Report

16 May 2023

To	Justin Stewart	**Contact No.**	02 8717 7777
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From	Evie Packett	**Project No.**	12596334
Project Name	Castle Hill Compliance		
Subject	Submission of the Castle Hill Water Recycling Plant Review of Environmental Factors Addendum (REFA)		

Dear Abergeldie Contractors Pty Limited,

1. Introduction

GHD Pty Ltd (GHD) was engaged by Abergeldie Contractors Pty Limited to undertake a Review of Environmental Factors Addendum (REFA) that assesses potential environmental impacts of the proposed modifications to the approved Castle Hill Water Recycling Plant (WRP) upgrade project. The enclosed REFA was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority.

2. Scope and limitations

The enclosed report: has been prepared by GHD for Abergeldie Contractors Pty Limited and may only be used and relied on by Abergeldie Contractors Pty Limited for the purpose agreed between GHD and Abergeldie Contractors Pty Limited as set out in section 1 of this letter.

GHD otherwise disclaims responsibility to any person other than Abergeldie Contractors Pty Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 3 of this letter). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

3. Assumptions

The REFA has been completed based on information provided by Sydney Water, including a CAD base and information gained from the site visit. This REFA that the information contained within the approved *Review of*

Environmental Factors North West Treatment Hub Castle Hill and Rouse Hill Water Recycling Plants Compliance Upgrade (August, 2021) is accurate.

Kind regards,

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Review of Environmental Factors Addendum

Northwest Hub Phase 2 Program - Castle Hill 2024 Compliance Project

1 Determination

This Review of Environmental Factors Addendum (REFA) assesses potential environmental impacts of the proposed modifications to the approved Castle Hill Water Recycling Plant (WRP) upgrade project. It was prepared under Division 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), with Sydney Water both the proponent and determining authority.

The Sydney Water Project Manager is accountable to ensure the proposal is carried out as described in this REFA and the *Review of Environmental Factors North West Treatment Hub Castle Hill and Rouse Hill Water Recycling Plants Compliance Upgrade (August, 2021)* (approved REF). If the scope of work or work methods described in this REFA change significantly following determination, additional environmental impact assessment may be required.

Decision Statement

During construction, the main potential environmental impacts of the proposal are typical construction impacts such as odour emissions and vegetation clearing. Traffic impacts are anticipated to be reduced during construction. During operation, the main impacts are associated with visual amenity. The proposal will not be carried out in a declared area of outstanding biodiversity value and is not likely to significantly affect threatened species, populations or ecological communities, or their habitats. Accordingly, a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is not required.

It is considered that, given the nature, scale and extent of impacts and implementation of the safeguards outlined in both this REFA and the approved REF, the proposed work is unlikely to have a significant impact on the environment. Accordingly, we do not require an Environmental Impact Statement (EIS) and the proposal may proceed.

Certification

I certify that I have reviewed and endorsed the contents of this REFA document and, to the best of my knowledge, it is in accordance with the EP&A Act and the Environmental Planning and Assessment Regulations (EP&A Regulation 2021). The proposal has been considered against matters listed in section 171 (Appendix A) and the Guidelines approved under section 170 of the EP&A Regulation and the information it contains is neither false nor misleading.

Prepared by:	Reviewed by:	Endorsed by:	Approved by:
[redacted]	[redacted]	[redacted]	[redacted]
Evie Packett REFA author GHD Date: 16 May 2023	John McManus Technical Director Environment GHD Date: 16 May 2023 [redacted] Veronica Ku Lead Environmental Scientist Sydney Water Date: 17 May 2023	Yousef Abdel Khaleq Senior Project Manager Sydney Water Date: 17 May 2023	Elissa Howie A/Environment and Heritage Manager Sydney Water Date: 17 May 2023

2 Project Summary

Project information	
Project location	190 Wrights Road, Castle Hill, 2154, Hills Shire local government area (LGA)
Approved REF	*Review of Environmental Factors North West Treatment Hub Castle Hill and Rouse Hill Water Recycling Plants Compliance Upgrade (August, 2021)*
Project scope	The approved project involves upgrades to the Castle Hill Water Recycling Plant (WRP) and Rouse Hill WRP in order to ensure continued compliance with environmental regulatory frameworks as the region develops. Specifically, the upgrades at Castle Hill WRP include: • installing inlet works (including screening and grit removal) • replacing existing infrastructure such as the primary sedimentation tank cover • upgrading existing systems such as the reclaimed effluent (RE) system • installing new infrastructure such as pumps, tanks, dosing systems, storage, pipelines, facilities, and an additional discharge main (~125 m) to Cattai Creek • demolishing redundant infrastructure. Figure 1 shows the approved project area that was assessed in the original REF.
Project change	Following the REF approval, Sydney Water identified some modifications to the approved project that require assessment and approval under the EP&A Act. These modifications are located at Castle Hill WRP only and are: • dewatering and infilling a decommissioned lagoon • installing a high voltage (HV) power cable • changing the location of a HV switch room. <u>Lagoon dewatering, cleaning and infilling</u> The original REF assessed excavations adjacent to the WRP artificial lagoon embankment. The artificial lagoon was originally used as part of the WRP digester process and was decommissioned several years ago. The lagoon has since filled up with rainwater. It has been determined that the existing lagoon needs to be dewatered, cleaned, and backfilled with material produced as part of the bulk excavations occurring as part of the approved project. This will allow the area to be used as a construction laydown area. The removed water would be transferred to the WRP for treating.

Algae has accumulated in the lagoon since its decommissioning. The lagoon also potentially contains bottom lying sediments and contaminants. As such, the lagoon water will be tested before dewatering commences to avoid any impacts to the WRP. The water will be sampled to test:

- pH
- turbidity
- ammonia
- nitrate.

If the water is found to be of a suitable quality for transfer to the WRP, dewatering will commence. If not, actions will be taken to improve the water's quality. The water would then be re-tested to confirm its quality is suitable for dewatering and transfer to the WRP.

The lagoon water will be transferred to a wastewater pipe via points located at the south-eastern and eastern corners of the proposal area (refer Figure 1). The water would then flow along a wastewater pipe known as the Cattai Creek 1050 Carrier Riser, into an existing inlet and treated at the WRP.

The lagoon will be dewatered using flex drive pumps and lay flat hoses. The pumps and hoses would lower the water level until the lagoon is safe to enter. The base of the lagoon would then be inspected, and any visible native turtles would be relocated to Cattai Creek by a suitably trained ecologist.

Once the lagoon is dewatered, the ground conditions would be assessed to determine if any plant or equipment can be safely driven over its base.

Sediment or other soft material at the base of the lagoon would be pushed to the edge of the batter away from the entrance path. Clean fill would then be placed on the base of the lagoon to create dry ground conditions. The remaining sediment or other soft material would be tested. If safe, the material would be dried and mixed in with other excavated material sourced from the site to create a suitably dry fill.

Vegetation along the edge and middle of the lagoon would be cleared. The existing platform would be removed, and the chamber walls would be pushed in.

The lagoon would then be backfilled with fill material excavated during the civil works occurring as part of the approved project. The fill material would be compacted in layers no more than two metres above the existing lagoon edge.

Once the lagoon is backfilled the area would be used as a laydown area for construction activities occurring as part of the approved project. After the works are completed, the area would be rehabilitated and hydromulched with an approved Sydney Water seed mix. The area may be used in the future for laydown requirements.

Project information	
	Installation of a HV cable The original REF approved the extension of the WRP partly to enable the installation of a HV switch room. As the project design progressed it was determined that the route of a proposed HV cable needed to be amended to reduce impacts to operation of the WRP. The proposed alignment of the HV cable is shown in Figure 1. Installation of the HV cable will require vegetation removal. Figure 1 shows a conservative estimate of the vegetation for removal to install the cable. Efforts would be made to align the cable closely to the lagoon footprint to reduce the amount of vegetation removal required. Vegetation removal would be needed to provide an excavator enough space to dig a trench of about 1.2 m wide, one metre deep, and 380 m in length. The HV cable would be installed within this trench. The trench would run along the western and southern side of the lagoon and would be infilled after cable installation. Once installation is complete, the cleared area would be rehabilitated apart from a three metre wide easement along the cable route (1.5 m on either side of the cable). This easement would be kept cleared during operation of the proposal to allow for maintenance of the cable. Changed location of HV switch room In addition, the proposed location for the HV switch room has been moved slightly to the south. The new location for the HV switch room is still within the area approved for vegetation clearing in the REF approved August 2021. The approximate size and scale of the switch room has not changed. The area of vegetation proposed to be cleared to allow the installation of the HV cable is shown in Figure 1.
Justification for project change	The proposal was revised to reduce the need for disposal of material off-site by infilling the decommissioned lagoon with spoil. It was determined that this would reduce traffic movements during construction, impacts to the community and costs. The HV cable route has moved to accommodate relocation of the inlet works structure*. The HV switch room was relocated to the north to provide space for future operations that may be required.

* *Relocation of the inlet works structure has remained within the approved project area and WRP boundary and is consistent with the approved project. It is therefore not assessed as part of this REFA.*

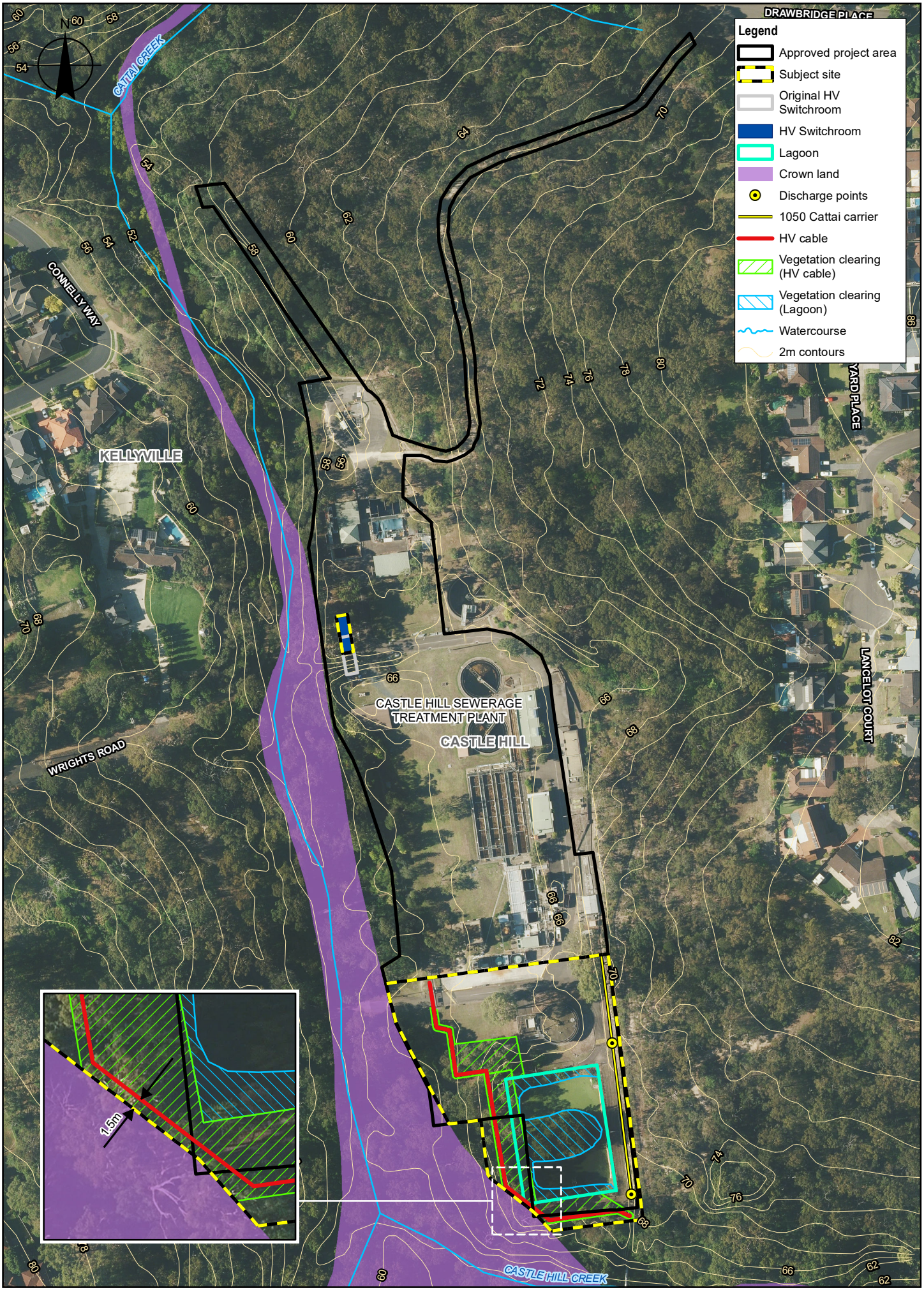

Figure 1 - Project change

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Print date: 12 May 2023 - 14:11

Data source: Sydney Water: Approved Project Area, 2023; LPI: DTDB, 2023; Aerial Imagery: Metromaps, 2023; . Created by: tthompson2

3 Legislative consideration

Table 1 provides the additional legislative requirements above those already assessed in approved REF (2021). These relate to changes in the State Environmental Policies (SEPP) since the determination of the approved REF.

The project change is required to facilitate development for the purpose of a water recycling facility in land zoned SP2 Infrastructure, which is a prescribed zone. The project is permissible without consent in accordance with Section 2.126 of the State Environmental Planning Policy (Transport and Infrastructure) 2021.

Accordingly, this REF addendum has been assessed under Division 5.1 of the EP&A Act and Sydney Water can self-determine the project.

Table 1 Additional legislative requirements

Legislation	Additional considerations
State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) Formerly the State Environmental Planning Policy (Infrastructure) 2007).	The proposal is considered to meet the definition of a water recycling facility in accordance with Division 18, s2.125 of the TISEPP. S2.126(4) permits development for the purpose of water recycling facilities may be carried out without consent on land in a prescribed zone in the prescribed circumstances. S2.125(g) provides that development is carried out in a prescribed zone if it is carried out on land zoned as SP2 Infrastructure. S2.126(1)(a) provides that development is carried out in the prescribed circumstances if the development is carried out by or on behalf of a public authority. As Sydney Water is a public authority, and the proposal area is zoned as SP2 Infrastructure, the proposal is permissible without consent.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) Formerly the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.	S2.3 of the Biodiversity and Conservation SEPP provides that the proposal area is subject to Chapter 2 of the Biodiversity and Conservation SEPP as it is located within The Hills Shire LGA on land zoned as SP2 Infrastructure. S2.4(1) provides that Chapter 2 of the Biodiversity and Conservation SEPP does not affect the provisions of any other SEPP. As the proposal is permissible under TISEPP a Council permit to clear vegetation under this SEPP is not required. <u>Vegetation in non-rural areas (Chapter 2)</u> Chapter 2 of this SEPP applies as it is in an area or zone listed in subsection 2.3(1). However, subsection 2.4(1) states: '*This Policy does not affect the provisions of any other SEPP….*', and as the works are permissible under the TISEPP a Council permit to clear vegetation under this SEPP is not required.

4 Consultation

Sydney Water must consult with councils and other authorities for work in sensitive locations or where the work may impact other agencies infrastructure or land (specified in Part 2.2 Division 1 of the TISEPP).

No formal consultation was required under the TISEPP. Further detail is provided in **Appendix B**.

5 Additional environmental impacts and mitigation measures

The purpose of the proposed modification is to reduce the need for disposal of material off-site by infilling the decommissioned lagoon with spoil. Reducing disposal of off-site material would notably reduce the amount of traffic movements to and from the site during construction as well as associated noise. This would reduce impacts to nearby community.

The table below lists other environmental impacts that could result from the proposed change compared to the approved REF and the additional mitigation measures identified. All other environmental impacts and mitigation measures identified in the approved REF (2021) remain the same and will be incorporated into the Contractor's Construction Environmental Management Plan (CEMP).

Environmental impacts table

Aspect	Additional impacts	Additional mitigation measures
Topography, geology and soils	Existing environment Soil investigations previously conducted at the WRP indicate soils comprise of sandy fill, up to two metres thick with fill thickness increasing towards the east of the site, underlain by residual clayey sands and sandstone rock. The WRP is located in a natural depression and a sandstone cliff face bounds the WRP to the east. There is no known contamination, acid sulfate soils (ASS) or saline soils at the WRP. Material at the site, for example within the lagoon, may contain localised contamination. The walking track around the WRP and the fire trail to the northeast are unsealed tracks. The fire trail is steep in places and requires upgrading to make it suitable for construction vehicle use. Potential additional impact Once the lagoon is dewatered, sediment and other soft material would be exposed at the base of the lagoon. The material would be dried and tested for contaminants. The following would occur based on the results of the testing: • if the material is found to be chemically suitable in accordance with Assessment of Site Contamination National Environment Protection Measure (ASC NEPM) 2013, the sediment would be mixed with other excavated material originated from the site and placed within the lagoon for infilling	• Any excavated sediments or soil that require disposal will be sampled, tested, and classified in accordance with the Waste Classification Guidelines: Part 1 Classifying Waste (EPA, 2014) prior to being disposed of at a waste facility licensed to accept the relevant class of waste. Any materials classified as Hazardous Waste may require treatment or an immobilisation approach in accordance with Part 10 of the Protection of the Environment Operations (Waste) Regulation 2014.

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	• if the material is found not to be suitable for placement within the lagoon, it will be tested for re-use and/ or recycling opportunities in accordance with relevant NSW EPA resource recovery order and exemptions. If the material cannot be re-used or recovered, the material will be classified in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (EPA, 2014) prior to being disposed of at a waste facility licensed to accept the relevant class of waste. The lagoon chamber walls would be pushed in and the lagoon would be backfilled with fill material. Material excavated elsewhere on site for the approved project would be used. This would reduce the volume of surplus spoil that would need to be disposed of offsite. During infilling, the fill material would be compacted in layers to a height no more than 2 m above the existing lagoon edge. The lagoon footprint will be rehabilitated. Planted vegetation around the site boundary during rehabilitation would reduce potential impacts from erosion as well as serve as a visual screen. Installation of the HV cable would involve trenching. The trench would result in about 456 m^3 of additional excavated spoil. This material would be used onsite if possible. Any excess soil would be tested for re-use, recycling opportunities as above. If unable to be re-used or recycled, it will be classified in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (EPA, 2014) prior to being disposed of at a waste facility licensed to accept the relevant class of waste. The additional spoil would be managed with previously approved safeguards.	

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
Water and drainage	Existing environment Cattai Creek flows north adjacent to the western boundary of the WRP. This creek is part of the Hawkesbury-Nepean catchment and flows into the Hawkesbury River. Castle Hill Creek flows along the southern boundary of the WRP and into Cattai Creek immediately upstream of the site access road crossing. The WRP is not within flood liable land. Groundwater has previously been recorded at 3.75 m below ground level at the WRP (Sydney Water, 2018). The WRP has experienced some water ponding issues in the past. Run-off generally flows east to west across the site. Potential additional impacts As part of the modified project the water within the decommissioned lagoon would be tested and discharged to a wastewater pipe known as the Cattai Creek 1050 Carrier Riser. The lagoon surface features a substantial accumulation of algae. There is also a possibility that there has been an accumulation of sediments in the base of the lagoon. As such, transfer of this water could potentially disperse contaminants if managed in an uncontrolled manner. As discussed in section 2, to manage this risk the lagoon water would be tested to determine if the water quality is suitable for transfer to the WRP. If not, actions would be taken to amend the water quality within the lagoon. The water would then be tested again before transfer to the WRP.	• A Dewatering Management Plan (DMP) will be drafted by a suitable qualified professional and implemented to guide water quality testing and other procedures to be followed during dewatering. The DMP will specify the water quality thresholds that must be met for the water to be transferred to the WRP. The DMP will be drafted in accordance with the following: ○ Beneficial Use of Process Unit Cleanout Products procedure (Sydney Water, 2020) ○ Delivery Management Guidance Standard 9.1 Excavation Dewatering.

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
Flora and fauna	<u>Existing environment</u> The subject site (refer Figure 1) consists of native vegetation, mixed planted trees, and managed grassland. The subject site features planted trees surrounding and within a disused lagoon. A small area of disturbed remnant vegetation borders the subject site. A field survey of the subject site undertaken on 6 February 2023 identified 50 plant species, including 12 exotic species and three priority weed species for the Greater Sydney region. The subject site supports *Plant Community Type (PCT) 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion in Poor and Fair condition* (refer Figure 2 in Appendix C). No threatened ecological communities were identified within the subject site or its immediate surrounds. The degraded condition of regrowth vegetation on site is unlikely to constitute important habitat for threatened species such that they are put at further risk of local extinction. Eastern Long-necked Turtle (*Chelodina longicollis*) are known to be present in the lagoon. <u>Potential additional impacts</u> The proposed modifications would require the removal of up to: • 0.133 ha of PCT 1255 – fair condition • 0.155 ha of PCT 1255 – poor condition • 0.096 ha of planted trees • 0.21 ha of managed grassland. The new location of the switch room was already approved for vegetation removal as part of the approved REF. As such, no further vegetation removal would be required for the changed switch room location. One waterbody, the lagoon, would also be removed as part of the proposed modifications. In addition, the proposed modifications have the potential to displace native fauna or directly/indirectly result in the mortality of fauna that are present at the time of vegetation clearing activities.	• A suitably trained ecologist will attend the site during the dewatering of the lagoon in order to assist in the re-locating of any native turtles present to the neighbouring Cattai Creek. • WIRES will be contacted in the event of injured fauna being discovered. • Standard hygiene measures in accordance with national best practice guidelines such as the washing down of vehicles will be implemented. • Offset vegetation removed (revegetate approximately 0.768 ha). Vegetation will be replanted at suitable locations at Castle Hill WRP or immediate surrounds. This includes revegetation at the edges of the lagoon as far as practical.

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	Mitigation measures have been proposed to relocate the Eastern Long-necked Turtle (*Chelodina longicollis*) to Cattai Creek and manage any potentially injured fauna. The proposed modifications have the potential to increase the introduction and spread of exotic plants and pathogens through increased visitation and disturbance of soil. These risks can be managed with standard hygiene measures to prevent the spread of weed propagules such as washing down of vehicles and disposing of weed material at an appropriate licensed facility. Raised levels of noise and vibration may deter native fauna from using the surrounding area during construction. These impacts are likely to be temporary and short-term and unlikely to result in permanent impacts to fauna. No threatened species were identified within the subject site during the field survey. However, several threatened flora and fauna species are likely to occur within the broader bushland surrounding the WTP. Powerful Owl (*Ninox strenua*), the Grey-headed Flying-fox (*Pteropus poliocephalus*), *Hibbertia superans*, *Epacris purpurascens var. purpurascens* and the Hairy Geebung (*Persoonia hirsuta*) were determined to have a high likelihood of occurring at the subject site (refer Appendix C). However, following assessments of significance (Appendix C) impacts to threatened species are anticipated to be minor as the proposed modifications are of a relatively small nature and the area around the subject site is highly developed. Regarding vegetation that may be used as potential foraging habitat for the Powerful Owl, hollow bearing trees were absent rendering this vegetation as unsuitable breeding habitat for this species (Appendix C). <u>Offsets</u> Although formal offsets are not required under the BC Act, Sydney Water has an internal position to deliver a 'maintained or enhanced' biodiversity outcome if projects have residual biodiversity impacts.	

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	As the proposed modification would impact non-threatened native vegetation (0.384 ha of PCT 1255: fair condition, PCT 1255: poor condition and mixed planted trees)), offsets could be obtained through restorative or regenerative works. Sydney Water is committed to completing restorative works or providing offsets at a multiplier of twice the amount of vegetation proposed for removal (2:1) and is therefore required to offset impacts to an area of 0.768 ha. The bushland directly adjacent to the eastern boundary of the approved project boundary would be broadly suitable for restorative works as per the methods outlined in *'SWEMS0025.11 Guideline for managing native re-vegetation for construction projects*'. For further discussion refer to the Sydney Water Offsets Guide (SWEMS0019.13; Sydney Water, 2019) and Appendix C.	
Air and energy	Existing environment The proposal is within a residential area and is situated in close proximity to residential areas of Castle Hill to the east and Kellyville to the west. Potential sensitive receivers during the proposed dewatering and infilling of a decommissioned lagoon would include all residential properties within 500 m of the lagoon. Castle Hill BMX Track and Fred Caterson Reserve would also be considered sensitive receptors whilst being used. The walking track west of the WRP will be closed to pedestrians and cyclists (sensitive receivers to potential dust and odour impacts) during construction of the proposal. Potential impacts The site is an existing source of odour. Odours in wastewater are caused during the breakdown of organic matter. Reviewing a site's odour complaint history is a way to understand the odour performance of the site.	• If dewatering of the lagoon results in odour generation at a level which may impact on nearby receptors, consider controls such as limiting dewatering to certain times or when winds are not blowing towards the nearest affected receptors. • If odour generation increases to a level where nearby receptors are impacted by odour, or if an odour complaint is received, then stop work procedures would be triggered until the issue has been resolved.

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	There have been two odour complaints received at the WRP in the past four years. Both complaints were from residents on Lancelot Drive, to the east of the WRP. The relatively low number of odour complaints received may indicate the site is performing well and not significantly impacting on the local community. The modified proposal would potentially result in odour and dust emissions from: • dust generated during infilling of the decommissioned lagoon, excavations for HV power cable and vegetation clearing • dust generated by construction vehicles travelling on disturbed / unsealed access routes • emissions from machinery, equipment and vehicles used during construction • odour generated construction activities including dewatering and removal of sediment from the decommissioned lagoon. The odour potential of the lagoon water and sediment is not well understood without any odour sampling data to review. Dewatering would result in mixing of water and sediments, releasing some odorous gases however as the lagoon was decommissioned years ago the odour potential is considered minimal. Local meteorology would influence dispersion of odours in the surrounding environment. There is no meteorological station at the site however NSW Department of Planning and Environment (DPE) has operated a meteorological station at Rouse Hill since 2019. The site is about 8 km to the northwest of Castle Hill WRP and can be referred to, to obtain an indication of potential conditions at the site. An annual wind rose at Rouse Hill is provided in Figure D.1 and seasonal wind roses in Figure D.2 in Appendix D. Most calm and light winds (which are typically associated with poor odour dispersion) occur during autumn and winter, from the northern and western directions. Light winds in spring and summer mostly occur from the north and southwest. The proposed construction activities would likely commence in spring which may result in some light winds (and odour) towards receptors in Castle Hill to the northeast of the lagoon.	

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	Given the odour potential of dewatering the lagoon is low, odour impacts are anticipated to be minimal during the works. Management measures have been provided should odour occur at a level which may impact nearby receptors.	
Waste and hazardous materials	Potential additional impacts In addition to the waste types identified in the approved REF (2021), dewatering the decommissioned lagoon would produce water that needs to be disposed. The lagoon water would be tested to determine if the water quality is suitable for transfer to the WRP in accordance with the DMP. If not, actions would be taken to amend the water quality within the lagoon. The water would then be tested again before discharge. To reduce waste, the sediment and other soft material within the lagoon would be mixed with other material and reused with fill if possible. However, if the material is found to be contaminated, it would be tested and classified in accordance with the *Waste Classification Guidelines: Part 1 Classifying Waste* (EPA, 2014) prior to being disposed of at a waste facility licensed to accept the relevant class of waste.	No further safeguards required.
Social and visual	Existing environment There are limited views into the WRP from surrounding residential properties located east and west of the WRP. This is due to the location of WRP in a natural topographical depression and within concealing bushland. However, the narrow and unsealed walking track around the WRP is frequented by local walkers, joggers and occasionally mountain bikers. Potential additional impacts As discussed in the REF approved in August 2021 the walking track to the west of the WRP would be closed during construction of the proposal. As such, no further social or visual impacts are anticipated from the proposed modifications.	Where feasible, offset vegetation will be replanted along the edges of walking tracks.

Environmental impacts table		
Aspect	**Additional impacts**	**Additional mitigation measures**
	During operation of the proposal, the view from the walking track would be altered due to the infilling of the lagoon to no more than two metres above existing levels and the additional vegetation clearing. The lagoon is no longer in use, is in a state of disrepair and features a layer of algae on the top. Infilling and revegetating the lagoon's edge would result in a positive visual change more consistent with the surrounding area. The proposed modifications would result in an additional about 0.594 ha of vegetation clearing (includes 0.21 ha of managed grassland) in the areas shown on Figure 1. A significant portion of the vegetation would be located along the boundary of the walking track. This would result in a negative visual impact along the walking track. However, this impact is expected to be minor as the surrounding bushland would remain. The proposed modifications are anticipated to reduce traffic movements and associated noise impacts during construction. This is because excavated materials may be used to infill the lagoon instead of being transported off-site.	

6 Conclusion

This REFA outlines potential environmental impacts associated with proposed modifications at Castle Hill WRP as part of the North West Treatment Hub compliance upgrade. Any additional environmental impacts are considered minor and potential impacts can be mitigated through implementation of the measures outlined in this addendum and the approved REF. The proposed works are not likely to significantly impact the environment.

7 References

NSW EPA (2014) *Waste Classification Guidelines Part 1: Classifying waste.* Available at: https://www.epa.nsw.gov.au/publications/wasteregulation/140796-classify-waste (Accessed: 27 September 2022).

Sydney Water (2018) *Review of Environmental Factors. Rouse Hill and Castle Hill Water Recycling Plant. Growth Amplification Project*, *November 2018.*

Sydney Water (2021) *Review of Environmental Factors North West Treatment Hub Castle Hill and Rouse Hill Water Recycling Plants Compliance Upgrade (August, 2021)*.

Appendix A – Section 171 checklist

Section 171 checklist	REF finding
Any environmental impact on a community	There may be short-term impacts on the community from odour and dust emissions. There may also be minor impacts to the community from a reduction in visual amenity along the public walking track. There will be environmental improvements by reducing traffic movements during construction.
Any transformation of a locality	The proposed work will not result in the transformation of a locality.
Any environmental impact on the ecosystems of the locality	The proposed work may result in minor impacts to flora and fauna from vegetation removal, removal of the lagoon, and noise generation. However, these impacts would be minor. There will be environmental improvements during construction with reduced traffic movements through the local area.
Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of the locality	The proposed work will result in a reduction of the aesthetic quality of the walking track due to vegetation removal. However, this impact would be minor. In accordance with the safeguards provided as part of the approved REF (2021) revegetation would occur where possible. The edges of the infilled lagoon will be revegetated to minimise aesthetic impacts. The project overall, improves treated water quality, contributing to future healthier waterways and associated ecosystems.
Any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations	The proposed work will not have any effect upon a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or any other special value for present or future generations.
Any impact on the habitat of any protected animals (within the meaning of the *Biodiversity Conservation Act 2016*)	The proposal will require impacts to both native and non-native vegetation that may be used as habitat. The proposal has the potential to displace native fauna or directly/indirectly result in the mortality of fauna that are present at the time of vegetation clearing activities. Mitigation measures have been provided to reduce the risk from vegetation clearing to protected animals. The Eastern Long-necked Turtle (*Chelodina longicollis*) has previously been identified in the lagoon. A suitably-trained ecologist will attend site during the dewatering of this lagoon to relocate any fauna present into the neighbouring Cattai Creek. In the event of injured fauna being discovered, WIRES will be contacted. It is likely that the threatened species, such as the Powerful Owl and the Grey-headed Flying-fox, may occur in the bushland surrounding the site, however, an assessment of significance pursuant to Section 7.3 of the *Biodiversity Conservation Act 2016* determined that impacts on these species, if present, are unlikely to be significant. Vegetation removed for the proposed work does not include hollow bearing trees that Powerful Owls are likely to use for breeding habitat.

Section 171 checklist	REF finding
Any endangering of any species of animal or plant or other form of life, whether living on land, in water or in the air	The proposed work will not be endangering any species of animal, plant or other form of life, whether living on land, in water or in the air.
Any long-term effects on the environment	The proposed work will not have any long-term impacts on the environment. The project overall will have a long-term benefit by providing a reliable and modern water recycling service for the area.
Any degradation of the quality of the environment	The proposed work will not cause the degradation of the quality of the environment. Some vegetation removal is required for the proposed work and will be subject to project approval safeguards to minimise impacts.
Any risk to the safety of the environment	The proposed work will not increase risk to the safety of the environment. The proposed safeguards will manage potential risks from contaminated material.
Any reduction in the range of beneficial uses of the environment	The proposed work will not have any reduction in the range of beneficial uses of the environment.
Any pollution of the environment	Environmental safeguards will mitigate the potential for the proposed work to pollute the environment. The upgrade will reduce pollution of the environment during operation of the proposal.
Any environmental problems associated with the disposal of waste	The disposal of wastes will be conducted in accordance with the environmental safeguards, and no environmental problems associated with the disposal of waste are expected.
Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply	The proposed work will not increase demand on resources, that are, or are likely to become, in short supply.
Any cumulative environmental effect with other existing or likely future activities	The proposed work will not have any cumulative environmental effect with other existing or likely future activities.
Any impact on coastal processes and coastal hazards, including those under projected climate change conditions	The proposed work will not have any impact on coastal processes or hazards, and coastal processes and coastal hazards will not have any impact on the proposed activity.
Any applicable local strategic planning statements, regional strategic plans or district strategic plans made under the EP&A Act, Division 3.1	There are no applicable strategic planning statements or plans, as the proposed work forms part of a renewals program.
Any other relevant environmental factors.	The proposed work has been assessed against the factors listed above, and there are no other relevant environmental factors to consider.

Appendix B – Consideration of TISEPP consultation

TISEPP section	Yes	No
Section 2.10, council related infrastructure or services – consultation with council		
Will the work:		
Potentially have a substantial impact on stormwater management services provided by council?		X
Be likely to generate traffic that will strain the capacity of the road system in the LGA?		X
Involve connection to, and have a substantial impact on, the capacity of a council owned sewerage system?		X
Involve connection to, and use of a substantial volume of water from a council owned water supply system?		X
Involve installation of a temporary structure on, or enclosing, a public space under council's control that will cause a disruption to pedestrian or vehicular traffic that is not minor or inconsequential?		X
Involve excavation of the surface of, or a footpath adjacent to, a road for which the council is the roads authority that is not minor or inconsequential?		X
Section 2.11, local heritage – consultation with council		
Is the work likely to affect the heritage significance of a local heritage item, or of a heritage conservation area (not also a State heritage item) more than a minor or inconsequential amount?		X
Section 2.12, flood liable land – consultation with council		
Will the work be located on flood liable land (that is land that is susceptible to flooding by the probable maximum flood event) and will they alter flood patterns other than to a minor extent?		X
Section 2.13, flood liable land – consultation with State Emergency Services		
Will the work be located on flood liable land (ie. land that is susceptible to flooding by the probable maximum flood event) and undertaken under a relevant provision*, but not the carrying out of minor alterations or additions to, or the demolition of, a building, emergency works or routine maintenance? * (e) Div.14 (Public admin buildings), (g) Div. 16 (Research/ monitoring stations), (i) Div. 20 (Stormwater systems)?		X
Section 2.14, development with impacts on certain land within the coastal zone– council consultation		
Is the work on land mapped as coastal vulnerability area and inconsistent with a certified coastal management program?		X
Section 2.15, consultation with public authorities other than councils		
Will the proposal be located on land adjacent to land reserved under the *National Parks and Wildlife Act 1974* or to land acquired under Part 11 of that Act*? If so, consult with DPIE (NPWS).*		X
Will the proposal be located on land in Zone E1 National Parks and Nature Reserves or in a land use zone that is equivalent to that zone? *If so, consult with DPIE (NPWS)*		X
Will the proposal comprise a fixed or floating structure in or over navigable waters? If so, consult *TfNSW*		X
Will the proposal be located on land in a mine subsidence district within the meaning of the *Coal Mine Subsidence Compensation Act 2017*? *If so, consult with Subsidence Advisory NSW.*		X
Will the proposal involve clearing of native vegetation on land that is not subject land (ie non-certified land)? *If so, notify DPIE at least 21 days prior to work commencing. (Requirement under s3.24 Chapter 3 Sydney Region Growth Centres - of the SEPP (Precincts – Central River City) 2021.*		X
Will the proposal involve development within a Western City operational area specified in the Western Parkland City Authority Act 2018, Schedule 2 with a capital investment value of $30 million or more? If so, consult with the Western Parkland City Authority.		X

Appendix C – Biodiversity Impact Assessment

Castle Hill Water Recycling Facility

Biodiversity Assessment Report Addendum 1

Sydney Water

16 May 2023

→ **The Power of Commitment**

Project name		Castle Hill Compliance					
Document title		Castle Hill Water Recycling Facility | Biodiversity Assessment Report Addendum 1					
Project number		12596334					
File name		12596334-Castle_Hill_WWTP-Addendum_REF_BAR_Rev_0.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	James Baldry	Kath Chestnut	On File	Andreas Broeckmann	On File	28 February 2023
S3	B	James Baldry	Kath Chestnut	On File	Andreas Broeckmann	On File	14 April 2023
S4	0	James Baldry	Kath Chestnut	[redacted]	Andreas Broeckmann	[redacted]	16 May 2023

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Appendices

1. Introduction

1.1 Purpose of this report

GHD Pty Ltd (GHD) was engaged by Sydney Water to complete this addendum for an existing Biodiversity Assessment Report (Biosis, 2021). This is required for additional works to upgrade the Castle Hill Water Recycling Facility, 190 Wrights Rd, Castle Hill NSW 2154, approximately 27 kilometres (km) north-west of the Sydney Central Business District (the study area) (Figure 1).

Sydney Water is proposing to upgrade the operational capacity of the facility and the removal of redundant infrastructure. This aims to increase the overall efficiency of the facility, subsequently accommodating the needs of a growing population in the locality. The proposal involves the following actions:

The removal of sludge and infilling of a pre-existing storage pond

The installation of a high voltage powerline.

The purpose of this addendum is to assess the potential impacts of the proposed works on biodiversity values within the subject site and immediate surrounds and detail additional safeguards or management measures where required.

1.2 Scope and limitations

This report: has been prepared by GHD for Abergeldie Contractors Pty Limited and may only be used and relied on by Abergeldie Contractors Pty Limited for the purpose agreed between GHD and Abergeldie Contractors Pty Limited as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Abergeldie Contractors Pty Limited arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Note that field survey was not designed to detect all species, rather to provide an overall assessment of the ecological values within the site. Some species, such as annual, ephemeral or cryptic flora species and mobile, migratory, transient or cryptic fauna may not have been present or detectable at the time of survey. The survey conducted was suited to the existing disturbed nature of the proposal area and its modified habitats.

1.3 Assumptions

This assessment has been completed based on information provided by Sydney Water, including a CAD base and information gained from the site visit.

1.4 Terminology

The following terminology is used in this report:

– The project: Proposed upgrades to the Castle Hill Water Recycling Facility
– Study area: Operational area associated with Castle Hill Water Recycling Facility
– Subject site: Areas of direct impact that are subject to this addendum
– Locality: refers to land within 10km of the subject site.

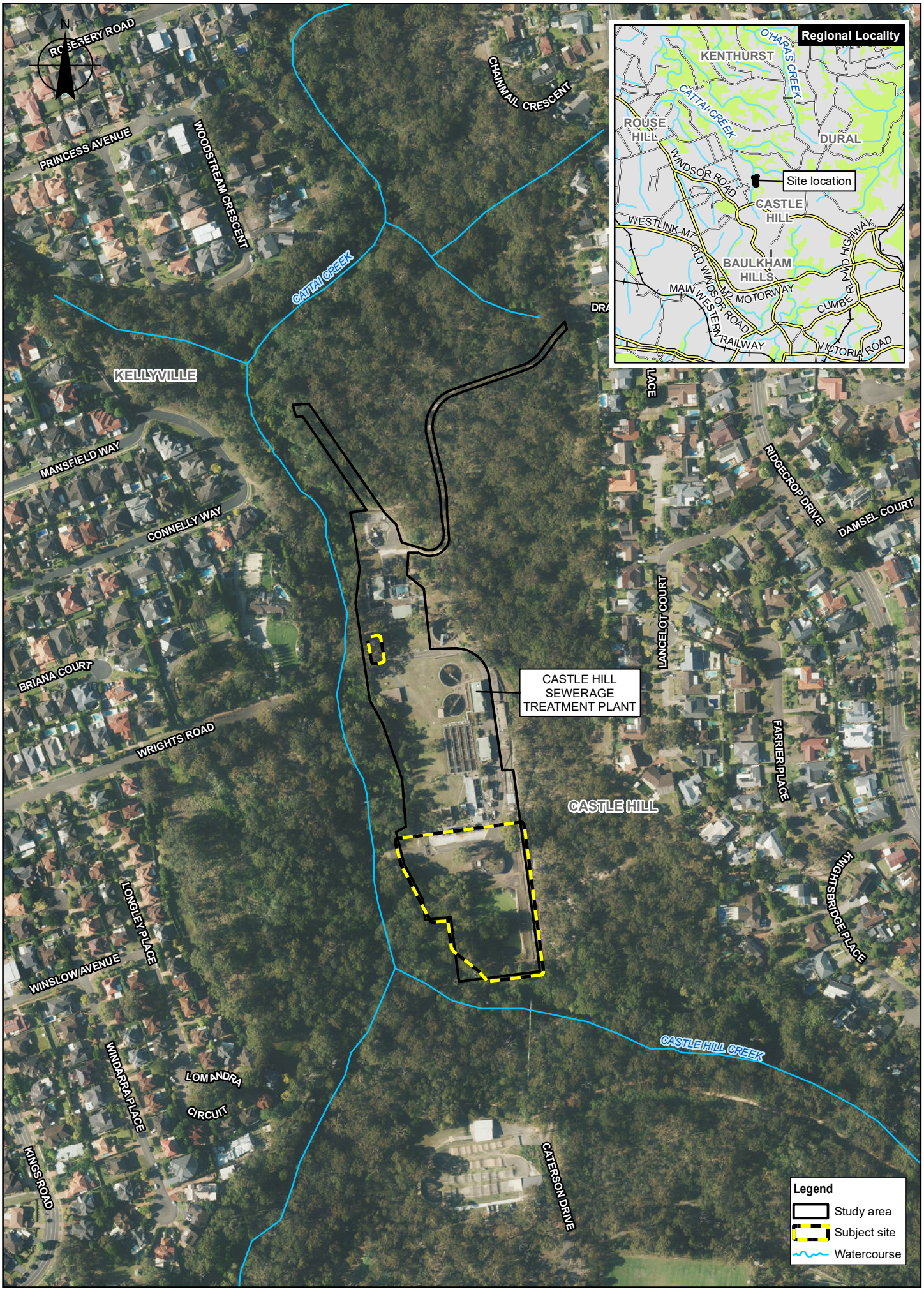

Figure 1 - Study area, subject site and locality

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Print date: 12 Apr 2023 - 12:29

Data source: Geoscience Australia: 250k Topographic Data Series 3, 2006; LPI: DTDB, 2023; Aerial Imagery: Metromaps, 2023; . Created by: fmackay

2. Methodology

2.1 Desktop assessment

A desktop assessment was undertaken to identify threatened flora and fauna species, populations and ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Act 1999* (EPBC Act) relevant to the proposal (within a 10 kilometre [km] radius of the site). A review of the following resources was completed:

– The Department of Climate Change, Energy, the Environment and Waters (DCCEEW) Protected Matters Search Tool for relevant MNES listed under the EPBC Act (accessed 09 February 2023) (DCCEEW 2023a)
– The NSW Department of Planning and Environment (DPE) BioNet database (licensed) for records of threatened species, populations and endangered ecological communities listed under the BC Act (accessed 09 February 2023) (DPE 2023a)
– DCCEEW Species Profile and Threats Database for description of the distribution and habitat requirements of threatened and migratory biota listed under the EPBC Act (DCCEEW 2023b)

DPE threatened biota profiles for descriptions of the distribution and habitat requirements of threatened biota listed under the BC Act (DPE 2023b). The likelihood of threatened and migratory biota occurring in the subject site was assessed based on presence of records in the locality, species distribution and habitat preferences and the suitability of habitat present in the subject site and broader study area. The assessment of the likely occurrence of threatened species within the subject site is provided in Appendix A.

2.2 Field survey

A rapid, preliminary field survey was conducted by two (2) GHD ecologists on 06 February 2023. The assessment assisted in determining the broad vegetation and habitat composition of the subject site.

The surveys were restricted to incidental observations of flora/fauna within the subject site and study area during the field survey. The surveys focused on identifying terrestrial biodiversity values and habitats including:

– Assessment of vegetation type, structure and condition
– Identification of vegetation conservation significance with reference to threatened ecological communities listed under the BC and EPBC Acts
– Identification of priority weeds
– Identification of potential habitat for threatened flora and fauna species e.g. waterbodies, hollow bearing trees, rocky outcrops etc)
– Incidental fauna/flora observations.

2.2.1 Survey limitations

Note that field survey was not designed to detect all species, rather to provide an overall assessment of the ecological values within the site. Some species, such as annual, ephemeral or cryptic flora species and mobile, migratory, transient or cryptic fauna may not have been present or detectable at the time of survey. The survey conducted was suited to the existing disturbed nature of the subject site and its modified habitats.

2.3 Mapping

An assessment was conducted within the subject site and broader study area to determine the presence and extent of vegetation communities. Vegetation community extents was delineated using a handheld GPS device.

If present, native vegetation was assigned to a PCT as per the NSW VIS (DPE, 2023b). Vegetation condition was assessed/delineated based on the degree of disturbance, weed infiltration and overall vegetation structure observed within the subject site.

This was mapped using the GIS software, ArcGIS by Esri and overlayed onto aerial imagery. Polygons of each community were used to estimate the impact of any identified communities within the subject site.

3. Results

3.1 Existing environment

Land use within the locality of the study area is predominantly residential in nature. Sydney Water has operated a water management facility within the study area since 1974. Remnant native vegetation associated with the nearby Cattai Creek directly adjoins the study area. The subject site consists of planted trees surrounding and within a disused sediment pond. A small area of disturbed remnant vegetation occurs on the edge of the subject site that adjoins the broader remnant community mentioned above.

Fifty plant species were recorded within the subject site during survey. A species list is provided in Appendix B. Twelve (12) exotic species were recorded including three (3) priority weed species for the Greater Sydney region (which includes the Hills Shire LGA; DPI, 2023) (Table 1). All exotic plant species in NSW are regulated with a general biosecurity duty under the *Biosecurity Act 2015* to prevent, eliminate or minimise any biosecurity risk. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Table 1 Priority weed species recorded within the study area.

Family	Scientific name	Common name
Asparagaceae	*Asparagus asparagoides*	Bridal Creeper
Solanaceae	*Cestrum parqui*	Green Cestrum
Verbenaceae	*Lantana camara*	Lantana

3.2 Vegetation

The subject site supports native vegetation, mixed planted trees, and managed grassland. Native vegetation is representative of disturbed regrowth consistent with the industrial use of the study area and residential locality. It exists in a highly developed locality and contains a high cover of exotic plant species. Canopy trees are often mature and have likely established following historical clearing. No old-growth trees were identified. A list of flora species identified within the subject site is provided in Appendix B.

The site supports a single (1) Plant Community Type (PCT) as per the NSW Vegetation Classification System (DPE 2023c); *PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion.* This community occurs in two condition states.

The distribution of plant communities across the subject site is provided in Figure 2.

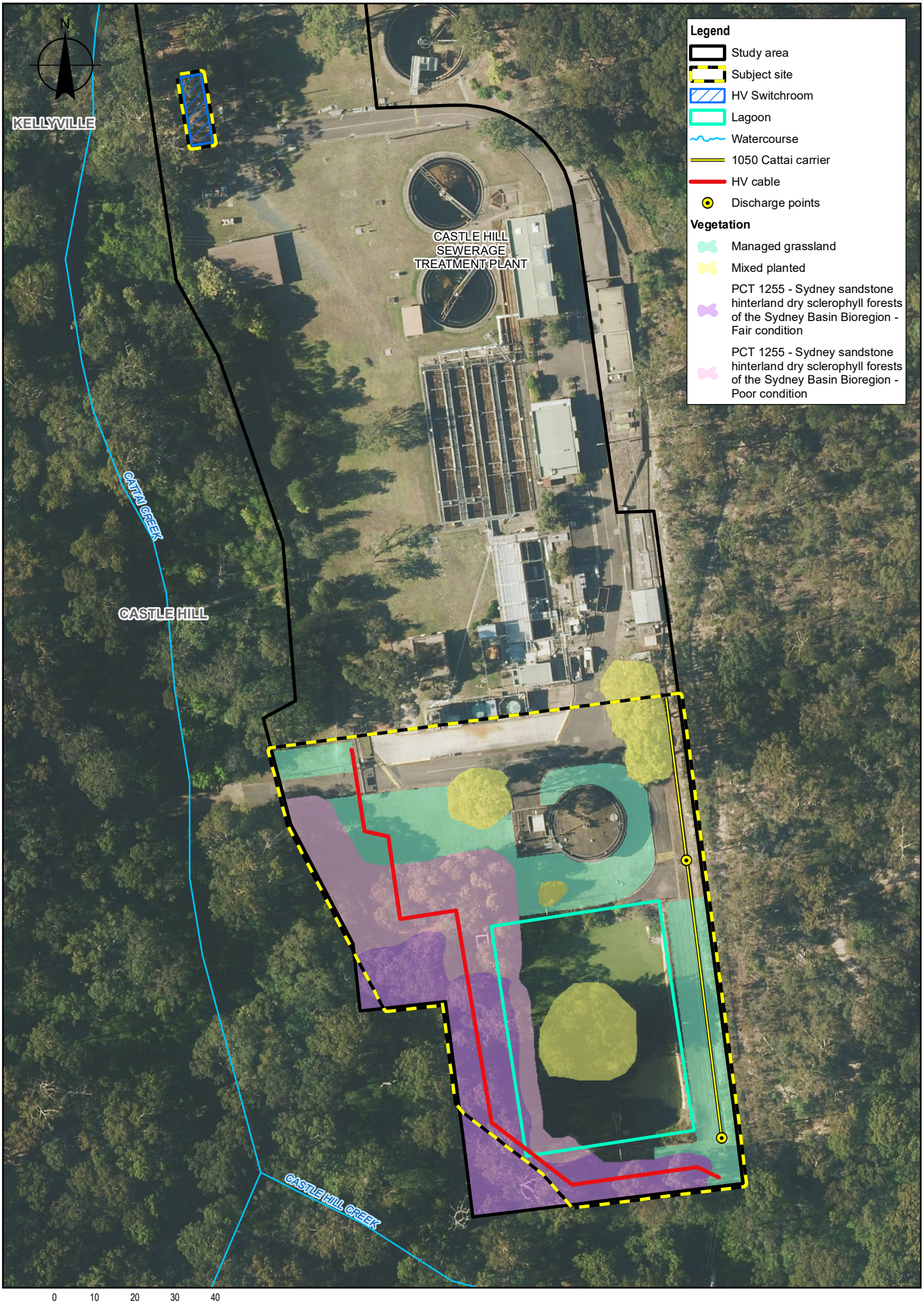

Figure 2 - Vegetation and impacted trees within the subject site

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Data source: LPI: DTDB, 2023; Aerial Imagery: Metromaps, 2023; . Created by: fmackay

3.2.1 PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion: Fair condition

This vegetation is representative of mature regrowth that has likely re-established following historical clearing. The over-storey is comprised of *Eucalyptus haemastoma* (Scribbly Gum), *Angophora costata* (Smooth-barked Apple) and *Angophora bakeri* (Narrow-leaved Apple).

Native species within the midstorey includes *Dodonaea triquetra* (Hop Bush), *Zieria smithii* (Sandfly Zieria), *Persoonia linearis* (Narrow-leaved Geebung) and *Acacia parramattensis* (Parramatta Wattle).

The ground layer consists of a variety of grasses and forbs such as Common Couch (*Cynodon dactylon*), *Dianella revoluta* (Blueberry Lily), *Microlaena stipoides* (Weeping Grass) and *Lobelia purpurascens* (Whiteroot).

The overall condition of this community is defined as 'Fair' due to a high abundance of exotic species including *Lantana camara* (Lantana), *Ligustrum sinense* (Small-leaved Privet), *Sporobolus virginicus* (Parramatta Grass) and *Richardia brasiliensis* (White Eye).

Plate 1 ***PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion: Fair condition***

3.2.2 PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion: Poor condition

This vegetation is representative of regrowth that has likely re-established following historical clearing. Overstorey vegetation is largely absent.

Midstorey vegetation is comprised of a single species; *Acacia parramattensis* (Parramatta Wattle). A high cover of the exotic species *Lantana camara* (Lantana) occurs throughout.

The ground layer consists of a variety of grasses and forbs such as Common Couch (*Cynodon dactylon*), *Dianella revoluta* (Blueberry Lily), *Microlaena stipoides* (Weeping Grass) and *Lobelia purpurascens* (Whiteroot). A high abundance of exotic species is present including *Sporobolus africanus* (Parramatta Grass), *Richardia brasiliensis* (White Eye).

Plate 2 ***PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion: Poor Condition***

3.2.3 Mixed Planted Trees

This vegetation does not align with a PCT and has been planted in several areas within the subject site. The trees are often mature and include species such as *Corymbia maculata* (Spotted Gum), *Casuarina glauca* (Swamp Oak), *Citrus limon* (Lemon Tree) and *Callistemon viminalis (*Weeping Bottle Brush).

Plate 3 ***Planted Casuarina glauca (Swamp Oak) individuals on the island at the centre of the retention pond.***

3.2.4 Managed Grassland

This vegetation is regularly mown and contains no canopy or mid-storey species. Native species include *Cynodon dactylon* (Couch) and *Portulaca oleracea* (Pigweed). It is dominated by exotic species such as *Hypochaeris radicata* (Catsear), *Trifolium repens* (White Clover) and *Bidens Pilosa* (Farmers Friend).

Plate 4 ***Managed grassland bordering the retention pond.***

3.3 Fauna

Seven (7) fauna species were identified within the broader study area during the field survey. This includes six (6) bird species and one (1) reptile (***Table 2***). No threatened species were identified within the study area.

Table 2 ***Fauna species identified within the study area.***

Family	Scientific Name	Common Name
Agamidae	*Intellagama lesueurii*	Water Dragon
Anatidae	*Chenonetta jubata*	Australian Wood Duck
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo
Maluridae	*Malurus cyaneus*	Superb Fairy Wren
Meliphagidae	*Manorina melanocephala*	Noisy Miner
Monarchidae	*Grallina cyanoleuca*	Magpie-lark
Psittaculidae	*Trichoglossus moluccanus*	Rainbow Lorikeet

3.4 Conservation significance

3.4.1 Vegetation

No threatened ecological communities were identified within the subject site or immediate surrounds. Furthermore, the degraded condition of regrowth vegetation on site is unlikely to constitute important habitat for threatened species such that they are put at further risk of local extinction.

3.4.2 Fauna

No threatened fauna species were identified in the subject site during the field survey. Despite this, the seven (7) species identified within the study area are native and are listed as Protected under the BC Act. Previous surveys have identified a population of the Eastern Long-necked Turtle (*Chelodina longicollis*) within the retention pond. This species is also listed as Protected under the BC Act.

The subject site contains vegetation that constitutes suitable habitat for several threatened bird, reptile and mammal species. A likelihood of occurrence assessment determined that two (2) species, the Powerful Owl (*Ninox strenua*) and the Grey-headed Flying-Fox (*Pteropus poliocephalus*), have a high likelihood of utilising the site given their habitat requirements and the high number of records within the locality (Appendix A). An Assessment of Significance pursuant to section 7.3 of the BC Act determined the proposal is unlikely to significantly impact either species (Appendix C).

4. Impact assessment

A discussion of potential impacts and impact mitigation methods associated with the development is provided below.

4.1 Direct impacts

4.1.1 Vegetation removal

The proposal will require impacts to both native and non-native vegetation. This includes the removal of up to:

– 0.133 ha of PCT 1255 – fair condition
– 0.155 ha of PCT 1255 – poor condition
– 0.096 ha of planted trees
– 0.21 ha of managed grassland.

Mitigation methods

In order to prevent impacts to native vegetation directly adjacent to the subject site, it is recommended that impacted vegetation be clearly delineated from retained vegetation using flagging tape. Trees proposed for removal should be clearly demarcated. Native vegetation outside of the subject site should be identified as a 'No-go' zone where construction activities, materials and staff are prohibited.

4.1.2 Waterbody removal

The proposal will require the dredging and filling of a disused retention dam. This dam was constructed specifically for use within the Sydney Water Recycling Facility. This will involve water testing prior to the commencement of dewatering. Additional actions may be taken in order to improve the quality of the water prior to its discharge The lagoon water would be discharged at the discharge points located at the south-eastern and eastern corners of the proposal area. Fill material will be sourced from an approved activity within the study area.

4.2 Indirect impacts

The proposal has the potential to result in the following indirect impacts.

4.2.1 Injury and mortality of native fauna

The proposal has the potential to displace native fauna or directly/indirectly result in the mortality of fauna that are present at the time of vegetation clearing activities. Less mobile terrestrial fauna, such as common species of frogs and reptiles present within groundcover are at most risk of mortality as a result of vegetation clearing. The Eastern Long-necked Turtle (*Chelodina longicollis*) has been previously identified within the disused retention pond.

Mitigation methods

It is recommended a suitably-trained ecologist attend site during the dewatering of this waterbody to relocate any fauna present into the neighbouring Cattai Creek. In the event of injured fauna being discovered, WIRES should be contacted.

4.2.2 Introduction and spread of weeds

Exotic flora species are already present within the subject site, including two priority weeds for the Hunter region (Fireweed and African Olive). The proposal has the potential to increase the introduction and spread of exotic plants through increased visitation and disturbance of soil.

Mitigation methods

These risks can be managed with standard hygiene measures to prevent the spread of weed propagules such as washing down of vehicles and disposing of weed material at an appropriate licensed facility.

4.2.3 Introduction of pathogens

Construction activities have the potential to introduce or spread pathogens such as Phytophthora (*Phytophthora cinnamomi*), Myrtle Rust (*Uredo rangelii*) and Chytrid fungus (*Batrachochytrium dendrobatidis*) throughout the subject site. Diseases and pathogens can be introduced or spread to site via dirt or organic material attached to machinery, vehicles, equipment and employees or through water imported to site for dust suppression. The spread of diseases and pathogens is not restricted to the construction phase of the proposal; they may also be introduced by visitors/users once construction is completed and the pathway is open to the public.

Phytophthora and Myrtle Rust may result in the dieback or modification of native vegetation and damage to fauna habitats. Chytrid fungus affects both tadpoles and adult frogs and can lead to the extinction of local populations once introduced into an area.

Mitigation methods

Implementation of hygiene measures in accordance with national best practice guidelines are proposed to mitigate any risk of pathogen introduction and spread.

4.2.4 Noise and vibration

Noise and vibration impacts are expected during the various stages of construction as a result of vegetation clearing, vehicle movement and operation of plant for construction. Raised levels of noise and vibration may deter native fauna from using the study area during construction. These impacts are likely to be temporary and short-term and unlikely to result in permanent impacts to fauna.

4.2.5 Soil and water pollution

Construction of the proposal has the potential to result in sedimentation, pollution, contaminated runoff or erosion within the study area, adjoining native vegetation and aquatic habitats. Potential sources of soil and water pollution include:

– Soil disturbance during excavation and construction works
– Inappropriate management of soil and material stockpiles
– Chemical leaks or spills from vehicles or equipment used in construction
– Increased sediment transfer and erosion potential in areas cleared of vegetation.

Mitigation methods

It is recommended that erosion and sediment control devices be installed prior to the commencement of works. Rehabilitation and/or landscaping will occur immediately following the dewatering of the dam.

4.3 Impacts on threatened biota

No threatened species were identified within the subject site at the time of survey. A likelihood of occurrence assessment determined that the subject site is unlikely to constitute habitat for most threatened species associated with the locality (Appendix A). Select species including the Powerful Owl (*Ninox strenua*), the Grey-headed Flying-fox (*Pteropus poliocephalus*), *Hibbertia superans*, *Epacris purpurascens* var. *purpurascens and* the Hairy Geebung (*Persoonia hirsuta*) were determined to have a high likelihood of occurrence, despite not having been detected during the survey event. This is in consideration of suitable habitat conditions and records of the species' within the vicinity of the study area.

The Powerful Owl is known to hunt in a wide variety of habitats such as open woodland, a community present within the subject site (DPE, 2023b). During the day this species may root in mature eucalypts that PCT 1255 provides. The blossoms on the eucalypts may also act as a food source for the Grey-headed Flying-fox.

Hibbertia superans, *Epacris purpurascens* var*. purpurascens* and the Hairy Geebung are all associated with the enriched sandy soils found within the study area. The shady canopy provided by mature eucalypts may create a microclimate suitable for these species (DPE, 2023b).

An assessment of significance pursuant to Section 7.3 of the *Biodiversity Conservation Act 2016* determined that impacts on these species, if present, are unlikely to be significant (Appendix C). This is in consideration of historical management practices and the subsequent degraded nature of native vegetation within the subject site.

The project has the potential to indirectly impact threatened species that have been recorded in the locality, albeit to a minor degree. This is in consideration of the minor works associated with the project and the highly developed nature of the locality in which the study area occurs.

4.4 Offsets

Although formal offsets are not required under the BC Act, Sydney Water has an internal position to deliver a 'maintained or enhanced' biodiversity outcome if projects have residual biodiversity impacts. The project is representative of a 'moderate (>100m^2) impact' that would impact non-threatened native vegetation, as defined in the Sydney Water Offsets Guide (*SWEMS0019.13;* Sydney Water, 2019).

As such, Sydney Water is committed to completing restorative works or providing offsets at a multiplier of twice the amount of vegetation proposed for removal (2:1). The project would impact up to 0.384 ha of native vegetation (PCT 1255: fair condition, PCT 1255: poor condition and mixed planted trees) and is therefore required to offset impacts to an area of 0.768 ha. This sum includes the mixed planted trees zone that is predominantly comprised of native tree species that are indigenous to the area, as well as a low abundance of exotic species.

Sydney Water may choose to complete regenerative works or purchase/retire biodiversity credits as per the BC Act. The proposed upgrade to the facilities within the study area make it broadly unsuitable as a candidate for regenerative works. Despite this, bushland directly adjacent to the eastern boundary of the study area would be broadly suitable for restorative works as per the methods outlined in '*SWEMS0025.11 Guideline for managing native re-vegetation for construction projects*'.

5. Conclusions

The subject site has been subject to significant levels of disturbance from historical and on-going management practices. The primary aim of the proposal is to improve the overall functionality of the facility to accommodate the growing population of the area. The proposal will involve the removal of redundant infrastructure associated with the water recycling facility, planted trees and native vegetation.

Demolition and construction works may impact up to 0.29 ha of native vegetation identified as *PCT 1255*. This vegetation is not commensurate with any threatened ecological communities listed under the BC Act or EPBC Act.

No threatened species were identified within the subject site during the survey period, however several threatened flora and fauna species are likely to occur within the broader bushland surrounding the facility. The proposal will result in the direct removal of vegetation that has the potential to represent marginal foraging habitat for several threatened fauna species. An assessment of significance for several threatened plants, the Powerful Owl and Grey-headed Flying-fox concluded there was unlikely to be a significant impact due to the small amount of vegetation removal and the amount of alternate and more-intact habitat that would be retained in the locality.

Direct impacts on habitat for most other threatened fauna species are likely to be minimal. Native vegetation removal would be restricted to the edges of degraded patches of vegetation adjoining managed grassland. The risk of injury and mortality of threatened species is low, given the small area and quality of habitat that is likely to be removed.

Regards,

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Appendices

Appendix A

Likelihood of occurrence for threatened species

Databases Searched

An evaluation of the likelihood and extent of impact to threatened and migratory fauna recorded within a 10 km radius of the subject site is provided below. Databases searched included the NSW BioNet Search Tool (licensed) and EPBC Protected Matters Search Tool (PMST). Ecological information has been obtained from the Threatened Species Profiles on the Biodiversity Conservation Division (BCD) of DPIE website (http://www.environment.nsw.gov.au/threatenedspecies/), the Species Profiles and Threats Database on the Commonwealth DAWE website (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) and other published literature.

Likelihood of Occurrence

Matters considered in determining the likelihood of occurrence include:

– Known natural distributions including prior records (database searches) and site survey results
– Geological/soil preferences
– Specific habitat requirements (e.g. aquatic environs, seasonal nectar resources, tree hollows etc.)
– Climatic considerations (e.g. wet summers; snow fall)
– Home range size and habitat dependence
– Topographical preferences (e.g. coastal headlands, ridgetops, midslopes, gilgai, wetlands)

The likelihood of occurrence scale is defined in Table A.1:

Table A.1 Likelihood of occurrence scale

Scale	Description
Known	Species known to occur within the site (e.g. breeding and foraging habitat; foraging habitat; movement corridors). Detected on or immediately adjacent to the site.
High	Presence of high value suitable habitat (e.g. breeding and foraging habitat; important movement corridors). Not detected.
Moderate	Presence of medium value suitable habitat (e.g. disturbed breeding conditions; constrained foraging habitat; movement corridors). Not detected.
Low	Presence of low value suitable habitat (e.g. disturbed conditions; isolated small habitat area; fragmented movement corridors). Not detected.
Nil	No suitable habitat or corridors linking suitable habitat present. Not detected.

Key: CE = Critically Endangered, E = Endangered, V=Vulnerable, M = Migratory

An assessment of the likelihood of occurrence of threatened and migratory fauna occurring at the site is provided in Table A.2.

Table A.2 Likelihood of occurrence: Threatened and migratory fauna

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Flora						
Acacia bynoeana	Bynoe's Wattle	E	V	12 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Endemic to central eastern NSW, known a limited number of locations, often comprising populations of few plants. Grows mainly in heath/ dry sclerophyll forest on sandy soils, prefers open, sometimes slightly disturbed sites such as trail margins, road edges, and in recently burnt open patches. Flowers September to March, and fruit matures in November.	Moderate
Acacia gordonii		E	E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Restricted to north-west Sydney, with disjunct populations in the lower Blue Mountains and the South Maroota/Glenorie areas (within the Hawkesbury, Blue Mountains and the Hills LGAs). Grows in dry sclerophyll forest and heathlands amongst or within 200m of ridgetop rock platforms on sandstone outcrops. Flowers from August to September and fruits from October to February.	Low
Acacia pubescens	Downy Wattle	V	V	16 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs mainly in Bankstown-Fairfield-Rookwood and Pitt Town areas, with outliers at Barden Ridge, Oakdale and Mountain Lagoon. Grows on alluviums, shales and shale/sandstone intergrades. Soils characteristically gravely, often with ironstone. Occurs in open woodland and forest, in communities including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Flowers from August to October.	Moderate
Acacia terminalis subsp. terminalis MS	Sunshine Wattle	E	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Very limited distribution, mainly in near-coastal areas from the northern shores of Sydney Harbour south to Botany Bay, with most records from the Port Jackson area and the eastern suburbs of Sydney. Recorded from North Head, Middle Head, Dover Heights, Parsely Bay, Nielsen Park, Cooper Park, Chifley, Watsons Bays, Wollstonecraft and Waverley. occurs in coastal scrub and dry sclerophyll woodland on sandy soils .Most sites are highly modified or disturbed due to surrounding urban development.	Low
Allocasuarina glareicola		E	E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Primarily found in Richmond district; although outlier populations exist in Voyager Point, Liverpool. Found in open castlereagh woodland on lateritic soil. The species is associated with the following species: Parramatta Red Gum, Red Ironbark, Narrow-leaved Apple, Hard-leaved Scribbly Gum and *Melaleuca decora*. Common associated understorey species include Prickly-leaved Paperbark, Finger Hakea, Needlebush, *Dillwynia tenuifolia*, *Micromyrtus minutiflora*, Swamp Wattle, *Acacia brownei*, *Themeda australis* and *Xanthorrhoea minor*.	Low
Asterolasia elegans		E	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby LGAs, may also occur in the western part of Gosford LGA with seven known populations. Occurs on Hawkesbury sandstone, commonly amongst rocky outcrops and boulders in sheltered forests on mid- to lower slopes and valleys.	Low
Caladenia tessellata	Thick-lipped Spider-orchid	E	V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs from Central Coast NSW to southern Victoria. Mostly coastal but extends inland to Braidwood in southern NSW. In NSW grows in grassy dry sclerophyll woodland on clay loam or sandy soils, and less commonly in heathland on sandy loam soils. Flowers between September and November.	Low
Callistemon linearifolius	Netted Bottle Brush	V		1 record within 10km (DPE, 2023a)	Recorded from the Georges to Hawkesbury Rivers in Sydney, and north to Nelson Bay. There is also a recent record from the northern Illawarra. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers from spring to summer	Moderate
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Occurs in coastal areas from East Gippsland to southern Queensland. Habitat preferences not well defined. Grows mostly in coastal heathlands, margins of coastal swamps and sedgelands, coastal forest, dry woodland, and lowland forest. Prefers open areas in the understorey and is often found in association with Large Tongue Orchid and the Bonnet Orchid. Soils include moist sands, moist to dry clay loam and occasionally in accumulated eucalypt leaves. Flowers November-February.	Low
Cynanchum elegans	White-flowered Wax Plant	E	E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Occurs from Gerroa (Illawarra) to Brunswick Heads and west to Merriwa in the upper Hunter. Most common near Kempsey. Usually occurs on the edge of dry rainforest or littoral rainforest, but also occurs in Coastal Banksia Scrub, open forest and woodland, and Melaleuca scrub. Soil and geology types are not limiting. Flowering occurs between August and May, with the peak in November.	Low
Darwinia biflora		V	V	580 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Known from north and north-western Sydney, in the Ryde, Baulkham Hills, Hornsby and Ku-Ring-Gai LGAs. Grows on the edges of weathered shale-capped ridges, at the intergrade with Hawkesbury Sandstone. Occurs in woodland, open forest and scrub/heath and is associated overstorey species include Scribbly Gum, Red Bloodwood and/or Scaly Bark.	Moderate

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Epacris purpurascens var. purpurascens		V		197 records within 10km (DPE, 2023a)	Occurs from Gosford in the north, Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Grows in a range of sclerophyll forest, scrubs and swamps, most of which have a strong shale soil influence.	High
Eucalyptus camfieldii	Camfield's Stringybark	V	V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs from Raymond Terrace to Waterfall, with populations known from Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai and the Royal NP. Occurs in exposed situations on sandstone plateaus, ridges and slopes near the coast, often on the boundary of tall coastal heaths or low open woodland. Grows in shallow sandy soils overlying Hawkesbury sandstone.	Low
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	5 records within 10km (DPE, 2023a)	Naturally occurs only in New England Tablelands from Nundle to north of Tenterfield. Widely planted as urban street tree well outside it's range. Grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock.	Moderate
Eucalyptus scoparia	Wallangarra White Gum	E	V	1 record within 10km (DPE, 2023a)	Known from only three locations in NSW, near Tenterfield, including Bald Rock National Park. Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes. At lower elevations can occur in less rocky soils in damp situations	Low
Eucalyptus sp. Cattai		CE	CE	36 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in The Hills Local Government Area, with known populations occurring within the area bounded by Kellyville - Maraylya - Glenorie. Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. The sites at which it occurs are generally flat and on ridge tops. Associated soils are laterised clays overlying sandstone.	Moderate
Genoplesium baueri	Yellow Gnat-orchid	E	E	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs from Ulladulla to Port Stephens, with only 13 known extant populations. Grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers from February to March.	Low
Haloragis exalata subsp. exalata	Wingless Raspwort	V	V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs in 4 widely scattered localities in eastern NSW, disjunctly distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Requires protected and shaded damp situations in riparian habitats.	Low
Haloragodendron lucasii		E	E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Known locations are confined to a very narrow distribution on the north shore of Sydney. Associated with dry sclerophyll forest and grows in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels.	Low
Hibbertia superans		E		549 records within 10km (DPE, 2023a)	Occurs from Baulkham Hills to South Maroota, and an isolated population at Mount Boss, inland from Kempsey. Grows on sandstone ridgetops often near the shale/sandstone boundary, in open woodland and heathland. Prefers open disturbed areas, such as tracksides.	High
Lasiopetalum joyceae		V	V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. Grows in heath on sandstone.	Low
Leptospermum deanei	Deane's Tea-tree	V	V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in NW Sydney, in the Hornsby, Warringah, Ku-ring-gai and Ryde LGAs. Grows in woodland on lower hill slopes or near creeks, in sandy alluvial soil or sand over sandstone. Occurs in riparian scrub, woodland and open forest.	Low
Leucopogon fletcheri subsp. fletcheri		E		25 records within 10km (DPE, 2023a)	Restricted to northwest Sydney between St Albans and Annangrove, within the Hawkesbury, The Hills and Blue Mountains LGAs. Occurs in dry eucalypt woodland or shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs. Flowers August to September.	Moderate
Macadamia integrifolia	Macadamia Nut		V	9 records within 10km (DPE, 2023a)	Found in remnant rainforest in northern NSW and south-east Queensland, preferring partially open areas such as rainforest edges. While specimens have been collected from the North Coast of NSW, this species is not known to occur naturally in NSW.	Low
Melaleuca biconvexa	Biconvex Paperbark	V	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Scattered, disjunct populations in coastal areas from Jervis Bay to Port Macquarie, with most populations in the Gosford-Wyong areas. Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Low
Melaleuca deanei	Deane's Paperbark	V	V	1 record within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas. Isolated occurrences at Springwood (Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Mostly grows on broad flat ridgetops, dry ridges and slopes and strongly associated with low nutrient sandy loam soils,	Moderate

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
					sometimes with ironstone. Occurs in heath- open forest, often in sandstone ridgetop woodland communities.	
Olearia cordata		V	V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Generally restricted to the south-western Hunter plateau, eastern Colo Plateau, and the far north-west of the Hornsby Plateau. Most known populations occur within conservation reserves including Wollemi National Park, Yengo National Park and Wisemans Ferry Historic site. Grows in dry open sclerophyll forest and open shrubland, on sandstone ridges.	Low
Persicaria elatior	Knotweed	V	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Recorded in south-eastern NSW from Ulladulla to the Victorian border. Known from Raymond Terrace and the Grafton area in northern NSW. Normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low
Persoonia hirsuta	Hairy Geebung	E	E	21 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Scattered distribution around Sydney, distributed from Singleton in the north, along the east coast to Hilltop in the south west, Dombarton in the south east and the Blue Mountains to the west. Found in clayey and sandy soils in dry sclerophyll open forest, woodland and heath, primarily on the Mittagong Formation and on the upper Hawkesbury Sandstone.	High
Persoonia mollis subsp. maxima		E	E	1 record within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in the Hornsby Heights-Mt Colah area north of Sydney. Grows in sheltered aspects of deep gullies or on the steep upper hillsides of narrow gullies on Hawkesbury Sandstone. These habitats support relatively moist, tall forest vegetation communities, often with mesic influences.	Moderate
Persoonia nutans	Nodding Geebung	E	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Grows only on aeolian and alluvial sediments in sclerophyll forest and woodland vegetation communities. Largest populations occur in Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland.	Low
Pimelea curviflora var. curviflora		V	V	36 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Confined to the coastal area of the Sydney and Illawarra regions. Populations known between northern Sydney and Maroota in the north-west and at Croom Reserve near Albion Park in Shellharbour LGA. Grows on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges.	Moderate
Pimelea spicata	Spiked Rice-flower	E	E	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Disjunct populations within the Cumberland Plain ((Marayong and Prospect Reservoir south to Narellan and Douglas Park) and Illawarra (Landsdowne to Shellharbour to northern Kiama). Found on well-structured clay soils in both the Cumberland Plain and Illawarra environments. Associated with Grey Box communities and in areas of ironbark on the Cumberland Plain sites. Occurs commonly in Coast Banksia open woodland in the coastal Illawarra.	Low
Pomaderris brunnea	Brown Pomaderris	E	V	1 record within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. Also occurs near Walcha on the New England tablelands. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Moderate
Pterostylis gibbosa	Illawarra Greenhood	E	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Known from a small number of populations in the Illawarra, Shoalhaven and Hunter regions. Grows in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum, Woollybutt and Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum, Forest Red Gum and Grey Ironbark. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark, Forest Red Gum and Black Cypress Pine.	Low
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Occurs in western Sydney between Picton and Freemans Reach. Grows in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. Associated vegetation above these rock shelves is sclerophyll forest or woodland on shale or shale/sandstone transition soils.	Low
Pultenaea parviflora		E	V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs on the Cumberland Plain, with core distribution from Windsor to Penrith and east to Dean Park, and outliers in Kemps Creek and Wilberforce. Grows in dry sclerophyll woodlands, forest or in grasslands on Wianamatta Shale, laterite or Tertiary alluvium, on infertile sandy to clay soils. Associated communities include Castlereagh Ironbark Forest, Shale Gravel transition Forest and intergrade with Castlereagh Scribbly Gum Woodland.	Low
Rhizanthella slateri	Eastern Underground Orchid	V	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Currently known only from 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood and no particular vegetation type has been associated	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
					with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore usually located only when the soil is disturbed. Flowers September to November.	
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in coastal districts north from Batemans Bay in New South Wales, to areas inland of Bundaberg in Queensland. Populations typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000 -1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. Highly to extremely susceptible to infection by Myrtle Rust.	Low
Rhodomyrtus psidioides	Native Guava	CE	CE	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs from Broken Bay, approximately 90 km north of Sydney, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation and also occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. Extremely susceptible to infection by Myrtle Rust.	Low
Syzygium paniculatum	Magenta Lilly Pilly	E	V	14 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Occurs in narrow coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast, the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast, it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Moderate
Tetratheca glandulosa		V		16 records within 10km (DPE, 2023a)	Restricted to Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong LGAs. Associated with shale-sandstone transition habitat (shale-cappings over sandstone). Occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils generally shallow, yellow, clayey/sandy loam, commonly with lateritic fragments. Vegetation varies from heath to open forest and is broadly equivalent to Sydney Sandstone Ridgetop Woodland community.	Low
Thesium australe	Austral Toadflax	V	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. Occurs in grassland or grassy woodland, and is often found in association with Kangaroo Grass.	Low
Zieria involucrata		E	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Found within The Hills, Hawkesbury, Hornsby and Blue Mountains local government areas. It occurs primarily on Hawkesbury sandstone but has also been found on Narrabeen Group sandstone and Quaternary alluvium. It has been recorded in sheltered forests on mid-lower slopes and valleys.	Low
Birds						
Anthochaera phrygia	Regent Honeyeater	CE	CE	2 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Found in drier coastal woodlands and forests in some years. Only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. Very patchy distribution in NSW, mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. Nectar and fruit from the mistletoes *Amyema miquelii*, A. pendula and *A. cambagei* are also utilised.	Low
Apus pacificus	Fork-tailed Swift		C,J,K	3 records within 10km (DPE, 2023a)	Almost exclusively aerial, flying from less then 1 m to at least 300 m above ground and probably much higher. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. Mostly occur over inland plains but sometimes above foothills or in coastal areas. Mostly found over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. Also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. Sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines. Also found over settled areas, including towns, urban areas and cities.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V		15 records within 10km (DPE, 2023a)	Occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Moderate
Botaurus poiciloptilus	Australasian Bittern	E	E	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Widespread but uncommon over south-eastern Australia. Found over most of NSW except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleocharis spp.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. May construct feeding platforms over deeper water from reeds trampled by the bird; platforms are often littered with prey remains.	Nil
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	1 record within 10km (DPE, 2023a)	In New South Wales, 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. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In spring and summer the species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands,particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas.	Low
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	11 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. It inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (Allocasuarina littoralis) and Forest Sheoak (A. torulosa) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, Allocasuaraina diminuta, and A. gymnathera. Belah is also utilised and may be a critical food source for some populations. The species is dependent on large hollow-bearing eucalypts for nest sites.	Moderate
Climacteris picumnus victoriae	Brown Treecreeper	V		1 record within 10km (DPE, 2023a)	The western boundary of the species range runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. Often found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. Also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses. Usually not found in woodlands with a dense shrub layer. Fallen timber is an important habitat component for foraging. Also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	Moderate
Cuculus optatus	Oriental Cuckoo		C,J,K	2 records within 10km (DPE, 2023a)	This species migrates to northern and eastern Australia in the warmer months. Occurs south to the Shoalhaven area. Occurs in a range of habitats, including monsoon forest, rainforest edges, leafy trees in paddocks, river flats, roadsides and mangroves.	Low
Daphoenositta chrysoptera	Varied Sittella	V		4 records within 10km (DPE, 2023a)	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. The species inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low
Dasyornis brachypterus	Eastern Bristlebird	E	E	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs in three disjunct areas, in southern Queensland/northern NSW, the Illawarra Region and in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. Habitat in northern NSW occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone. The age of habitat since fires (fire-age) is of paramount importance to this species. The Illawarra and southern populations reach maximum densities in habitat that has not been burnt for at least 15 years. Habitat in northern NSW requires frequent fires to maintain habitat condition and suitability. The northern fire regimes is between 3-6 years and of variable intensity depending on the habitat condition.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Erythrotriorchis radiatus	Red Goshawk	CE	V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. Inhabits open woodland and forest, preferring a mosaic of vegetation types, a large population of birds as a source of food, and permanent water, and are often found in riparian habitats along or near watercourses or wetlands. Preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Low
Falco hypoleucos	Grey Falcon	E	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	Low
Glossopsitta pusilla	Little Lorikeet	V		13 records within 10km (DPE, 2023a)	Distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia. NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year. Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Moderate
Grantiella picta	Painted Honeyeater	V	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Nomadic species occurring at low densities throughout its range. Most commonly found on the inland slopes of the Great Dividing Range in NSW, where almost all breeding occurs. More likely to be found in the north of its distribution in winter. Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. Specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low
Hirundapus caudacutus	White-throated Needletail		V,C,J,K	11 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Migrates to eastern Australia from October to April. Almost exclusively aerial and most often seen before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. Occurs over most types of habitat, but mostly recorded above wooded areas, including open forest and rainforest. May also fly between trees or in clearings, below the canopy. Recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows.	Moderate
Ixobrychus flavicollis	Black Bittern	V		3 records within 10km (DPE, 2023a)	Scattered records along the east coast of NSW, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. May occur in flooded grassland, forest, woodland, rainforest and mangroves, where permanent water is present.	Low
Lathamus discolor	Swift Parrot	E	CE	9 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Migrates from Tasmania to south-eastern Australia in the autumn and winter months. Mostly occurs on the coast and south west slopes in NSW. Occurs on the mainland in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens.*	Moderate
Lophoictinia isura	Square-tailed Kite	V		4 records within 10km (DPE, 2023a)	Ranges along coastal and subcoastal areas from south-western to northern Australia. Scattered records throughout NSW indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests and shows a particular preference for timbered watercourses. Observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland in arid north-western NSW.	Moderate
Melithreptus gularis gularis	Black-chinned Honeyeater	V		1 record within 10km (DPE, 2023a)	Widespread in NSW, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. Rarely recorded east of the Great Dividing Range, although regularly observed from the Richmond and Clarence River areas. Recorded at a few scattered sites in the Hunter, Central Coast and Illawarra regions, but very rare in the latter. Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi)* and Forest Red Gum (*E. tereticornis).* Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Neophema pulchella	Turquoise Parrot	V		1 record within 10km (DPE, 2023a)	Extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Typically lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Low
Ninox connivens	Barking Owl	V		4 records within 10km (DPE, 2023a)	Found throughout continental Australia except for the central arid regions. Occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains and in some northeast coastal and escarpment forests. Sometimes extends home range into urban areas. Inhabit woodland and open forest, including fragmented remnants and partly cleared farmland. Flexible in its habitat use, hunting can extend in to closed forest and more open areas. Typically roosts in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species.	Moderate
Ninox strenua	Powerful Owl	V		130 records within 10km (DPE, 2023a)	Widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes and plains. Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Requires large tracts of forest or woodland habitat but can also occur in fragmented landscapes. Breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. Roosts by day in dense vegetation comprising species such as Turpentine, Black She-oak, Blackwood, Rough-barked Apple, Cherry Ballart and a number of eucalypt species.	High
Petroica boodang	Scarlet Robin	V		1 record within 10km (DPE, 2023a)	Occurs from the coast to the inland slopes in NSW. Disperses to the lower valleys and plains of the tablelands and slopes after breeding. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. Found in dry eucalypt forests and woodlands with usually open and grassy understorey with few scattered shrubs. Lives in both mature and regrowth vegetation and occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. Abundant logs and fallen timber are important components of its habitat.	Low
Petroica phoenicea	Flame Robin	V		2 records within 10km (DPE, 2023a)	Breeds in upland areas in NSW and moves to the inland slopes and plains in winter. Likely two separate populations in NSW, one in the Northern Tablelands, and another ranging from the Central to Southern Tablelands. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys.	Low
Petroica rodinogaster	Pink Robin	V		1 record within 10km (DPE, 2023a)	Found far south-eastern NSW, almost as far north as Bombala. Disperses north and west and into more open habitats in winter, regularly as far north as the ACT area, and sometimes being found as far north as the central coast of NSW. Inhabit rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	Low
Polytelis swainsonii	Superb Parrot	V	V	1 record within 10km (DPE, 2023a)	Found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	Low
Pycnoptilus floccosus	Pilotbird		V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	The pilotbird is found from the Wollemi National Park and Blue Mountains National Park in New South Wales through to the Dandenong Ranges, near Melbourne in Victoria. Its natural habitat is temperate wet sclerophyll forests and occasionally temperate rainforest, where there is dense undergrowth with abundant debris. It is sedentary and common.	Low
Rostratula australis	Australian Painted Snipe	E	E	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River, the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Forages nocturnally on mud-flats and in shallow water.	Low
Thalasseus bergii	Crested Tern		J	1 record within 10km (DPE, 2023a)	Distributed around the Australian coast, it occurs on ocean beaches, estuaries and coastal lagoons and occasionally on salt lakes. The species is known to rest on sand spits, low points and reefs along coastal beaches and inlets. It rarely flies far from shore out to sea or inland on bodies of fresh water.	Nil
Tyto novaehollandiae	Masked Owl	V		2 records within 10km (DPE, 2023a)	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. Lives in dry eucalypt forests and woodlands from sea level to 1100 m and often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	Moderate

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Tyto tenebricosa	Sooty Owl	V		1 record within 10km (DPE, 2023a)	Occupies the easternmost one-eighth of NSW, occurring on the coast, coastal escarpment and eastern tablelands. Found in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roost by day in the hollow of a tall forest tree or in heavy vegetation and nest in very large tree hollows.	Moderate
Mammals						
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	2 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. Generally rare with a very patchy distribution in NSW and scattered records from the New England Tablelands and North West Slopes. Roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies.	Moderate
Dasyurus maculatus	Spotted-tailed Quoll	V	E	1 record within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Found in eastern NSW, the species has been recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Uses hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. Known to traverse their home ranges along densely vegetated creeklines.	Low
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		23 records within 10km (DPE, 2023a)	Found on the south-east coast and ranges of Australia, from southern Queensland to Victoria. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Moderate
Isoodon obesulus obesulus	Southern Brown Bandicoot		E	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Patchy distribution, found in south-eastern NSW, east of the Great Dividing Range south from the Hawkesbury River. Generally only found in heath or open forest with a heathy understorey on sandy or friable soils. Nest during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material.	Low
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V		37 records within 10km (DPE, 2023a)	Found along the east coast from south Queensland to southern NSW. Occurs in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roosts maily in tree hollows but will also roost under bark or in man-made structures.	Moderate
Miniopterus australis	Little Bent-winged Bat	V		18 records within 10km (DPE, 2023a)	Occurs along the east coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Prefers moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day. Forages for small insects beneath the canopy of densely vegetated habitats.	Moderate
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		84 records within 10km (DPE, 2023a)	Occurs along the east and north-west coasts of Australia. Uses caves as the primary roosting habitat, but also uses derelict mines, storm-water tunnels, buildings and other man-made structures. Hunts in forested areas, catching moths and other flying insects above the tree tops.	Moderate
Myotis macropus	Southern Myotis	V		22 records within 10km (DPE, 2023a)	Mainly coastal but may occur inland along large river systems. Usually associated with permanent waterways at low elevations in flat/undulating country, usually in vegetated areas. Forages over streams and watercourses feeding on fish and insects from the water surface. Roosts in a variety of habitats including caves, mine shafts, hollow-bearing trees, stormwater channels, buildings, under bridges and in dense foliage, typically in close proximity to water.	Moderate
Notamacropus parma	Parma Wallaby		V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	The species once occurred in north-eastern NSW from the Queensland boarder to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Nil
Petauroides volans	Greater Glider		E	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. Prefers taller montane, moist eucalypt forest with relatively old trees and abundant hollows.	Nil
Petaurus australis australis	Yellow-bellied Glider		V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Very mobile and occupy	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
					large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources.	
Petrogale penicillata	Brush-tailed Rock-wallaby		V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupies rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. It typically shelters or basks during the day in rock crevices, caves and overhangs and are most active at night when foraging. Browse on vegetation in and adjacent to rocky areas.	Nil
Phascolarctos cinereus	Koala	E	E	2 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests of NSW, with some smaller populations on the plains west of the Great Dividing Range. Inhabits eucalypt woodlands and forests, and feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but will select preferred browse species in any one area.	Low
Pseudomys novaehollandiae	New Holland Mouse		V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Largely restricted to the coast of central and northern NSW, with one inland occurrence near Parkes. Known from Royal National Park (NP), the Kangaroo Valley, Kuringai Chase NP, and Port Stephens to Evans Head near the Queensland border. Known to inhabit open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes. Soil type may be an important indicator of suitability of habitat, with deeper top soils and softer substrates being preferred for digging burrows.	Low
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	184 records within 10km (DPE, 2023a). Roosting known to occur within 10km (DCCEEW, 2023a)	Generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. May be found in unusual locations in times of natural resource shortage. Occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	High
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		19 records within 10km (DPE, 2023a)	Wide-ranging species found across northern and eastern Australia. Rare visitor of south-western NSW in late summer and autumn. Scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. It forages in most habitats across its very wide range, with and without trees.	Moderate
Scoteanax rueppellii	Greater Broad-nosed Bat	V		30 records within 10km (DPE, 2023a)	Found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. Widespread on the New England Tablelands in NSW, however does not occur at altitudes above 500 m. Found in a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, most commonly found in tall wet forest. Usually roosts in tree hollows but also found in buildings.	Moderate
Vespadelus troughtoni	Eastern Cave Bat	V		1 record within 10km (DPE, 2023a)	Found on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. Cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; recorded roosting in disused mine workings. Occasionally found along cliff-lines in wet eucalypt forest and rainforest. Forage over a small area, but are capable of flying 500 m over clear paddocks.	Nil
Amphibians						
Heleioporus australiacus	Giant Burrowing Frog	V	V	Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Distributed in south eastern NSW as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Found in heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	Low
Litoria aurea	Green and Golden Bell Frog	E	V	1 record within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Approximately 50 recorded locations in NSW, most of which are small, coastal, or near coastal populations. Large populations are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast. Only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (*Typha spp.*) or spikerushes (*Eleocharis spp.*). Optimal habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (Gambusia holbrooki), have a grassy area nearby and diurnal sheltering sites available. Also recorded in highly disturbed areas.	Low

Scientific Name	Common Name	BC Act	EPBC Act	Records	Description	Likelihood of occurrence
Mixophyes balbus	Stuttering Frog	E	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Occurs along the east coast of Australia from southern Queensland to north-eastern Victoria. Stronghold in the Dorrigo region, in north-east NSW. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. BreedS in streams during summer after heavy rain.	Low
Pseudophryne australis	Red-crowned Toadlet	V		18 records within 10km (DPE, 2023a)	Restricted distribution, confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. 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.	Moderate
Delma impar	Striped Legless Lizard	V	V	Species or species habitat may occur within 10km (DCCEEW, 2023a)	Occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Found mainly in Natural Temperate Grassland but also in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	Low
Hoplocephalus bungaroides	Broad-headed Snake	E	V	Species or species habitat likely to occur within 10km (DCCEEW, 2023a)	Largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring.	Low
Meridolum corneovirens	Cumberland Plain Land Snail	E		12 records within 10km (DPE, 2023a)	Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountains. The species primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. It lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Moderate
Pommerhelix duralensis	Dural Land Snail	E	E	94 records within 10km (DPE, 2023a). Species or species habitat known to occur within 10km (DCCEEW, 2023a)	Shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. Found within the Local Government Areas of The Hills Shire, Hawkesbury Shire and Hornsby Shire. Records from the Blue Mountains City, Penrith City and Parramatta City may represent this species. Favours forested habitats with good native cover and woody debris. Shelters under rocks or inside curled-up bark, it does not burrow nor climb.	Moderate

Key: V,C,J,K = Migratory, V = Vulnerable, E = Endangered, CE = Critically Endagered

Appendix B

Recorded flora species

Table B.1 Species recorded within the subject site.

Family	Scientific Name	Common Name	Form
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax	Shrub (SG)
Asparagaceae	*Asparagus asparagoides*	Bridal Creeper	HTW
Asteraceae	*Bidens pilosa*	Cobbler's Pegs	Exotic
Asteraceae	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic
Asteraceae	*Cotula australis*	Common Cotula	Forb (FG)
Asteraceae	*Ozothamnus diosmifolius*	White Dogwood	Shrub (SG)
Campanulaceae	*Lobelia purpurascens*	whiteroot	Forb (FG)
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak	Tree (TG)
Chenopodiaceae	*Einadia hastata*	Berry Saltbush	Forb (FG)
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	HTW
Ericaceae	*Leucopogon juniperinus*	Prickly Beard-heath	Shrub (SG)
Fabaceae (Mimosoideae)	*Acacia decurrens*	Black Wattle	Tree (TG)
Fabaceae (Mimosoideae)	*Acacia longifolia*		Shrub (SG)
Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle	Tree (TG)
Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	Grass & grasslike (GG)
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry	Other (OG)
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	Exotic
Menispermaceae	*Stephania japonica*	Snake vine	Other (OG)
Myrtaceae	*Angophora bakeri*	Narrow-leaved Apple	Tree (TG)
Myrtaceae	*Angophora costata*	Sydney Red Gum	Tree (TG)
Myrtaceae	*Eucalyptus haemastoma*	Broad-leaved Scribbly Gum	Tree (TG)
Myrtaceae	*Eucalyptus punctata*	Grey Gum	Tree (TG)
Myrtaceae	*Leptospermum petersonii*	Lemon-scented Teatree	Shrub (SG)
Myrtaceae	*Leptospermum polygalifolium*	Tantoon	Shrub (SG)
Oleaceae	*Ligustrum sinense*	Small-leaved Privet	HTW

Family	Scientific Name	Common Name	Form
Papaveraceae	*Fumaria officinalis*	Common Fumitory	Exotic
Phormiaceae	*Dianella caerulea*	Blue Flax-lily	Forb (FG)
Phormiaceae	*Dianella revoluta*	Blueberry Lily	Forb (FG)
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush	Shrub (SG)
Pittosporaceae	*Billardiera scandens*	Hairy Apple Berry	Other (OG)
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	Shrub (SG)
Poaceae	*Cynodon dactylon*	Common Couch	Grass & grasslike (GG)
Poaceae	*Entolasia marginata*	Bordered Panic	Grass & grasslike (GG)
Poaceae	*Entolasia stricta*	Wiry Panic	Grass & grasslike (GG)
Poaceae	*Eragrostis brownii*	Brown's Lovegrass	Grass & grasslike (GG)
Poaceae	*Eragrostis curvula*	African Lovegrass	HTW
Poaceae	*Microlaena stipoides*	Weeping Grass	Grass & grasslike (GG)
Poaceae	*Oplismenus aemulus*		Grass & grasslike (GG)
Poaceae	*Sporobolus africanus*	Parramatta Grass	Grass & grasslike (GG)
Polygonaceae	*Persicaria decipiens*	Slender Knotweed	Forb (FG)
Polygonaceae	*Rumex sagittatus*	Turkey Rhubarb	Exotic
Portulacaceae	*Portulaca oleracea*	Pigweed	Forb (FG)
Proteaceae	*Persoonia levis*	Broad-leaved Geebung	Shrub (SG)
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung	Shrub (SG)
Rubiaceae	*Richardia brasiliensis*	Mexican Clover	Exotic
Rutaceae	*Zieria smithii*	Sandfly Zieria	Shrub (SG)
Sapindaceae	*Dodonaea triquetra*	Large-leaf Hop-bush	Shrub (SG)
Solanaceae	*Cestrum parqui*	Green Cestrum	HTW
Solanaceae	*Solanum prinophyllum*	Forest Nightshade	Forb (FG)
Verbenaceae	*Lantana camara*	Lantana	HTW - Manageable

Key: HTW = High threat weed, HTW - Manageable = Manageable high threat weeds. Form is defined as per the NSW Biodiversity Assessment Method.

Appendix C

Assessments of significance pursuant to Section 7.3 of BC Act 2016

Flora

Epacris purpurascens var. purpurascens **(Vulnerable – BC Act)**
An erect shrub, 50 - 180 cm high; older stems with prominent short, broad leaf scars. Leaves are spreading and recurved above, ovate to heart-shaped, 7 - 21 mm long, 4.4 - 9 mm wide, with sharply pointed tips. Flowers are showy, 7 - 10 mm diam., covering much of the branchlets, white or sometimes pinkish. Fruit approximately 2 mm long. It has been recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South (OEH, 2017).

Persoonia hirsuta **(Hairy Geebung; Endangered – BC Act)**
The Hairy Geebung is best distinguished by its hairiness - long coarse hairs on flowers and branchlets and short stiff ones on the leaves. It is a spreading shrub with small leaves of variable shape. They are from 6 - 12 mm long, from oblong to narrow in shape and crowded along the stems; they are curled under at the edges. Groups of flowers grow into a leafy shoot. The tubular flowers are yellow or orange and about 1 cm long and also hairy. There are two subspecies - both are considered to be endangered (OEH, 2017).

Hibbertia superans **(Endangered – BC Act)**
A low spreading shrub to 30 cm high. It has few to many weak, twisted stems and branches, covered with long shaggy hairs when young, becoming more densely hairy with longer hairs wearing off. Leaves are usually linear, 7.5 - 10 mm long. Flowers are yellow, terminal on main branches. It occurs from Baulkham Hills to South Maroota in the northern outskirts of Sydney, where there are currently 16 known sites, and at one locality at Mount Boss, inland from Kempsey. No populations are known from a formal conservation reserve (OEH, 2017).

Table E-2: Flora: *Epacris purpurascens var. purpurascens, Persoonia hirsuta* (Hairy Geebung) and *Hibbertia superans*
a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The proposal will involve the removal of native vegetation and the construction of infrastructure associated with the existing Castle Hill Water Recycling Facility. The primary objective of the proposal involves the removal of redundant infrastructure, including a retention pond. Direct impacts to native vegetation are limited to approximately 0.29 ha of vegetation commensurate with *PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion.* The understorey of the subject site is broadly suitable as habitat for each species, albeit at a reduced capacity due poor-fair overall vegetation condition. No threatened flora species were identified during the survey, despite the presence of suitable habitat. It contains enriched sandy soils derived from sandstone, of which all three species are commonly associated with (DPE, 2023b) Given this, and the broader availability of similar habitat directly adjacent to the subject site, the proposal is considered unlikely to significantly impact the species' such that they would be placed at risk of local extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
Not applicable to these threatened species.
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
Not applicable to these threatened species.
c) In relation to the habitat of a threatened species, population or ecological community:
(i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity and
The proposal will result in the removal of up to 0.29 ha of *PCT 1255*. This community, including the soil profile on which it is based and its landscape position, is considered broadly suitable for these

Table E-2: Flora: *Epacris purpurascens var. purpurascens, Persoonia hirsuta* (Hairy Geebung) and *Hibbertia superans*
threatened plants. Indirect construction and operational impacts are likely minor given the disturbed condition of vegetation surrounding the subject site.
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
Remnant vegetation within the subject site forms a small part of a broader remnant woodland community associated with the Castle Hill Water Recycling Facility and Cattai Creek. It occurs in a highly developed locality. The works associated with the proposal are unlikely to further isolate any plant communities within the locality, with clearing limited to the subject site hence avoiding impacts to PCT 1255 outside these areas.
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,
Remnant vegetation within the subject site is of poor to fair condition as a result historical and on-going land management e.g. management of the broader study area as a water treatment facility. It contains several environmental weed species that render it less suitable as habitat for threatened plant species known to occur in the locality. No threatened species were identified at the time of survey and therefore this vegetation is considered unlikely to be important to the preservation of these species in the locality.
d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
The proposal will not have an impact on areas of outstanding biodiversity value.
e) whether the proposed development or activity is or is part of a key threatening process is likely to increase the impact of a key threatening process
The following Key Threatening Processes are relevant to the proposed development: - Clearing of native vegetation. The proposal is likely to facilitate the above-listed KTPs to a minor extent. This is in consideration of the small impact area, resulting in little clearing of native vegetation.
Conclusion
The subject site at the Castle Hill Water Recycling Facility represents potential habitat for *Epacris purpurascens var. purpurascens, Persoonia hirsuta* (Hairy Geebung) *and Hibbertia superans.* It is unlikely that the proposed works will significantly impact these species such that they are put at further risk of extinction in the locality. This is in consideration of the reduced condition of vegetation and that none of the species were identified during the survey.

Predatory owls

***Ninox strenua* (Powerful Owl; Vulnerable – BC Act)**
The Powerful Owl is the largest owl in Australasia. It is a typical hawk-owl, with large yellow eyes and no facial-disc. Adults reach 60 cm in length, have a wingspan of up to 140 cm and weigh up to 1.45 kilograms. Males are larger than females. The upper parts of the Powerful Owl are dark, greyish-brown with indistinct off-white bars. The underparts are whitish with dark greyish-brown V-shaped markings. Juvenile Powerful Owls have a white crown and underparts that contrasts with its small, dark streaks and dark eye patches. The call of this species may be heard at any time of the year, but it is more vocal during the autumn breeding season (OEH, 2017).

Table E-2: Predatory owl, *Ninox strenua* (Powerful Owl).
a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The proposal will involve the removal of native vegetation and the construction of infrastructure associated with the existing Castle Hill Water Recycling Facility. The primary objective of the proposal involves the removal of redundant infrastructure, including a retention pond. Direct impacts to native vegetation are limited to 0.29 ha of vegetation commensurate with *PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion.* Native vegetation within the subject site is broadly suitable as foraging habitat for the Powerful Owl, albeit at a reduced capacity due to poor-fair overall vegetation condition. Individuals are known to hunt in a wide variety of habitats such as open woodland like PCT1255 within the subject site (DPE, 2023b). During the day this species may root in mature eucalypts that this community provides. It is not suitable as breeding habitat due to the absence of hollow-bearing trees. This species was not identified during the survey, despite the presence of suitable habitat. Given this, and the broader availability of similar habitat directly adjacent to the subject site, the proposal is considered unlikely to significantly impact the species such that it placed at further risk of local extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
Not applicable to these threatened species.
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
Not applicable to these threatened species.
c) In relation to the habitat of a threatened species, population or ecological community:
(i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity and
The proposal would result in the removal of up to 0.29 ha of *PCT 1255*. This community is considered broadly suitable as foraging habitat for the Powerful Owl. Construction and operational impacts are likely minor given the disturbed condition of vegetation surrounding the subject site. Furthermore, construction works are unlikely to occur in the evening when this species is actively foraging.
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
Remnant vegetation within the subject site forms a small part of a broader remnant woodland community associated with the Castle Hill Water Recycling Facility and Cattai Creek. It occurs in a highly developed locality. The works associated with the proposal are unlikely to further isolate any plant communities within the locality considering the limited extent of the works and retention of the broader extent of *PCT 1255* outside the study area. Additionally, the Powerful Owl is a highly mobile species capable of flying to isolated patches of vegetation.

Table E-2: Predatory owl, *Ninox strenua* (Powerful Owl).
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,
Remnant vegetation within the subject site is of poor to fair condition as a result of historical and ongoing management practices. It is representative of regrowth vegetation and does not retain any hollow-bearing trees suitable for owl nesting. Additionally, it contains several environmental weed species that render it less suitable as foraging habitat. Vegetation within the subject site is unlikely to constitute important habitat for the Powerful Owl.
d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
The proposal will not have an impact on areas of outstanding biodiversity value.
e) whether the proposed development or activity is or is part of a key threatening process is likely to increase the impact of a key threatening process
The following Key Threatening Processes are relevant to the proposed development: - Clearing of native vegetation. The proposal is likely to facilitate the above-listed KTPs to a minor extent. This is in consideration of the small impact area, resulting in little clearing of native vegetation.
Conclusion
0.29 ha of the subject site at the Castle Hill Water Recycling Facility represents potential foraging habitat *Ninox strenua* (Powerful Owl). It is unlikely that the proposed works will significantly impact this species such that it is put at further risk of extinction in the locality. This is in consideration of the reduced condition of vegetation and that it doesn't contain any hollow-bearing trees, rendering it unsuitable as breeding habitat.

Flying mammals

***Pteropus poliocephalus* (Grey-headed Flying-fox; Vulnerable – BC Act)**
The Grey-headed Flying-fox is the largest Australian bat, with a head and body length of 23 - 29 cm. It has dark grey fur on the body, lighter grey fur on the head and a russet collar encircling the neck. The wing membranes are black and the wingspan can be up to 1 m. It can be distinguished from other flying-foxes by the leg fur, which extends to the ankle. It is generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations (OEH, 2017).

Table E-2: Flying mammal, *Pteropus poliocephalus* (Grey-headed Flying-fox).
a) In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The proposal will involve the removal of native vegetation and the construction of infrastructure associated with the existing Castle Hill Water Recycling Facility. The primary objective of the proposal involves the removal of redundant infrastructure, including a retention pond. Direct impacts to native vegetation are limited to 0.29 ha of vegetation commensurate with *PCT 1255: Sydney sandstone hinterland dry sclerophyll forests of the Sydney Basin Bioregion.* No bat camps were identified within the subject site or surrounds. As such, it is unlikely to be utilised as breeding habitat for the species. Despite this, native vegetation within the subject site may represent foraging habitat for the Grey-headed Flying-fox, albeit at a reduced capacity due to poor-fair overall vegetation condition. The species was not identified during the survey, despite the presence of suitable habitat. Given this, and the broader availability of similar habitat directly adjacent to the subject site, the proposal is considered unlikely to significantly impact the species such that it placed at further risk of local extinction.
b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity: (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
Not applicable to these threatened species.
(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
Not applicable to these threatened species.
c) In relation to the habitat of a threatened species, population or ecological community:
(i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity and
The proposal would result in the removal of up to 0.29 ha of *PCT 1255*. This community is considered broadly suitable as foraging habitat for the Grey-headed Flying Fox. An additional 0.096 ha of planted trees proposed for impact may represent foraging habitat for the species. Construction and operational impacts on this nocturnal species are likely minor given the disturbed condition of vegetation surrounding the subject site and that construction works are unlikely to occur in the evening.
(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
Remnant vegetation within the subject site forms a small part of a broader remnant woodland community associated with the Castle Hill Water Recycling Facility and Cattai Creek. It occurs in a highly developed and fragmented locality. The works associated with the proposal are unlikely to further isolate any plant communities within the locality considering the limited extent of the works and retention of the broader extent of *PCT 1255* outside the study area. Additionally, the Grey-headed Flying Fox is a highly mobile species capable of flying to isolated vegetation patches.

Table E-2: Flying mammal, *Pteropus poliocephalus* (Grey-headed Flying-fox).
(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,
Remnant vegetation within the subject site is of poor to fair condition as a result of historical and ongoing management practices. It is representative of regrowth vegetation and contains several environmental weed species that render it less suitable as foraging habitat for the Grey-headed Flying-fox. Similarly, the proposed impact to planted trees is unlikely represent important habitat for the species. No bat camps were identified within areas of remnant vegetation or planted trees. Vegetation within the subject site is unlikely to constitute important habitat for the continued presence of the Grey-headed Flying-fox in the locality.
d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
The proposal will not have an impact on areas of outstanding biodiversity value.
e) whether the proposed development or activity is or is part of a key threatening process is likely to increase the impact of a key threatening process
The following Key Threatening Processes are relevant to the proposed development: - Clearing of native vegetation. The proposal is likely to facilitate the above-listed KTPs to a minor extent. This is in consideration of the small impact area, resulting in little clearing of native vegetation.
Conclusion
Approximately 0.39 ha of the subject site represents potential foraging habitat for *Pteropus poliocephalus* (Grey-headed Flying-fox). It contains a variety of mature eucalypt species that produce edible blossoms for this species. It is unlikely that the proposed works will significantly impact this species such that it is put at further risk of local extinction given the reduced condition of vegetation and small area of works.

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The Power of Commitment

Appendix D – Odour Impact Assessment figures

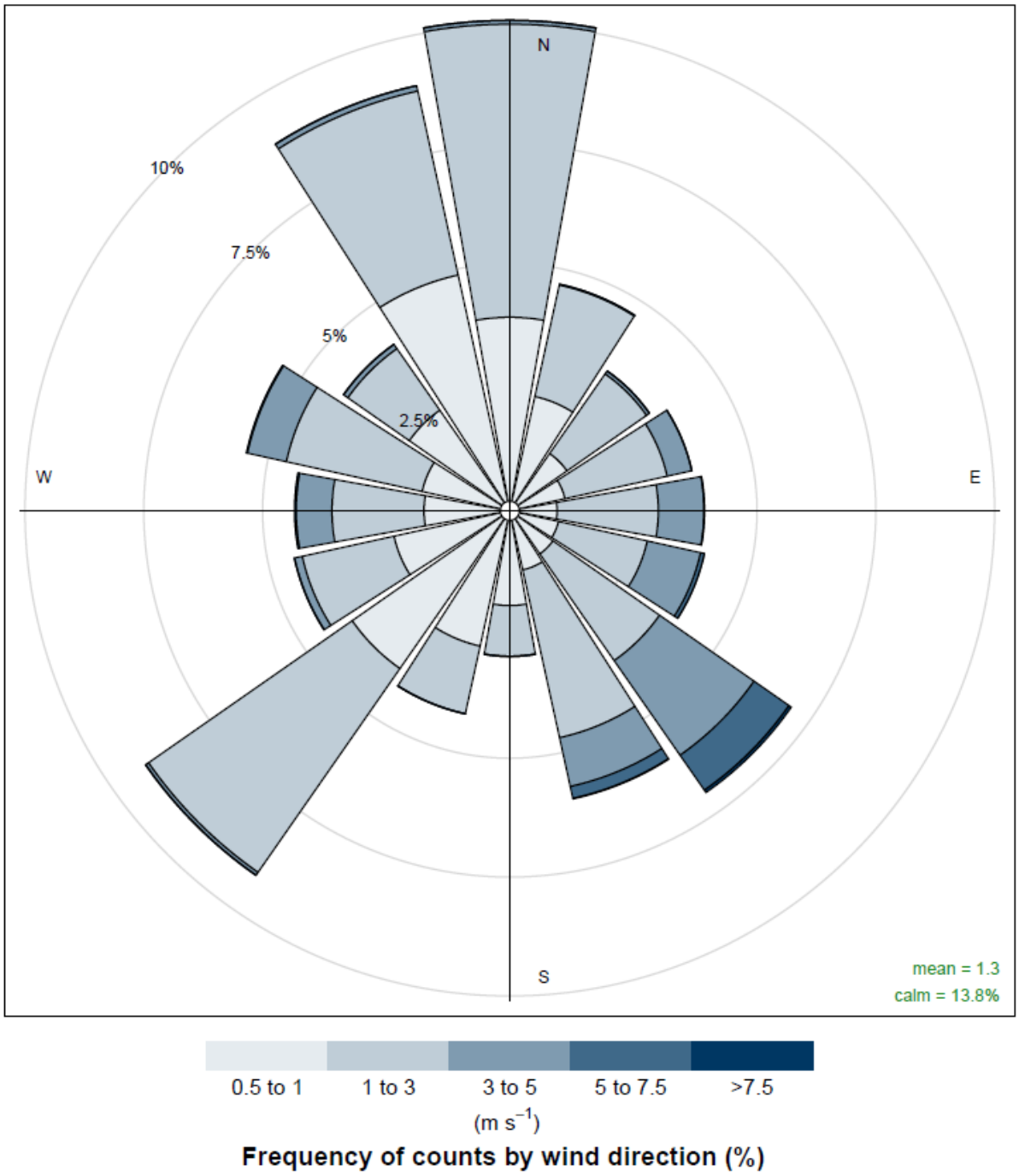

Figure D.1 Rouse Hill annual wind rose (2019 – 2022)

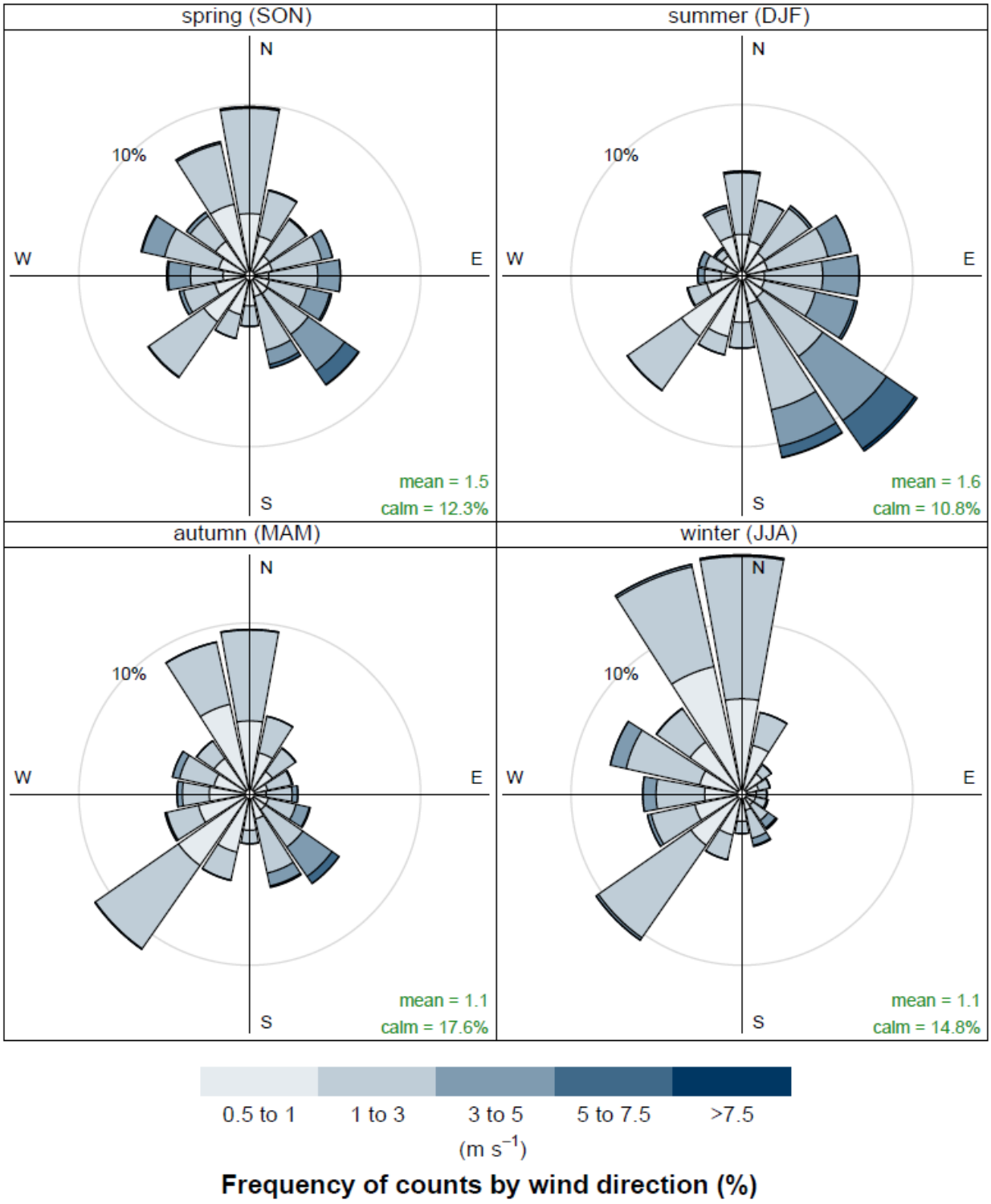

Figure D.2 Rouse Hill seasonal wind roses (2019 – 2022)