna hirundo</i>	Common Tern		M,C,J,K	Marine, pelagic and coastal habitats. Non-breeding migrant winters in Australia. Commonly observed in near-coastal waters, ocean beaches, platforms, headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores, where they roost and forage.	Moderate potential to occur. Some suitable habitat present on the subject land.
Meliphagidae	<i>Epthianura albifrons</i>	White-fronted Chat	V		This is a gregarious species generally found foraging on bare or grassy ground in wetland areas, alone or in pairs. They feed on insects,	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					mainly flies and beetle caught on the ground or close to. It occupies foothills and slopes up to 1000 m ASL, though in coastal areas is predominately found in areas of salt marsh, and occasionally in low shrubs bordering wetland areas.	
Meliphagidae	<i>Epthianura albifrons</i>	White-fronted Chat population in the Sydney Metropolitan Catchment Management Area	E		Regularly observed in the saltmarsh of Newington Nature Reserve (with occasional sightings from other parts of Sydney Olympic Park and in grassland on the northern bank of the Parramatta River). Current estimates suggest this population consists of 8 individuals.	Unlikely to occur. No suitable habitat present on the subject land.
Procellariidae	<i>Ardenna grisea</i>	Sooty Shearwater		M,J	Migratory, appears in summer. Breeds on islands off New South Wales (NSW) and Tasmania. Forages in pelagic waters, rarely coming to shore except during storms.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Procellariidae	<i>Ardenna pacificus</i>	Wedge-tailed Shearwater		M,J	Species is pelagic with only one breeding area on the mainland.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Procellariidae	<i>Ardenna tenuirostris</i>	Short-tailed Shearwater		M,C,J,K	Occurs in large flocks in coastal and oceanic regions.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Procellariidae	<i>Macronectes giganteus</i>	Southern Giant Petrel	E	E,M,B	Pelagic species with a circumpolar range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW.	Unlikely to occur. Pelagic species which does not forage or roost onshore.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Procellariidae	<i>Macronectes halli</i>	Northern Giant-Petrel	V	V,M,B	Pelagic species with a circumpolar pelagic distribution, usually between 40-64°S in open oceans. Their range extends into subtropical waters (to 28°S) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V		Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Also utilises isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees. Roosts in treetops, often distant from feeding areas. Nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts.	Unlikely to occur. No suitable habitat present on the subject land.
Psittacidae	<i>Lathamus discolor</i>	Swift Parrot	E	CE,M	Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations	Unlikely to occur. No suitable habitat present on the subject land.
Psittacidae	<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Occurs in Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Rostratulidae	<i>Rostratula australis</i>	Australian Painted Snipe	E	E,M	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber	Unlikely to occur. No suitable habitat present on the subject land.
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper		M,B,C,J,K	Inhabits coastal or inland wetlands, both saline and fresh. It is more commonly found on muddy edges or rocky shores.	Moderate potential to occur. Some habitat present in the subject land.
Scolopacidae	<i>Arenaria interpres</i>	Ruddy Turnstone		C,J,K	Mainly inhabits exposed rocks or reefs, often with shallow pools, and on beaches.	Moderate potential to occur. Some habitat present in the subject land.
Scolopacidae	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M,B,C,J,K	Prefers the grassy edges of shallow inland freshwater wetlands, but also occurs at other habitats including mangroves, beaches, mudflats and sewage farms.	Moderate potential to occur. Some habitat present in the subject land.
Scolopacidae	<i>Calidris alba</i>	Sanderling	V	M,B,C,J,K	Occurs in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; between September and May. Feeds on plants, seeds, worms, crustaceans, spiders, jellyfish and fish, foraging around rotting heaps of kelp, at the edges of shallow pools on sandspits and on nearby mudflats.	Moderate potential to occur. Some habitat present in the subject land.
Scolopacidae	<i>Calidris canutus</i>	Red Knot		E,M,BC,J,K	Occur on the coast in sandy estuaries with tidal mudflats.	Low potential to occur. Marginal suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE,M,C,J,K	Occurs mainly on intertidal mudflats in coastal areas including sheltered estuaries and bays. Less often found inland in appropriate water sources such as dams and lakes.	Moderate potential to occur. Some habitat present in the subject land.
Scolopacidae	<i>Calidris melanotos</i>	Pectoral Sandpiper		M,B,J,K	Species prefers shallow fresh to saline wetlands and is known to utilise lagoons, estuaries, bays, swamps, lakes, inundated grasslands and other water bodies. Species does not breed in Australia.	Unlikely to occur. No suitable habitat present on subject land, not recorded for >25yrs.
Scolopacidae	<i>Calidris ruficollis</i>	Red-necked Stint		M,B,C,J,K	Species occurs in coastal areas including sheltered inlets, bays, lagoons, mudflats, shallow wetlands, swamps and other water bodies. Species roosts in primarily near water bodies listed above, but also recorded at inland clay pans.	Moderate potential to occur. Some suitable habitat present in the subject land.
Scolopacidae	<i>Calidris subminuta</i>	Long-toed Stint		M,B,C,J,K	Occurs as scattered records in NSW, including Botany Bay. The Long-toed Stint forages on wet mud or in shallow water, often among short grass, weeds and other vegetation on islets or around the edges of wetlands. Feeds on seeds, molluscs, crustaceans and insects mainly on fresh waters through temporary wetlands in Australia.	Unlikely to occur. No suitable habitat present on subject land, not recorded for >25yrs.



Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	<i>Calidris tenuirostris</i>	Great Knot	V	CE,M,B,C,J,K	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons.	Moderate potential to occur. Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Gallinago hardwickii</i>	Latham's Snipe		M,B,J,K	Inhabit open, freshwater wetlands with low, dense vegetation.	Low potential to occur. Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V	M,B,C,J,K	Estuarine sandflats and mudflats, harbours, lagoons, saltmarshes.	Low potential to occur. Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Limosa lapponica</i>	Bar-tailed Godwit		M,B,C,J,K	Found mainly in coastal habitats including large intertidal sandflats, estuaries, bays and lagoons. Often occurs at seagrass and sometimes in nearby saltmarsh.	High potential to occur. Suitable habitat present in the subject land.
Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit	V	M,B,C,J,K	Found in coastal habitats such as mudflats, estuaries, bays and intertidal sandflats.	Low potential to occur. Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Numenius madagascariensis</i>	Eastern Curlew		CE,M,B,C,J,K	Prefers sheltered coasts, especially estuaries, bays, harbours, inlets and lagoons. Also known to occur in sewage farms, wetlands and mangroves. Species roosts on sandy spits and in low Saltmarsh or mangroves.	Moderate potential to occur. Some suitable habitat present in the subject land.
Scolopacidae	<i>Numenius minutus</i>	Little Curlew		M,B,C,J,K	Most often found feeding in short, dry grassland and sedgeland, including dry floodplains and black soil plains, which have scattered, shallow freshwater pools or areas	Unlikely to occur. No suitable habitat present on subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					seasonally inundated. Open woodlands with a grassy or burnt understorey, dry saltmarshes, coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, mown lawns, gardens, recreational areas, ovals, racecourses and verges of roads and airstrips are also used.	
Scolopacidae	<i>Numenius phaeopus</i>	Whimbrel		M,B,C,J,K	Occurs primarily in intertidal mudflats or sheltered coasts, but also occurs in sheltered coastal areas and saline or brackish lakes near the coast. Nesting usually occurs in mangroves and tall coastal trees.	Moderate potential to occur. Some suitable habitat present in the subject land.
Scolopacidae	<i>Tringa brevipes</i>	Grey-tailed Tattler		M,B,C,J,K	Found on sheltered coasts with reefs and rock platforms or with intertidal mudflats.	Moderate potential to occur. Some suitable habitat present in the subject land.
Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper		M,B,C,J,K	Occurs in well-vegetated, shallow, freshwater wetlands that are contain emergent, aquatic plants or grass, and are dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums Eucalyptus camaldulensis and often with fallen timber. Also recorded in grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops.	Unlikely to occur. No suitable habitat present on subject land, not recorded for >25yrs.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Scolopacidae	<i>Tringa incana</i>	Wandering Tattler		M,B,J	Non-breeding migratory species, found on rocky coasts, reefs, platforms, points, spits, offshore islands and shingle beaches or beds. Avoids mudflats.	Low potential to occur suitable Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank		M,B,C,J,K	Occurs in a wide variety of inland wetlands and sheltered coastal areas. Species does not breed in Australia.	Low potential to occur suitable Marginal suitable habitat present in the subject land.
Scolopacidae	<i>Xenus cinereus</i>	Terek Sandpiper	V	M,B,C,J,K	Found on the coast in mangrove swamps, tidal mudflats and the seashore.	Moderate potential to occur. Some suitable habitat present in the subject land.
Sulidae	<i>Sula leucogaster</i>	Brown Booby		M,C,J,K	Occurs on oceans, reefs, rocky islands and around harbours mostly in the tropical regions from QLD border north. Very rare, but occasionally found around Sydney and Melbourne regions.	Unlikely to occur. No suitable habitat present on subject land.
Stercorariidae	<i>Stercorarius pomarinus</i>	Pomarine Jaeger		M,C,J	Migratory species which breeds on Arctic tundra and islands. Winters in Australia along the NSW coastline where it feeds on fish, carrion and other birds, Frequently robs gulls and terns for catches.	Unlikely to occur. Pelagic species which does not forage or roost onshore.
Strigidae	<i>Ninox strenua</i>	Powerful Owl	V		Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Also occurs in fragmented habitats. Nests in hollows of large, old eucalypts.	Low potential to occur. Highly mobile, aerial species that may utilise the subject land and surrounds as part of a wider foraging range on

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
						occasion. No nesting habitat present.
Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis		M,B	Preferred foraging and breeding habitat are fresh water marshes at the edges of water bodies. This species has low breeding site fidelity and nests in primarily in swamps.	Unlikely to occur. No suitable habitat is present in the subject land.
Tytonidae	<i>Tyto longimembris</i>	Eastern Grass Owl	V		Occurs in areas with tall grass including swamps, grassy plains and flood plains. Species breeds on the ground within dense trodden grass.	Unlikely to occur. No suitable habitat is present in the Kurnell Peninsula
Tytonidae	<i>Tyto novaehollandiae</i>	Masked Owl	V		Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. The typical diet consists of tree-dwelling and ground mammals, especially rats	Low potential to occur. Highly mobile, aerial species that may utilise the subject land and surrounds as part of a wider foraging range on occasion. No nesting habitat present.
Tytonidae	<i>Tyto tenebricosa</i>	Sooty Owl	V		Occurs in coastal rainforest, including dry, subtropical, and temperate rainforests, and moist eucalypt forests. Utilises tall trees in heavily vegetated areas for day time resting. It hunts during the night for small ground or tree dwelling mammals such as the Common Ringtail Possum or Sugar Glider. The species requires very large tree hollows for nesting.	Low potential to occur. Highly mobile, aerial species that may utilise the subject land and surrounds as part of a wider foraging range on occasion. No nesting habitat present.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
<b>Mammalia</b>						
Balaenidae	<i>Eubalaena australis</i>	Southern Right Whale	E	E,B	Occurs along the Australian coast between late April and early November. Significant calving grounds in near-shore waters off the southern coasts of Australia. Primary feeding areas between 40° S and 55° S	Unlikely to occur. The species may traverse outside the Kurnell Peninsula only. The Kurnell Peninsula is not in the identified core breeding, calving, or feeding grounds.
Balaenopteridae	<i>Megaptera novaeangliae</i>	Humpback Whale	V	V,B	Annual migrations occur between breeding areas in tropical waters along the east and west coast of Australia (15° S to 20° S) and feeding areas in the Antarctic (south of 56° S). The migratory habitat for the humpback whale around mainland Australia is primarily coastal waters less than 200 m in depth and generally within 20 km of the coast.	Unlikely to occur. The species may traverse outside the Kurnell Peninsula only. The Kurnell Peninsula is not in the identified core breeding, calving, or feeding grounds.
Burramyidae	<i>Cercartetus nanus</i>	Eastern Pygmy Possum	V		Species is found in a broad range of habitats from rainforest to wet and dry sclerophyll forests through to woodland and heath. Woodland and heath habitats are preferred. The species feeds on pollen and nectar from banksias, eucalypts, and bottlebrushes, though will eat soft fruits when flowers are unavailable, and will also eat insects throughout the year. They shelter in tree hollows, rotten stumps, holes in the ground, abandoned birds' nests and Ringtail Possum dreys, and thickets of vegetation. Tree	Unlikely to occur. No suitable habitat present on the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					hollows are preferred for nesting but the species will also nest under tree bark and shredded bark in tree forks.	
Dugongidae	<i>Dugong dugon</i>	Dugong	E	M,B	Occur in wide shallow protected bays, wide shallow mangrove channels and in the lee of large inshore islands. Will also occupy deeper waters if their sea grass food is available. Known from incidental records in northern NSW only.	Unlikely to occur. The species may traverse outside the Kurnell Peninsula only. The Kurnell Peninsula is not in the identified core breeding, calving, or feeding grounds. Not recorded for >25yrs.
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	V		Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low potential to occur. Marginal foraging habitat is present in the Kurnell Peninsula, but no roosting habitat.
Otariidae	<i>Arctocephalus forsteri</i>	New Zealand Fur Seal	V	M	Occur primarily around the South and Western coasts and offshore islands of Australia.	Unlikely to occur. No suitable habitat present in the subject land.
Otariidae	<i>Arctocephalus pusillus doriferus</i>	Australian seal	Fur- V	M	Reported to have bred at Seal Rocks, near Port Stephens and Montague Island in southern NSW. Prefers rocky parts of islands with flat, open terrain.	Low potential to occur. Marginal suitable habitat present in the subject land.

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	V	V	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	Unlikely to occur. No suitable habitat present in the Kurnell Peninsula.
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	High potential to occur. No core roosting habitat present, observed using the Kurnell Peninsula as marginal foraging habitat
Vespertilionidae	<i>Miniopterus australis</i>	Little Bent-winged bat	V		Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bent-winged bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	High potential to occur. Recorded using the subject land during surveys, most likely as part of a wider foraging area. No roosting habitat present.
Vespertilionidae	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-winged bat	V		Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Hunt in forested areas, catching moths and other flying insects above the tree tops.	High potential to occur. Recorded using the subject land during surveys, most likely as part of a wider foraging area. No roosting habitat present.
Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis	V		Roosts close to water in caves, mines, tree hollows, storm water channels, bridges,	High potential to occur. Recorded using the subject

Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
					buildings or in dense foliage. Forages over streams and pools catching insects and fish.	land during surveys, most likely as part of a wider foraging area. No roosting habitat present
Vespertilionidae	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V		More commonly found in tall wet forest but also occurs in dry eucalypt forest. Roosts in tree hollows and buildings. Forages along creek and river corridors.	Low potential to occur. No suitable forest habitat present for roosting, may use the subject land as part of a larger foraging area.
<b>Reptilia</b>						
Cheloniidae	<i>Caretta caretta</i>	Loggerhead Turtle	E	E,M,B	The Loggerhead turtle occurs in the open ocean until it reaches maturity, and subsequently migrates to their breeding areas where they nest on open, sandy beaches. Preferred foraging habitats include various tidal and sub-tidal areas, and the species is known to keep returning to both their chosen foraging and breeding sites throughout their life cycle.	Unlikely to occur. No suitable habitat present in the subject land.
Cheloniidae	<i>Chelonia mydas</i>	Green Turtle	V	V,M,B	The Green Turtle is known to have an initial pelagic phase, lasting up to ten years. The species subsequently settle in shallow benthic foraging habitats, when reaching 30-40 cm 'curved carapace length'. These habitats include tropical tidal and sub-tidal coral and rocky reef areas, and inshore seagrass beds.	Unlikely to occur. No suitable habitat present in the subject land.



Family	Scientific name	Common name	BC Act	EPBC Act	Habitat Requirements	Likelihood of Occurrence
Cheloniidae	<i>Eretmochelys imbricata</i>	Hawksbill Turtle		V,M,B	Species occurs in the northern Great Barrier Reef and Torres Strait, but have been seen in temperate regions as far south as northern NSW.	Unlikely to occur. No suitable habitat present in the subject land.
Varanidae	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V		Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component.	Unlikely to occur. No suitable habitat present in the subject land.

Key: Legal Status - CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Marine, C/J/K/B = Protected under International Migratory Agreements with China, Japan, Korean and/or the Bonn Convention

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# APPENDIX C :

## Flora Species List



# APPENDIX D :

## Fauna Species List

**Table 18 Fauna species recorded on the subject land**

Family	Species name	Common Name	EPBC Act	BC Act
<b>Amphibia</b>				
Myobatrachidae	<i>Crinia signifera</i>	Common Eastern Froglet		
Myobatrachidae	<i>Limnodynastes peronii</i>	Striped Marsh frog		
Hylidae	<i>Litoria fallax</i>	Eastern Dwarf Tree Frog		
Hylidae	<i>Litoria peronii</i>	Perons tree frog		
<b>Aves</b>				
Sturnidae	<i>Acridotheres tristis</i>	Common Myna		
Anatidae	<i>Anas castanea</i>	Chestnut Teal		
Anatidae	<i>Anas platyrhynchos</i>	Mallard		
Scolopacidae	<i>Calidris ruficollis</i>	Red-necked Stint	C/J/K/B	
Cacatuidae	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-cockatoo		
Laridae	<i>Chroicocephalus novaehollandiae</i>	Silver Gull		
Corvidae	<i>Corvus orru</i>	Torresian Crow		
Ardeidae	<i>Egretta novaehollandiae</i>	White-faced Heron		
Falconidae	<i>Falco cenchroides</i>	Nankeen Kestrel	M	
Rallidae	<i>Fulica atra</i>	Eurasian Coot		
Rallidae	<i>Gallinula tenebrosa</i>	Dusky Moorhen		
Artamidae	<i>Gymnorhina tibicen</i>	Australian Magpie		
Haematopodidae	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher		
Maluridae	<i>Malurus lamberti</i>	Variiegated Fairywren		
Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	Little pied Cormorant		
Anatidae	<i>Anas superciliosa</i>	Pacific Black Duck		
Passeridae	<i>Passer domesticus</i>	House Swallow		
Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian Pelican	M	
Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant		
Phalacrocoracidae	<i>Phalacrocorax varius</i>	Pied Cormorant		
Columbidae	<i>Phaps chalcoptera</i>	Common Bronzewing		
Rallidae	<i>Porphyrio porphyrio</i>	Purple swamphen		
Rhipiduridae	<i>Rhipidura leucophrys</i>	Willy Wagtail		
Laridae	<i>Sternula albifrons</i>	Little Tern	C/J/K/B, M	E
Laridae	<i>Thalasseus bergii</i>	Crested Tern	J, M	

Family	Species name	Common Name	EPBC Act	BC Act
Charadriiformes	<i>Vanellus miles</i>	Masked Lapwing		
<b>Mammalia</b>				
Molossidae	<i>Austronomus australis</i>	White-striped Free-tailed Bat		
Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's Wattled Bat		
Vespertilionidae	<i>Chalinolobus morio</i>	Chocolate Wattled Bat		
Felidae	<i>Felis catus</i>	Feral cat		
Miniopterus	<i>Miniopterus australis</i>	Little Bent-winged bat		V
Miniopterus	<i>Miniopterus oriana oceanensis</i>			
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey headed Flying fox	V	V
Muridae	<i>Ratus ratus</i>	Black Rat		
Vespertilionidae	<i>Vespadelus vulturnus</i>	Little Forest Bat		
Canidae	<i>Vulpes vulpes</i>	Red Fox		

Key: Legal Status - CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Marine, C/J/K/B = Protected under International Migratory Agreements with China, Japan, Korean and/or the Bonn Convention

# APPENDIX E :

## AES Green and Golden Bell Frog Assessment





Our Ref: DOC23/00283  
Your Ref.  
The Holt Estate 1861  
Besmaw Pty Ltd  
P: 02 9923 1944 M: 0403 461 418  
Supplied by e-mail: dmccomb@besmaw.com.au

Wednesday 6<sup>th</sup> December 2023

Attention: Duncan McComb

Dear Duncan

**Re: Specialist Assessment of land owned by Besmaw Pty Ltd [251, 260R, 278 & 280-282 Captain Cook Drive] as well as land associated with required upgrade to infrastructure within sections of the road reserve frontage of Captain Cook Drive, Kurnell, NSW**

Thank you for engaging Australian Environmental Surveys – (AES, Ross Wellington) to undertake a supplementary ecological assessment for the Green and Golden Bell Frog (GGBF) and the potential habitat areas considered to possibly occur within the ‘subject land’ identified above.

After having had a lengthy involvement with conservation efforts for the GGBF across NSW and at Kurnell in particular, I appreciate the opportunity to provide conservation related input on this topic and in support of your proposal.

I have now reviewed the provided background information and other assessment reports, as well as the broader framework of the current proposal. I have also undertaken both a targeted GGBF survey and a species expert habitat appraisal for the GGBF across the subject land.

Furthermore, I have also undertaken a linear assessment along the road reserve and adjacent lands along Captain Cook Drive that might require upgrade or widening. Whilst I did not undertake targeted GGBF survey along the Captain Cook Road roadside habitat area I did inspect and evaluate any existing habitat values and sites that may provide opportunities for improving such values for the GGBF where they occurred.

In providing this letter report I have attempted to outline and address several matters relating to implications of the possible occurrence of Green and Golden Bell Frog within the subject land, nearby and at Kurnell more broadly.

These matters include the adequacy of the existing survey effort undertaken by others and whilst it may have been argued that these were considered adequate, I have now supplemented these with further targeted survey effort repeating some efforts at the same locations as well as surveying other areas and including areas of all the lots comprising the subject land. The results of the additional surveys I undertook were consistent with the results of previous efforts that found no evidence of the Green and Golden Bell Frog on the subject

land. Having undertaken this additional survey effort and an evaluation of habitat elements present I have concluded that the GGBF is unlikely to be currently present within the subject land as far as this can be categorically established. I have further appraised the areas that were considered to have specific GGBF habitat value on site and have also concluded that whilst they do have relevant habitat values for the species that they do not appear to be any longer occupied. Nevertheless, these specific habitat areas are proposed for exclusion or avoidance from impact within the current proposal and in fact are identified as being not only retained but enhanced and incorporated into the broader biodiversity habitat rehabilitation and re-establishment initiatives proposed. The current master plan for the site and its planned biodiversity conservation areas and other associated measures also provides a unique opportunity to implement aspects of the Kurnell Green and Golden Bell Frog Key Population conservation strategy.

The GGBF habitat evaluation along relevant areas of the Captain Cook Drive (CCD) road reserve revealed that whilst there are elements of the local landscape along it as well as adjacent that provide habitat values for GGBF, they are generally in poor condition and are heavily weed infested. Swale areas that occur parallel to CCD (east-west) for significant lengths of some sections of the roadway, do provide inherent corridor connectivity values for GGBF.

Similarly, culverts beneath CCD may also provide connectivity value north south, across the CCD connectivity 'barrier'. All these areas are constructed and/or heavily modified habitat elements at best and are herein considered merely potential habitat elements for the GGBF and therefore should not be considered or identified as actual habitat elements requiring offsetting in my expert opinion. Nevertheless, road upgrade works that may be an essential aspect of the current proposal do provide a suitable opportunity to rehabilitate those swale areas that have become choked with weed infestations. Essential culvert upgrades also provide an opportunity to enhance connectivity and for provision of microhabitat features that may enhance such utilisation by GGBF.

Whilst all or most of these matters most specifically relate to issues, that are development assessment related and part of the approval process, sight should not be lost of the underlying conservation outcome opportunities for GGBF at Kurnell. These issues are all discussed in further detail in **Attachment 1** and **Attachment 2** to this letter report. However, the recommendations from the two GGBF evaluation component Attachments for this proposal are reiterated here.

### **Besmaw Lands Assessment Recommendations**

1. That the Green and Golden Bell Frog should be considered as having been adequately and compliantly surveyed for within the Besmaw Lands and in accordance with survey Guidelines/Protocols.
2. Targeted surveys for the Green and Golden Bell Frog have found no evidence of their presence on the subject land and it is thus considered highly likely to be currently absent from said land.
3. That Besmaw continue with its current strategy to incorporate GGBF habitat features within the master planning for the current proposal and its biodiversity reconstruction and enhancement initiative inclusions.
4. Besmaw should consider cooperating with other GGBF initiatives nearby and continue with its current approach to incorporate other Kurnell GGBF Key Population Plan initiatives in its future site considerations.

### **Captain Cook Drive Assessment Recommendations**

1. Green and Golden Bell Frog habitat along Captain Cook Drive should be considered artificial heavily modified and generally unsuitable for occupation other than as a transient pathway at best.
2. It is not possible to generate any relevant or appropriate habitat polygons for GGBF along any sections of Captain Cook Drive inspected and it is not considered herein relevant to require offsets for GGBF as part of any development assessment process including BAM.
3. Conservation measures that could be applied to the assessment considerations for GGBF might more profitably consider provision of habitat enhancement and rehabilitation initiatives particularly along drainage swale areas and culverts in concert with bush regeneration weed management.

4. Any conservation measures for GGBF should consider the GGBF Best Practice Habitat Guidelines (DECC 2008) and be recognised as contributing to implementation of the Kurnell GGBF Key Population management Plan (DECC2007)

If you have any further questions about this subject matter, please do not hesitate to contact the writer Ross Wellington, Conservation Biologist, Accredited Biodiversity Expert for the GGBF, Senior Ecologist and Principal AES, who can be contacted on 0407 489 489 or at [rwrossco@gmail.com](mailto:rwrossco@gmail.com) .

Yours sincerely



**Ross Wellington**

AES - Australian Environmental Surveys  
Proprietor and Senior Ecologist  
Accredited Biodiversity Expert  
Conservation Planner  
Environmental Educator  
0407 489489 or 0466 580882

## **Attachment 1: Detailed Comments – Description of the Planning Proposal on Besmaw Lands**

### **Background**

The subject land owned by Besmaw Pty Ltd is comprised of Lots 8//DP586986 (including a tiny inholding Lot 9 DP586986 260R), 2//DP1030269 (N) & 2//DP//559922 (S) and are mainly three large allotments located at 251, 278 & 280-282 Captain Cook Drive, essentially encompassing a coast to bayside expanse of land ca 210 ha in area that, south to north straddles the width of the Kurnell Peninsula.

The subject land has been variously developed previously or currently with Lot 2 north largely cleared, highly modified and currently operating as a horse riding, training, stables and agistment area, with a relatively small component of coastal wetland identified within the Coastal Management SEPP layer. Lot 8 has previously been largely utilised for quarried sand extraction/mining and is understood to have reached its end of mining life. Lot 8 is Zoned E4 General Industrial under the standard instrument whereas both Lot 2 north and Lot 2 south, the latter still approved and operating as a sand extraction operation-landfill site, are currently zoned DM (deferred matter) with antecedent (old LEP split) zones still applying. These lots are required to be assigned appropriate land use zones under the standard instrument LEP (Sutherland Shire Local Environmental Plan 2015). This current landowner-initiated planning proposal addresses this underlying process as part of the sites overall master planning.

The subject land provides by its location and extent, strategic connective values east-west and north-south across the Kurnell Peninsula. However, historical and ongoing development modifications within the subject land as well as across most of the peninsula generally, have significantly changed and degraded biodiversity values generally as well as specifically for GGBF. Nevertheless, fringing the subject land and adjacent are areas of high biodiversity value, with attributes including Towra Point Nature Reserve, Quibray Bay and designated RAMSAR wetlands of international importance.

The Green and Golden Bell Frog (*Litoria aurea*) has had previous consideration as a significant element of the biota at Kurnell forming a component of various assessments for developments and other activities across Kurnell where it was implicated. These considerations have been triggered by other nearby industrial sand extraction and landfill works (Breen Holdings & Rocla), wastewater treatment facility upgrades and sewage outfall pipelines (Sydney Water), desalination plant sites (Veolia), power line stanchion upgrades, maintenance, sub-station installations and sub-Botany Bay cable projects (Energy Australia), as well as residential, commercial, light industrial and recreational area more recently evaluated and approved.

In 2005 a Draft National Recovery Plan (RP) was prepared for the Green and Golden Bell Frog (GGBF). This document synthesised the then current state of understanding of the species. It further developed a comprehensive framework for the conservation of remaining 'important' GGBF populations across the species national distribution, and thus identified 'Key' populations for focused conservation efforts with specific recovery actions to be implemented at Key Population level. Consequently, Kurnell was identified as harbouring one of the then 43 recognised/known Key Populations and a RP action was the prioritised development of important population Management Plans. Kurnell was one of the first GGBF populations for which a Key Population Management Plan (KPMP) was formulated as a priority. The Kurnell GGBF KPMP was developed following a facilitated stakeholder workshop with all relevant landowner managers included in this process. This process gained insights about opportunities and risks, raised awareness of the species and was hoped to gain an improved conservation status outcome for GGBF at Kurnell. Besmaw were an active participant in that KPMP development process at that time.

Despite this level of interest and investment in the assessment of potential impacts on the GGBF across Kurnell in the years during and post the Recovery Plan's development the general perception has been that the GGBF has declined. This has likely been contributed to by the general failure in implementation of the Recovery Plan or its subsidiary KPMP developed for Kurnell resulting from moves away from a comprehensive approach to conservation generally in NSW.

It is against this backdrop that the current planning proposal is being developed. These Besmaw lands are located at a strategically important site and are proposed for rezoning with a wide array of

development outcomes envisaged. These include substantial areas being set aside and allocated for rehabilitation and reconstruction of biodiversity enriched areas. This is therefore herein considered as providing a unique opportunity to secure significant GGBF conservation outcomes as an integral part of the overall proposal.

As a part of this proposals considerations and to facilitate the best outcome for GGBF the following issues and questions regarding GGBF have been attempted to be addressed.

- Are GGBF still present within the Besmaw owned lands at Kurnell?
- To what extent are habitat values still present on the Besmaw lands?
- Has adequate survey and assessment already been undertaken to support a solid/robust understanding of the answers to the above questions?
- What other factors are at play that might influence the current planning proposal?
- What conservation measures are or could be further incorporated into the existing broader biodiversity rehabilitation works already proposed at Besmaw?
- How do these broad biodiversity related conservation measures sit within the broader implementation of RP and KPMP frameworks for the conservation of GGBF at Kurnell given that they are the only efforts undertaken to develop or provide one for the species?
- Can Besmaw in the development of its masterplan for the site actually become the primary implementation agent for the GGBF KPMP and the species broader conservation outcomes at Kurnell?

## **Method**

An evaluation of prior survey efforts for the Green and Golden Bell Frog on-site and nearby/adjacent were sourced where possible and evaluated. A Bionet Atlas search was also undertaken for the species to update records of the GGBF already in the possession of the author from previous surveys and habitat evaluations for GGBF at Kurnell where he has been involved (South Cronulla STP and deep water outfall by Sydney Water, trans Botany Bay submarine power cable and facilities upgrade by Energy Australia, Power Stanchion upgrade and maintenance works by Energy Australia, Australand Residential Development at Green Hills, Rocla sand mining proposal, Sydney Desalination Plant, Calsill Dunes development proposal, Breen Holdings land developments, Green and Golden Bell Frog Recovery Plan development for DEC, Kurnell GGBF Key Population management Plan development, GGBF best practice habitat guide formulation.

Thus, during suitable and prevailing warm and humid weather conditions, and also following recent substantial rain events, AES (Ross Wellington) undertook targeted surveys and a habitat appraisal over 16 hours on 14 and 15 November 2023. This also included a visitation to two known GGBF reference sites, one at Green Hills and the other at Arncliffe, to evaluate comparative activity levels and hence contemporaneous detectability of GGBF. Ross Wellington was accompanied by Darren Floyd during the undertaking of all the on-site survey efforts. Further survey effort was also contemporaneously undertaken along the Captain Cook Drive interface areas to each of the lots as well as west and east of the subject land allotments.

The subject land was surveyed by day to visually identify areas of potential habitat and also the finer resolution of extent of habitat type categorisations perceived to be present. This was followed by nocturnal survey efforts.

Survey methodology included diurnal searches of areas across each of the Lots comprising the subject land to identify the extent of potential habitat components present across the overall site. It also included visual scanning of suitable vegetation in suitable locations for basking individuals. Water bodies were also scanned for the visual presence of tadpoles with the intent of dip-netting where necessary or relevant. Any ideal areas were thus identified for later nocturnal search effort.

Nocturnal surveys were undertaken using headlamp and torch light to search for active amphibians as well as an auditory evaluation of calling frogs. Call playback and call imitation renditions were also undertaken at several sites and included across all land parcels.

## **Results**

Survey results included the detection of a number of non-target reptile and amphibian species.

Herpetofauna species observed included:

Frogs – Dwarf Green Tree Frog *Litoria fallax*, Brown Tree Frog *Litoria peronii*, Brown Striped Marsh Frog *Limnodynastes peronii*, Spotted Marsh Frog *Limnodynastes tasmaniensis* and Common Toadlet *Crinia signifera*.

Reptiles – Delicate Litter Skink *Lampropholis delicata*, Water Skink *Eulamprus quoyii*, and Water Dragon *Intellagama lesueurii*.

No Green and Golden Bell Frogs were detected by any of the search methods that were applied. These methods included nocturnal call playback and call imitation rendition auditory survey, nocturnal spotlight/torch/headlamp surveys of any of the areas considered to have some potential habitat value. Diurnal searches of possible shelter habitat including the scanning of emergent sedges and other fringing vegetation where it existed around wetland and dam/pond areas. Scanning of other potential shelter/basking habitat by day to reveal any GGBF perched in advantageous positions.

Lot 2 south, being the active development site was observed as having virtually zero suitable habitat for the GGBF. Most of the site was observed and evaluated as being either an active dredge pond/lake or else otherwise predominantly covered in recently disturbed earth fill deposits that had been subjected to earth works by plant machinery or roads over which these machines drive. Surveys of the accessible parts of Lot 2 south that included margins of water bodies established to retain stormwater runoff revealed little if any suitable habitat for the species. Sites at which previous targeted surveys were undertaken by Cumberland Ecology were specifically revisited during the current targeted surveys and included the western margins of Lot 2 South with its closest proximity to the most recent GGBF records purportedly from the vicinity of Green Hills.

The Lot 8 component of the subject land now persists as a completed development site of the former sand extraction facility. The site is heavily weed infested with Bitou among other weed species and other vegetation cover including Coastal Wattle. The existing form of this site appears to be remnant fragments of former dunes post mining and some lower denuded swale areas. This component of the subject land currently provides little GGBF habitat value beyond shelter/refuge habitat although some low swales could provide suitable ephemeral water bodies following extreme/heavy rain events if GGBF were still present. A single dam/pond occurs in the east adjacent to the former access road to Boat Harbour and provides what could be considered a potential breeding site although it has little fringing vegetation or emergent macrophytes. This dam appears to be suffering the effect an excess of water bird roosting activity and consequent nutrient loads.

Lot 2 north was found to be mostly devoid of any GGBF habitat values other than within the area of wetland that adjoins other drainage swales fringed with planted Swamp Oak that border the equestrian business facilities. This business is understood to have operated on the site under lease for decades. The wetland area itself was identified as having GGBF habitat values albeit it is isolated from other such areas by an open, closely cropped grassy area to the north and Captain Cook Drive to the south.

Map Figure 1 depicts those areas identified as having potential GGBF habitat values, the survey traverses undertaken in the most recent targeted survey and call playback locations where auditory surveys were undertaken.

## **Discussion**

The subject land does present some significant strategic value for the ongoing survival of Green and Golden Bell Frog at Kurnell. However, this strategic value appears to be mainly in the form of possible future opportunities presented as part of the planning proposal. Currently there is minimal actual habitat value persisting within the majority of the subject land. An area of wetland within a segment of Lot 2 North provides potential shelter, potential foraging and possibly also breeding habitat as well. This area of the subject land is to be excluded from any future proposed development impacts. Further, this area is also proposed to be enhanced and guided by the GGBF best practice habitat guide (DECC 2008) through provision of GGBF habitat features and proposed connectivity opportunities as a suite of conservation measures applied to this part of the site. Lot 2 South is currently an active industrial development site operating with approval. This precludes any current actions on-site for the benefit of GGBF and which (if present) are in any case currently actively discouraged away from the moving development impact zones. These works fronts include dredge, fill deposition, internal road use. Frogs either persisting or having been reintroduced are excluded from the subject land along its eastern boundary through the erection of a frog exclusion fence where it adjoins property including the Veolia operated Sydney Desalination Plant (SDP).

During the master planning phase of this proposal and as part of background investigation of the current known local situation of GGBF, it became apparent that Veolia/SDP were in the process of carrying out a reintroduction/translocation of GGBF. Enquiries made to Department of Planning and Environment (DPIE) as well as to Symbio revealed that it was a joint exercise by Veolia (the SDP operators) and Symbio (a private Zoo facility maintaining a GGBF breeding colony under licence, Arncliffe provenance). Froglets and tadpoles of Arncliffe provenance are understood to have already been released into the conservation area within the DSP site next door to the subject land.

These revelations followed an earlier series of pre-planning consultations with DPIE and Sutherland Shire Council about the sites future land use zone configuration and during which the GGBF was also discussed, with matters raised including the adequacy or otherwise of GGBF survey efforts undertaken to date. Matters arising from this include the GGBF reintroduction licensing decision and incongruous advice provided by DPIE with respect to GGBF being possibly present on Besmaw Land but with Besmaw considering that the survey effort, undertaken by Cumberland Ecology on their behalf, was adequate to meet survey requirements.

This is especially relevant given that Veolia has now reintroduced/translocated GGBF to the SDP conservation area. The threatened species translocation was approved by DPIE apparently premised on the belief that GGBF is extinct at Kurnell. This belief was apparently based on third party survey effort and advice that GGBF could not be found on the SDP site, or elsewhere nearby, just prior to the approval for GGBF reintroduction/translocation. No consultation or notification pitot to Besmaw an immediate neighbour was carried out. Besmaw's firsthand knowledge of the GGBF translocation release was via several local news/media items.

Besmaw has since responded to this knowledge by erecting, at considerable cost, a frog exclusion fence along its eastern boundary to prevent straying or migrating GGBF released on the SDP from entering an active industrial operational area that might result in inadvertent mortality.

Notwithstanding all of the above, Besmaw has commissioned this GGBF survey and habitat assessment to provide yet further GGBF survey effort and undertake an expert GGBF habitat reappraisal at the same time.

Based on this study by Ross Wellington (AES) and taking into consideration all of the matters outlined herein, it is considered unlikely that GGBF are still persist on the subject land. Were GGBF to be detected subsequently it would be likely very difficult, if not impossible, to distinguish GGBF individuals

as being of either original/remnant Kurnell provenance or captive bred releases of Arncliffe provenance.

It is herein considered that an adequate survey effort has now been undertaken when this effort includes both the earlier Cumberland Ecology survey as well as the most recent supplementary survey efforts by AES. The vast majority of the site is an active industrial operation with existing development approval. The other smaller allotment components of the proposal have also now been surveyed and evaluated with a null result for any GGBF specimens and the areas with what might be regarded as the best potential habitat values, being thoroughly examined and in any case also planned for exclusion from the master plan impact areas of the proposal.

Besmaw has developed, with the assistance of Urbis, Cumberland Ecology, EcoPlanning and now with further inputs by AES, a master plan and planning proposal with significant areas proposed as conservation lands. These areas are planned to have relevant and appropriate biodiversity values re-established, rehabilitated or enhanced to create and maintain connectivity values through and across the subject land.

As part of this biodiversity re-establishment vision for the proposal there are currently also GGBF conservation measures being planned for incorporation into the broader ecological rehabilitation works identified to be undertaken. These measures are to be framed by the National Recovery Plan for the GGBF (DEC 2005) as well as by its subsidiary Kurnell GGBF Key Population Management Plan (DECC 2007) and, gaining specific microhabitat feature guidance from the GGBF Best Practice Guide (DECC 2008). These documents outline what is still the only comprehensive conservation strategy for the GGBF. It is therefore here considered that Besmaw in the development of its masterplan for the site is actually likely to become the primary implementation agent for the Kurnell GGBF KPMP and the species overall conservation outcome at Kurnell, if approved?

## **Conclusion**

That the Green and Golden Bell Frog is likely absent from the Besmaw property notwithstanding the sites, strategic location and the substantial conservation opportunities for GGBF that are to be provided by the current proposal.

What could be considered as areas having potential habitat value are already excluded from the proposal impact zone as part of the planning for it. These site components include the wetland area within Lot 2 North and pond/dam area located along the former access roadway to Boat Harbour within Lot 8. Both are proposed to be retained and incorporated within the biodiversity conservation/rehabilitation areas of the site with further habitat enhancement measures to be undertaken.

Other areas of the subject land are herein considered unremarkable and with generalised habitat values for connectivity, foraging and/or shelter habitat that are easily created/maintained, and or supplemented and enhanced.

Survey efforts undertaken by Cumberland Ecology during 2018 further supplemented by those undertaken by AES 2023 coupled with a species expert habitat evaluation should be considered an adequate assessment of the subject land particularly given that the most significant area of the site is an active industrial sand mining operation operating with approval.

If approved the Besmaw proposal is likely to provide the best possible opportunity for salvaging what is or should be considered a precarious conservation situation for the GGBF at Kurnell. It provides a belated opportunity to implement components of the Kurnell KPMP and, perhaps with some coordination/collaboration, interlink with and bolster other initiatives (SDP/Veolia Symbio) to provide more secure connected and viable habitat for the GGBF at Kurnell, east to west in particular.



## **Recommendations**

1. That the Green and Golden Bell Frog should be considered as having been adequately and compliantly surveyed for within the Besmaw Lands and in accordance with survey Guidelines/Protocols.
2. Targeted surveys for the Green and Golden Bell Frog have found no evidence of their presence on the subject land and it is thus considered highly likely to be currently absent from said land.
3. That Besmaw continue with its current strategy to incorporate GGBF habitat features within the master planning for the current proposal and its biodiversity reconstruction and enhancement initiative inclusions.
4. Besmaw should consider cooperating with other GGBF initiatives nearby and continue with its current approach to incorporate other Kurnell GGBF Key Population Plan initiatives in its future site considerations.

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Department of the Environment Water Heritage and the Arts (2010) Survey guidelines for Australia's threatened frogs Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.

Department of the Environment Water Heritage and the Arts (2009a) Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*) Nationally threatened species and ecological communities EPBC Act policy statement 3.19.

Department of the Environment Water Heritage and the Arts (2009b) Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*) Nationally threatened species and ecological communities Background paper to the EPBC Act policy statement 3.19

Department of Planning Industry and Environment (2020) NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method



<p><b>Legend</b></p>	<p><b>Holt-Besmaw Lands</b></p>	<p>0 162.5 325 650</p>
<p> Subject Land</p>	<p>251, 260R, 278 &amp; 280-282</p>	<p>Metres</p>
<p> Lots</p>	<p>Captain Cook Drive Kurnell NSW</p>	<p></p>
<p> Call Playback Locations</p>	<p>Green and Golden</p>	<p></p>
<p> Targeted Survey Traverses</p>	<p>Bell Frog Survey</p>	<p></p>
<p> Potential GGBF Habitat Area</p>	<p><small>This map is not guaranteed to be free from error or omission. Therefore Australian Environmental Surveys (AES) its employees &amp; associates disclaim liability for any act done or omission made on the basis of information provided within the map and any consequences of such acts and omissions.</small></p>	<p></p>

Figure 1 – Survey Locations

## **Attachment 2: Detailed Comments – Description of the Captain Cook Drive Upgrade**

### **Background**

Captain Cook Drive has been identified as requiring upgrades and widening to accommodate an increased traffic flow anticipated as being a resultant outcome of the future proposals on the Besmaw Lands. An evaluation of the Captain Cook Road Reserve was consequently identified as requiring an ecological assessment for the resultant/likely biodiversity value impacts of these anticipated works. An expert evaluation of the GGBF habitat elements along CCD was thus commissioned.

Urbis therefore provided to AES a plan and digital spatial data for the new road alignment design in its existing corridor/road reserve.

### **Method**

Using ARC Map GIS software Captain Cook Road Reserve segments were generated into georeferenced PDFs for use within the Avenza Map spatial referencing tool App used within a handheld mobile/tablet device.

Consequently, Captain Cook Drive was thus traversed on either side to evaluate a 10-20m band of generally vegetated areas bordering the existing Captain Cook Drive roadway.

Spatial traverse data was captured for the areas evaluated and waypoints to demarcate various features along the length of roadway evaluated.

### **Results**

Both sides of Captain Cook Drive were thus evaluated, photographed and mapped to reveal/depict areas of landscape, geomorphological form and the prevailing vegetation in its various type and condition (See Map Figure 2). Road culverts traversing CCD were position captured to indicate points where habitat enhancement measures could be undertaken. The extent of occurrence of apparent roadside swales parallel to CCD and providing inherent connectivity habitat value was also captured.

### **Discussion**

The entire length of Captain Cook Drive traversed revealed an area that has almost entirely modified habitat values with much of the vegetation having been planted or rehabilitated following road works originally or subsequently undertaken in association with later developments.

Almost all of the vegetation is heavily weed infested with little of it providing any habitat values for GGBF.

What could only be considered artificial constructed and now heavily modified habitat values for GGBF occur generally in sections along Captain Cook Drive. These areas of vegetation associated with swale culverts that have been constructed along and parallel to CCD when last constructed/upgraded may provide opportunistic occasional movement pathways for GGBF where/if they occur. Other habitat relevant elements occurring are the beneath road culverts traversing CCD and provide a north south connectivity opportunity for GGBF.

### **Conclusion**

No natural GGBF habitat was identified along Captain Cook Drive in the relevant sections investigated (see Map Figure 2 a-c).

It is considered unlikely that GGBF would be found occupying the relevant sections of CCD inspected given current prevailing conditions.

No areas of the relevant section of CCD inspected should be considered GGBF habitat for the purposes of developing or determining habitat polygons under the BAM as all such areas are derived or constructed elements considered unlikely occupied other than transiently if at all. Most areas are in very poor condition and with heavy weed infestation.

## **Recommendations**

1. Green and Golden Bell Frog habitat along Captain Cook Drive should be considered artificial, heavily modified and generally unsuitable habitat for occupation other than as a transient pathway at best.
2. It is not possible to generate any relevant or appropriate habitat polygons for GGBF along any sections of Captain Cook Drive inspected and it is not considered herein relevant to require offsets for GGBF as part of any development assessment process including applying BAM to road widening activities.
3. Conservation measures that could be applied to any assessment considerations for GGBF might more profitably consider for conservation purposes the provision of habitat enhancement and rehabilitation initiatives/measures, particularly along drainage swale areas where they occur and at beneath road culverts, in concert with bush regeneration weed management activities generally.
4. Any conservation measures for GGBF should consider the GGBF Best Practice Habitat Guidelines (DECC 2008) and be recognised as contributing to the implementation of the Kurnell GGBF Key Population Management Plan (DECC 2007).



<p><b>Legend</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid purple; margin-right: 5px;"></span> Subject Land</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid yellow; margin-right: 5px;"></span> Lots</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid orange; margin-right: 5px;"></span> No Significant GGBF Habitat</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 2px solid orange; margin-right: 5px;"></span> Potential Movement Habitat Swales</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid green; border-radius: 50%; margin-right: 5px;"></span> Beneath Road Drain</li> </ul> <p>Map A</p>	<p><b>Holt-Besmau Lands</b></p> <p>251, 260R, 278 &amp; 280-282          Captain Cook Drive Kurnell NSW</p> <p>Green and Golden          Bell Frog Survey</p> <p><small>This map is not guaranteed to be free from error or omission. Therefore Australian Environmental Surveys - AES, its employees &amp; associates disclaim liability for any act done or omission made on the basis of information provided within the map and any consequences of such acts and omissions.</small></p>	<p>0 100 200 400</p> <p style="text-align: center;">Metres</p> <div style="text-align: center;"> <p>N</p> <p>S</p> </div> <div style="text-align: center;"> <p>AES</p> </div>
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Figure 2a – Road Reserve Assessment Area









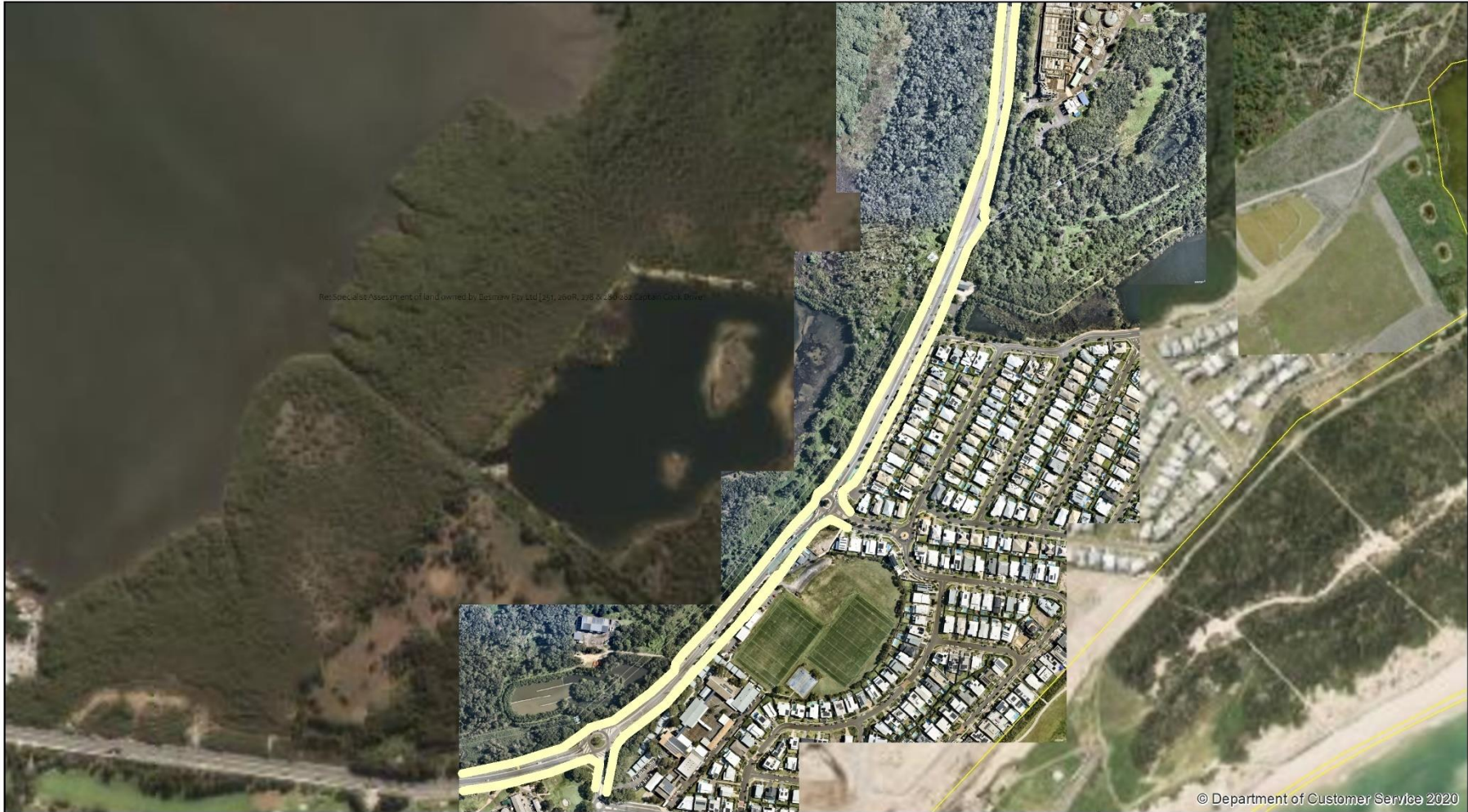
<p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Subject Land</li> <li> Lots</li> <li> No Significant GGBF Habitat</li> <li> Potential Movement Habitat Swales</li> <li> Beneath Road Drain</li> </ul>	<p>Map B</p>	<p><b>Holt-Besmau Lands</b>          251, 260R, 278 &amp; 280-282          Captain Cook Drive Kurnell NSW          Green and Golden          Bell Frog Survey</p> <p><small>This map is not guaranteed to be free from error or omission. Therefore Australian Environmental Surveys - AES, its employees &amp; associates disclaim liability for any act done or omission made on the basis of information provided within the map and any consequences of such acts and omissions.</small></p>	<p>0 100 200 400          Metres</p> <p>N          W E          S</p> <p></p>
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Figure 2b – Road Reserve Assessment Area



Resource Assessment of land owned by Besmaw Pty Ltd [251, 260R, 278 & 280-282] Captain Cook Drive

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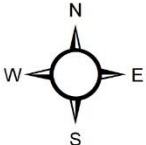

<p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Subject Land</li> <li> Lots</li> <li> No Significant GGBF Habitat Potential Movement Habitat Swales</li> <li> Beneath Road Drain</li> </ul>	<p><b>Map C</b></p> <p><b>Holt-Besmaw Lands</b>          251, 260R, 278 &amp; 280-282          Captain Cook Drive Kurnell NSW          Green and Golden          Bell Frog Survey</p> <p><small>This map is not guaranteed to be free from error or omission. Therefore Australian Environmental Surveys - AES, its employees &amp; associates disclaim liability for any act done or omission made on the basis of information provided within the map and any consequences of such acts and omissions.</small></p>	<p>0 100 200 400            Metres</p> <p>N            W E          S</p> <p>          AES</p>
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Figure 2b – Road Reserve Assessment Area