01 November 2021

Jon Howell
Development Project Manager
URBNSURF
Email: Jonathan@urbnsurf.com

Cumberland Ecology
PO Box 2474
Carlingford Court 2118
NSW Australia
Telephone (02) 9868 1933
ABN 14 106 144 647
Web: www.cumberlandecology.com.au

Revised Biodiversity Impact Statement for a wave park at Sydney Olympic Park

Dear Jon,

Cumberland Ecology has previously prepared a Biodiversity Impact Statement to accompany an application for modification (SSD-7942-Mod-1) of an existing State Significant Development (SSD) application (SSD-7942) approval for a proposed wave park to be constructed at Sydney Olympic Park (the 'project'). The proposed modification to the existing consent includes increased operating hours beyond those already approved.

The NSW Department of Planning Infrastructure and Environment (DPIE) have since received comments from Sydney Olympic Park Authority (SOPA) and have requested that a revised Biodiversity Impact Statement be prepared.

Appendix A of this letter presents a revised Biodiversity Impact Statement for the project that has been prepared as an Addendum to the previously prepared Flora and Fauna Assessment (FFA) for the project. This includes a summary of the methodology implemented as well as our results and an assessment of the ecological impacts of the longer operating hours on the biodiversity values adjacent to the subject site. The revised Biodiversity Impact Statement has taken into consideration the comments of SOPA and DPIE, and includes more detailed consideration of the fauna habitat and species that may be impacted beyond the subject site's boundary, as well as applicable legislation including the *Sydney Olympic Park Authority Act 2001* and the Sydney Olympic Park Parklands Plan of Management.

The revised assessment concludes that a significant impact is not expected to occur to any threatened species because of noise or light resulting from increased operational hours. The subject site and surrounding areas are already subject to relatively high levels of noise and light due to their location in an urban environment adjacent to existing development and busy roads. Furthermore, the project has been redesigned which will result in reduced noise levels (12Db(A) less) for the modification compared to what was proposed under the original SSD application. Northrop engineering have provided

updated light spill modelling that includes the street lighting on Hill Road, as well as a statement of compliance and report highlighting the extent of the spill light into the wetland habit from the development. The updated modelling confirms that the extent of the light spill is minimal and Figure 1 of the Northrop report (Northrop 2021 (SY191314-ER-1)) clearly shows very minimal impact. The fauna present are currently subject to light from existing and surrounding urban development as well as the street lighting on surrounding roads such as Hill Road & Holker Busway that remains on throughout the night. As a result no significant impact to any fauna species is expected.

If you have any questions or wish to discuss the contents of this revised Biodiversity Impact Statement further, please do not hesitate to contact Bryan Furchert in our Sydney office on (02) 9868 1933.

Yours sincerely,

David Robertson
Director
David.Robertson@cumberlandecology.com.au

APPENDIX A :

Revised Biodiversity Impact Statement

A.1. Introduction

A.1.1. Background

Cumberland Ecology previously prepared a Biodiversity Impact Statement to accompany an application for modification (SSD-7942-Mod-1) of an existing State Significant Development (SSD) application (SSD-7942) approval for a proposed wave park to be constructed at Sydney Olympic Park (the 'project'). The proposed modification to the existing consent includes increased operating hours beyond those already approved.

The NSW Department of Planning Infrastructure and Environment (DPIE) received comments from Sydney Olympic Park Authority (SOPA) and have requested that a revised Biodiversity Impact Statement be prepared that includes more detailed consideration of the fauna species and habitats that may be impacted, and consideration of applicable legislation including the *Sydney Olympic Park Authority Act 2001* and the Sydney Olympic Park Parklands Plan of Management.

In accordance with the requirements of DPIE, this document is a revised version of the Biodiversity Impact Statement that was previously prepared for the project by Cumberland Ecology as an Addendum to a previous Flora and Fauna Assessment (FFA). It includes additional details of the biodiversity present in surrounding areas, a summary of applicable legislation as well as details of the methodology implemented as well as an assessment of the ecological impacts of the longer operating hours on the biodiversity values adjacent to the subject site.

A.1.2. The Project

The location of the project is Pod B P5 Carpark, Hill Road, Sydney Olympic Park near the junction of Hill Road, Holker Busway and Holker Street (hereafter referred to as the 'subject site' - see **Figure 1**).

The approved project is a wave park for recreational surfing. The wave park will be arranged around a large open water surf sports lagoon incorporating a Wavegarden surfing wave generator. The open water lagoon will comprise two zones with waves of different heights produced in each zone, allowing for beginners through to advanced surfers to be accommodated at the same time.

The maximum lagoon capacity is estimated at 84 participants per hour, with around half in each zone. Total attendance will include over 250,000 surfers annually, along with 75,000 other admissions, as well as numerous members of the general public. Attendances are expected to peak early mornings, after work, and on weekends. Car parking for approximately 180 cars will be required to cater for guests and staff. Other parking will be available in the adjoining P5 carpark Pods A and C.

The currently approved hours of operation of the proposed wave park are 6 am to 10 pm, seven days a week with the Café, restaurant, and alfresco bar in the Main Entry Building able to operate from 6 am to 12 am midnight on Fridays and Saturdays only.

Figure 1 The subject site (from SLP Planning 2021)

A.1.2.1. Proposed Modification

It is understood that the proponent has submitted an application that seeks to modify the development consent for the project to facilitate the following (SJB 2021):

- Extend the morning operating hours by opening one (1) hour earlier at 5 am rather than 6 am, seven days a week; and
- An additional two (2) hours of operation for the wave park by closing at 12 am on Fridays and Saturdays, rather than 10 pm.

The proposed lights will comprise Sylvania Raptor LED sports lighting floodlights. The floodlights will be directed downward and will be fitted with cut-off fixtures and back shields to limit spill light outside the subject site (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)).

The extension to the morning and night-time hours has arisen out of a need to provide access to the facility for a range of demographics including tradespeople and shift workers, as well as allow members of the public

with extended commute times, access to surfing, recreation and the amenity offered by the facility. Travel restrictions for international visitors and interstate border uncertainty has also required the business to focus on local participation programs. Feedback from URBNSURF's Melbourne facility has indicated that there is an increasing demand for the early morning and night-time hours. Recently URBNSURF received approval for grant funding for a Surfing Centre of Excellence as part of the Greater Cities Sport Facilities Fund. The extended hours will allow athletes and coaches access to elite level training facilities outside of peak daytime hours which allows for more focussed training programs.

A.1.3. Assessment History

The modification application was publicly exhibited, and several submissions were received. These were addressed in a Response to Submissions document. The DPIE reviewed the Response to Submissions and requested further information be provided in an addendum report to the Flora and Fauna Assessment (FFA) that was previously prepared by Applied Ecology (2017) to support the approved project.

The requirements of DPIE relevant to ecology are reproduced verbatim below in italics.

1. Lighting

Further information is required on lighting impacts on nocturnal fauna. These potential impacts have also been raised by SOPA and were not addressed in the RTS.

The Flora and Fauna Assessment report submitted with the original EIS, provided an assessment of lighting impacts on fauna, based on five, 25 m high lighting poles and operating hours till 10 pm.

An addendum to the Flora and Fauna Assessment report shall be submitted, providing an assessment of the lighting impacts of the extended hours of operation and revised lighting design, (which now includes six, 30 m high lighting poles) on fauna.

The difference between the lighting design submitted with the EIS and the proposed lighting design in regard to any additional lighting spill to the nature reserve shall be quantified.

2. Noise

a) An addendum to the Flora and Fauna Assessment report submitted with the original EIS shall be submitted, providing an assessment of any noise impacts of the extended hours of operation on fauna.

b) The Noise Impact Assessment (NIA) submitted with the original EIS provided an operational noise level of 44 dB(A) at the nearest sensitive receiver. The NIA submitted with the modification application provides an operational noise level of 32 dB(A) at the nearest sensitive receiver. An explanation as to why there is a reduction in the operational noise level shall be provided.

A Biodiversity Impact Statement was prepared by Cumberland Ecology in August 2021 as an addendum to the existing FFA to address the requirements of DPIE identified above, and to provide further information relating to the impacts of light and noise on the biodiversity values of the subject site.

After submission of the Biodiversity Impact Statement, DPIE received comments from SOPA and requested that a revised Biodiversity Impact Statement be prepared that includes more detailed consideration of the fauna species and habitats that may be impacted, and consideration of applicable legislation including the *Sydney Olympic Park Authority Act 2001* and the Parklands Plan of Management. The requirements of DPIE were communicated in a letter dated 1 October 2021, and those relevant to ecology are reproduced *verbatim* below:

3. Biodiversity impacts

In consideration of the comments provided by SOPA, provide a revised Biodiversity Impact Statement that:

- details the fauna species and fauna habitats that would be impacted by noise and light spill from the proposed extension to the operating hours

- addresses the strategic context of the site, and relevant sections of the Sydney Olympic Park Authority Act 2001 and the Parklands Plan of Management

A.1.4. Purpose

The purpose of this document is to present a revised Biodiversity Impact Assessment for the project in accordance with the requirements of DPIE as outlined above. This has included more detailed consideration of the fauna species and habitats adjacent to the subject site that may be impacted, as well as relevant legislation.

A.2. Methodology

The methodology used in the preparation of this Biodiversity Impact Statement comprised a detailed desktop assessment only as field surveys have previously been undertaken by Applied Ecology (2017) for the FFA that accompanied the approved SSD application. The FFA adequately describes the biodiversity values and fauna habitats present within the subject site and no additional surveys were considered necessary.

In addition to a detailed review of the FFA, Cumberland Ecology conducted a review of relevant literature including, but not limited to:

- National Light Pollution Guidelines for Wildlife prepared by the Department of the Environment and Energy (Commonwealth of Australia 2020);
- Acoustic Report and compliance letter prepared by Stantec Australia (2021a, b) for the proposed modification of the project;
- Lighting Plan and compliance letter prepared by Northrop (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)) for the proposed modification of the project; and
- Response to Submissions provided by DPIE (DPIE 2021).

The impact assessment of the proposed lighting and noise on biodiversity has been based on the information contained within the Lighting Plan and Acoustic Report and compliance letters prepared by Northrop and Stantec Australia.

In preparing this revised Biodiversity Assessment, additional information was reviewed, including the following:

- *Sydney Olympic Park Authority Act 2001*;
- Environmental Guidelines for Sydney Olympic Park (SOPA 2008)
- Sydney Olympic Park, Parklands Plan of Management (SOPA 2010); and
- Information provided to DPIE by SOPA regarding the wave park including pages titled Affected Fauna and Fauna Habitats and Nature Conservation Context (SOPA 2021)/

A.3. Regulatory Framework

The subject site is located within the Sydney Olympic Park and is therefore subject to the provisions of a range of legislation, management plans and guidelines. Those of relevance to biodiversity include the following:

- *Sydney Olympic Park Authority Act 2001;*
- Environmental Guidelines for Sydney Olympic Park (SOPA 2008); and
- Sydney Olympic Park Parklands Plan of Management (SOPA 2010).

The relevant sections of these documents are summarised below in subsequent subsections.

A.3.1. Sydney Olympic Park Authority Act 2001

The *Sydney Olympic Park Authority Act 2001* commenced on 1 July 2001. The objectives of this Act are to make all reasonable attempts to:

(a) ensure that Sydney Olympic Park becomes an active and vibrant centre within metropolitan Sydney, and

(b) ensure that Sydney Olympic Park becomes a premium destination for cultural, entertainment, recreation and sporting events, and

(c) ensure that any new development carried out under or in accordance with this Act accords with best practice accessibility standards and environmental and town planning standards, and

(d) ensure the protection and enhancement of the natural heritage of the Millennium Parklands.

Of relevance to biodiversity, the *Sydney Olympic Park Authority Act 2001* requires any development within the Sydney Olympic Park to be consistent with the principles of ecologically sustainable development in accordance with best practice environmental standards. According to the Act, in determining an application for consent to carry out development on land within Sydney Olympic Park, the Minister for Planning must consider the consistency of the proposed development with the Environmental Guidelines (see ***Section A.3.2***).

The Act also outlines the role of SOPA which, among other things is to "*protect and enhance the natural and cultural heritage of Sydney Olympic Park, particularly the Millennium Parklands*". This is relevant to the project as it is within the Millennium Parklands.

A.3.2. Environmental Guidelines for Sydney Olympic Park

The principal objective of the Environmental Guidelines for Sydney Olympic Park (SOPA 2008) is to set out a general scheme of environmental issues and commitments that aim to implement the Environmental Policy of the SOPA with regards to the care, control, management, and development of Sydney Olympic Park. These guidelines apply to the whole of the Sydney Olympic Park including the subject site.

The relevant biodiversity objectives of the Environmental Guidelines are as follows:

> *Sydney Olympic Park Authority seeks to appropriately monitor, conserve and enhance wildlife habitat, and the stability of remnant ecological communities and flora and fauna populations where landscapes are largely constructed and levels of visitation and development are increasing significantly. In pursuit of this objective, wherever possible Sydney Olympic Park Authority is committed to:*
>
> *(a) Protecting and enhancing the natural heritage and ecological integrity of Sydney Olympic Park – targeting priority species and communities, places of high biodiversity value, and biodiversity generally;*
>
> *(b) Applying an adaptive management approach to stewardship of Sydney Olympic Park's biodiversity assets;*
>
> *(c) Ensuring conservation of biological diversity and ecological integrity is a fundamental consideration for new developments, activities, levels or types of use, or management practices that affect the ecosystems of Sydney Olympic Park;*
>
> *(d) Promoting the ecological, aesthetic and educational value of an urban site with high species diversity and abundance;*
>
> *(e) Conserving and enhancing the remnant woodland and wetland habitats of Newington Nature Reserve in accordance with the Newington Nature Reserve Plan of Management, and managing adjoining lands in sympathy with the Reserve; and*
>
> *(f) Maximising the habitat values of native plantings by promoting priority species and communities, providing structural complexity and plant species diversity, avoiding habitat fragmentation; promoting habitat linkages and large core areas; and prioritising the use of indigenous species in landscape planting schemes in the Parklands.*

A.3.3. Sydney Olympic Park Parklands Plan of Management

The subject site is located within the Sydney Olympic Park and is therefore covered by the Sydney Olympic Parklands Plan of Management (SOPA 2010), hereafter referred to as the Parklands Plan of Management. The Parklands Plan of Management is intended to manage the implementation of the objectives and functions of Sydney Olympic Park as outlined in the *Sydney Olympic Park Authority Act 2001*.

The subject site is categorised under the Parklands Plan of Management as land for Sport and Recreation (SOPA 2010). Section 1.13 of the Parklands Plan of Management provides a management framework that defines the management framework for each category of land. The land description for Sport and Recreation Parks is as follows:

> *Sports & Recreation Parks are typically designed and built - or have the potential - to provide for a broad range of sports activities associated with organised sports, team training and sports competition activities on turf playing fields, custom tracks and surfaces and hard-courts. These places are all located on remediated lands; are adjacent to wetlands and waterways; Parklands Junction* (an area that includes the subject site) *is primarily a major events carpark*.

The proposed development falls within the stated purposes for the area according to the Parklands Plan of Management.

Surrounding the subject site are areas that are categorised as Wetlands and Waterways under the Parklands Plan of Management, including Haslams Creek to the south, Narawang Wetland to the north, and Nuwi Wetland to the east. As defined by the Parklands Plan of Management, the land description for Wetlands and Waterways is as follows:

> *Wetlands & Waterways are typically designed and constructed for ecological and hydrological values or are remnant land forms with minimal visitor amenities and facilities that support a range of nature-based activities. Wetlands & Waterways include both saltwater and freshwater ecosystems. These places are all subject to tidal inundation or are ephemeral water bodies; are adjacent to sensitive ecological communities or are in themselves to some extent providers of threatened species habitat and are adjacent to leisure and play and conservation areas.*

These areas are further identified in Plan 6 of the Parklands Plan of Management as Threatened Species Habitats and they also correspond to land zoned E2 Environmental Conservation under the *State Environmental Planning Policy (State Significant Precincts) 2005*. Lands zoned E2 Environmental Conservation contain significant flora and fauna habitat that is the focus of long-tern conservation and restoration programs and include endangered ecological communities, and habitats set aside or constructed to offset the removal of threatened species habitat elsewhere in the park (SOPA 2021).

A.4. Biodiversity Values of the Subject Site and Surrounding Areas

This section provides a description of the biodiversity values of the subject site and surrounding areas based on a literature review of relevant documentation and review of recent aerial photography (**Figure 2**). Review of the most recently available aerial photography indicates that that the subject site and its surroundings has not changed substantially since the FFA was prepared in 2017 (Applied Ecology 2017) and the description of the biodiversity values are still considered to be accurate.

Initially, the overall context of the subject site is considered, followed by an overview of the biodiversity values present in the subject site and surrounding areas.

A.4.1. Context of the Subject Site

The subject site is located within Pod B P5 Carpark, Hill Road and is located at the western edge of Sydney Olympic Park in Western Sydney. Sydney Olympic Park is located in an area that is characterised by a network of wetlands and natural areas, existing in between historic and current industrial development. Approximately 1 km to the north of the subject site is the Paramatta River, and substantial open space and wetland areas occur in the intervening land. To the south of the subject site is Haslams Creek, a vegetated natural creek that

flows to the east into a side branch of the Paramatta River. The wetland habitat that occurs naturally along Haslams Creek and the Paramatta River has been enhanced by substantial wetland creation on Sydney Olympic Park after the Olympic Games in 2000, and it is now a large area of connected habitat that is important for a wide range of species, in particular wetland birds including several that are listed as threatened or migratory under either the NSW *Biodiversity Conservation Act 2016* (BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see ***Section A.4.3*** below). Several habitat types are represented, including estuarine and freshwater wetlands, saltmarsh meadows and remnant woodland.

However, the area is also home to substantial heavy industry and development. Historic industrial activities resulted in much of Sydney Olympic Park being highly contaminated with little natural ecology and a fragmented stream corridor. Sixty-five percent of the soils were required to be excavated and contained on-site as part of the restoration works undertaken after the 2000 Olympic Games. Extensive urban development currently occurs in close proximity to the subject site including the Sydney Showground to the south, and residential and industrial development to the north-west and north-east.

A.4.2. Biodiversity Values of the Subject Site

The subject site currently comprises a carpark with 844 car spaces and a bus parking area, which is used for events parking at Sydney Olympic Park. It is currently comprised predominantly of a sealed bitumen surface that has highly limited biodiversity values. No remnant or regrowth native vegetation is mapped as occurring on the subject site and native species are restricted to those used as landscape plantings from around 1999-2000, when the site was being prepared for use during the Sydney Olympic Games (Applied Ecology 2017). Some colonisation by native species from surrounding areas has occurred since then, but this is mainly limited to damp areas in the gabion lined swales, which were designed for stormwater treatment prior to discharge to nearby Narrawang Wetlands, a series of constructed wetlands located north/northwest of the subject site (Applied Ecology 2017). Flora species recorded from the subject site include 43 weed species, with five species of weed listed as State Priority Weeds under the NSW *Biosecurity Act 2015* (Applied Ecology 2017). Detailed lists of all the flora and fauna species recorded from the subject site and adjacent areas are provided in the FFA (Applied Ecology 2017).

Six species of birds were recorded on the subject site during field surveys by Applied Ecology in 2017 (Applied Ecology 2017). No threatened bird species were recorded, and these were all common, highly mobile, mostly larger bird species, well adapted to living in a highly urbanised environment. Trees within the subject site are too young to provide breeding habitat in the form of hollows. Three common species of small lizards were also recorded during field surveys, and a fourth is reportedly often sighted around the bioswales (Applied Ecology 2017). Very little amphibian habitat is present on the subject site and no frog species were recorded during surveys conducted for the FFA (Applied Ecology 2017).

No threatened species, endangered ecological communities, endangered populations, or critical habitat was recorded on the subject site, although several have been reported from nearby areas including Narawang Wetland. The subject site is separated from the Narawang Wetland to the northwest by the busy Hill Road near the junction of Holker Road. Hill Road is a four-lane road with median strip and hard stand verges at this location. Frog fences have been erected along the perimeter of the wetland to prevent frogs, and other fauna, from dispersing from the wetland across Hill Road and Holker Road (Applied Ecology 2017). Five threatened

species of microbats (listed as vulnerable under the BC Act) have been recorded in the locality, with two of these frequenting the vicinity of the subject site: Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) and Southern Myotis (*Myotis macropus*). Comprehensive species lists are provided in the FFA (Applied Ecology 2017).

The subject site is currently exposed to ongoing disturbance from noise and light from nearby roads, as well as an active container storage area immediately to the east of the subject site that is active day and night (Applied Ecology 2017). This includes heavy machinery and trucks operating around the clock.

A.4.3. Biodiversity Values of Surrounding Areas

Although the subject site itself has limited biodiversity values, as outlined above, it is located in land defined as the 'parklands' of Sydney Olympic Park, and there are substantial biodiversity values in nearby areas. Currently extensive ecological restoration and management is being undertaken at Sydney Olympic Park via a comprehensive and multidisciplinary ecological conservation effort at the landscape scale with the goal of increasing the ecological value and functionality of the landscape, particularly targeting identified focal species and ecological communities (SOPA 2021).

A.4.3.1. Fauna Habitats

As outlined previously in ***Section A.3.3***, although the subject site itself is highly degraded and provides minimal habitat for fauna species, it is surrounded by areas of high biodiversity significance. These are predominantly wetland areas including Haslams Creek to the south, Narawang Wetland to the north, and Nuwi Wetland to the east. Haslams Creek is a naturally occurring wetland located south and southeast of the site which has a narrow band of Estuarine Saltmarsh, an Endangered Ecological Community (EEC) listed under the BC Act, along lengthy sections of creek bank near the subject site. Within this area a threatened flora species is present, Narrow-leaved Wilsonia (*Wilsonia backhousei*), listed as vulnerable under the BC Act. North and north-east of the subject site are the Narawang Wetlands and Nuwi Wetlands, artificial and recreated habitat areas surrounded by established revegetation plantings and small areas of weeds.

These areas have been zoned E2 Environmental Conservation and contain significant flora and fauna habitat that is the focus of long-term conservation and restoration programs and include EECs, and habitats for threatened species (see ***Section A.4.2.2*** below). As outlined previously, these areas are identified in the Parklands Plan of Management as Threatened Species Habitats. Some areas of these wetlands are natural, however large areas are artificial and have been recreated during restoration works associated with the Olympic Games and afterwards.

Several habitat types are represented in conserved areas in the vicinity of the subject site, including estuarine and freshwater wetlands, saltmarsh meadows and remnant woodland. These habitats provide habitat for a wide range of species, including some threatened species. Further details of the fauna species recorded from or likely to occur in the areas of conservation significance around the subject site are presented below.

A.4.3.2. Fauna Species

As identified by SOPA (SOPA 2021), over 180 vertebrate wildlife species have been recorded in areas of biodiversity value near the subject site including 168 native bird species, seven (7) native frog species, 13 native

mammal species and 15 native reptile species. Of these, it is mostly the nocturnal species that have potential to be indirectly impacted by noise and light generated by the project. Nocturnal species of significance recorded in the vicinity of the subject site include the following (SOPA 2021):

- Latham's Snipe (*Gallinago hardwickii*), listed as migratory under the EPBC Act. A nationally-significant population occurs in Narawang Wetlands;
- Green and Golden Bell Frog (*Litoria aurea*), listed as Endangered under the BC Act and Vulnerable under the EPBC Act. Large populations of this species have been recorded in Narawang Wetlands;
- The Southern Myotis bat (*Myotis macropus*) and the Large Bent-wing Bat (*Miniopterus orianae oceanensis*), both listed as Vulnerable under the BC Act. Maternity roosts of both these species are located within 500m of the subject site;
- Australasian Bittern (*Botaurus poiciloptilus*), listed as Endangered under the BC Act and the EPBC Act and Black Bittern (*Ixobrychus flavicollis*), listed as Vulnerable under the BC Act. These two wetland species have been recorded in Narawang Wetlands;
- The Powerful Owl (*Ninox strenua*), listed as Vulnerable under the BC Act;
- White-bellied Sea-Eagle (*Haliaeetus leucogaster*), listed as Vulnerable under the BC Act. A nest of this species is located within 380 m of the subject site, within Newington Nature Reserve; and
- Eastern Curlew (*Numenius madagascariensis*) listed as Critically Endangered under the EPBC Act, Bar-tailed Godwit (*Limosa lapponica subsp. baueri*) listed as Vulnerable under the EPBC Act and the Curlew Sandpiper (*Calidris ferruginea*), listed as Critically Endangered under the EPBC Act and Endangered under the BC Act. These species have been recorded moving between habitats in areas near the subject site.

In addition, as identified by SOPA (2021) numerous other non-threatened fauna have been recorded from nearby areas including other nocturnal birds such as owls, and other microbats that are common in urban areas.

A.5. Impact Assessment

This section provides an assessment of the impacts of the modification on the biodiversity values of the subject site and nearby areas. As required by the DPIE, this focuses on the impacts of increased operating hours and the changes to lighting and noise that are proposed by the modification. These changes are assessed individually below in subsequent subheadings.

A.5.1. Lighting

The FFA submitted with the original EIS (Applied Ecology 2017), provided an assessment of lighting impacts on fauna, based on five, 25 m high lighting poles and operating hours from 6 am till 10 pm. The proposed modification includes the construction of six, 30 m high lighting poles. This means that each pole is 5 m higher than what has been approved, and there will be one more light pole, thereby resulting in some additional light spill to that which was approved. In addition, the impacts of light will be present for longer due to the proposed extension of operating hours.

The impacts of lighting on fauna species were evaluated in the FFA for the approved project, and a range of potential impacts were identified including changes to foraging ability, mate choice and predator avoidance behavior (Applied Ecology 2017). The impacts of lighting on fauna as a result of the project were assessed as not significant in the FFA due to the lack of habitat for native fauna species on the subject site and the existing high levels of disturbance. The only fauna species assessed as likely to occur in the subject site were urban adapted, common species for which there are abundant habitats in the locality.

This is still relevant and applicable to the proposed modification, and any increase in light levels in the subject site itself from the proposed changes are not expected to result in any significant impact to native fauna species on the subject site as none are likely to occur. However, as discussed earlier (see ***Section A.4***) nearby areas outside of the subject site contain higher biodiversity values including Narrawang Wetlands to the north of Hill Road, and the vegetation along Haslams Creek to the south, and there is potential for some lighting impacts to occur to these areas and therefore it is relevant to assess the impacts of the increased lighting on these areas and the species they may contain.

A.5.1.1. Existing and Modelled Light Spill

As noted in the FFA, the subject site is an existing carpark that is already illuminated at night with parking flood lights, and there are existing street lights on Hill Road that currently spill light into the Narrawang Wetlands. Accordingly, the adjacent habitats to the subject site are already substantially impacted by light during the night. Light modelling was conducted by Gerard Lighting (2017) for the approved development that divided the interface between the Narrawang Wetland and the subject site into five (5) segments (see **Table 1** below) and light modelling was conducted for each segment (Please refer to Figure 44 of the FFA for mapping of the segments). This modelling indicated that existing light spill from street lights on Hill Road into the Narrawang Wetlands was up to a maximum of 0.6 lux (see **Table 1**). Additional lighting as a result of the approved project was also modelled, which indicated that a maximum of 0.5 lux additional light from the project would spill into the wetlands (see **Table 1**).

Recent modelling was conducted by Northrop (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)) for the proposed modification, taking into account the additional lighting pole and the additional 5 m height of the poles. This modelling indicates that the maximum additional illumination to the Narrawang Wetlands as a result of the modification proposal is 2.8 lux in Segment 4 only and only at the test boundary (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)). The light modelling conducted for the previously approved project and the proposed modification is presented below in **Table 1**. Note that the previous light modelling conducted by Gerard Lighting (2017) provided an indication of the combined light spill from the lagoon basin lighting only and the existing light spill from street lights along Hill Road. The updated light modelling of the proposed modification conducted by Northrop (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)) now includes the combined light spill of the street lighting, external landscape and F&B lighting, and Lagoon basin lighting in the calculations. A comparison of this data is presented in **Table 1**.

The results indicate that the level of light spill to the Narrawang Wetlands as a result of the proposed modification will exceed the previously modelled level of light spill for all segments for which monitoring was conducted.

Table 1 Existing and modelled light spill into Narrabeen Wetlands

Calc reference	Street light on Current (Lux)	Street light on Seg1 Previous (Lux)	Basin, external and street light on Current(Lux)	Basin, external and street light on Previous (Lux)	External on and street light off Current (Lux)	External and Street light on Current (Lux)	Default street lighting (Lux)
	Current	Previous (Gerard Lighting 2017)	Current	Previous (Gerard Lighting 2017)	Current	Current	Previous (Gerard Lighting 2017)
Drawing reference	LC1		LC2		LC3	Add results of LC1 and LC3	
Segment 1 Vertical lighting levels in 30m high zone	1.7	0.6	2.1	0.8	0	1.7	0.6
Segment 2 Vertical lighting levels in 30m high zone	0.3	0.4	1.6	0.5	0	0.3	0.4
Segment 3 Vertical lighting levels in 30m high zone	0.4	0.6	1.9	0.9	0	0.4	0.6
Segment 4 Vertical lighting levels in 30m high zone	4.2	0.6	7.0	1.1	0	4.2	0.6
Segment 5 Vertical lighting levels in 30m high zone	4.2	0.4	4.2	0.4	0	4.2	0.4
Average horizontal levels past Wetland boundary in 30m wide zone (Lux)	0.11		0.25		0	0.11	

A.5.1.2. Timing of Light Spill

Although the proposed modification will result in an increase in light spill from the project, the time each day that these impacts will be felt is relatively short. As identified previously, the project is currently approved to operate from 6 am to 10 pm, seven days a week and 6 am to 12 am midnight for the Main Entry Building food and beverage areas on Fridays and Saturdays. For most of the operating hours of the wave park, it will be daylight and the issue of light spill into adjacent areas is not relevant. It is only during the hours of darkness that light spill from the project has potential to cause an ecological impact to nearby areas.

In winter in Sydney, the latest the sun rises is approximately 7 am and the earliest it sets is at approximately 5 pm (Time and Date AS 2021). Although this is when the sun rises and sets, it is usually still light before and after these times for at least one hour. This indicates that in winter the only time when light impacts are likely to be relevant are before 6 am and after 6 pm. The proposed modification will result in an opening time of 5 am, (instead of the currently approved 6 am) which means that in the mornings it will have some additional light impacts for approximately one hour until daylight (from 5 am to 6 am) during the shortest days of winter. In summer, the earliest the sun rises is approximately 5.30 am on the longest day of the year (Time and Date AS 2021), and as it is light for at least an hour prior to sunrise, no impacts are expected from the opening of the wave park one hour earlier at 5 am as it will be already light.

For the majority of the time (five days out of seven) no change is proposed to the approved lighting hours in the evening. However, the proposed extension to opening hours on the weekend from 10 pm to 12 am will result in approximately two hours of potential light spill impacts (from 10 pm to 12 am) for two days per week (a total of four hours per week). This is considered to be a relatively minor impact, and for almost every night, the light levels will be as they were prior to the modified project. Furthermore, the dining facilities at Sydney Olympic Park are already approved to operate until 12 am on Friday and Saturday nights, and these also involve some light spill (nominal).

A.5.1.3. Lighting Impact Assessment

Although it is clear that some increase in light illumination of nearby areas will occur, it is difficult to quantify the impacts of light exposure on native species. While significant research has been completed on the impacts of light spill on fauna species, these focus mainly on the impacts of newly introduced light into an area that has not previously been subject to light impacts. However, the subject site is located in a highly urban environment, and the adjacent habitats in the Narrawang Wetlands and Haslams Creek are already subject to substantial light spill from Hill Road as well as the car park lighting in the subject site. As identified in the National Light Pollution Guidelines for Wildlife prepared by the Department of the Environment and Energy (DoEE 2020) a major limitation to understanding the impact of light on fauna is the lack of biological data with which to confidently interpret a model outcome. Therefore, it is not possible to objectively estimate how much artificial light is going to cause an impact on a particular species, or age class, over a given distance and under variable environmental conditions (DoEE 2020).

Although it has been shown that there will be some increase in the amount of light spill from the modified project as a result of the additional height of the light poles and the additional pole, the time period during which these impacts will be relevant are relatively short. As demonstrated above, additional potential light spill from the proposed modification will occur for approximately seven hours per week in the winter (due to

opening one additional hour in the morning) and approximately four hours per week in the summer (due to the two additional hours of operation in the evening on the weekend). This is a relatively short time each day that there will be increased light impacts and the majority of the night will still remain at existing levels of lighting.

Measures have been implemented to minimise the light spill as a result of the project. The proposed lights will comprise Sylvania Raptor LED sports lighting floodlights that will be directed downward and aimed at the basin and will be fitted with cut-off fixtures and back shields to limit spill light outside URBNSURF boundary (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)). Furthermore, the lighting design complies with the requirements of Australian Standard AS/NZS 4282:2019 "*Control of the obtrusive effects of outdoor lighting*" by limiting glare and upward light ratio, low level spill light and reducing luminaire brightness and also by but introducing a digital lighting control system which helps to accommodate multiple selective lighting scenes and light levels both in pre-curfew and curfew intervals (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)).

Taking into consideration the already relatively high existing light levels and continuous night light spill into the Narrawang Wetlands from streetlights, the minor increase in the hours of operation is not likely to adversely impact any fauna species utilizing this area or Haslams Creek. Any species utilizing adjacent areas of habitat are already accustomed to significant continuous night light spill from street lights and the existing car park lighting, and a minor increase in illumination for a relatively short period each day is not expected to significantly impact these species.

A.5.2. Noise

The FFA submitted with the original EIS (Applied Ecology 2017), provided an assessment of noise impacts on fauna, based on the hours of operation being 6 am to 10 pm, seven days a week and 6 am to 12 am midnight for the Main Entry Building food and beverage areas on Fridays and Saturdays. As identified in the Noise Impact Assessment (Wood and Grieve Engineers 2017) and considered in the FFA (Applied Ecology 2017), the approved project will result in a wide array of noise from several sources including the following:

- Construction noise;
- Increased traffic noise associated with the project;
- Noise of patrons;
- Ambient music;
- Noise of waves; and
- Noise of the wave generator.

These impacts were assessed for the approved development by Wood and Grieve Engineers (2017) who found that they would not cause a significant impact on the surrounding community and sensitive fauna located within the Narrawang Wetlands located north of Hill Road.

The modification proposal seeks to extend those hours by opening one hour earlier at 5 am rather than 6 am on all seven days per week of operation and an additional two hours of operation by closing the wave park at 12 am midnight, rather than 10 pm on Fridays and Saturdays. These changes have potential to result in increased impacts to fauna species and therefore the DPIE have requested an assessment of the impact to fauna of the increased hours of operation and associated increased noise. The areas most likely to be subject to impacts of noise are the Narrawang Wetlands, north of Hill Road and Haslams Creek to the south.

It is widely recognised that increased levels of noise in the environment have the potential to impact on fauna species. One major way through which noise can affect wildlife is by masking acoustic signals that animals rely on and, in doing so, hindering inter- and intraspecific communication among individuals (Berger-Tal et al. 2019). This has implications for reproduction if it interferes with mating calls, and may affect communication, distribution and foraging success.

This subject site and surrounding areas including the Narrawang Wetlands and Haslams Creek are currently subject to substantial levels of noise due to traffic, heavy machinery, aircraft and an active recreational area (Sydney BMX Track) which is located approximately 50 m to the south-east of the subject site (Stantec 2021). Fauna are known to habituate to noise in their environment, and due to the current high levels of noise, the fauna that utilise nearby areas are likely to be habituated to the already relatively high levels of noise in their environment.

As identified above, the approved project will result in additional noise as a result of the wave generator and patrons. However, the Noise Impact Assessment for the approved project (Wood & Grieve Engineers, 2017) used the most stringent noise limit (night-time criterion) as the noise target at the boundary for the nearest sensitive receivers and found that no significant impacts would be expected. As reported in the FFA, predicted maximum noise levels (44dB(A)) were within permissible limits (Applied Ecology 2017).

The modification proposes to increase the hours of operation by one hour per day in the morning by opening one hour earlier (5am), and by an additional two hours in the evening (10pm-12am midnight) on Fridays and Saturdays. Although this will increase the length of time that the noise from the project is present in the environment, it will not increase the level of noise. The Acoustic Report prepared for the modification (Stantec 2021) found that with all noise sources operating simultaneously, operational noise levels will be a maximum of 32 dB(A) at the nearest sensitive receiver. This is approximately 12 dB(A) less than originally predicted for the approved project (44 dB(A)) and has been achieved due to changes in the current design relative to the one proposed at the time of the original SSD submission.

The time periods that additional noise impacts would be experienced are at either end of the day, early in the morning and late at night. Accordingly, not all of the potential noise sources are likely to be operating equally and at the same time. During the early morning/late evening the crowd attendance would likely be significantly lower, which would result in lower noise levels (Stantec 2021). Similarly, at these times of the day there would likely be less traffic on the roads, thereby reducing the overall level of noise in the environment. As the predicted noise levels were calculated by simulating all noise sources operating simultaneously, the actual level of noise produced during the additional hours of operation in the morning and evening are likely to be less than those modelled as it is unlikely that all noise sources would, in fact, operate simultaneously.

Given that the approved project will result in 10 hours of noise impacts, the relatively minor additional impact of one hour per day in the early morning (7 hours per week), and two hours in the weekend evenings (four hours per week) when other noises are expected to be reduced is unlikely to increase the level of impact to native species substantially beyond the level already approved. Furthermore, there has been a reduction of 12 dB(A) in the proposed modification compared to the already approved project.

The fauna species that currently utilise the Narrawang Wetlands and Haslams Creek are already habituated to relatively high levels of noise in the environment and the additional noise impacts are an extension to existing noise impacts, and are not a stand-alone, additional noise source. If the additional opening hours were to be during a period where there was silence before and after, it would be expected to have a greater impact than as part of a long period of continuous noise. Being an extension to the continuum of noise that will be produced for an already approved 10 hours means that it is more likely that fauna will adapt to it than they would to a stand-alone, additional noise source. Accordingly, the relatively minor increase in noise impacts expected as a result of the proposed modification are not expected to result in a significant impact to fauna species.

A.6. Mitigation Measures

A number of mitigation measures have been proposed to reduce the impacts of light and noise on fauna species as detailed in **Section A.5** above.

Mitigation measures for light and noise impacts are:

- Lights will comprise Sylvania Raptor LED sports lighting floodlights that will be directed downward and aimed at the basin;
- Lights will be fitted with cut-off fixtures and back shields to limit spill light outside URBNSURF boundary;
- Lighting design complies with the requirements of Australian Standard AS/NZS 4282:2019 "*Control of the obtrusive effects of outdoor lighting*" by limiting glare and upward light ratio, low level spill light and reducing luminaire brightness;
- Lighting has a digital lighting control system which helps to accommodate multiple selective lighting scenes and light levels both in pre-curfew and curfew intervals; and
- All outdoor and security lights are selected with only downward light beams. External and display lighting will have downward light beams. These lights will be turned off when the facility is closed, only security lights are turned on.
- The external illuminated signs will be internally illuminated or have downward facing beams and will be timer controlled.
- Redesign of the project has resulted in a reduction in noise of 12 dB(A).

A.7. Conclusion

The proponent is proposing a modification to an existing SSD application approval, for a proposed wave park to be constructed on the subject site at Sydney Olympic Park. The currently approved hours of operation are 6 am to 10 pm, seven days a week with the Café, restaurant, and alfresco bar in the Main Entry Building able to operate from 6am to 12am midnight on Fridays and Saturdays. The modification application seeks to amend the approved development by the following:

- Extend the morning operating hours by opening one (1) hour earlier at 5 am rather than 6 am seven days a week; and
- An additional two (2) hours of operation for the wave park by closing at 12 am on Fridays and Saturdays, rather than 10 pm.

This will result in a minor increase in the impacts of light and noise to areas of nearby biodiversity value and a Biodiversity Impact Statement was prepared by Cumberland Ecology to provide an assessment of these impacts in response to a request from DPIE. The original Biodiversity Impact Statement was revised (this document), to address a further request from DPIE to include additional assessment of the fauna species and habitats that may be affected by the modification as well as further consideration of the strategic context of the site and relevant sections of the Parklands Plan of Management. Comments and information provided by SOPA have also been incorporated into this revised assessment.

As demonstrated by the results of field surveys, the subject site itself is highly degraded and offers nearly no habitat for native species, and therefore no impacts to native species occurring in the subject site are considered likely to occur as a result of additional light and noise caused by the proposed modification. However, significant fauna habitats exist in close proximity to the subject site, including natural wetland habitat in Haslams Creek, and reconstructed wetlands in Narawang Wetland. These areas are zoned E2 Environmental Conservation and have high significance for the conservation of fauna species and habitat, including several threatened species as outlined in ***Section A.4.3***. There is some potential for additional light and noise levels caused as a result of the project to impact these areas.

The amount of light spill to adjacent areas of biodiversity value will increase to some extent as a result of the modification as indicated by modelling conducted by Northrop (Northrop 2021 (SY191314-ER-1), Northrop 2021 (SY191314-EL11-1)) and presented previously in **Table 1**. However, the project itself will predominantly operate during the day, and light spill impacts will be limited to early in the morning and late at night. As the project will operate mainly during daylight hours when no impact of lighting will occur to nearby areas, only relatively few hours per week of lighting impacts will be experienced by nearby areas, from operation early in the morning and after sunset. Although the amount of light spill at any one time likely to be caused by the modified project is an increase from the approved project; overall the increased light impacts are for a relatively short time each day and the majority of the night will still remain at existing levels of light spill. There is already a relatively high level of existing night light entering the Narrawang Wetlands and Haslams Creek due to street lighting, car park lighting and car headlights, and in this context the additional light proposed by the modification is considered to be minor. The fauna that utilise adjacent habitats are already habituated to

existing light levels and the minor increase in light as a result of the modification is not expected to cause a significant impact to these species.

Noise modelling indicates that noise levels caused by the proposed modification will reduce in intensity from those proposed in the approved project, although due to the increase in operating hours, some increase in the duration of noise impacts may occur to adjacent areas of biodiversity value in the Narrawang Wetlands and Haslams Creek. These areas are already subject to substantial levels of noise due to traffic, heavy machinery, aircraft and a BMX track. The land directly adjacent to the subject site is currently operating around the clock as a shipping container depot, with high levels of noise. Fauna species are known to habituate to noise in their environment, and due to the current high levels of noise, the fauna that utilise the Narrawang Wetlands and Haslams Creek are likely to be habituated to the already relatively high levels of noise in their environment. Furthermore, the increase in operating hours will occur at the beginning of the day and the end of the day when other noise sources such as traffic and patrons are likely to be reduced. The additional noise from the project will comprise an addition to existing noise impacts, and are not a stand-alone, additional noise source and therefore it is expected that fauna will habituate to the minor increase in noise. Therefore, the relatively minor increase in noise impacts as a result of the increased operating hours are not expected to result in a significant impact to fauna species occurring in nearby habitats.

The proposed modification is consistent with the requirements of the Environmental Guidelines for Sydney Olympic Park and also the Sydney Olympic Park Parklands Plan of Management. These documents require the consideration of the principles of ecologically sustainable development and aim to conserve native species and habitats. As outlined above, it is not considered that the modification will increase impacts to native species significantly relative to the approved project, and habitats of high conservation significance in nearby areas will remain and continue to provide habitat for native species. Therefore, the modification is considered to be in accordance with the requirements of these documents. Furthermore, the subject site has been designated for Sports and Recreation by the Plan of Management, and the project complies with the principles for this use of the land. The proposed amendment to the operating hours would bring the wave park in line with other aquatic facilities operating within Sydney Olympic Park. The modifications proposed will result in a development that is substantially the same as the approved development and the minor increases to noise and light impacts from the increased opening hours are not expected to result in a significant impact to the biodiversity values of adjacent areas or their ability to provide habitat for native fauna species. A number of mitigation measures have been incorporated into the design of the lighting and noise controls to reduce the impacts on biodiversity.

A.8. References

Applied Ecology. 2017. Flora and Fauna Assessment. Carpark P5 (Pod B), Sydney Olympic Parklands, Cnr Hill Road & Holker St, Newington. Prepared for Wavepark Group.

Berger-Tal, O., B. Wong, U. Candolin, and J. Barber. 2019. What evidence exists on the effects of anthropogenic noise on acoustic communication in animals? . Environmental Evidence **18**.

Commonwealth of Australia. 2020. National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds.

DoEE. 2020. National Light Pollution Guidelines for Wildlife Including marine turtles, seabirds and migratory shorebirds. Commonwealth of Australia.

DPIE. 2021. Sydney Olympic Park - Open Water Surf Facility-Mod-1 (SSD-7942-Mod-1) Response to Submissions. Department of Planning, Industry and Environment.

Northrop 2021 (SY191314-ER-1) - URBNSURF SYDNEY - External Lighting Assessment

Northrop 2021 (SY191314-EL11-1) - Urbnsurf Sydney – Basin Lighting Statement of ComplianceSJB. 2021. Statement of Support for 4.55(2) Modification Application to SSD-7942. Prepared for URBN SURF.
SOPA. 2008. Environmental Guidelines Sydney Olympic Park 2008. Sydney Olympic Park Authority, Homebush, NSW.
SOPA. 2010. Sydney Olympic Park Parklands Plan of Management. Sydney Olympic Park Authority, Homebush, NSW.
SOPA. 2021. Affected Fauna and Fauna Habitats and Nature Conservation Context (responses to Applied Ecology Flora and Fauna Assessment Report). Sydney Olympic Park Authority, Homebush, NSW.
Stantec Australia. 2021a. Acoustic Report. Prepared for URBNSURF Sydney.
Stantec Australia. 2021b. Letter of Compliance. Prepared for URBNSURF Sydney.
Time and Date AS. 2021. Sydney, New South Wales, Australia — Sunrise, Sunset, and Daylength, 2021.

FIGURES

Image Source:
Image © NearMap 2021
Dated: 31/5/2021

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 50 100 150 200 m

I:\...\21209\Figures\Letter 2\20210809\Figure 2. Aerial photography

Figure 2. Aerial photography covering the subject site