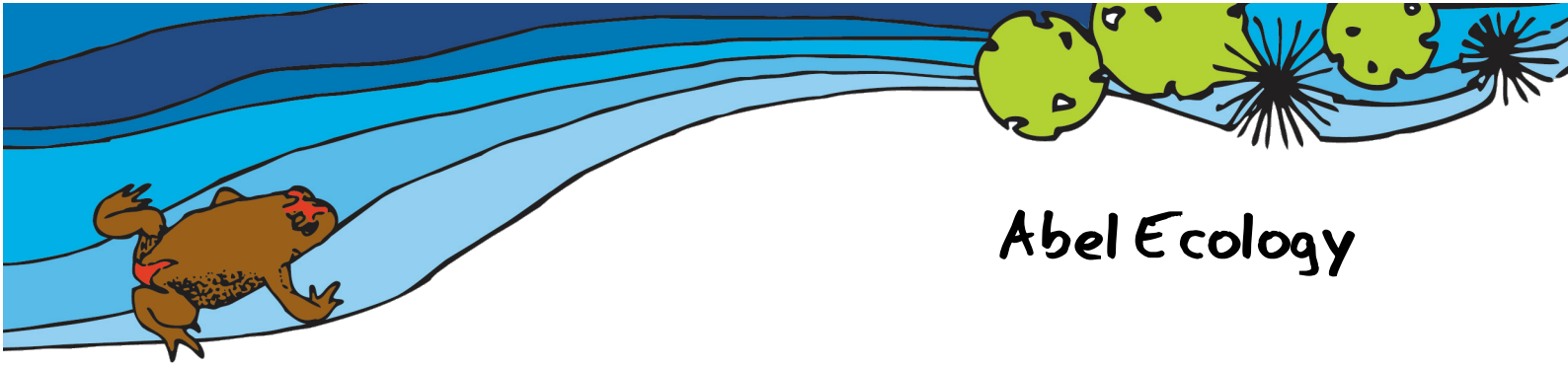

Abel Ecology

Prescribed Ecological Actions Report (PEAR)

For Toronto Investments No.1 Pty Ltd

Address:

Lots 4, 5, 6 and 7 Section 6 DP 2505 (114-120 Cary Street),

Lots 9 and 10 Section 6 DP 2505 (1 Bath Street),

Lot 100 DP 874314 (2 Bath Street),

Lot 8 Section 6 DP 2505 (Bath Street) and

Lot 101 DP 1110774 (3 Arnott Avenue)

Proposed: Mixed use development including residential flat building and ground floor commercial

Prepared for:	Fay Vranas of Toronto Investments No.1 Pty Ltd
Report No:	AE21-REP-2387-ISS-2
Prepared by:	Abel Ecology
Date:	5 July 2022

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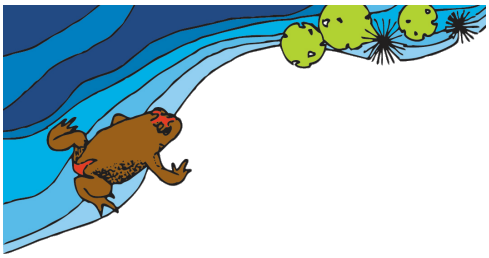


Disclaimer

This report has been prepared in accordance with the scope of services described in agreement between Abel Ecology and the Client.

In preparing this report, Abel Ecology has relied upon data, surveys and site inspection results taken at or under the particular time and or conditions specified herein. Abel Ecology has also relied on certain verbal information and documentation provided by the Client and/or third parties, but did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Abel Ecology assumes no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to Abel Ecology.

The findings contained in this report are the result of discrete/specific methods used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site/sites at all points.

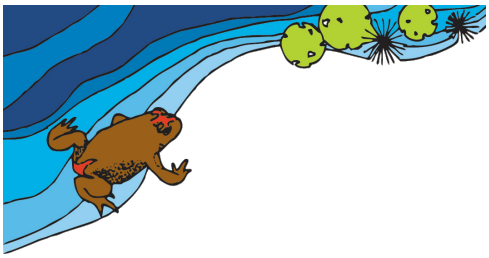
Any representation, statement, opinion or advice, expressed or implied in this publication is made in good faith but on the basis that Abel Ecology, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever, which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement, or advice referred to above. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by the Client.

Furthermore, this report has been prepared solely for use by the Client. Abel Ecology accepts no responsibility for its use by other parties.

I confirm that I have read the NSW Land and Environment Court Practice Note commencing on 14 May 2007, Division 2, Part 31 of the Uniform Civil Procedure Rules 2005 and the Expert Witness Code of Conduct in Schedule 7 to the Uniform Civil Procedure Rules 2005. I have prepared this advice in accordance with the requirements of the Practice Note and Code of Conduct and believe this report is consistent with the requirements of the Practice Note and the Code of Conduct. I agree to be bound by the Practice Note and Code of Conduct.

Document History

Report	Version	Prepared by	Proofread by	Submission	
				Method	Date
Report	Draft A	Dr Daniel McDonald	Jane Bonwick	Dropbox	25 May 2022
Report	Issue 1	Dr Daniel McDonald	Jane Bonwick	Dropbox	30 June 2022
Report	Issue 2	Dr Daniel McDonald	Jane Bonwick	Dropbox	5 July 2022



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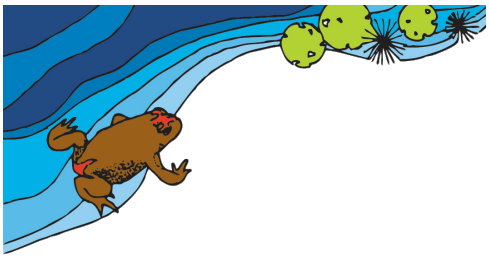

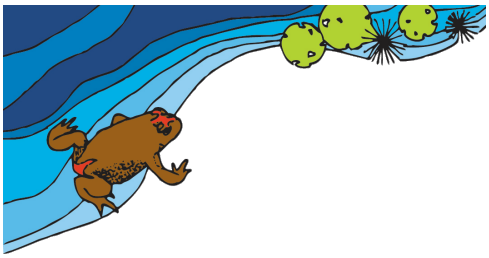

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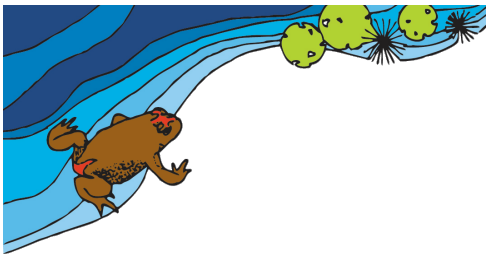


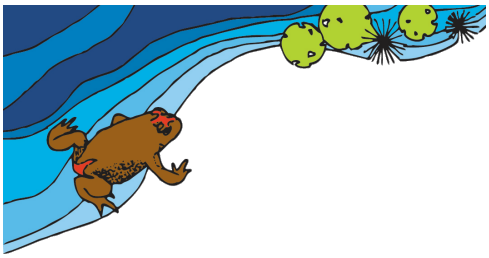
List of Abbreviations

ALS	Actual Lot Size
BAM	Biodiversity Assessment Method
BC Act	Biodiversity Conservation Act 2016
BCR	Biodiversity Conservation Regulation 2017
BDAR	Biodiversity Development Assessment Report
d.b.h.	Diameter at breast height (~1.4 metres)
EEC	Endangered Ecological Community
ESD	Ecologically Sustainable Development
LEP	Local Environmental Plan
LGA	Local Government Area
MLS	Minimum Lot size

Note regarding maps in this report

The diagrams/site maps used in this report have been supplied by and are used with the permission of the client.

With regard to maps provided by the Land Information Centre, Topographic maps used with the permission of © Land and Property Information, NSW.



Executive summary

An existing site comprised of multiple blocks, namely 114-120 Cary Street, 1, 2 & 5 Bath Street, and 10-12 Bay Street, is present in Toronto. Currently the site is comprised of disturbed vegetation. Buildings and other constructed features previously present on the site have been demolished and mostly removed.

The proposal is to construct:

- Commercial premises (929 m^2 internal)
- 108 residential dwellings (including 1 bed, 2 bed and 3 bed apartments)
- Car parking including residential, visitor, commercial and service spaces.

Toronto Wetland, a wetland with biodiversity values is present across the road from the site. The wetland was mapped as a SEPP14 wetland. It was also included in the State Environmental Planning Policy (Coastal Management) 2018 mapping.

A biodiversity survey was carried out at 114-120 Cary Street, 1, 2 & 5 Bath Street, and 10-12 Bay Street to assess the likely impacts of the proposal on species and ecological communities present on the site, and whether the proposal requires a Biodiversity Development Assessment Report (BDAR) because it is a likely trigger to entry into the Biodiversity Offsets Scheme identified in s. 7.4 of the *Biodiversity Conservation Act 2016.*

This report also describes whether there is likely to be any significant effect on any endangered ecological community, endangered population, threatened species or their habitats, as per the listings in the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999 - Commonwealth legislation).

The areas to be potentially affected are the site and Toronto Wetland.

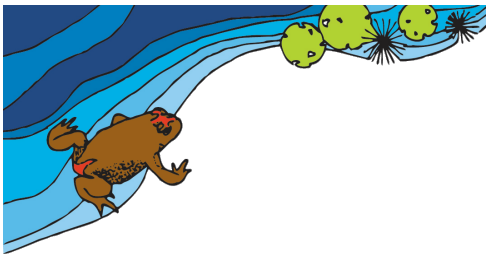
The following three considerations are triggers for entry into the Biodiversity Assessment Method.

1. Threshold 1: The proposal does not exceed the clearing threshold area as described in clause 7.2 of the BC Regulation 2017.

2. Threshold 2: The proposal does not undertake clearing of native vegetation or any prescribed activities (clause 6.1 of the BC Regulation 2017) on land shaded in the Biodiversity Values Land Map. Similarly, the proposal is not being carried out in a declared area of outstanding biodiversity value (AOBV).

3. Threshold 3: The proposal is not likely to significantly affect any threatened species or Endangered or Critically Endangered Species.

There is no impediment to this proposal in the scope of this report. None of the three thresholds for entry into the Biodiversity Offsets Scheme are triggered by the proposal.



A report prepared using the Biodiversity Assessment Method is not recommended.

The proposal is unlikely to have a significant adverse impact on Toronto Wetlands or the biodiversity values within Toronto Wetlands.

The provisions of the EPBC Act 1999 do not apply to this proposal and it does not require referral to the Commonwealth.

This report details the potential impacts on Toronto Wetland and shows that the proposal is unlikely to have a significant adverse impact on Toronto Wetland.

- The proposal minimises impacts on groundwater and is consistent with NSW guidelines.
- The proposal changes stormwater inputs to Toronto Wetland. The quality of stormwater flowing to Toronto wetland is improved but the quantity is increased. These modifications are unlikely to have a significant negative impact on Toronto Wetland.
- No significant impact on any threatened plant community (EECs), threatened plant or threatened fauna species is anticipated by the proposal.

Recommendations:

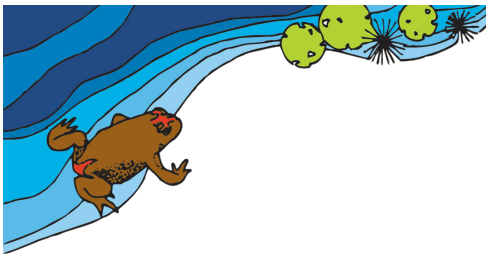
A Biodiversity Development Assessment Report (BDAR) is not required.

A consent or approval may be issued with the following conditions:

Management of acid sulfate soils

> *Where a Preliminary Acid Sulfate Soil Assessment report identifies potential adverse impacts, a detailed assessment report and management plan must be submitted, in accordance with the NSW Acid Sulfate Soils Planning Guidelines.*
>
> *4. Any Acid Sulfate Soils must be identified on the site analysis plan.*

Chameleon Geosciences Pty Ltd (9 October 2020) have prepared an *Acid Sulfate Soils Management Plan* (ASSMP). The ASSMP provides information on the potential presence of Acid Sulfate Soil on the site and appropriate management.



Groundwater monitoring

The consent must include:

- a requirement for baseline risk monitoring of groundwater
- periodic groundwater monitoring and assessment.

The ASSMP provides details about monitoring groundwater. Monitoring requirements consistent with the ASSMP and relevant policies must be incorporated into the consent conditions.

Figure 1. Locality map for the proposal site

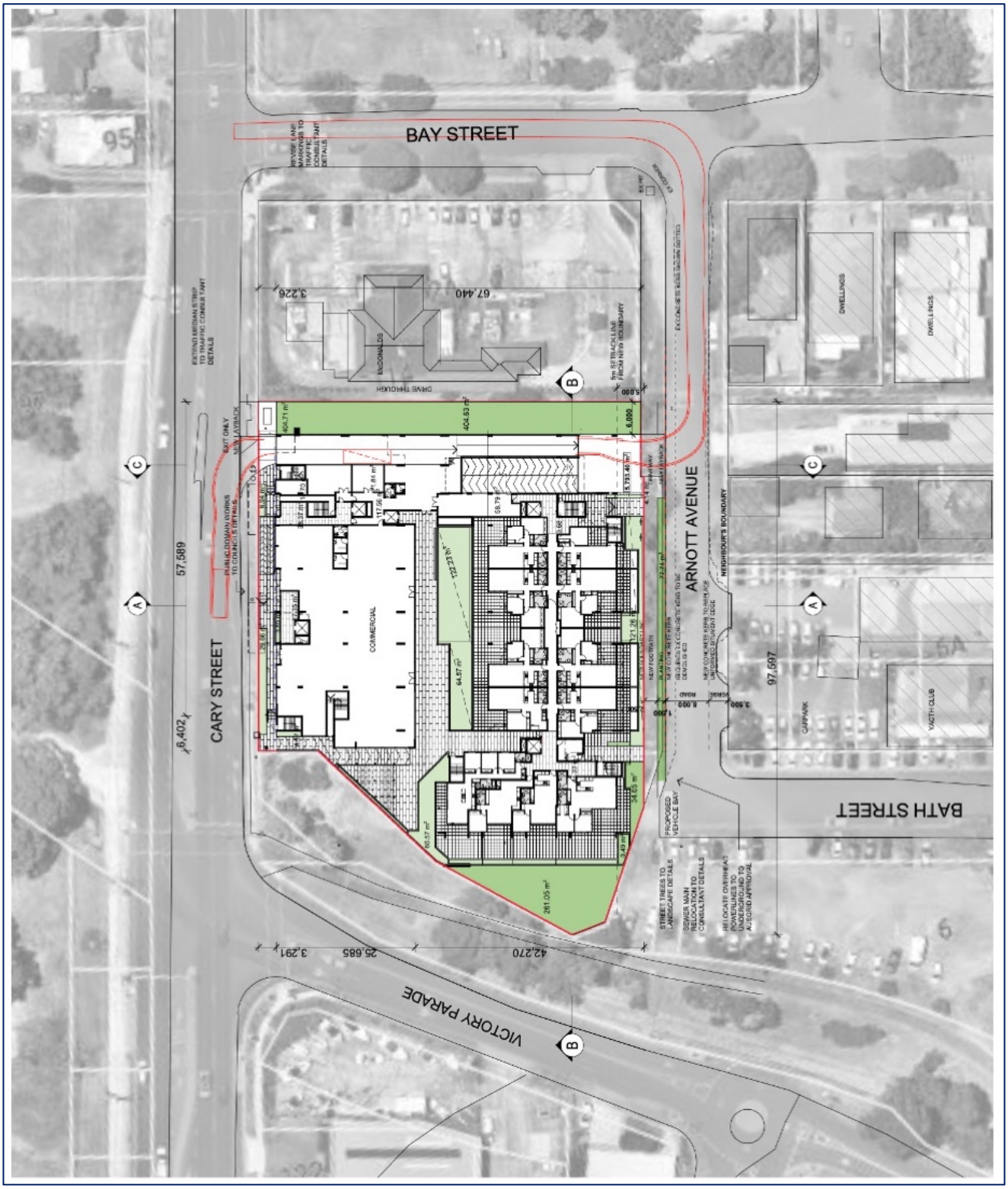


Figure 2. Proposal diagram.

Figure 3. Aerial photo of the site and local area.

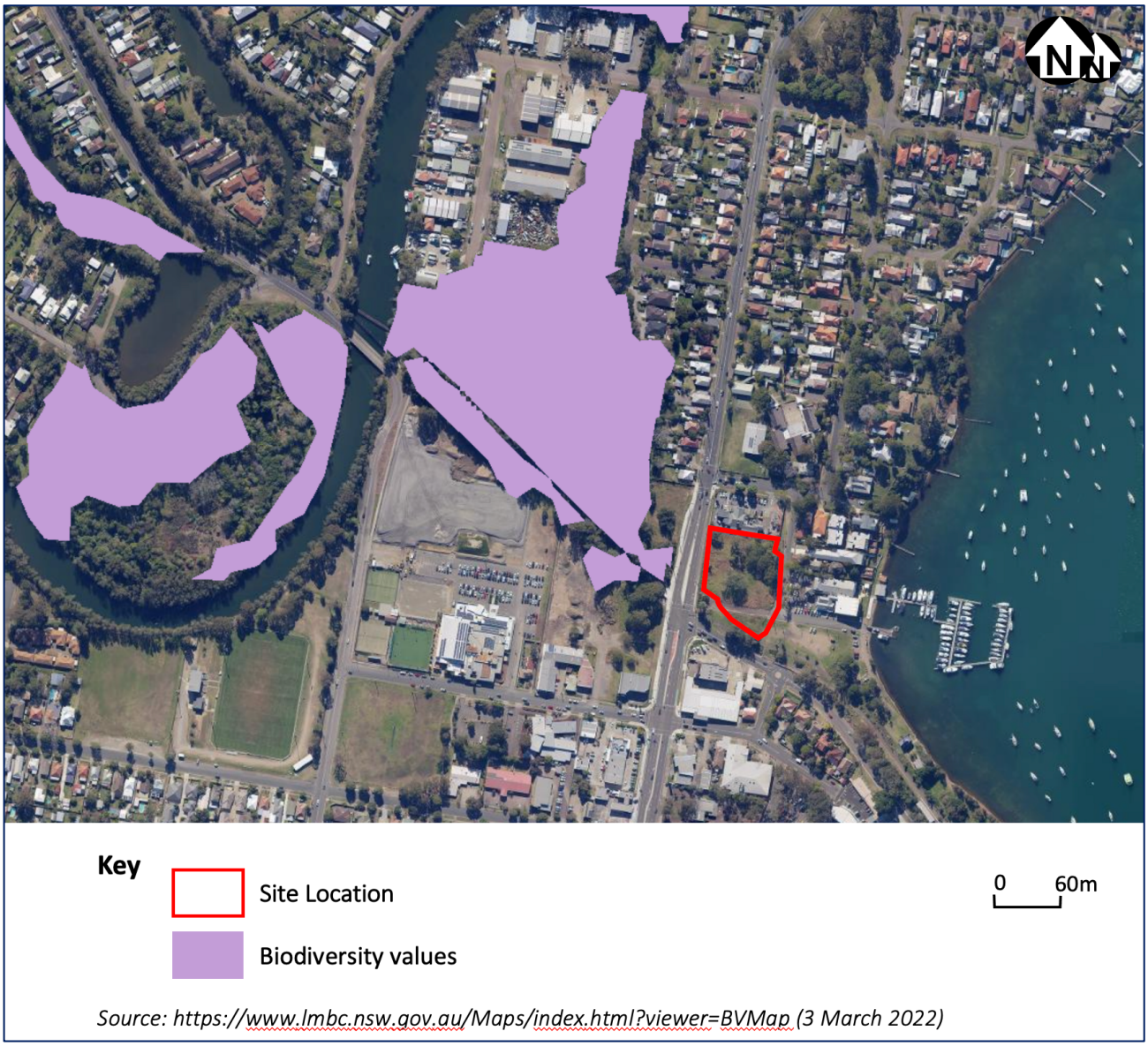


Figure 4. Biodiversity values map.

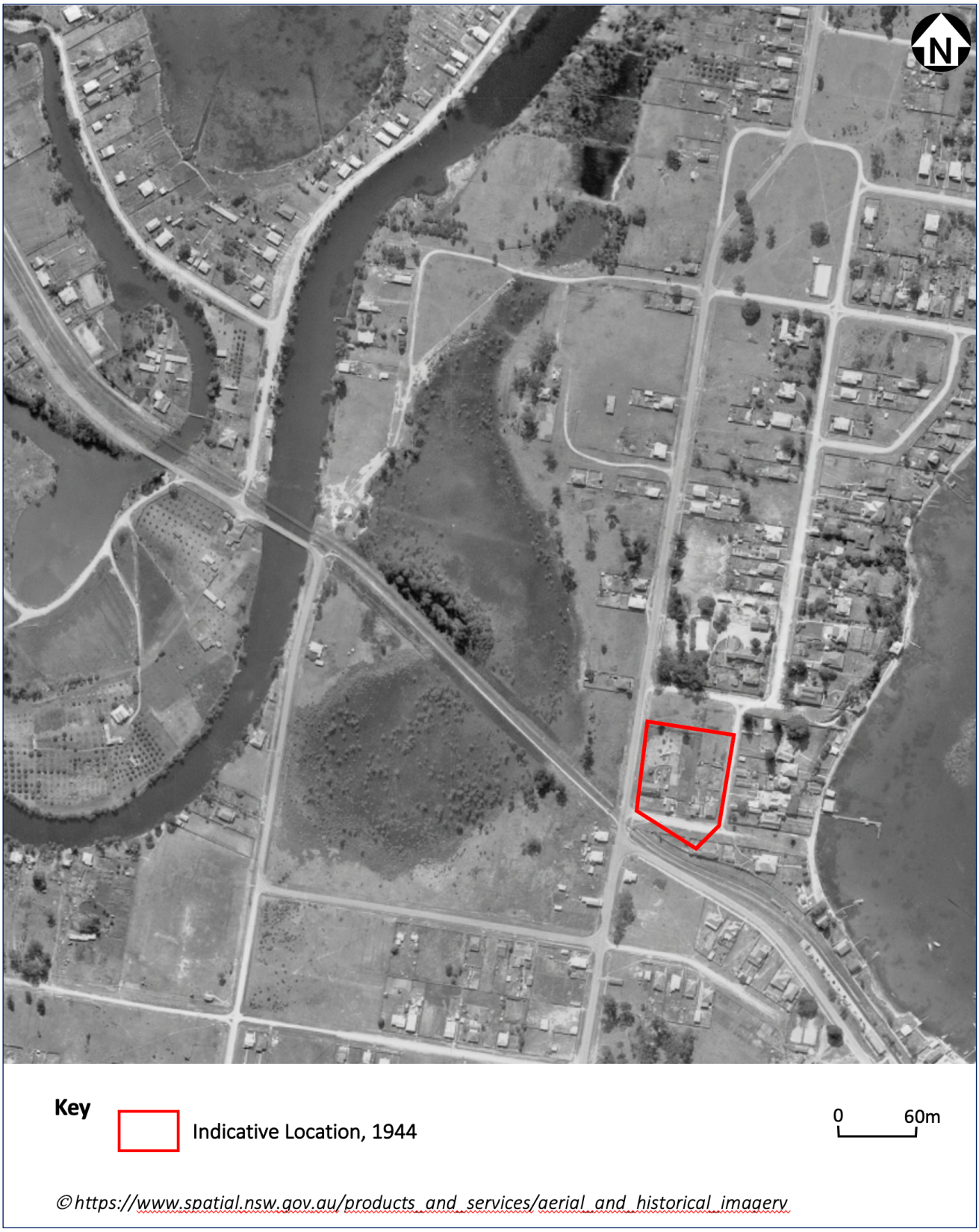


Figure 5. 1944 air photo of the locality

https://www.spatial.nsw.gov.au/products_and_services/aerial_and_historical_imagery

Figure 6. 1965 air photo of the locality.

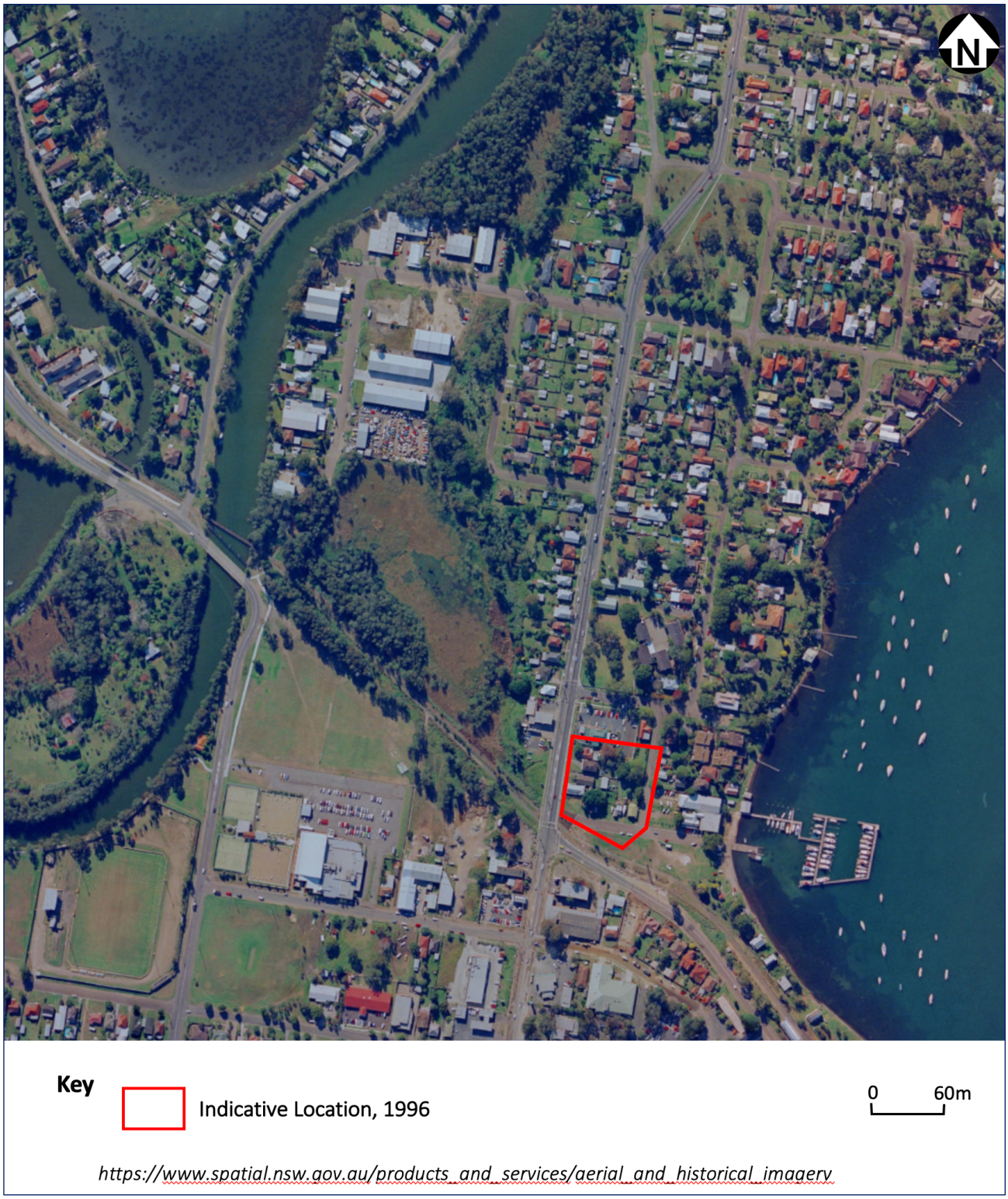


Figure 7. 1996 air photo of the locality.

1. Introduction

1.1 Aims of this report

This report addresses the impact of the proposal on the biodiversity on the site and in the locality.

The first aim of the report is to address legislation and policies that consider potential biodiversity impacts on the site.

A Second aim of the report is to examine both direct and indirect impacts on the Toronto Wetland which is near the site. The examination of impacts on the Toronto Wetlands is to address Lake Macquarie Council's request for more information described in their assessment report (Lake Macquarie City Council (25 November 2019)).

The impact of the proposal was also examined by the NSW Land and Environment Court. The focus of the discussions were potential impacts on the Toronto Wetland. Potential impacts on Toronto Wetland are discussed in Sections 1.5.1 and Section 9 and elsewhere.

1.2 The proposal

The proposal (Figure 2) is to construct a six-storey mixed-use building including a residential flat building located at 118 Cary Street, Toronto.

The subject DA relates to the following works:

- Commercial premises (929 m^2 internal).
- 108 residential dwellings (including 1 bed, 2 bed and 3 bed apartments).
- Car parking including residential, visitor, commercial and service spaces.

and consists of:

a) buildings

b) on-site stormwater detention

c) driveways

d) outdoor living and landscape areas

e) link up to sewage system

f) utilities within the lot

g) excavation

1.3 Legislative context

The aims of this report are to address:

- the requirements of the *Biodiversity Conservation Act 2016* (BC Act) to enable a Council or another consent authority to assess a proposed development or activity under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).
- legislation and policies regarding potential hydrological (stormwater and groundwater) impacts on Toronto Wetland. The assessment of potential hydrological impacts influences the assessment under the BC Act and related policies. The impact assessments for Toronto Wetland are noted here as they form a large component of this report.

1.3.1 Requirements of the Biodiversity Conservation Act 2016

The *requirements of the Biodiversity Conservation Act 2016 and related policies state that:*

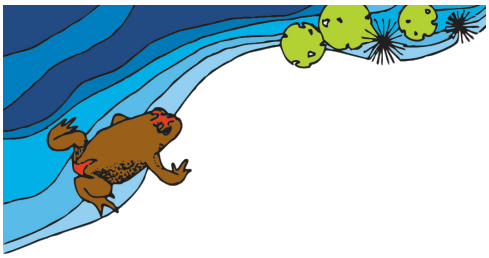
> *The authority must consider the following three Biodiversity Offset Scheme Development Thresholds.*
>
> *Threshold Trigger 1: Exceeding the clearing threshold on an area of native vegetation*
>
> *Threshold Trigger 2: Development or a prescribed activity is carried out on land included in the Biodiversity Values Land Map. Or development or an activity on an Area of Outstanding Biodiversity Value.*
>
> *Threshold Trigger 3: A "significant effect" on threatened species or ecological communities*

A biodiversity survey of the proposed development site on the northern side of Bath Street between Cary Street and Arnott Avenue ('the site' – Figure 1) was undertaken on 25 January 2022. A survey of Toronto Wetland and the surrounding area was also undertaken on the same day.

This Prescribed Ecological Actions Report investigates whether the impacts of proposal will trigger any of the three thresholds to entry into the Biodiversity Offsets Scheme, thereby requiring a Biodiversity Development Assessment Report.

This assessment addresses both 'endangered' and 'vulnerable', as required by the Biodiversity Conservation Act 2016 (BCA 2016). Throughout this report 'threatened' refers to those species and communities listed as 'endangered' or 'vulnerable' in Schedules 1 & 2 of the BC Act 2016.

If any of the three thresholds are triggered, then a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor for the Authority to issue a consent or an approval and a calculation of offsetting required.



1.3.2 Policies considering potential stormwater and groundwater impacts on Toronto Wetland include the following:

- NSW Risk assessment guidelines for groundwater dependent ecosystems
- The State Environmental Planning Policy (Resilience and Hazards) 2021
- NSW wetlands policy

These policies are addressed in this report.

1.4 Sources of information used in this assessment

Literature reviewed in order to assess possible issues relating to this site include:

Air photo (SIX maps and historic aerial imagery)

Aargus Pty Ltd (27.10.2021) Laboratory Test Request / Chain of Custody Record

Chameleon Geosciences Pty Ltd (9 October 2020) Acid Sulfate Soils Management Plan – 114-120 Cary Street, 1-5 Bath Street & 3 Arnott Avenue, Toronto NSW.

Chameleon Geosciences Pty Ltd (20 January 2022) Dewatering Management Plan – 118 Cary Street Toronto NSW 2283 Report No. GS8030-5A

Chameleon Geosciences Pty Ltd (25 February 2022) Geotechnical Investigation Report – 118 Cary Street Toronto NSW 2283 Report No. GS8030-1A, Rev3

CMW Geosciences (21 February 2022) Groundwater Drawdown Model and Detailed Settlement Analysis – 114-120 Cary Street, 1,2,3,5 Bath Street and 3 Arnott Avenue Toronto (SYD2021-0134AB Rev 4)

Council Assessment Report – Panel Reference 2018HCC010 - DA/419/2018 – Report prepared by Georgie Williams, Senior Development Planner – Report date – 25 November 2019

Duggan Mather Surveyors (10 October 2016) Topographical Survey 2016205 TS1A

Duggan Mather Surveyors (10 October 2016) Topographical Survey 2016205 TS1A incl Drainage

Envirotech (25 September 2018) Environmental Management Plan (REP-18-6157).

Eurofins Environment Testing (Aargus Pty Ltd)(12 November 2021) Water Analysis Report 837227-W

JK Geotechnics (October 2016) Report to Toronto Investments Pty Ltd on geotechnical assessment for proposed mixed use development at 118 Cary Street, Toronto, NSW (Ref: 29644SBrpt).

Kembla Environmental Consultants (9 – 11 – 2018) Addendum to:- Envirotech – Environmental Management Plan REP-18-6472 by Shane Maloney.

Lake Macquarie City Council (Landcare Resource Office) (October 2008) A case study of Toronto Wetlands – Toronto District Landcare – Rehabilitate Wetlands & Treat Weeds.

Land and Environment Court of NSW (24 May 2021) Amended Statement of Facts and Contentions (Case number 2020/00091325).

Maloney, S. and Clements, A. (August 2021) Joint ecology expert report – Toronto Investments Pty Ltd v Lake Macquarie City Council – NSW Land and Environment Court Case 2020/00091325.

Maloney, S. and Clements, A. (September 2021) Joint ecology expert report – Toronto Investments Pty Ltd v Lake Macquarie City Council – NSW Land and Environment Court Case 2020/00091325.

Northrop (27 October 2021) Erosion and sediment control plan – project 118 Cary Street Toronto, NSW 2283 – job number – NL171556 drawing number C00DA – Revision 1 – pp 1-12.

Northrop (23 November 2021) Concept Stormwater Management Plan for 118 Cary Street, Toronto (NL171556 / Rev A).

Planning Ingenuity (20 May 2022) Statement of Environmental Effects – 114-120 Cary Street, Toronto (REF: M200034).

Schedules to the BC Act 2016.

Schedules to the EPBC Act 1999.

State Environmental Planning Policy Koala habitat protection (SEPP 2021).

OEH Atlas of NSW Wildlife.

1.5 Background

1.5.1 Previous assessments of the proposal

The proposal in a general form has been previously assessed by Lake Macquarie City Council and reviewed by the NSW Land and Environment Court. These assessments have allowed the proposal to be modified.

The proposal was also considered to lack information in regard to potential impacts on Toronto Wetland. This report provides additional information and assessments on the impact on Toronto Wetland.

2. Biodiversity offsets scheme thresholds 1 and 2

2.1 Threshold One: Biodiversity Conservation Regulation 2017 Development area assessment thresholds

The site details and proposed native vegetation clearing are presented in Table 1.

Table 1. Details of lot size and size of proposed native vegetation clearing.

Component of site	Area m^2	Proportion of the site %
Whole site	[1]6000 m^2	100
Extent of proposed native vegetation clearing	[2]1800 m^2	30%

[1]The site is approximately 6000 m^2 in size.

[2] The ground layer is dominated by exotic species, primarily Buffalo grass *Stenotaphrum secundatum,* Kikuyu *Cenchrus clandestinus* and Coolatai grass *Hyparrhenia hirta.* Indigenous groundcover present on the site include Blady Grass *Imperata cylindrica* and Couch *Cynodon dactylon*. There are also other indigenous species, including trees and shrubs. The approximate total cover of indigenous species = 1800 m^2.

Clearing of native vegetation is declared by clause 7.2(1) to exceed the biodiversity offsets scheme threshold if the area proposed to be cleared is the area set out in Column 2 of the Table to that clause (Table 2 below) opposite the minimum lot size applicable to the land to be cleared in Column 1 of that Table.

Clearing of native vegetation will trigger entry into the offsets scheme if clearing is greater than the assessment threshold. To determine the correct threshold from Table 2 below, the appropriate minimum lot size of land must be selected. The minimum lot size of land can be found on the NSW planning portal:

https://www.planningportal.nsw.gov.au/find-a-property/property/.

The smallest lot within the proposal footprint is 3 Arnott Avenue, Toronto 2283 (Lot 101 DP1110774). The NSW planning portal (checked on 24 March 2022) does not provide a minimum lot size for this land parcel. The size of the lot is approximately 279.5 m^2.

Table 2. Areas - Section 7.2(4) Biodiversity Conservation Regulation 2017.

	Land to be considered	Assessment threshold
	Minimum lot size of land	Area of clearing
A	Less than 1 hectare	0.25 hectare or more
B	Less than 40 hectares but not less than 1 hectare	0.5 hectare or more
C	Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
D	1,000 hectares or more	2 hectares or more

Row A is appropriate for this proposal. The area of clearing for the total proposal is (all nine lots) is approximately 6000 m^2. However, the site is dominated by exotic vegetation, native vegetation in the form of native species are generally scattered or in small patches. The total area of native vegetation is estimated to be 1800 m^2.

The site does not contain 2500 m^2 of native vegetation. Consequently, the proposal does not include clearing of more than 2500 m^2 of native vegetation. Threshold 1, the development area threshold is not breached.

Conclusion

The proposed clearing does not exceed the threshold and entry into the BC Act offset scheme is not required as a result of clearing.

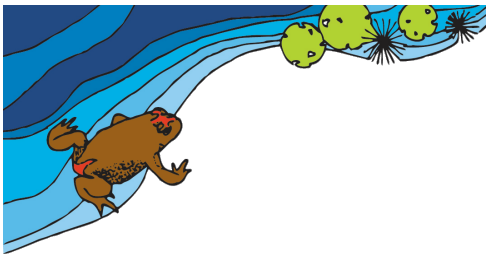
2.2 Threshold Two: Clearing or prescribed activities as listed in the Biodiversity Conservation Regulation 2017 on land included on the Biodiversity Values Map. Proposed clearing on an Area of Outstanding Biodiversity Value.

No part of the site is included on the Biodiversity Values Map (Figure 4). No clearing is proposed on land included in the Biodiversity Values Map.

No Area of Outstanding Biodiversity Value is present on or near the site.

2.2.1 Prescribed Activities

If one of more of the following prescribed activities are included directly or indirectly on land included on the Biodiversity Values Map as part of the proposal/proposed activity the Biodiversity Offsets Scheme will apply.



The following extracts are from the *Biodiversity Conservation Regulation 2017*:

Part 7 Biodiversity assessment and approvals under Planning Act

7.1 Biodiversity offsets scheme threshold (section 7.4)

(1) Proposed development exceeds the biodiversity offsets scheme threshold for the purposes of Part 7 of the Act if it is or involves:

(a) the clearing of native vegetation of an area declared by clause 7.2 as exceeding the threshold, or

(b) the clearing of native vegetation, or other action prescribed by clause 6.1, on land included on the Biodiversity Values Map published under clause 7.3.

Part 6 Biodiversity offsets scheme

Division 6.1 General

6.1 Additional biodiversity impacts to which scheme applies (sections 6.3 and 6.6 (2) BCR)

(1) The impacts on biodiversity values of the following actions are prescribed (subject to subclause (2)) as biodiversity impacts to be assessed under the biodiversity offsets scheme:

(a) the impacts of development on the following habitat of threatened species or ecological communities:

(i) karst, caves, crevices, cliffs and other geological features of significance,

(ii) rocks,

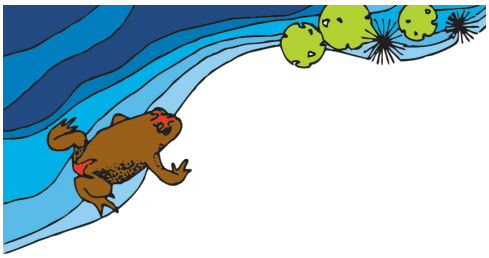
(iii) human made structures,

(iv) non-native vegetation,

Response: No significant impacts from the proposal will occur on karsts, caves, crevices, cliffs or other geological features of significance, or rocks, human made structures or non-native vegetation that were present on site or nearby and are habitat for threatened species or ecological communities.

(b) the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,

Response: The development is unlikely to have a significant impact on connectivity of habitat for any threatened species.



(c) the impacts of development on movement of threatened species that maintains their lifecycle,

Response: The proposal is unlikely to have a significant impact on the movement of threatened species as required for their lifecycle.

(d) the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),

Response: The proposal has a potential indirect hydrological impact on Toronto Wetland. This is discussed in under the heading "*BAM 2020 Section 6 Identifying prescribed additional biodiversity impacts".*

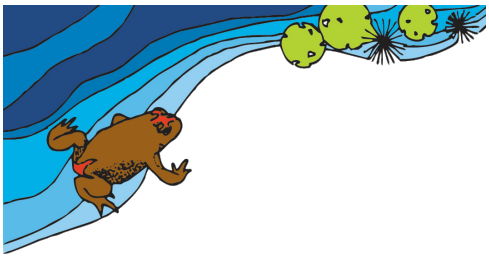
As Toronto Wetland is not within the subject site, a prescribed impact as defined by point (d) is not generated.

(e) the impacts of wind turbine strikes on protected animals,

Response: Wind turbines are not part of the proposal.

(f) the impacts of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.

Response: The proposal will not significantly increase vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.



(2) The additional biodiversity impacts prescribed by this clause (above)*:*

(a) are prescribed for the purposes of assessment and biodiversity assessment reports under the Act, but are not additional biodiversity impacts for the purposes of calculating the number and class of biodiversity credits that are required under a biodiversity assessment report to be retired to offset the residual impact on biodiversity values of proposed development, proposed clearing of native vegetation or proposed biodiversity certification of land, and

(b) may be taken into account in the determination of the biodiversity credits required to be retired (or other conservation measures required to be taken) under a planning approval or vegetation clearing approval or under a biodiversity certification of land.

BAM 2020 Section 6 Identifying prescribed additional biodiversity impacts

Section 6 of the BAM 2020 states:

6 Identifying prescribed additional biodiversity impacts

1. Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per clause 6.1 of the BC Regulation. Such prescribed impacts (including direct and indirect impacts) are impacts:

(a) on the habitat of threatened entities including:

i. karst, caves, crevices, cliffs, rocks and other geological features of significance, or

ii. human-made structures, or

iii. non-native vegetation

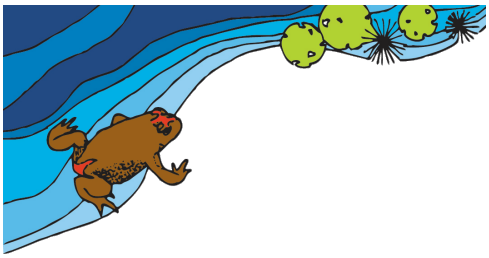
(b) on areas connecting threatened species habitat, such as movement corridors

(c) that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)

(d) on threatened and protected animals from turbine strikes from a wind farm

(e) on threatened species or fauna that are part of a TEC from vehicle strikes.

Response: Point c. *"that affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining)"* requires more consideration.



Section 6.1.4 of the BAM 2020 states:

6.1.4 Water bodies, water quality and hydrological processes

1. Where water bodies or any hydrological processes that sustain threatened entities occur on the ***subject land****, the assessor must:*

a. prepare a list of threatened entities that may use or depend on water bodies or hydrological processes for all or part of their life cycle, or

b. prepare a list of threatened entities that will be, or are likely to be impacted by changes to existing water bodies or hydrological processes or the construction of a new water body

(c) describe the habitat provided for each threatened entity by the water body or hydrological process, including consideration of water quality, volume, flow paths and seasonal patterns (based on published literature and other reliable sources).

(2) If relevant, these features must be identified on the Site Map and the Location Map prepared in Chapter

Response (continued): The phrase "subject land" has been highlighted by using a bold font in the extract above. It is not in bold font in the original. It is important to note that Toronto Wetland is not on the subject land. Consequently, while potential impacts on the hydrology of Toronto Wetland will be considered further within this report, the impacts do not meet the definition of a prescribed impact.

Stated in another way, if Toronto Wetland was within the subject land and if potential hydrological impacts were proposed then the proposed development would generate a prescribed impact.

Regardless hydrological impacts on Toronto Wetland are extensively examined in this report.

Conclusion

None of the prescribed biodiversity impacts described above (a, b, c, d, e, or f) are included in the proposal.

The threshold two trigger for entry into the Biodiversity offsets scheme is not activated by the proposal. A Biodiversity Development Assessment Report is not required.

3. Landscape features of the site and the locality

3.1 Site description

The site is somewhat trapezoidal in shape comprising Lot 4-10 DP 2505 and Lot 101 DP 1110774 corner of Cary Street, Bath Street and Arnott Avenue. The street address is 114- 120 Cary St, 1, 2, 3, 5 Bath St and 3 Arnott Ave Toronto (site referred to as 118 Cary St). It is bound to the west by Cary Street then a Wetland (~120m to the west) and to the east by Arnott Avenue. To the south of the site is a vacant grassed area and then Victory Parade. To the north of the site is a McDonald's business operation comprising of a single storey building. The proposed site is located about 100m to the west of Toronto Bay, which is part of Lake Macquarie, within gently to moderately undulating terrain. The ground surface within the site slopes down to the southwest and northwest with slopes generally of about 1° to 2°, but locally steeper at about 3° in the north eastern corner. At the time of site investigation, the site was vacant and covered with grass and medium sized trees. (Extract from the Chameleon Geosciences *Geotechnical Investigation Report* (25 February 2022).

Nearby properties (Figure 3) include a mix of business, residential land use and water bodies including Lake Macquarie, Stony Creek and Toronto Wetland.

The vegetation (Figure 1) is described in detail in Section 5 below and fauna habitat is detailed in Section 5 below.

3.2 History of the site and Toronto Wetland

Aerial photos of the site and Toronto Wetland dated from 1944 to the present are provided as Figure 3, Figure 5 Figure 6 and Figure 7.

3.2.1 The site

It is presumed that the original native vegetation on the site was dominated by trees. In 1944 (Figure 5) the site appears to be cleared of the majority of the remnant native trees. Four dwellings appear within the site. In 1965 (Figure 6) the site includes a relatively large residential block in the South-West corner as well as other residences on other lots. By 1996 (Figure 7) a carpark and presumably a business is present to the North of the site. Presently the site has been cleared of residential buildings. Vegetation including trees, shrubs and groundcovers occupy most of the site presently.

3.2.2 Toronto wetland

The 1944 (Figure 5) appears to show the original extent of Toronto Wetland. However, Toronto wetland had already been altered due to both:

1. The railway crossing; and
2. Roads and tracks crossings. Taller trees appear to be present primarily along the North-Western section of the rail line.

In 1965 (Figure 6) the crossing associated with the railway appears to be wider. Taller trees appear to be more common around the edge of Toronto Wetland. Trees occupy both the edges as well as the centre of the section of Toronto Wetland South of the railway crossing.

By 1996 the section of Toronto Wetland South of the railway line was filled.

It is likely that historic changes to the locality have changed the dynamics of both groundwater and stormwater flows to Toronto Wetland.

3.3 Site Soils

JK Geotechnics (October 2016) indicate that the "*subsurface profile at the site is likely to comprise surface fill in parts of the site overlying predominantly silty clay and sandy clay soils which in turn overly bedrock at an unknown depth*."

The eSpade map for the locality has mapped the area as part of the "Doyalson Soil Landscape"

It appears that the surface soils have been disturbed and as stated by JK Geotechnics are probably fill. Native soils are probably present at depth.

No soil profiles on the site were assessed by Abel Ecology for the preparation of this report.

3.4 Landscape features

3.4.1 Site landscape features

The following landscape features are present on the site (Table 3).

Table 3. Site landscape features

Vegetation	The entire site has been cleared or disturbed. Some native species, including trees, shrubs and groundcovers are present on the site.
Non-native vegetation	The site has potential for foraging habitat for threatened species of bats and birds.
Human structures	Concrete and small retaining walls are present on the site. They have very little potential as bat roosts.
Wetlands/dams/watercourse	No watercourses are present on site. Toronto Wetland is West of the site.
Karst, caves, crevices and other geological features of significance	No karst, caves, crevices or other geological features of significance are present on the site.
Roads	Vehicle traffic along Cary Street is significant. This may lead to increased rates of mortality for some fauna species that use the site.

3.5 Background information – Nearby water bodies

Significant water bodies near to the site are:

- Lake Macquarie – Approximately 91 metres East of the site.
- Stony Creek – Stony Creek is approximately 345 metres West of the site.
- Toronto Wetland – The edge of the water on Toronto Wetland was approximately 112 metres West of the site on the day of the survey (25 January 2022).

Water was sampled from various locations on the 27 October 2021. The locations of water sampling are displayed in Figure 8 and the original results are provided in Appendix 6.

3.5.1 Lake Macquarie

Lake Macquarie is a large estuary. The major opening for water and seawater exchange is near Blacksmiths Beach and Swansea Heads.

The WBM (1996) report in Volume 2 on page 17 (Section 4.1.2 of their report): *"Mean annual salinities of the Lake (32-34 g/L) are typically at, or slightly below, salinity levels associated with ocean waters, indicating the relatively efficient nature of exchange of waters between the Lake and the ocean. In particularly wet years, mean annual salinities (28-30 g/L) are depressed to values slightly less than oceanic concentrations*

3.5.2 Stony Creek

Stony Creek merges with Lake Macquarie approximately North of the site where it flows into Edmunds Bay and Fennell Bay. It has a relatively large catchment that extends to the West. There are two channels of interest to this project.

One channel flows from Cary Street near the site to Stony Creek. This channel is South of the old rail crossing along the southern edge of Toronto Wetland. This channel does not appear to be directly linked with Toronto Wetland. The eastern end of this channel seems to have regular exchange of water with Stony Creek. Grey Mangrove *Avicennia marina* is growing in this channel close to Stony Creek.

Swamp Sheoak *Casuarina glauca* and Grey Mangrove *Avicennia marina* were observed along the bank of Stony Creek during the survey on 25 January 2022.

A second short channel links Toronto Wetland to Stony Creek. This channel is relatively high compared to the average water level in Stony Creek. It seems that in general water is likely to flow from Toronto Wetland to Stony Creek rather than the reverse.

During flood or perhaps extreme high tide events water from Stony Creek may flow to Toronto Wetland.

The testing by Eurofins on October 28 2021 (Date sampled: 27 October 2021) reported salinity within Stony Creek as 36000 mg/L. The water sample was taken at location W6 as indicated in Figure 8.

Morrisey (1995) states:

> *"The salinity of seawater is generally 33 – 38 parts per thousand (ppt), while that of freshwater is always less than 5%. In an estuary, therefore, the salinity may vary between 38 parts per thousand when the tide is high (if dilution of freshwater is small) to less than 5 parts per thousand at low tide in areas where river water flows out."*

Note: 36000 mg/L is approximately the same as 36 parts per thousand (ppt).

The level of salinity measured in Stony Creek is higher than the mean annual salinity reported by WBM (1996) in Lake Macquarie. The level of salinity is Stony Creek still appears to be within the normal range based upon Morrisey's (1995) understanding.

Thus at the time of testing, Stony Creek has a similar level of salinity to Lake Macquarie and the ocean.

3.5.3 Toronto Wetland

A case study of Toronto Wetlands – Toronto District Landcare (Lake Macquarie City Council (Landcare Resource Office) (October 2008)) provides the following description (pages three to six):

> *Toronto Wetlands lies within the sub-catchment of Lake Macquarie, in the Hunter Central Rivers Catchment on land traditionally owned by the Awabakal peoples and presently under custodianship of the Koompahtoo Local Aboriginal Land Council. It is a permanent brackish wetland that changes between salt and fresh water depending upon the water flowing into it. It is listed as a SEPP14 – Coastal Wetland so is protected by the State Environmental Planning Policy that requires development consent from council before undertaking filling, draining, or clearing in the area.*
>
> *Urbanisation has reduced the size of the wetland which is now approximately one quarter of its pre-European distribution. It is currently approximately 3.43 hectares in size. Toronto Wetland is bound to the south by open parkland, to the west by Stony Creek, to the north by an industrial estate, and to the east by residential development. A well-used public cycleway runs through the wetland adjacent to the abandoned Toronto railway line.*
>
> *The wetland has suffered greatly in the past from degrading and unsustainable practices on neighbouring sites. While these practices have been minimized or improved in recent times, the effects of urbanization still impact on the current health of the wetland system. These impacts have been mitigated considerably by the efforts of local Landcare, Community and Civic groups who have spent considerable time and resources to rehabilitate the wetland.*
>
> ***Flora and Fauna***
>
> *A diverse mix of habitats, sedge lands and extensive stands of macrophytes are present within the fringe of freshwater / littoral wetland. The adjoining forest includes Swamp Oak (Casuarina glauca), Ball Honeymyrtle (Melaleuca nodosa), Forest Red Gum (Eucalyptus tereticornis) and Swamp Mahogany (E. robusta). All of the vegetation communities occurring at the wetlands are listed as Endangered Ecological Communities under the NSW Threatened Species Conservation Act 1995.*
>
> *The Toronto Wetlands is an important breeding site for a range of waterbirds including Nankeen Night Heron, Pied Cormorant and the three species of Egret along with Pacific Black and Chestnut Teal Ducks. Threatened water bird species include Sooty and Pied Oyster Catcher and*

Black Bittern. Several of the visiting migratory bird species are listed under JAMBA and CAMBA Migratory Bird Agreements (Japanese/Chinese/Australian).

Water testing results for salinity are available for three locations in Toronto Wetland. The sampling date was 27 October 2021. The salinity recorded at the tree locations was: 370 mg/L (W2), 290 mg/L (W3), and 350 (W4).

Based upon Morrisey's (1995) statement above, the level of the salinity in Toronto Wetland is currently low and the water is characterised as freshwater.

Some of the plant species recorded in Toronto Wetland are tolerant of both freshwater and brackish environments. Information about the salinity tolerance of various species recorded in Toronto Wetland or adjacent to the wetland is provided below:

Swamp Sheoak *Casuarina glauca*

"Swamp Sheoak Casuarina glauca seedlings are moderately resistant to salinity" (Clemens *et al.* 1983).

"Habitat: Swampy estuarine flats and near creeks with brackish water." (Benson and McDougall 1995).

"Very tolerant – EC of a saturation extract of the medium no higher than 13 dS/m". Handreck and Black (1994)

Common Reed *Phragmites australis*

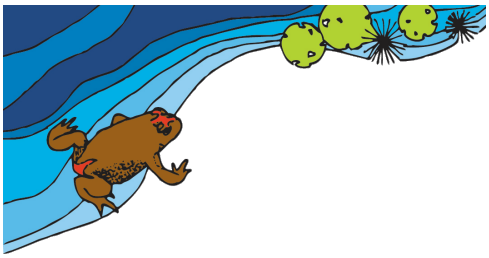
"Habitat – Grows in fresh or slightly brackish water up to 2 metres deep, mainly on a mud substrate but occasionally on sand. May also grow in seasonally inundated areas with a high watertable." Sainty and Jacobs (1981).

"Economic Significance – In irrigation districts and flood mitigation channels it is a major pest, encroaching into water 2 meters deep, ultimately reducing the flow of the largest canals. It is also a weed of poorly drained agricultural land, particularly in high rainfall areas." Sainty and Jacobs (1981).

"Control – It is killed by continuous exposure to sea-strength salinity. Sea flooding of a stand for a few days will severely damage the plant." Sainty and Jacobs (1981).

Up to 10,000 ppm total dissolved salts (16 dS/m) Sainty and Jacobs (2003)

"At the seaward end of the estuary, sometimes in the sea itself if there is some offshore protection, is usually Avicennia. Then there are one or more zones of mixed species, if there is more than one species present. Eventually, the mangroves tail off to a zone that is fresh water for a lot of the time. This upstream zone is makred by ...*Aegiceras corniculatum in the south. At this upstream end there are often also species such as Schenoplectus litoralis, Bolboschoenus fluviatilis, Phragmites australis and Crinum pedunculatum."* Sainty and Jacobs (2003)



Cumbungi *Typha* sp.

"Growth Biology – The plants grow in fresh to brackish water up to 2 metres deep, forming an extensive underground network of fleshy white rhizomes that produce aerial shoots at intervals."

"Grows in fresh or slightly brackish water to 2 metres deep", "Major weed of drains and channels of irrigation systems, especially in Vic and Tas. where it is spreading rapidly." Sainty and Jacobs (2003).

Typha orientalis has been recorded on saline sites in central-western NSW ((Semple 1993) cited from Benson and McDougall (2005)).

Azolla *Azolla* sp.

"Growth Biology – Dense growth is usually an indication of high nutrient levels." Sainty and Jacobs (1981).

Grey Mangrove *Avicennia marina* var. *australasica*

Grey Mangrove was not observed within Toronto Wetland during the survey on 25 January 2022. It grows in the canal immediately South of the cycleway close to Stony Creek. Grey Mangrove is also present along the banks of Stony Creek.

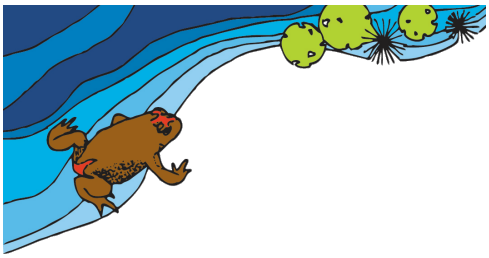
"Habitat – Mud or sandy-mud alluvium along periodically inundated margins of estuaries and saline or brackish rivers." Sainty and Jacobs (1981).

Grey Mangrove *Avicennia marina* will grow in culture in varying concentrations of seawater salinity. The maximum growth rate occurs at about 25% of the salinity of seawater. At 100% of the salinity of seawater the growth rate is about 40% when compared to 25% salinity when growing for 24 months (Hutchings and Saenger 1987).

Tomlinson (1999) states that Grey Mangrove *Avicennia marina,* when the name is used in the wide sense, has the broadest distribution, both latitudinally and longitudinally of any mangrove. The range is from East Africa and the Red Sea along tropical and subtropical coasts of the Indian Ocean to the South China Sea, throughout much of Australia into Polynesia as far as Fiji, and South to the North Island of New Zealand.

Conclusion

Currently (at least in October 2021) Toronto Wetland is experiencing freshwater conditions. The presence of plant species in Toronto Wetlands that tolerate salinity suggest that Toronto Wetland experiences higher levels of salinity or perhaps the soil or growing media around the edge has a higher level of salinity than a completely freshwater lake.



The dual freshwater and brackish character of Toronto Wetland is consistent with the description described in: *"A case study of Toronto Wetlands* (October 2008). Wetlands that are influenced intermittently by saline water are discussed by Pollard (1994) and Roy *et al.* (2001).

3.5.4 Channel South of the old railway crossing

A channel connects some of the Stormwater from Cary Street and surrounds is present South of the cycleway. The water generally flows to Stony Creek. As stated above Grey Mangroves are present at the West end of the channel. The channel does not appear to be directly connected to Toronto Wetlands.

The level of salinity reported by Eurofins Environment Testing for the sample taken in the canal (27 October 2021) was 100 mg/L. This level of salinity is low.

Figure 8. Locality map and water testing locations

4. Field survey methods

4.1 Field work effort

Over the one day of fieldwork a total of six hours were spent undertaking survey work on the site and surrounding habitat areas. Details of the survey day are provided in Table 4.

Table 4. Survey dates and weather conditions.

Date	Time	Weather	Task	Hours (hrs x no. people)
25 January 2022	10:00 – 16:00	20 – 26 °C, no rain	Flora and fauna survey of the site, Toronto Wetland and some of the surrounding area.	6.0 x 1 = 6 hours

Survey effort was concentrated within the site boundaries and Toronto Wetland, although adjacent surrounding vegetation was noted (Figure 3). Stony Creek and parts of Lake Macquarie were also visited on the survey day.

4.2 Flora survey method, vegetation community and habitat classification

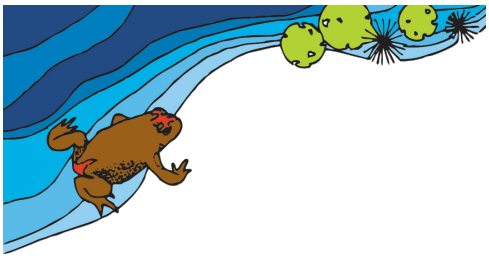
A flora survey was conducted to compile vegetation descriptions and species lists for the site and Toronto Wetland. The site is disturbed and does not contain typical habitat for threatened plant species. However, survey work included assessing plant diversity on the site and surveying for threatened plant species was included. Threatened plant species habitat is described in Appendix 5.

The objective of the survey of Toronto Wetland was to undertake a random meander around the whole perimeter of the wetland. This was achieved apart from a section along the southern fenceline and part of the Eastern fenceline of 18 Sara Street, Toronto. Plant species observed during the survey of Toronto Wetland were recorded.

Vegetation quality is assessed as described below (Section 5).

4.3 Fauna survey method

The methods of survey undertaken to detect the various faunal groups or their habitat are outlined below. The objective of the survey was to record both common and threatened species presence. Both direct and indirect



evidence was recorded. Details of potential threatened species previously recorded in the locality were derived from the BioNet Atlas website records, and the Ecologist's knowledge.

Roads and road verges were searched for road-kill fauna. Surveys for mammals, reptiles and frogs are generally run concurrently.

Dates, weather and temperatures of all fieldwork were recorded and are tabulated in Table 4 above.

4.3.1 Diurnal fauna searches

Searching, opportunistic observations and call recording provides an indication of types of species using a site. These methods are used to identify and record live animals, or record indirect evidence of animal presence on the site. On occasions, specific surveys may be conducted for a targeted group or species, such as searching the margins of a dam for frogs. Generally though, birds, reptiles, frogs and mammals, or evidence of them, may all be present in the same habitat at the time of survey, therefore searching for these faunal groups is generally run concurrently. This involved:

a) Searching shelter sites, basking sites, opportunistic observation, and assessment of shelter site diversity suitability for reptiles.

b) Searching shelter sites, calling sites, egg deposition sites and listening for calling males for frogs.

c) Opportunistic observations and identification of calls of species, and search for indirect evidence such as nests, feathers, scratchings and feeding signs for birds.

d) Searching for indirect evidence, such as diggings, droppings, runways and burrows, and opportunistic observations for mammals.

While rigorous surveys are likely to find more species, high species richness for birds can be recorded in a relatively short amount of time. Bird surveys are used as a simple indicator of other parameters, such as biodiversity and the functioning of the ecosystem.

4.4 Limitations of the survey

This survey was conducted in the summer season. This was not suitable for winter migrants or species of autumn-flowering orchids that lose their aerial stems after fruiting.

The weather conditions were 20 – 26 °C with no rain.

Species that may use the site were not detected during the survey for the following reasons:

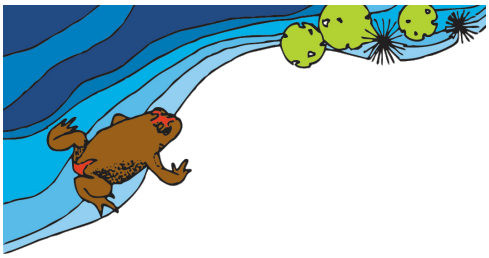
a) The species was present during the survey but was not detected due to dormancy, inactivity or cryptic habits.
b) The species use the site at other times of the year, but was not present during the survey due to being nomadic or migratory.

4.5 Staff associated with the field work

Details of the individual involved in the field work and analysis of field work is provided in Table 5.

Table 5. Staff associated with field work and analysis of field work.

Name	Field work	Analysis of field work
Dr Daniel McDonald	Yes	Yes



5. Survey Results: Vegetation, flora species and habitat description

5.1 Bionet atlas search of threatened plants

A NSW Bionet atlas search for threatened plant species records was undertaken. The following list is the record of all threatened plant species recorded since 1 January 1990 within a 10 km x 10 km square centred on the site.

Acacia bynoeana,

Angophora inopina,

Caladenia tessellata,

Callistemon linearifolius,

Cryptostylis hunteriana,

Cynanchum elegans,

Grevillea parviflora subsp. *parviflora,*

Hibbertia procumbens,

Rutidosis heterogama,

Syzygium paniculatum, and

Tetratheca juncea.

Habitat on site and in Toronto Wetland was considered unsuitable for *Cynanchum elegans* and *Syzygium paniculatum* (Appendix 5).

A five-part test for threatened plant species is provided in Appendix 1.

5.2 Species and Communities of conservation concern

No threatened plant species listed in the BC Act 2016 were observed on the site or during the survey of Toronto Wetland.

No ecological communities described as vulnerable, endangered or critically endangered in the BC Act are present on the site.

Two Endangered Ecological Communities are mapped in Toronto Wetland Swamp Oak Floodplain Forest and River-Flat Eucalypt Forest on Coastal Floodplains. This is discussed in more detail in Section 5.4.

5.3 Site vegetation and habitat

The site appears to have a long history of disturbance (Figure 5). While native species are present, the native species are a mixture of planted species, native species that are found in disturbed areas, and weeds.

The site is highly disturbed. It could be described as having two habitat zones. One habitat zone is the clumps and scattered trees and shrubs. The second habitat zone is the grassland.

The site contains plant species indigenous to NSW. However, no remnant vegetation with a diverse composition of indigenous species was recorded on the site.

No potential habitat trees of were observed on the site. There are some fallen logs and dead wood/coarse woody debris.

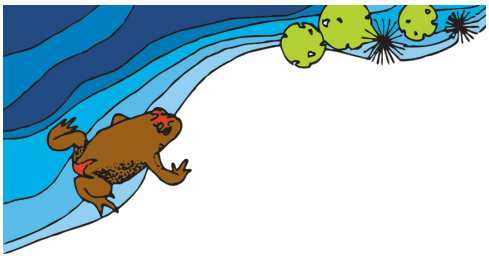
Appendix 2 provides the list of flora found on the site.

5.4 Toronto Wetland

Historically Toronto Wetland extended North of Day Street and South of the old rail crossing. This survey was confined to the wetland area and short northern watercourse that is within the area bound by Day Street to the North, Cary Street to the East, the old railway line to the South and Stony Creek to the West.

There are at least three broad habitat types within Toronto Wetland:

1) The relatively deeper areas of water in Toronto wetlands. These areas were dominated by aquatic species such as Bullrush *Typha* sp. Common Reed *Phragmites australis.* In areas of open water, floating species such as *Azolla sp* were recorded.



2) The water margin areas. This area includes species that can grow in broad habitat type 1 (above) and trees that grow along the margin that can tolerate periods of waterlogging such as Swamp she-oak *Casuarina glauca.*

3) The forest areas. This broad habitat type includes forest around the Toronto Wetland. The forest includes Swamp Mahogany *Eucalyptus robusta* and Forest Red Gum *Eucalyptus tereticornis.* Forest Red Gum *Eucalyptus tereticornis* is more common near the northern watercourse adjacent to Oak Street.

The habitat types are not completely discrete, the boundaries between the broad habitat types are indistinct.

5.4.1 Toronto Wetland

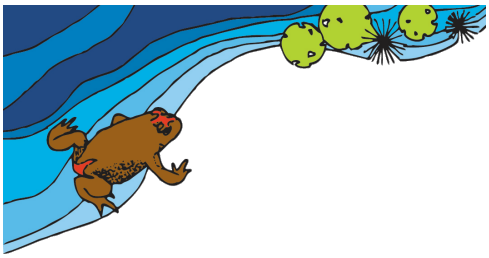
The field survey did not use plots or quadrats to assess the vegetation communities within Toronto Wetland.

The Joint Ecology Expert Report prepared by Shane Maloney and Dr AnneMarie Clements dated 12 August 2021 describes existing vegetation mapping for Toronto Wetland. The following information about the previous studies of Toronto Wetland vegetation is derived from the Expert Report as well as other documents detailed below.

Greater Hunter Native Vegetation Mapping – Geodatabase Guide

The *Greater Hunter Native Vegetation Mapping – Geodatabase Guide* document (NSW OEH, HCC REMS and HCR CMA) – Version 4.0 June 2012 and associated geodatabase, map Toronto Wetland as one map unit. The map unit is MU209. An extract of the details about MU209 is provided below:

> ***Map Unit**: MU209*
>
> ***Scientific Name**: Casuarina glauca/ Juncus kraussii/ Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast*
>
> ***Common Name**: Swamp Oak/ Sea Rush/ Baumea juncea swamp forest on coastal lowlands of the Central Coast and Lower North Coast*
>
> ***Brief Description**: Casuarina dominated Swamp Open Forest with a Myrtaceous shrubby mid- stratum. The ground stratum is typically dominated by sedges and rushes with grasses dominating in slightly raised areas.*
>
> ***Distribution within Region**: This community is typically found on the margins of brackish water bodies on floodplains from the southern boundary of the study area to Failford. Substrates tend to be unconsolidated sediments at elevations less than 20m.*
>
> ***Floristic Summary***
>
> - Characteristic over-storey species: *Casuarina glauca*
> - Characteristic mid-storey species: *Melaleuca ericifolia, Melaleuca styphelioides*



- Characteristic under-storey species: *Phragmites australis, Juncus kraussii, Baumea juncea, Sporobolus virginicus, Gahnia clarkei, Samolus repens*

Relationship to Endangered Ecological Communities: Forms part of the Endangered Ecological Community "Swamp oak floodplain forest of the NSW North Coast; Sydney Basin and South East Corner bioregions"

The Joint Ecology Expert Report prepared by Shane Maloney and Dr AnneMarie Clements dated 12 August 2021 also details information provided by *Lake Macquarie City Council Native Vegetation and Corridors Map* (Bell and Driscoll 2016). Their Joint Ecology report states that Toronto Wetland was mapped as three map units, namely, 1. *MU40 Swamp Oak – Rushland Forest*, 2. *MU40a Phragmites Rushland*; and 3. *MU38 Foreshore Redgum Rough-barked Apple*.

The document *Volume 1: Vegetation Mapping Report, Lake Macquarie Local Government Area Stages 1 – 6* by Stephen Bell and Colin Driscoll (2016) provides the following information about each of the map units.

MU40 Swamp Oak – Rushland Forest

Floristic Summary (Characteristic Spp *)

Casuarina glauca clearly dominates this community, with an understorey of sedges and rushes such as Juncus kraussii subsp. australiensis and Baumea juncea, and the herb Apium prostratum.

Notes - *Occurs adjacent to tidal estuaries on Lake Macquarie and associated inlets. Areas that have been previously cleared and then left to regenerate are quickly re-colonised by monospecific stands of Swamp Oak (eg: on Crooked Creek at Myuna Bay), however other components of the community do not always return, and are replaced by weed species.*

Keith Equivalent

Coastal Floodplain Wetlands

EEC Equivalent

Swamp Oak Floodplain Forest

Greater Hunter Vegetation Equivalent

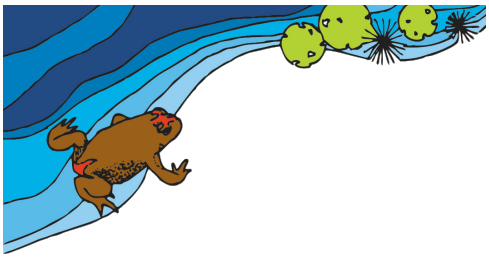
MU209: Swamp Oak/ Sea Rush/ Baumea juncea swamp forest on coastal lowlands of the Central Coast and lower North Coast

MU40a Phragmites Rushland

Floristic Summary (Characteristic Spp *)

Almost exclusively dominated by Phragmites australis.

Notes - *A secondary vegetation community occupying previously cleared areas of Swamp Oak – Rushland Forest (MU40) and associated wetlands near coastal estuaries.*



Keith Equivalent

Coastal Floodplain Wetlands

EEC Equivalent

Swamp Oak Floodplain Forest

Greater Hunter Vegetation Equivalent

?MU209: Swamp Oak/ Sea Rush/ Baumea juncea swamp forest on coastal lowlands of the Central Coast and lower North Coast

MU38 Foreshore Redgum Rough-barked Apple

Floristic Summary (Characteristic Spp *)

Eucalyptus tereticornis with Angophora floribunda, and Allocasuarina littoralis, Acacia longifolia, Leptospermum polygalifolium, Melaleuca styphelioides, Melaleuca linariifolia, Breynia oblongifolia, Dodonaea triquetra, Imperata cylindrical, Lomandra longifolia, and Entolasia stricta.

Notes - *Remnants of this type occur on alluvial flats of Lake Macquarie and associated lagoons. Restricted in distribution in the region, and has commonly been converted to foreshore parks and picnic areas. Some good intact examples occur in the Eraring area, and Landcare groups have been removing extensive stands of Lantana from these stands.*

Keith Equivalent

Coastal Swamp Forests ?

EEC Equivalent

River-Flat Eucalypt Forest on Coastal Floodplains

Greater Hunter Vegetation Equivalent

?MU202: Cabbage Gum/ Forest Red Gum/ Flax-leaved Paperbark Floodplain Forest of the Central Coast

5.4.2 Results of the field survey of Toronto Wetland

While no formal investigations of Toronto Wetland were undertaken during the field survey. However, the observations indicate that the three vegetation communities described above, namely:

1. Swamp Oak – Rushland Forest,

2. Phragmites Rushland; and

3. Foreshore Redgum Rough-barked Apple are present within Toronto Wetland.

5.5 Weeds

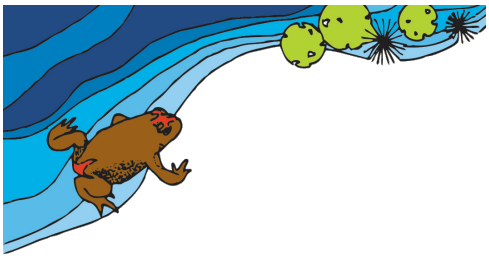
The *NSW Noxious Weeds Act 1993* has been repealed and *the Biosecurity Act 2015* has replaced it. The Biosecurity Act 2015 requires each landholder and/or occupier to control biosecurity matter (weeds) on their property. The landholder and/or occupier is to develop an effective control strategy and plan to ensure they meet their General Biosecurity Duty.

The General Biosecurity Duty (GBD) is imposed on any person who deals with biosecurity matter (weeds), and who knows (or ought reasonably to know) of the biosecurity risk posed (or likely to be posed), has a biosecurity duty to ensure that the risk associated with those weeds is prevented, eliminated or minimised - so far as is reasonably practicable. A requirement is that all public and private land owners or managers and all other people who deal with weed species (biosecurity matter) must use the most appropriate approach to prevent, eliminate or minimise the negative impact (biosecurity risk) of those weeds.

Council may issue a Biosecurity Direction when any owner/occupier fails in their biosecurity duty to control weeds on their land. The owner/occupier must comply with this biosecurity direction. A penalty notice or prosecution may follow if the owner/occupier fails to comply with the Biosecurity Direction.

Response

A large proportion, perhaps all of the site, will be cleared for the proposal. Weeds will be removed as part of this process.



6. Survey Results: Fauna

6.1 Bionet atlas search of threatened fauna

A NSW Bionet atlas search for threatened fauna species records was undertaken. The following list is the record of all threatened fauna species recorded since 1 January 1990 within a 10 km x 10 km square centred on the site.

Amphibians and reptiles: Stephens' Banded Snake.

Birds:

Diurnal raptors:

White-bellied Sea-Eagle,

Little Eagle, and Eastern Osprey.

Migratory birds:

White-throated Needletail.

Water birds:

Black Bittern,

Sooty Oystercatcher

Pied Oystercatcher, and

Forest birds and nocturnal raptors:

Rose-crowned Fruit-Dove,

Powerful Owl,

Gang-gang Cockatoo,

Masked Owl,

Glossy Black-Cockatoo,

Sooty Owl,

Little Lorikeet,

Brown Treecreeper (eastern subspecies),

Swift Parrot,

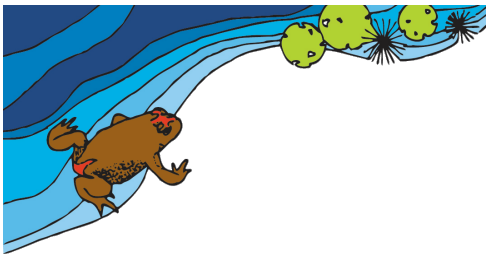
Regent Honeyeater, V

Turquoise Parrot,

aried Sittella, and

Barking Owl,

Dusky Woodswallow.



Mammals:	
Koala,	Squirrel Glider, and
Eastern Pygmy-possum,	Spotted-tailed Quoll.
Yellow-bellied Glider,	

Bats (flying mammals):	
Grey-headed Flying-fox,	Greater Broad-nosed Bat,
Eastern Coastal Free-tailed Bat,	Eastern Cave Bat,
Large-eared Pied Bat,	Little Bent-winged Bat, and
Eastern False Pipistrelle,	Large Bent-winged Bat.
Southern Myotis,	

Species recorded since 1 January 1990 within the 10 km x 10 km square centred on site for which no suitable habitat is present on the site or within Toronto Wetland are listed below. Both species were excluded because they are marine (ocean) species: Loggerhead Turtle and Green Turtle.

A five-part test for threatened fauna species is provided in Appendix 1.

6.2 Species of conservation concern

No threatened fauna species were recorded on the site during the survey.

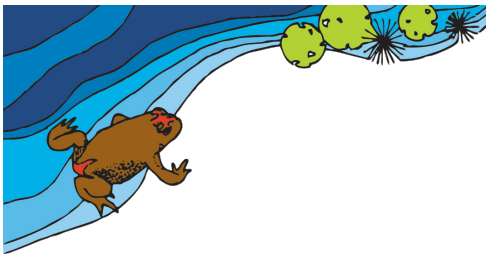
Toronto Wetland is included in the Important Area mapping for the Swift Parrot. BAM important area mapping can be accessed in the NSW Biodiversity Accredited Assessor System (BAAS).

6.3 Fauna results

The following fauna species were recorded on the site: Garden Sunskink, Crested Pigeon and the Noisy Miner. It is highly likely that a longer survey would record more fauna species on the site.

Other species recorded during the survey of Toronto Wetlands are also listed in this section.

Species listed as 'likely to occur' in the area are presented in Appendix 4. Note that the majority of the 'Expected Species' would not occur on the site due to the lack of habitat, but many occur in the wider area. All the species



listed as 'likely to occur' are common throughout the locality and the region. It is unlikely that protected species will be affected at a local, regional or state-wide scale by the proposal.

The habitats for threatened species that occur in the area are tabulated in Appendix 5.

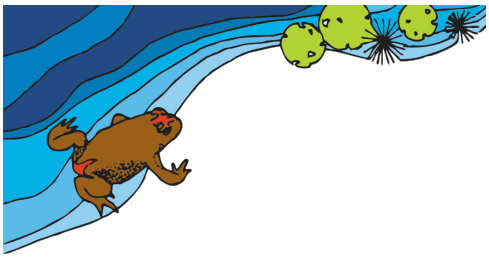
Fauna recorded during the survey of Toronto Wetland are displayed in Table 6.

Table 6. List of fauna detected on the site or Toronto Wetland (WL)

Frogs			
Striped marsh frog	*1. Lymnodynastes peronii*		W (WL)
N=	1		

Reptiles			
Garden Sunskink	*1. Lampropholis* sp.		O
N=	1		

Birds			
Black Swan	*1. Cygnus atratus*		O (WL)
Chestnut Teal	*1. Anas castanea*		O (WL)
Australian White Ibis	*1. Threskiornis molucca*		O (WL)
Purple Swamphen	*1. Porphyrio porphyrio*		O (WL)
Dusky Moorhen	*1. Gallinula tenebrosa*		O (WL)
Spotted Turtle-dove*	*1. Streptopelia chinensis*		O (WL)
Crested Pigeon	*1. Ocyphaps lophotes*		O
Laughing Kookaburra	*1. Dacelo novaeguineae*		W (WL)
Brown Thornbill	*1. Acanthiza pusilla*		O (WL)
Noisy Miner	*1. Manorina melanocephala*		O
Eastern Whipbird	*1. Psophodes olivaceus*		W (WL)
Magpie-lark	*1. Grallina cyanoleuca*		O (WL)
Black-faced Cuckoo-shrike	*1. Coracina novaehollandiae*		O (WL)
Silvereye	*1. Zosterops lateralis*		O (WL)
N =	14		



Key

*	=	Introduced fauna	W	=	Calls heard
O	=	Observed	(WL)	=	Recorded in the Toronto Wetland

6.4 Fauna Summary

The number of species from each faunal group, listed as 'likely to occur' can be seen in Appendix 3.

6.5 Microbats

Foraging Habitat

This site and Toronto Wetland provides potentially suitable foraging habitat for ten threatened microbat species (Appendix 4). *Myotis macropus* (syn. *Myotis adversus*) has suitable foraging habitat in the form of open water bodies with Toronto Wetland.

Roosting Habitat

No hollows were observed on the site that provide suitable roosting habitat for:

Falsistrellus tasmaniensis,

Myotis macropus,

Micronomus norfolkensis,

Miniopterus a

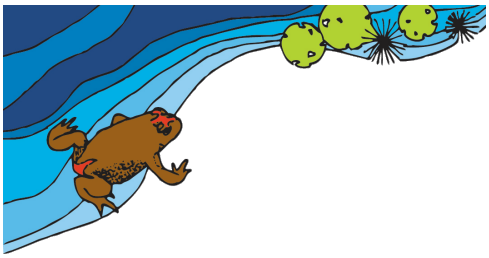
Scoteanax rueppellii,

ustralis and *Saccolaimus flaviventris*.

However, hollows are likely to be present within Toronto Wetland.

6.6 Feral fauna

No feral animals were recorded on the site during the survey. It is likely that feral and domestic exotic species such as foxes, cats and rats forage on the site.



7. Brief discussion of results

The site

Weed indicator species are common on the site, indicating a high disturbance regime on the site.

Toronto Wetland

Toronto Wetland has also experienced significant disturbance. However, it still retains important natural values.

8. Impact on biodiversity: Threshold 3

8.1 Threshold 3: Five-part test summary

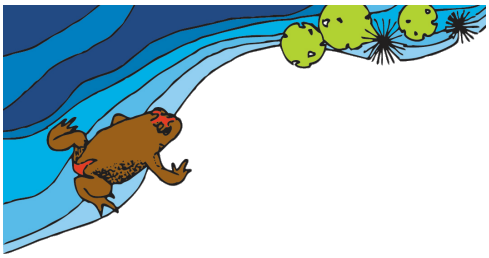
Habitat requirements for locally occurring threatened faunal species, and the presence or absence of such habitat on the site, is tabulated in Appendix 4. Threatened plant species, listed in the BC Act and the EPBC Act, are shown in Appendix 5.

Under Section 7.3 of the Biodiversity Conservation Act several factors (listed in Appendix 1) need to be considered in deciding whether there is likely to be a Significant effect on threatened species, populations or ecological communities, or their habitats. If there is likely to be a significant effect on threatened species, etc., the proposal must be accompanied by a Biodiversity Development Assessment Report.

While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the five-part tests.

The proposal including work on the site and potential hydrological impacts on Toronto Wetland has been assessed using five-part tests (Appendix 1). All five-part tests assessments gave a result of “no significant effect”.

There is no significant effect so a Biodiversity Development Assessment Report is not required.



9. Potential impacts on Toronto Wetland

The footprint of the proposal does not directly overlap Toronto Wetland. Consequently, direct impacts resulting from the proposal are unlikely.

The proposal potentially includes changes to both stormwater and groundwater. Stormwater and/or groundwater changes may potentially significantly impact Toronto Wetland. Impacts potentially arising from stormwater and groundwater management will be addressed separately below.

Lake Macquarie Council reviewed the proposal and compared potential impacts to the State Environmental Planning Policy (SEPP) No. 14 (Coastal Wetlands). Clause 7(2) of SEPP 14 includes the following text:

> *"the environmental effects of the proposed development, including the effect of the proposed development on:*
>
> *…the surface and groundwater characteristics of the site on which the development is proposed to be carried out and of the surrounding area, including salinity and water quality"*
>
> SEPP No. 14 Coastal Wetlands has now been repealed. It was replaced by SEPP (Coastal Management) 2018 (Coastal Management SEPP). The Coastal Management SEPP has also now been repealed. The current applicable SEPP is the SEPP (Resilience and Hazards) 2021.

SEPP (Resilience and Hazards) 2021 includes the following text:

> *2.10 Development on land within the coastal environment area*
>
> *(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—*
>
> *(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*

The following two sections will discuss potential stormwater and groundwater impacts on the wetland.

9.1 Water management

The management of water on the site has the potential to impact the nearby Toronto Wetland. Two water management issues will be addressed below:

1. Stormwater management and;

2. Groundwater management.

9.2 Stormwater management

Stormwater management and potential impacts are examined below by comparing the existing condition to the anticipated conditions during two following stages. The first stage is during construction. The second stage is post-construction.

9.2.1 Existing stormwater management

Stormwater currently generated on-site will primarily flow downslope approximately to the West. It will collect in stormwater pits within the gutter (kerb) along Cary Street. The locations of the existing nearby stormwater gutter pits along Cary Street are indicated in Figure 9.

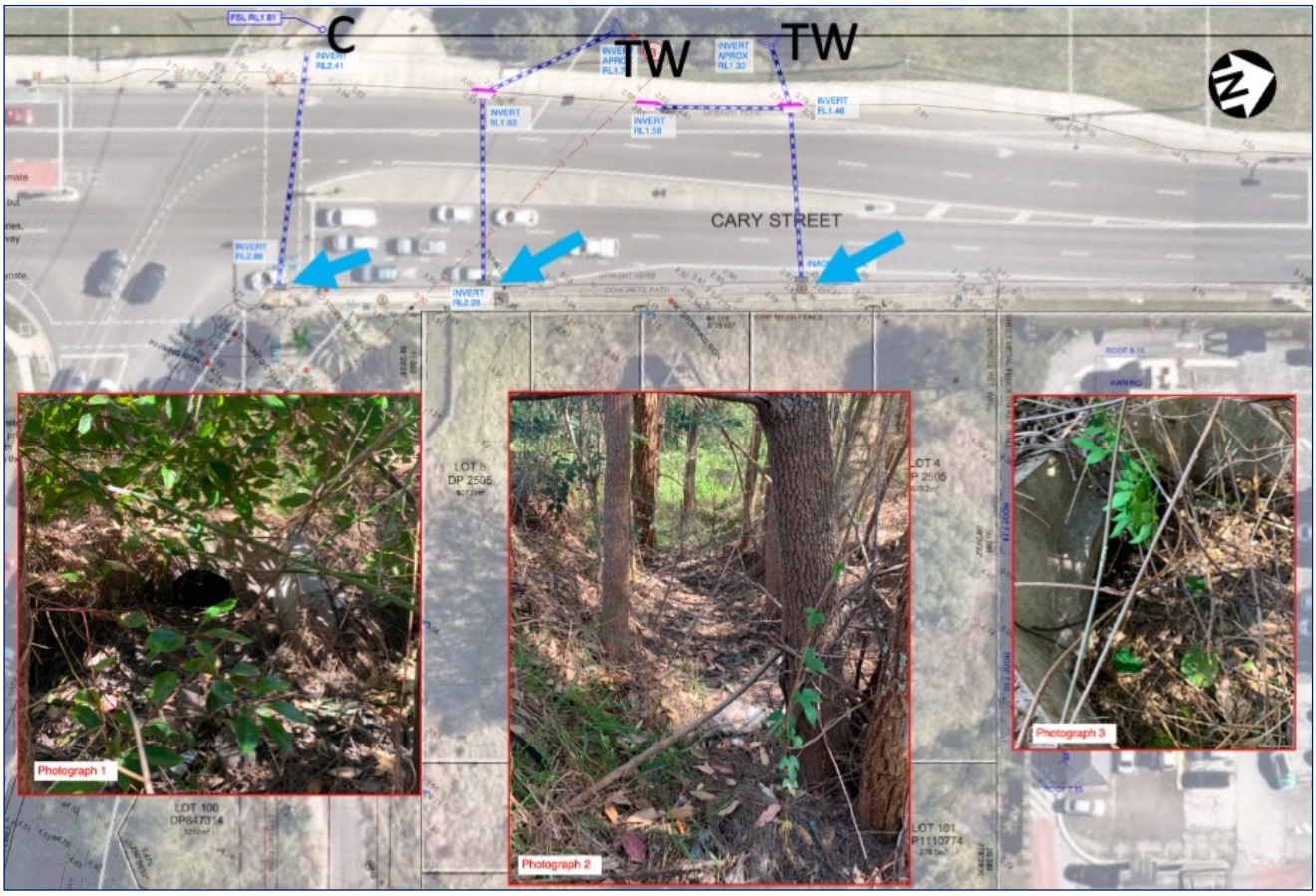


Figure 9. Plan showing the three existing stormwater pits (indicated by blue arrows).

Figure 9 *is an extract from the drawing 2016205 TS1A incl Drainage (Duggan Mather Surveyors).*

The codes "C" and "TW" shown in Figure 9 indicate flow paths. C indicates that the stormwater will flow along the channel South of the old railway easement. TW indicates that stormwater will flow towards Toronto Wetland.

9.2.2 Stormwater management during construction

Management of stormwater during construction is described in the Northrop *Erosion and Sediment Control Plan* Revision 1 (27 October 2021). The plans are twelve (12) pages in total.

9.2.3 Proposed stormwater management during the life of the development

A Joint Report of Engineers was prepared as part of the Land and Environment Case (2020/91325). The engineers who prepared the report were: Mr Nick Kariotoglou, Mr Chris Smith and Dr Daniel Martens. They provided the following statement on 20 September 2021:

> *Based on the MUSIC modelling undertaken to date, and assuming that a 40 KL rainwater tank will be provided as part of the consent and there will be rainwater re-use within the building, there will be an increase in flow to the nearby wetland of around 0.8 ML/year. This is an approximate annualised figure and will vary from year to year.*
>
> *The figure will also vary once the MUSIC model assumed soil properties are updated to reflect findings of site geotechnical investigations.*

Response: A new report has been prepared and issued on the 23 November 2021 (Northrop). The new report provides the details and analysis of the proposed stormwater management. The report indicates that the increase in stormwater flow is 1.05 ML/year, greater than the 0.8ML described above. The results are provided below:

Reproduction of Table 2 (Northrop 23 November 2021) - Music model results

	Pre-Development Load (kg/yr)	*Post Development Load (kg/yr)*	*% Pre. Vs Post Reduction*
Flow (ML/yr)	*1.25*	*2.29*	*-83.2%*
Total Suspended Solids (kg/yr)	*2.61E+02*	*38.2*	*85.4*
Total Phosphorous (kg/yr)	*0.476*	*0.108*	*77.3%*
Total Nitrogen (kg/yr)	*2.59*	*1.69*	*34.7%*
Gross Pollutants (kg/yr)	*13.6*	*0*	*100%*

The proposal increases the total volume of stormwater delivered to Toronto Wetland. The increase is 1.04 ML per year. Stormwater discharge is managed so the flow rates are relatively slow. Increased erosion due to increased stormwater flow is unlikely. The main impact is that on average following each rainfall event the surface level of Toronto Wetland will be slightly raised when compared to pre-development conditions.

The potential impact of the increased volume of stormwater can be considered as follows:

1 Megalitre per hectare (ML) = 100 millimetres (10 cm) depth of water over one hectare.

The approximate size of Toronto Wetland (January 2022) = 2.45 ha. Existing stormwater flows into Toronto Wetland vary on a weekly monthly and annual basis. Some years are wet years while other years are dry years.

Similarly, some years are hot years, while other years are milder. One of the significant causes of loss of water from the wetland is evaporation.

A very rough understanding of the influence of the additional stormwater and evaporation on Toronto Wetland can be gained by the following "model".

The additional stormwater 1.04 ML is delivered to Toronto Wetland following rainfall every two months. The 1.04 ML (1,040,000 litres) is delivered to Toronto Wetland in six rainfall events. Thus 1,040,000 litres / 6 = 173,333 litres. Thus, an additional 173,333 litres will be delivered to Toronto Wetland every two months. Following the rainfall event the water level within Toronto Wetland will increase by approximately 1.73 mm.

Evaporation varies over time. The Australian Bureau of Meteorology provides information about the average annual pan evaporation. The information is available from:
http://www.bom.gov.au/jsp/ncc/climate_averages/evaporation/index.jsp

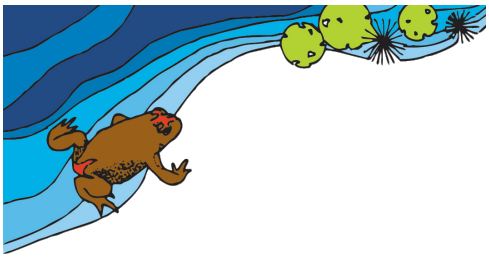
The estimate of total average annual pan evaporation at Toronto Wetland is: 1453 mm per year. This is equal to approximately 1453 mm/365 days = 3.97 mm = approximately 4 mm pan evaporation per day.

Yihdego and Webb (2017) discuss the relationship between pan evaporation and open water (lake) evaporation. Two quotes demonstrate some of the differences between pan evaporation and open water evaporation:

> "*Pan evaporation measurements generally overestimate evaporation from open water bodies, because the US standard class A pan gets much hotter than a lake*"; and "*Moreover, the differences between a pan and a lake will vary through the year because of seasonal differences in radiation, air temperature, wind and heat storage within the larger body of water*."

Yihdego and Webb (2017) note that studies in Australia have found that pan correction factors used in Australia have varied from 0.5 to 0.9. The midpoint between 0.5 and 0.9 is 0.7, and the value of 0.7 will be used as an estimate for correction factor in this "model".

3.97 mm (pan evaporation) x 0.7 (correction factor) = 2.8 mm per day. Thus, a reasonable average estimate of the evaporation from Toronto Wetland is 2.8 mm per day.



Conclusion

If an additional 1.73 mm additional stormwater is delivered to Toronto Wetland following a rainfall event; the additional stormwater will be evaporated in less than a day.

Northrop report

The Northrop (23 November 2021) report provides the following information about the impact on stormwater on Toronto Wetland (page 8): "*A quantitative assessment of the water level in the wetland suggests that the average increased water level within the wetland during rainfall events post development would be less than 0.5mm.*"

The estimate of the increase in water level calculated by Northrop is: *"increased water level…0.5mm",* a lower value than the very rough model presented above (1.73 mm). There is a difference between the (very rough) Abel Ecology estimate of 1.73 mm (additional increase in water level) and the 0.5 mm (Northrop estimate). It is assumed that the difference is due to the more likely accurate modelling in stormwater flows generated by the MUSIC model results.

9.3 Groundwater considerations

The NSW Office of Water (May 2012) defines groundwater as "*water that occurs under the ground*". The same document includes the following definition for a groundwater dependent ecosystem (GDE): *"Ecosystems which have their species composition and natural ecological processes wholly or partially determined by groundwater."*

The proposal requires excavation. The Chameleon Geosciences Pty Ltd (February 2022) *Geotechnical Investigation Report* found groundwater in all test holes on the site. Groundwater entering the excavation during the construction phase will be removed. The removal of groundwater during the construction phase is called "dewatering".

Two reports address groundwater removal and potential impacts on Toronto Wetland. This report will first describe the groundwater changes and then discuss the potential ecological impacts.

Dewatering will be required to remove groundwater entering the excavation. A *Dewatering Management Plan* for the proposal was prepared by Chameleon Geosciences Pty Ltd (January 2022). The *Dewatering Management Plan* states that it will be updated once an appropriate system of dewatering is designed. The dewatering system will include a treatment system prior to discharge of the water. Following appropriate treatment of the groundwater, the groundwater will be discharged to the existing stormwater infrastructure.

The extraction of groundwater from the excavation creates the potential for groundwater near the Toronto Wetland to flow into the excavation. Groundwater loss adjacent to the Toronto Wetland will be recharged from water within the wetland. This could lead to a drop in the level of water within the wetland.

CWW Geosciences have prepared a *Groundwater Drawdown Model and Detailed Settlement Analysis* report (21 February 2022 – SYD2021-0134AB Rev4).

9.3.1 Groundwater Drawdown Model and Detailed Settlement Analysis – Rev4

The *Groundwater Drawdown Model and Detailed Settlement Analysis – Rev4* report (CMW Geosciences) provides an assessment regarding: the *Impact to wetland water balance* on pages 14 to 15. The information from the report is reproduced below:

> ***Impact to wetland water balance***
>
> *Based on model simulated groundwater inflow to the wetland with and without excavation dewatering, a summary of groundwater inflow and wetland impact is provided in Table 5, together with the estimated water level change.*
>
> *Assuming a wetland area of 1.7 ha the water level change is indicated to be less than 9 mm by 180 days, and approximately 21 mm after 360 days dewatering.*
>
> *It is noted that the wetland area varies according to water level, and has been reported up to 2.45 ha (GIS measurements undertaken by Dr Daniel McDonald on 25 January 2022). Assuming a wetland area of 2.45 ha the water level change is reduced by ~70% to less than 6 mm by 180 days, and less than 15 mm after 360 days dewatering (Table 5).* Table 5 from the CMW report is reproduced below.

Table 5 wetland Impacts

Time (days)	*Cumulative wetland inflow* (m^3)*		*Difference (m^3/d)*	*Cumulative water level change at wetland (mm)*	
	without dewatering	*with dewatering*		*wetland surface area of ~1.7 ha*	*wetland surface area of ~2.45 ha*
30	*257.8*	*241.1*	*16.6*	*0.98*	*0.68*
60	*515.6*	*478.3*	*37.3*	*2.2*	*1.5*
90	*773.3*	*712.8*	*60.6*	*3.6*	*2.5*
120	*1031.1*	*944.9*	*86.2*	*5.1*	*3.5*
180	*1546.8*	*1401.9*	*144.9*	*8.5*	*5.9*
360	*3093.7*	*2734.6*	*359.1*	*21.1*	*14.7*

** inflow data from transient model reported mass balance data*

3.2.3 Post-construction groundwater simulation

To simulate the effects of the development, the cells in the model representing the basement were assigned a very low hydraulic conductivity value to simulate a zone with no effective permeability.

Figure 9 shows steady-state groundwater head and flow vector arrows for the baseline groundwater surface, which represents the pre-development groundwater system simulation (i.e. no dewatering), and Figure 10 shows steady-state groundwater head and flow vector arrows for the post-construction groundwater surface.

The simulation indicates that:

- *The model predicted changes in groundwater head and flow direction in the site vicinity are considered materially insignificant.*
- *No material change is indicated to groundwater discharge area locations or discharge rate.*

Sensitivity analysis was also undertaken to the simulate potential impacts that may occur if some of the estimates used in the model are incorrect. The largest decrease in the water level of Toronto Wetland occurred when the flow rate of water from Toronto Wetland through the soil to the excavation increases. This flow rate is called "horizontal hydraulic conductivity".

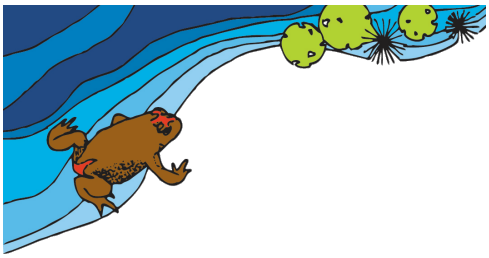
Appendix B – Sensitivity Analysis is provided in the *Groundwater Drawdown Model and Detailed Settlement Analysis – Rev4* report. Case 2 is the simulation with the greatest potential impact on Toronto Wetland. Case 2 estimates a "Cumulative water level change at wetland (mm)" of 76 mm. The estimate of 76 mm is based upon a wetland surface area of ~ 1.7 ha. The report states that the impacts will be reduced by approximately 70%.

A calculation provides an estimate of the "cumulative water level change at wetland (mm)" when the wetland surface area is 2.45 ha. If the reduction is 70%, then the actual amount is 30% of the original value (Table 7).

Table 7. Comparison of drop in water surface level Case 2 (Layer 1 Kh x 2) at 360 days – wetland size of 1.7 ha versus 2.45 ha

Wetland Impacts – Case 2 - (Layer 1 K_h x 2) Adapted from the original table found in the CMW report issue 4 (pages 30 – 31)		
Time days	Surface area of wetland (approximate)	Cumulative water level change at wetland (mm)
360	1.7 ha	76
360	2.45 ha	22.8

Stated in another way, the impact of dewatering reduces as the size of the wetland increases.



Conclusion

A temporary decrease in the water level of 15 mm during dewatering is unlikely to have any significant impact on the wetland vegetation or fauna that use the wetland. The loss of water from Toronto Wetland due to dewatering may be greater if hydraulic conductivity is greater than anticipated. However, increased conductivity is unlikely to significantly change the impact on Toronto Wetland.

There will potentially a minor drop in the level of the Toronto Wetland during dewatering. The model predicts that if construction, prior to completion of the "sealing" of the underground excavated area takes 360 days then the drop in the level of Toronto Wetland will be approximately 15 mm. If dewatering is required for a shorter period the decrease in the water level of Toronto Wetland will be less than 15 mm.

The greatest negative impact generated in the Sensitivity analysis increased the loss of water in Toronto Wetland, consequently further reducing the level of water in Toronto Wetland.

Fluctuations in the level of water in Toronto Wetland is normal. The water level will generally rise when rain is frequent, and evaporation is low. Conversely, during a prolonged drought and hot weather is regular the water level will fall.

As stated above average daily evaporation of water in Toronto Wetland is approximately 2.8 mm. The average drop in surface level due to evaporation over six days is 16.8 mm. The drop in water surface level over a full year due to groundwater loss is predicted to be 15 mm. The impact of the drop in water level due to ground water loss over a full year is relatively trivial, as a similar drop in surface water level occurs every six days.

Once the construction works are complete, no change in the water level of Toronto Wetland is anticipated. Consequently, there is highly unlikely to be any long-term significant ecological impact on the wetland.

9.4 Acid sulfate soils

The Statement of Environmental Effects (SEE) prepared Planning Ingenuity (20 May 2022) provides information about acid sulfate soils:

Page 41 states:

> *Lake Macquarie Local Environmental Plan 2014 – 7.1 Acid Sulfate Soils*
>
> *Requirement: (2) Development consent is required for the carrying out of works described in the Table to this subclause on land shown on the Acid Sulfate Soils Map as being of the class specified for those works.*
>
> *Class 5 - Works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum and by which the watertable is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*
>
> *Proposal: As per the previous DA (DA419/2018), it is not anticipated that any acid sulfate soils will be encountered on the site. As such, it is anticipated that conditions of consent will require an Acid Sulphate Management Plan to be prepared and approved prior to the issue of a CC for implementation for the proposed construction site.*
>
> *Complies? Yes*

Page 60 states:

> *Lake Macquarie Development Control Plan 2014 - 2.7 Acid Sulfate Soils*
>
> *Requirement: 1. Development must be sited or designed to avoid the disturbance of Acid Sulfate Soils or potential Acid Sulfate Soils.*
>
> *2. Where the disturbance of Acid Sulfate Soils is unavoidable, a Preliminary Acid Sulfate Soil Assessment report must be submitted with the development application, in accordance with the NSW Acid Sulfate Soils Planning Guidelines.*
>
> *3. Where a Preliminary Acid Sulfate Soil Assessment report identifies potential adverse impacts, a detailed assessment report and management plan must be submitted, in accordance with the NSW Acid Sulfate Soils Planning Guidelines.*

4. Any Acid Sulfate Soils must be identified on the site analysis plan.

Proposal: The site is mapped by Council as containing acid sulfate soils (Class 5). An acid sulfate management plan will be prepared prior to construction and will form part of the contractors CEMP.

Complies? Yes

Chameleon Geosciences Pty Ltd (9 October 2020) have prepared an *Acid Sulfate Soils Management Plan.* This report provides information on the potential presence of Acid Sulfate Soil on the site and appropriate management.

10. Groundwater dependent ecosystems – Risk assessment

10.1 NSW Risk assessment guidelines for groundwater dependent ecosystems

A completed *NSW Government Risk assessment guidelines for groundwater dependent ecosystems – Volume 1 – The conceptual framework* is provided as an attachment to this report [Appendix 8].

A summary of the information from the "*Risk assessment guidelines"* is presented below:

Toronto Wetland is a groundwater dependent wetland. It is facultatively dependent on groundwater. The risk from the proposal is rated as "*Low*". Toronto Wetland is ranked as a: "*Category 1 – High Ecological Value (HEV) – Sensitive environmental areas".*

The following two acronyms are used in the document: GDEs (Groundwater Dependent Ecosystems); and WSP (Water Sharing Plans).

Table 8 is an extract of Table 8 from the "Risk assessment guidelines". The full title of Table 8 is *Risk matrix management actions for each matrix box.* The extract below provides the following information for low-risk activities in high value groundwater dependent ecosystems.

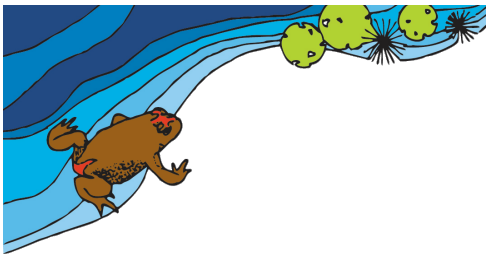


Table 8. An extract of Table 8 from the *Risk assessment guidelines.*

Risk matrix box	Descriptor	Management action short term	Management action mid term	Management action long term**
A	High value / low risk	Protection measures for aquifer and GDEs	Continue protection measures for aquifers and GDEs.	Adaptive management. Continue monitoring.
		Baseline risk monitoring.	Periodic monitoring and assessment.	

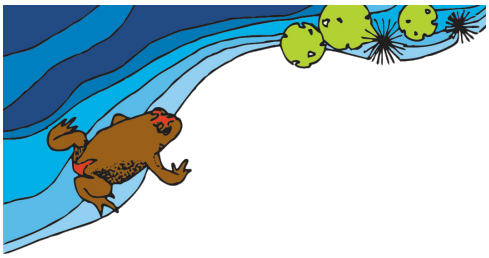
** It is anticipated that the monitoring actions and management will change in light of observed GDE responses. The triggers for management responses will vary depending on GDE type and WSP.

Ground water monitoring is being undertaken next to Toronto Wetlands. It assumed that the monitoring wells can be used as part of the: *Baseline risk monitoring* and *Periodic monitoring and assessment.*

The *Risk assessment guidelines* provide more information about management strategies.

Conclusion

The *Risk assessment guidelines* provide the following description of the type of change anticipated by Category 1 – Low risk activities: “Minor to no discernible impact resulting in no change or minor change to the aquifer and/or associated GDEs.



11. Planning Instruments

11.1 State Environmental Planning Policies (SEPPs)

Development assessment for proposals in the locality have been subject to various SEPPs over recent decades. Many of the SEPPs that consider biodiversity have been repealed. Information about repealed SEPPs and current SEPPs is provided below:

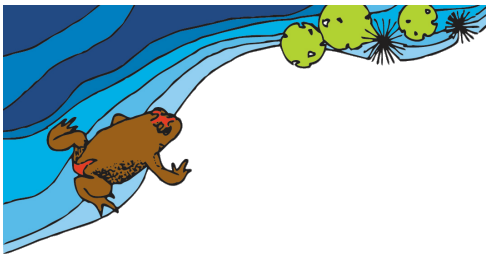
The Coastal Management SEPP (now repealed).

The State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP) commenced on 3 April 2018.

> *The Coastal Management SEPP implements the objectives of the Coastal Management Act 2016 (the Act) from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone.*
>
> *The SEPP updated and consolidated these (now repealed) SEPPs into one integrated policy:*
>
> *SEPP 14 (Coastal Wetlands)*
>
> *SEPP 26 (Littoral Rainforests)*
>
> *SEPP 71 (Coastal Protection), including clause 5.5. of the Standard Instrument – Principal Local Environmental Plan.*
>
> *The SEPP promotes an integrated and coordinated approach to development assessment, with tailored development controls to ensure development proponents and consent authorities consider and address the most important issues for the coastal management area(s) their proposal falls within. The SEPP is supported by detailed mapping.*

The State Environmental Planning Policy (Resilience and Hazards) 2021

> *The (Resilience and Hazards SEPP) consolidates and repeals the provisions of the following 3 SEPPs:*
>
> *1. SEPP (Coastal Management) 2018 (Coastal Management SEPP)*
>
> *2. SEPP 33 – Hazardous and Offensive Development (SEPP 33)*
>
> *3. SEPP 55 – Remediation of Land (SEPP 55)*



Key message

The following SEPPs have been repealed: SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests), SEPP 71 (Coastal Protection), and SEPP (Coastal Management) 2018 (Coastal Management SEPP).

The State Environmental Planning Policy (Resilience and Hazards) 2021 will be addressed below. While the other repealed SEPPs are no longer relevant, sometimes they will be discussed below as they provide some context for the locality.

11.2 SEPP mapping

11.2.1 SEPP Coastal management – Proximity Area for Coastal Wetlands

The site is included in the 100 m proximity area for coastal wetlands. This was mapping prepared under the Coastal Management SEPP. The Coastal Management SEPP has been repealed. It is assumed that the proximity area mapping considerations have been transferred to the Resilience and Hazards SEPP.

11.2.2 SEPP Coastal management – Coastal wetlands and littoral rainforests area map

Toronto Wetland is included in the coastal wetlands and littoral rainforest mapping that was part of the Coastal Management SEPP. It is assumed that the coastal wetlands and littoral rainforest mapping considerations have been transferred to the Resilience and Hazards SEPP.

11.2.3 SEPP 14

SEPP No.14 Coastal Wetlands has now been repealed. Similar controls that aim to protect the environment and wetlands are included in the SEPP (Resilience and Hazards) 2021.

Toronto Wetland was mapped as a SEPP 14 wetland.

11.3 State Environmental Planning Policy (Resilience and Hazards) 2021

Toronto Wetland is within an area with the Feature ID 2151. The area extent of Feature ID 2151 is 42987 m^2.

Both the *State Environmental Planning Policy No. 14 (Coastal Wetlands)* and the *State Environmental Planning Policy (Coastal Management) 2018* have been repealed. They have been replaced by the *State Environmental Planning Policy* (SEPP) *(Resilience and Hazards) 2021.*

The following extract is taken from SEPP (Resilience and Hazards) 2021:

The site is included within the proximity area for coastal wetlands and littoral rainforest mapping.

2.8 Development on land in proximity to coastal wetlands or littoral rainforest

Note— The Coastal Wetlands and Littoral Rainforests Area Map identifies certain land that is inside the coastal wetlands and littoral rainforests area as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" or both.

(1) Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on—

(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or

(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

(2) This section does not apply to land that is identified as "coastal wetlands" or "littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map.

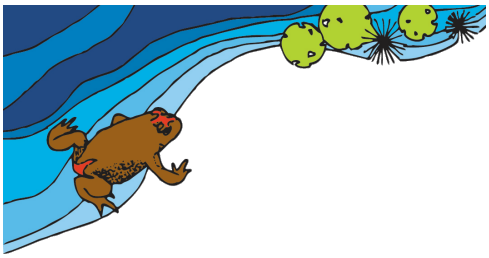
Response

The site is within the proximity area for coastal wetlands.

The proposal is unlikely to have any significant negative impacts on the *biophysical, hydrological or ecological integrity* of Toronto Wetland. Similarly, the proposal is unlikely to have a significant negative impact on the *quantity and quality of surface and ground water flows to and from the adjacent* Toronto Wetland. Details supporting these statements are provided below.

Groundwater

The proposal will have a temporary impact on groundwater flows adjacent to the South-East corner of the wetland. During dewatering works associated with the excavation the model prepared by CMW Geosciences (21 February 2022- Rev 4) predicts that the water surface level will drop by approximately 14.7 mm if dewatering continues for 360 days. This assumes a wetland surface area of 2.45 ha. Additional details can be found in the report prepared by CMW Geosciences (21 February 2022 – Rev 4).



A drop in the water surface level of 14.7 mm over one year in Toronto Wetland is a negligible change. A similar drop in surface level can level can occur after four days of evaporation. Average daily evaporation is 2.8 mm. The drop in surface water level after six days is approximately 16.8 mm.

Groundwater extracted from the excavation will be appropriately treated and discharged to existing stormwater infrastructure, see Section 9.3.9.2.2

At the completion of the dewatering, no further losses of groundwater will be caused by the proposal.

Stormwater

Stormwater volumes

Stormwater generated on the site will flow to two different waterbodies, some will flow to Toronto Wetland and some stormwater will flow to Stony Creek. The joint report of engineers prepared on 20 September 2021 states that *"there will be an increase in flow to the nearby wetland of around 0.8 ML/year. This is an approximate annualised figure and will vary from year to year."* The modelled value of stormwater discharge has been updated to 1.04 ML (Northrop 23 November 2021).

If all the 1.04 ML was to arise from one rainfall event the surface level of Toronto Wetland (2.45 ha) would increase by 42.4 mm. It is considered extremely unlikely that a single annual event would deliver the total stormwater volume of 1.04 ML.

If the 1.04 ML was delivered over 12 events, for example one each month, the total volume of water discharged to Toronto Wetland would be 1.04 ML/12 = 1,040,000 litres / 12 -= 86,667 litres. Inflow of 86,667 litres into Toronto Wetland would increase the surface level by 3.5 mm.

Rainfall does not fall in regular volumes even volumes during each event, each month or each year. Thus, volumes of 1,040,000 litres and 86,667 litres are guides.

Average evaporation at Toronto Wetland is estimated to be 2.8 mm per day. Based upon this figure, if an extra 86,677 litres flowed into Toronto Wetland it would increase the surface level of the wetland by approximately 3.5 mm. Two days of evaporation would remove the additional water.

Similar reasoning is provided in Section 9.2.

Stormwater quality

The *Northrop Concept Stormwater Management Plan for 118 Cary Street, Toronto* (NL 171556 / 23 November 2021 / Revision A) provides information about the quality of stormwater generated by the proposal. Page six (6) of the report states:

> *It is our understanding that the sites downstream receiving waters are environmentally sensitive, comprising an existing coastal wetland. In order to minimise the developments impact on the*

existing wetland in accordance with the Coastal Wetland SEPP, water quality objectives required for Neutral or Beneficial Effect (NorBE) have been considered.

As such, stormwater treatment devices have been incorporated into the design of the development such that the development can provide a Neutral or Beneficial Effect (NorBe) to the downstream environment. Refer to design documentation for specific water quality treatment facilities

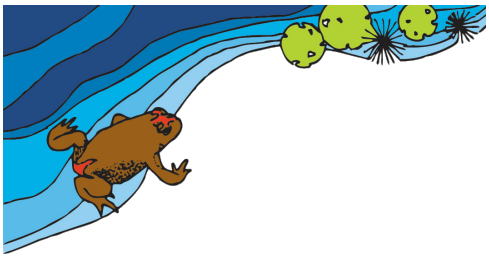
The performance of the proposed stormwater management strategy was assessed against these targets using the conceptual software MUSIC (Version 6.3.0). The MUSIC model was developed using recommended parameters presented in the document "Draft NSW MUSIC Modelling Guidelines" (WBM, 2015) while complying with LMCC's MUSIC Link parameters. A schematic of the proposed treatment train can be seen below in Figure 2.

Table 2 below is reproduced from the *Northrop Concept Stormwater Management Plan for 118 Cary Street, Toronto (NL 171556 / 23 November 2021 / Revision A).*

Table 2 - MUSIC model results

	Pre-Development Load (kg/yr)	*Post Development Load (kg/yr)*	*% Pre. Vs Post Reduction*
Flow (ML/yr)	*1.25*	*2.29*	*-83.2%*
Total Suspended Solids (kg/yr)	*2.61E+02*	*38.2*	*85.4*
Total Phosphorus (kg/yr)	*0.476*	*0.108*	*77.3%*
Total Nitrogen (kg/yr)	*2.59*	*1.69*	*34.7%*
Gross Pollutants (kg/yr)	*13.6*	*0*	*100%*

The proposed stormwater management system will generate an improvement in the quality of the stormwater flowing to Toronto Wetland from the site. The proposal will achieve an improvement by reducing the levels of suspended solids, total phosphorous, total nitrogen and gross pollutants being discharged from the site as part of stormwater.



2.10 Development on land within the coastal environment area

(1) Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following—

(a) the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,

(b) coastal environmental values and natural coastal processes,

(c) the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,

(d) marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,

(e) existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,

(f) Aboriginal cultural heritage, practices and places,

(g) the use of the surf zone.

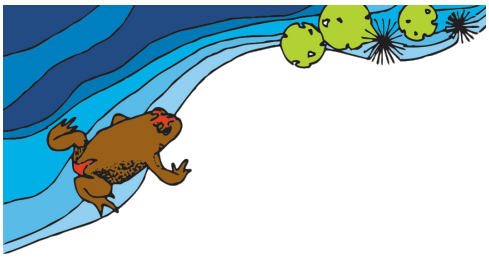
(2) Development consent must not be granted to development on land to which this section applies unless the consent authority is satisfied that—

(a) the development is designed, sited and will be managed to avoid an adverse impact referred to in subsection (1), or

(b) if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised—the development will be managed to mitigate that impact.

(3) This section does not apply to land within the Foreshores and Waterways Area within the meaning of Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.



Response

The proposal is unlikely to cause a significant adverse impact on the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological of the local environment including Toronto Wetland.

Similarly, the proposal is unlikely to cause a significant adverse impact on coastal environmental values and natural coastal processes.

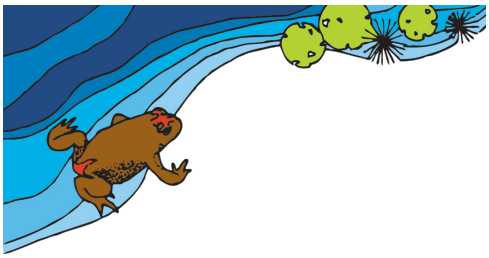
11.4 SEPP Koala Habitat Protection

Both the site and Toronto Wetland have koala feed trees. However, koalas, or evidence of koalas, were not seen on site or Toronto Wetland and it is unlikely that any Koalas use the site or Toronto Wetland. The site and Toronto Wetland are not considered core Koala habitat.

The following is a list of SEPP scheduled Koala feed tree species (Table 8):

Table 8: Koala tree species for the Central Coast koala management area

Scientific name	Common name(s)
Allocasuarina littoralis	Black She-oak
Allocasuarina torulosa	Forest Oak
Angophora bakeri	Narrow-leaved Apple
Angophora costata	Smooth-barked Apple
Angophora floribunda	Rough-barked Apple
Casuarina glauca	Swamp Oak
Corymbia eximia	Yellow Bloodwood
Corymbia gummifera	Red Bloodwood
Corymbia maculata	Spotted Gum
Eucalyptus acmenoides	White Mahogany
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus albens	White Box
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus beyeriana	Beyer's Ironbark
Eucalyptus blakelyi	Blakely's Red Gum



Scientific name	Common name(s)
Eucalyptus bosistoana	Coast Grey Box
Eucalyptus botryoides	Bangalay
Eucalyptus camaldulensis	River Red Gum
Eucalyptus camfieldii	Camfield's Stringybark
Eucalyptus canaliculata	Large-fruited Grey Gum
Eucalyptus capitellata	Brown Stringybark
Eucalyptus carnea	Thick-leaved Mahogany
Eucalyptus consideniana	Yertchuk
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus deanei	Mountain Blue Gum
Eucalyptus eugenioides	Narrow-leaved Stringybark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus glaucina	Slaty Red Gum
Eucalyptus globoidea	White Stringybark
Eucalyptus grandis	Flooded Gum
Eucalyptus haemastoma	Broad-leaved Scribbly Gum
Eucalyptus imitans	Eucalyptus imitans
Eucalyptus largeana	Craven Grey Box
Eucalyptus longifolia	Woollybutt
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus michaeliana	Brittle Gum
Eucalyptus microcorys	Tallowwood
Eucalyptus moluccana	Grey Box
Eucalyptus oblonga	Stringybark
Eucalyptus paniculata	Grey Ironbark
Eucalyptus parramattensis	Parramatta Red Gum
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus propinqua	Small-fruited Grey Gum
Eucalyptus punctata	Grey Gum

Scientific name	Common name(s)
Eucalyptus quadrangulata	White-topped Box
Eucalyptus racemosa	Narrow-leaved Scribbly Gum
Eucalyptus resinifera	Red Mahogany
Eucalyptus robusta	Swamp Mahogany
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus scias	Large-fruited Red Mahogany
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus siderophloia	Grey Ironbark
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus sieberi	Silvertop Ash
Eucalyptus signata	Scribbly Gum
Eucalyptus sparsifolia	Narrow-leaved Stringybark
Eucalyptus squamosa	Scaly Bark
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus umbra	Bastard White Mahogany
Eucalyptus viminalis	Ribbon Gum
Melaleuca quinquenervia	Broad-leaved Paperbark
Syncarpia glomulifera	Turpentine

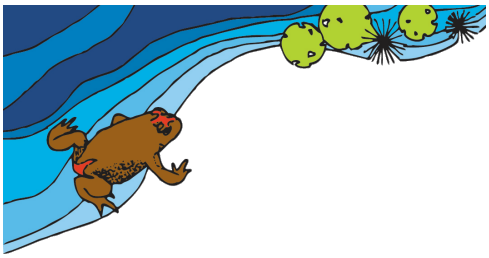
11.5 NSW wetlands policy

There are Twelve Guiding Principles of the NSW Wetlands Policy. Each principle is reproduced below and a response is provided after each principle.

In summary, the proposal is generally consistent with the twelve guiding principles of the NSW wetlands policy.

Principle 1: Wetlands are valued as significant parts of NSW landscapes – their conservation and management are most appropriately considered at the catchment scale.

Response: The site is a relatively small part of the catchment for Toronto Wetland. The proposal is generally consistent with the relevant policies addressing water management impacts on the wetland. The proposal will on average likely increase the volume of stormwater flowing to Toronto Wetland. The added volume is unlikely to have an adverse significant impact the conservation values of Toronto Wetland.



Stormwater discharged to Toronto Wetland from the site following the completion of the proposal will have improved water quality. The amount of total suspended solids, total phosphorus and total nitrogen will be decrease from their current modelled values.

During excavation and construction there will be a temporary loss of groundwater that may lead to a drop in the surface level of the wetland. The impact is unlikely to have a significant effect on the local ecology of Toronto Wetland.

Principle 2: Water regimes needed to maintain or restore the ecological resilience of wetlands should be provided through water management planning, water recovery and water purchase, recognising that a balance between environmental and human requirements must be reached.

Response: The proposal is generally consistent with policies associated with water management planning.

Principle 3: Floodplains should be managed to maintain the natural distribution of water to and from wetlands, and to allow for the movement of aquatic biota.

Response: The site is not part of a floodplain. The proposal is unlikely to have a significant effect on the natural distribution of water to and from wetlands. Additionally, the proposal is unlikely to significantly change the movement of aquatic fauna.

Principle 4: Wetlands of international, national and regional significance should be identified and given priority for conservation and investment.

Response: Toronto Wetland was recognised as a SEPP14 wetland. SEPP14 has now been repealed. However, Toronto Wetland generally retains a similar policy importance. It is included in the NSW government wetland mapping associated with the Coastal Management SEPP. The Coastal Management SEPP has now been repealed but the information associated with wetlands has been incorporated into the SEPP (Resilience and Hazards) 2021.

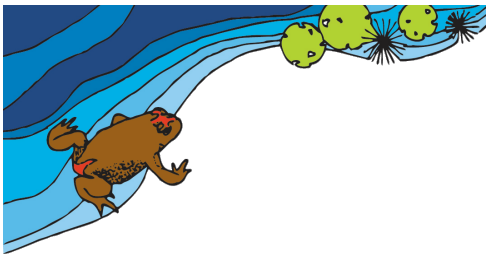
The proposal is highly unlikely to have any impact on the recognition of the importance of the wetland in NSW.

Principle 5: Land management practices should maintain or improve wetland habitats, ecosystem services and cultural values.

Response: Many of the ongoing land management practices that may impact the wetland are not part of the proposal. The proposal includes stormwater and groundwater management. The improvement in water quality discharged from the site will likely slightly improve the quality of the habitat and ecosystem services within Toronto Wetland. The slight increase in stormwater volume discharged to Toronto Wetland is unlikely to have a significant negative impact on the quality of the habitat or ecosystem services within Toronto Wetland.

Principle 6: Wetlands should be recognised as places with important cultural values, in particular that wetlands are an important part of Country for Aboriginal people.

Response: It is beyond the scope of this report to consider the aboriginal cultural values of Toronto Wetland.



Principle 7: Degraded wetlands and their habitats should be rehabilitated and their ecological processes improved as far as is practicable.

Response: The proposal includes stormwater and groundwater management. The improvement in water quality discharged from the site will likely slightly improve the quality of the habitat within Toronto Wetland. This will generate a small improvement in Toronto Wetland.

The slight increase in stormwater volume discharged to Toronto Wetland is unlikely to have a significant negative impact on the quality of the habitat or ecological processes within Toronto Wetland.

During excavation and construction there will be a temporary loss of groundwater that may lead to a drop in the surface level of the wetland. The impact is unlikely to have a significant effect on the local ecology of Toronto Wetland.

Principle 8: The potential impacts of climate change should be considered in planning for wetland conservation and management.

Response: It is beyond the scope of this report to consider the potential impacts of climate change on Toronto Wetland.

Principle 9: Research into wetland ecology should be encouraged to better support water and land use planning and management.

Response: It is beyond the scope of the proposal to support direct research into the wetland ecology of Toronto Wetland. Some research in the form of reviewing relevant literature and a field survey was undertaken during the preparation of this report.

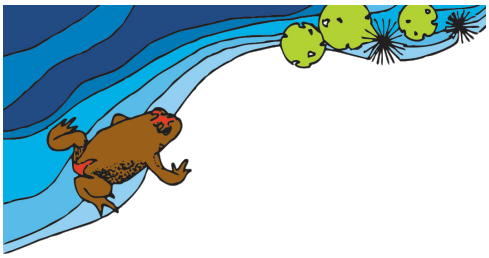
Principle 10: Natural wetlands should not be destroyed or degraded. If social or economic imperatives in the public interest result in a wetland being degraded or destroyed, the establishment and protection of a wetland offset that supports similar biodiversity and ecological functions will be needed.

Response: The proposal does not include actions that are likely to destroy or degrade Toronto Wetland.

The proposal includes stormwater and groundwater management. The improvement in water quality discharged from the site will likely slightly improve the quality of the habitat within Toronto Wetland. This will generate a small improvement in Toronto Wetland.

The slight increase in stormwater volume discharged to Toronto Wetland is unlikely to have a significant negative impact on the quality of the habitat or ecological processes within Toronto Wetland.

During excavation and construction there will be a temporary loss of groundwater that may lead to a drop in the surface level of the wetland. The impact is unlikely to have a significant effect on the local ecology of Toronto Wetland.



Principle 11: Cooperation and incentives among land managers, government authorities, catchment management authorities, non- government organisations and the general community are essential for effective wetland management.

Response: It is a legislative requirement that the proposal includes documents providing information that consider wetland management. This report provides demonstrates a level of co-operation that will be achieved and assist with effective wetland management.

Aspects of wetland management that involve other land managers and a range of other government authorities, catchment management authorities, non-government organisations and the general community are beyond the scope of this proposal.

Principle 12: Regular reporting of wetland extent and condition is vital to assess management performance and to understand wetland dynamics.

Response: It is beyond the scope of the proposal to provide regular reporting of wetland extent and condition. Similarly, it is beyond the scope of the proposal to assess management performance or continue to investigate wetland dynamics.

11.6 Environment Protection and Biodiversity Conservation Act 1999

https://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf

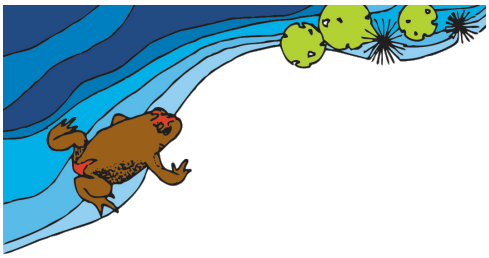
11.6.1 Protected matters

The Protected Matters Search Tool was used to find relevant Matters of National Environmental Significance (MNES) on or near the site. The outputs are shown in (Appendix 7) and summarised below. The Protected Matters Search Tool used a five (5) kilometre buffer.

The following were NOT found using the Protected Matters Search Tool.

- World Heritage Properties
- National Heritage Places
- Wetlands of International Importance (Ramsar)
- Great Barrier Reef Marine Park
- Commonwealth Marine Area

The Protected Matters Search Tool found: four listed threatened ecological communities, seventy-one (71) listed threatened species and forty-nine (49) listed migratory species.



No formal assessment of the vegetation within Toronto Wetland has been undertaken during the preparation of this report. It is possible that the following three Commonwealth listed threatened ecological communities may occur within Toronto Wetland.

- Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community
- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria

Conservation advice from the Commonwealth is available for each of the three Commonwealth listed communities:

Coastal Swamp Oak

http://www.environment.gov.au/biodiversity/threatened/communities/pubs/141-conservation-advice.pdf

Coastal Swamp Sclerophyll Forest
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/171-conservation-advice.pdf

River-flat Eucalypt Forest

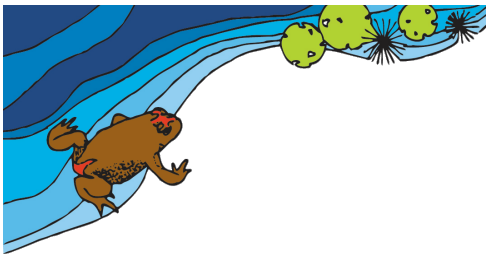
http://www.environment.gov.au/biodiversity/threatened/communities/pubs/154-conservation-advice.pdf

The conservation advice documents for all three communities state that hydrological changes may have an adverse impact on a community.

As described in Sections 9 and elsewhere, the proposed changes to hydrology are likely to have a negligible impact on any of the three Commonwealth listed communities.

The three ecological communities that may be present within Toronto Wetland are protected under Commonwealth legislation by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) and are listed as Endangered or Critically Endangered. The provisions of the EPBC Act may apply to this proposal. The outcome is not significant, however, and does not require referral to the Commonwealth.

No critically endangered, endangered or vulnerable species were recorded during the survey on the site or within Toronto Wetland.



11.6.2 Criteria Critically Endangered and Endangered Ecological Communities

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered ecological community if it does, will, or is likely to:

a) lead to a long-term adverse effect on an ecological community, or

b) reduce the extent of a community, or

c) fragment an occurrence of the community, or

d) adversely affect habitat critical to the survival of an ecological community, or

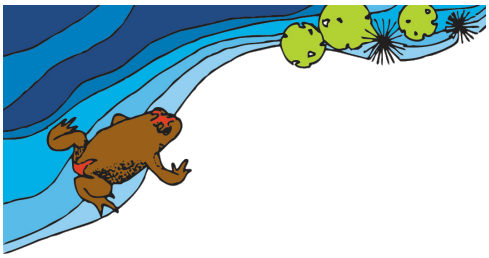
e) modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival, or

f) result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community*, or

g) interfere with the recovery of an ecological community.

(*Introducing an invasive species into the occurrence may result in that species becoming established. An invasive species may harm a critically endangered or endangered ecological community by direct competition, modification of habitat, or predation.)

The proposal has the potential to modify abiotic factors such as water through hydrology changes. The proposed changes are highly unlikely to have a significant impact on the survival of any of the three ecological communities.



12. Conclusion and Recommendations

None of the three thresholds are triggered as follows:

1. Area of clearing
2. Biodiversity Land Map – clearing or prescribed biodiversity impacts. No clearing or activities in an Area of Outstanding Biodiversity Value
3. Five Part Tests

Therefore, a Biodiversity Development Assessment Report (BDAR) is not required.

The proposal is unlikely to have a significant adverse impact on Toronto Wetlands or the biodiversity values within Toronto Wetlands.

A consent or approval may be issued with the following conditions:

Management of acid sulfate soils

Where a Preliminary Acid Sulfate Soil Assessment report identifies potential adverse impacts, a detailed assessment report and management plan must be submitted, in accordance with the NSW Acid Sulfate Soils Planning Guidelines.

4. Any Acid Sulfate Soils must be identified on the site analysis plan.

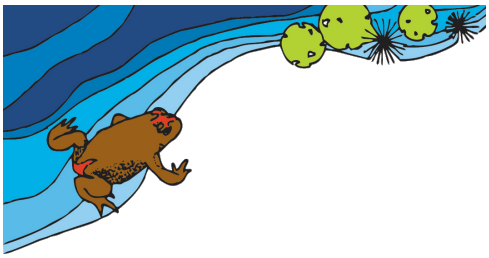
Chameleon Geosciences Pty Ltd (9 October 2020) have prepared an *Acid Sulfate Soils Management Plan* (ASSMP). The ASSMP provides information on the potential presence of Acid Sulfate Soil on the site and appropriate management.

Groundwater monitoring

The consent must include:

1) a requirement for baseline risk monitoring of groundwater
2) periodic groundwater monitoring and assessment.

The ASSMP provides details about monitoring groundwater. Monitoring requirements consistent with the ASSMP and relevant policies must be incorporated into the consent conditions.



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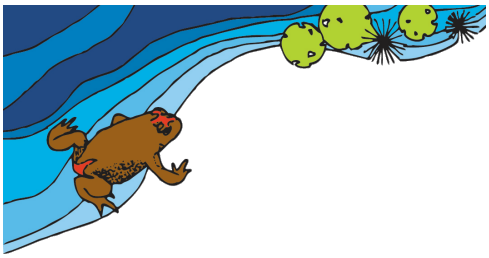

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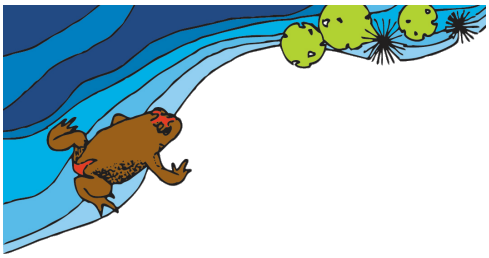

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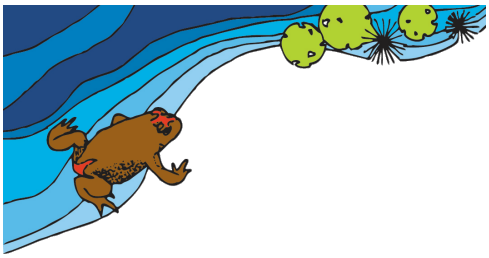


Appendix 1. Five-part tests

While the overall proposal incorporates mitigating considerations and offsets, these are not taken into account in determining the outcome of the **five-part** tests.

> The Assessment of Significance (Office of Environment and Heritage (OEH)) states that "*Proposed measures that mitigate, improve or compensate for the action, development or activity should not be considered in determining the degree of the effect on threatened species, populations or ecological communities, unless the measure has been used successfully for that species in a similar situation.*"

7.2 Development or activity "likely to significantly affect threatened species"

(1) For the purposes of this Part, development or an activity is **"likely to significantly affect threatened species"** if:

(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, or

(b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or

(c) it is carried out in a declared area of outstanding biodiversity value.

(2) To avoid doubt, subsection (1) (b) does not apply to development that is an activity subject to environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979*.

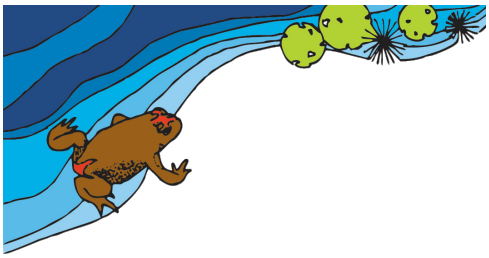
7.3 Test for determining whether proposed development or activity likely to significantly affect threatened species or ecological communities, or their habitats

(1) The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(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

(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



(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,

(c) in relation to the habitat of a threatened species or ecological community:

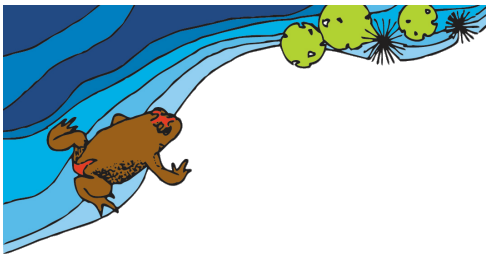
(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community 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),

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.



Reptiles

Scientific name	Common name	NSW status	Comm. status
Hoplocephalus stephensii	Stephens' Banded Snake	Vulnerable	-

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,

No. Both the site and Toronto Wetland provide marginal to poor habitat for this species.

The site is highly disturbed and Toronto Wetland has also experienced disturbance. Residential and commercial development are common in the locality and have been present for many decades.

The proposal will clear all marginal potential habitat on site.

This species is unlikely to use the site, and there was no evidence of this species present on site. Neither has it been recorded from Toronto Wetland. The proposal is unlikely to affect the life cycle of this species such that a viable local population will be placed at risk of 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. This test is for a threatened species.

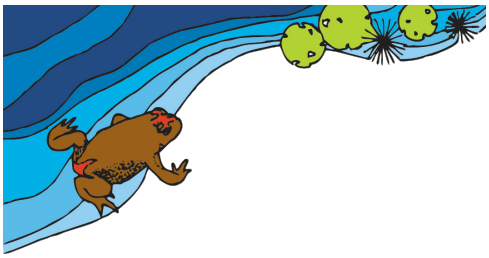
ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable. This test is for a 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents poor or marginal habitat for Stephens' Banded Snake.



The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Only a portion of this area is marginal habitat for the Stephens' Banded Snake. A very small area may be temporarily modified due to the proposed changes to hydrology.

None of the threatened plant species listed above were recorded on the site or within Toronto Wetland and adjoining areas during the survey.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The habitat for Stephens' Banded Snake on the site is poor or marginal. The removal of vegetation and modification of the site is unlikely to cause fragmentation or isolation from other areas of habitat for the Stephens' Banded Snake.

The proposal also includes potential hydrological impacts on Toronto Wetland. The impacts include potential changes to both the quality and the characteristics of the flow of stormwater flowing from the site to Toronto Wetland. Additionally, there will be a temporary change to groundwater levels near the South-West corner of Toronto Wetland.

These changes may cause the water levels within Toronto Wetland to fluctuate. However, water levels within Toronto Wetland are already subject to natural fluctuations.

Suitable habitat for Stephens' Banded Snake is marginal or poor within Toronto Wetland. Stephens' Banded Snake spends a lot of time in trees. If suitable habitat occurs within Toronto Wetland it will be the dryland areas and perhaps the slightly damper areas near the water edge.

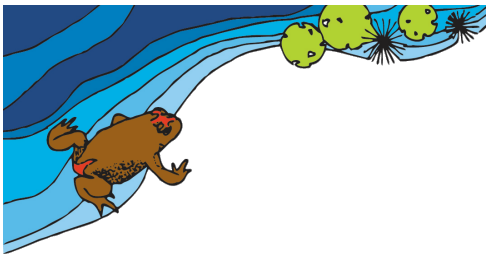
It is unlikely that any area of habitat for Stephens' Banded Snake will become fragmented or isolated from other areas of habitat as a result of the proposal.

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,

Low. Stephens' Banded Snake was not observed on the site, nor has it been recorded within Toronto Wetland. The habitat both within the proposal site and within Toronto Wetland is in general marginal to poor.

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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.



e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands". This key threatening process probably has less relevance to Stephens' Banded Snake.

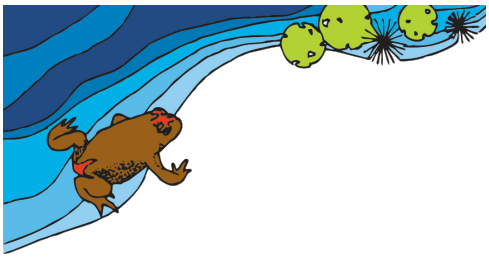
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on Stephens' Banded Snake. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on Stephens' Banded Snake.

Therefore, a BDAR is not recommended.



Diurnal Raptors

Scientific name	Common name	NSW status	Comm. status
Haliaeetus leucogaster	White-bellied Sea Eagle	V,P	-
Hieraaetus morphnoides	Little Eagle	V,P	-
Pandion cristatus	Eastern Osprey	V,P	-

Key

V = Vulnerable P = Protected

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,

No. The site contains a small number of scattered trees. It is only probably marginal habitat for the Little Eagle and very marginal habitat for the White-bellied Sea Eagle and the Eastern Osprey.

Toronto Wetland provides better habitat for all three threatened raptor species.

The proposal will clear the site and consequently remove any habitat present on the site. The proposal will modify hydrological conditions for Toronto Wetland. However, the modifications are unlikely to significantly modify the habitat for any of the threatened raptor species within Toronto Wetland.

All three species are highly mobile, and the impacts of the proposal on habitat for these three species is minor to negligible.

The impacts of the proposal are relatively minor and unlikely to have an adverse effect on the life cycle of any threatened bird such that a local viable population will be placed at risk of extinction.

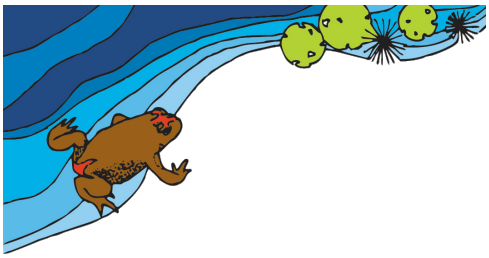
b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents marginal habitat for threatened diurnal raptor species.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides moderate habitat for threatened diurnal raptor species. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The habitat for threatened diurnal raptor species on the site is marginal. The removal of vegetation and modification of the site is unlikely to cause fragmentation or isolation from other areas of habitat for threatened diurnal raptor species.

The proposal also includes potential hydrological impacts on Toronto Wetland. The impacts include potential changes to both the quality and the characteristics of the flow of stormwater flowing from the site to Toronto Wetland. Additionally, there will be a temporary change to groundwater levels near the South-West corner of Toronto Wetland.

These changes may cause the water levels within Toronto Wetland to fluctuate. However, water levels within Toronto Wetland are already subject to natural fluctuations.

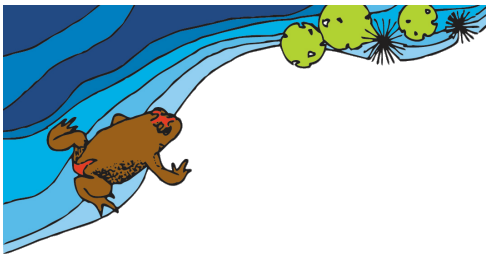
Suitable habitat within Toronto Wetland for threatened diurnal raptor species is unlikely to be significantly impacted by the proposal.

It is unlikely that any area of habitat for threatened diurnal raptor species will become fragmented or isolated from other areas of habitat as a result of the proposal.

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,

Low to negligible. Threatened diurnal raptors were not recorded on the site during the survey. Neither were any threatened diurnal raptor species observed within Toronto Wetland.

All three threatened diurnal raptor species are highly mobile and the habitat within both the site and Toronto Wetland only represents a small part of their potential foraging habitat.



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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened diurnal raptors. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on the White-bellied Sea Eagle, Little Eagle and the Eastern Osprey.

Therefore, a BDAR is not recommended

Migratory Birds

Scientific name	Common name	NSW status	Comm. status
Hirundapus caudacutus	White-throated Needletail	P	V,C,J,K

Key

V = Vulnerable

P = Protected

C = China-Australia Migratory Bird Agreement

J = Japan-Australia Migratory Bird Agreement

K = Republic of Korea-Australia Migratory Bird Agreement

Note the Swift Parrot is also a migratory species. It is assessed below in another five-part test.

Habitat and Ecology

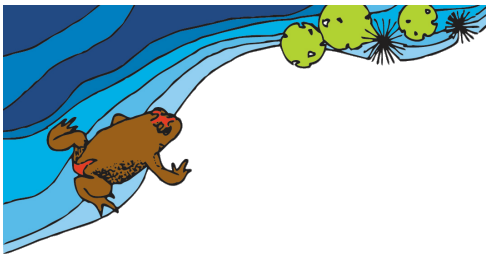
https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=20354

- Migrates to eastern Australia and can be seen from October to April
- More common in coastal areas
- Feed on flying insects, such as termites, ants, beetles, and flies.

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,**

No. The site is highly disturbed and Toronto Wetland has also experienced disturbance. Residential and commercial development are common in the locality and have been present for many decades. The locality provides potential foraging aerial habitat for the white-throated needletail. This species has also been recorded in a 5 km radius.

While the proposal will modify an area of potential foraging habitat for this species, the extent of habitat modification is minor considering the foraging range of this species. The impact of clearing is minor and unlikely to have an adverse effect on the life cycle of any threatened bird such that a local viable population will be placed at risk of 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. This test is for a 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. This test is for a 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 White-throated Needletail is a migratory species that spends most of its time in the air while in Australia. It is highly unlikely to perch on any of the trees within the site or Toronto Wetland. It is more likely to fly over the site or Toronto Wetland while travelling or feeding and unlikely to directly use either site.

The size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents a very small portion of the habitat of the white-throated needletail.

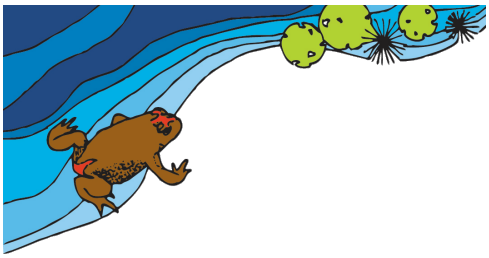
The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides a very small portion of the habitat of the white-throated needletail. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. This species is highly mobile. The clearing and modification of habitat at the site as well as the modification of the hydrology impacting Toronto Wetland is unlikely to significantly impact habitat for this species. The proposal is unlikely to cause habitat to be fragmented or isolated for this species.

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,

Negligible. The White-throated Needletail is highly mobile and the proposal impacts a very small part of the habitat of this species.



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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes. All three key threatening processes are likely to have a relatively minor impact on the white-throated needletail.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

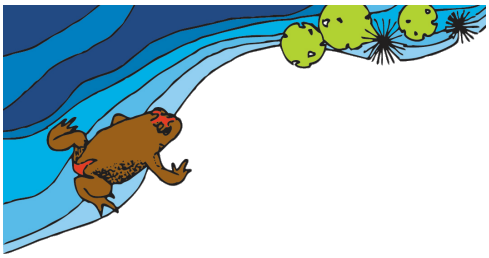
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the white-throated needletail. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on White-throated Needletail.

Therefore, a BDAR is not recommended.



Water Birds

Scientific name	Common name	NSW status	Comm. status
Ixonrychus flavicollis	Black Bittern	V,P	-
Haematopus longirostris	Pied Oystercatcher	E,P	-
Haematopus fuliginosus	Sooty Oystercatcher	V,P	-

Key

E = Endangered V = Vulnerable P = Protected

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,

No. The site contains marginal or poor habitat for these species.

Toronto Wetland provides habitat for all three species. However, the site provides marginal habitat for the Sooty Oystercatcher. The proposal may modify a very small part of the habitat of these three species.

The proposal will clear the site and will modify the hydrology for Toronto Wetland. The proposal is unlikely to have an adverse effect on the life cycle of the three assessed threatened water birds such that a viable local population of any of those species is likely to be placed at risk of extinction.

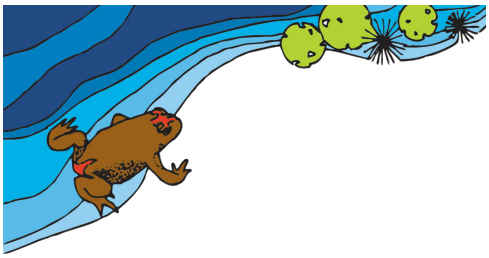
b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents marginal or poor habitat for the assessed threatened water bird species.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides habitat for the assessed threatened water bird species. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. All three species are highly mobile. It is highly unlikely that the proposal will cause fragmentation or isolation of habitat for the assessed threatened water birds.

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,

Low to moderate to high. The habitat within the site is poor to marginal (low) for these three species. The habitat within Toronto Wetland is moderate to high. However, only a relatively small area of habitat for these three species within Toronto Wetland may be modified by the proposed changes to hydrology.

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),

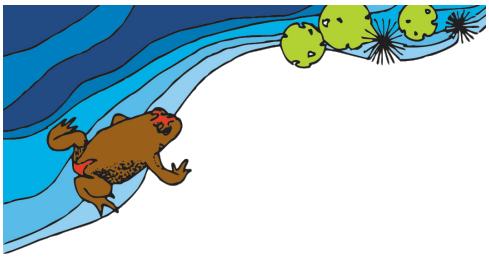
No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the “Clearing of native vegetation”, as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the



description of the key threatening process “Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands”.

The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process “Removal of dead wood and dead trees”.

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened water birds. Key threatening processes are listed in both the NSW BC Act and the Commonwealth’s EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on the Black Bittern, Pied Oystercatcher or the Sooty Oystercatcher.

Therefore, a BDAR is not recommended.

Forest Birds and Nocturnal Raptors

Scientific name	Common name	NSW status	Comm. status
Ptilinopus regina	Rose-crowned Fruit-Dove	V,P	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V,P	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P	-
Glossopsitta pusilla	Little Lorikeet	V,P	-
Lathamus discolor	Swift Parrot	E1,P	CE
Neophema pulchella	Turquoise Parrot	V,P	-
Ninox strenua	Powerful Owl	V,P	-
Tyto novaehollandiae	Masked Owl	V,P	-
Tyto tenebricosa	Sooty Owl	V,P	-
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P	-
Anthochaera phrygia	Regent Honeyeater	CE,P	CE
Daphoenositta chrysoptera	Varied Sittella	V,P	-
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P	-

Key

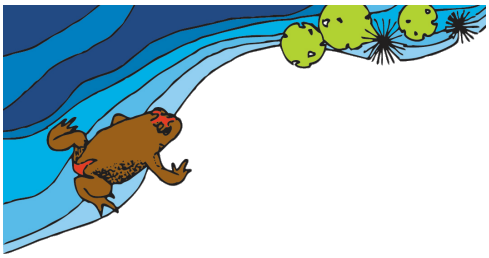
CE = Critically Endangered E = Endangered P = Protected

E1 = Endangered Species V = Vulnerable

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,

No. The size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. The site has had a long history of disturbance. The vegetation on the site contains a mixture of naturalised exotic species (weeds), planted exotic species and native species. The habitat on site represents typically poor habitat for all of the assessed threatened bird species.

Toronto Wetland provides better habitat for the assessed threatened bird species. A small area of land within Toronto Wetland may be modified by the proposed changes to hydrology. The impacts on the suitable habitat for these species is minor.



The proposal is unlikely to have an adverse effect on the life cycle of any of the threatened forest birds or nocturnal raptors such that a viable local population of any of the assessed species is likely to be placed at risk of 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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents marginal habitat for the assessed threatened forest birds and threatened nocturnal raptors.

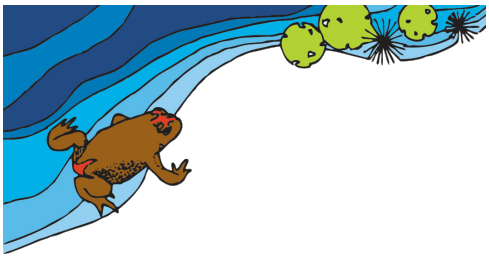
The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides moderate to good habitat for the assessed threatened forest birds and threatened nocturnal raptors. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. All the species assessed in this five-part test are mobile to highly mobile birds. The proposal is unlikely to cause fragmentation or isolation of habitat for any of the assessed threatened forest birds or threatened nocturnal raptors.

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,

Low to moderate to high. The habitat within the site is poor to marginal (low) for these species. The habitat within Toronto Wetland is moderate to high. However, only a relatively small area of habitat for these species within Toronto Wetland may be modified by the proposed changes to hydrology.



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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

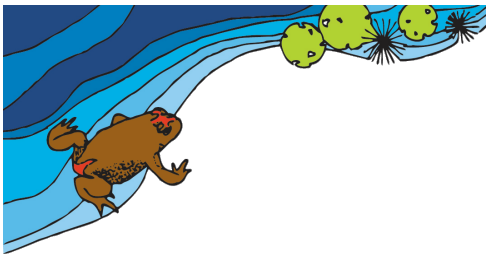
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened forest birds or threatened nocturnal raptors. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on the Rose-crowned Fruit-Dove, Gang-gang Cockatoo, Glossy Black-Cockatoo, Little Lorikeet, Swift Parrot, Turquoise Parrot, Powerful Owl, Masked Owl, Sooty Owl, Brown Treecreeper (eastern subspecies), Regent Honeyeater, Varied Sittella, or Dusky Woodswallow.

Therefore, a BDAR is not required.



Threatened arboreal and terrestrial mammals

Scientific name	Common name	NSW status	Comm. status
Phascolarctos cinereus	Koala	V,P	E
Cercartetus nanus	Eastern Pygmy-possum	V,P	-
Petaurus australis	Yellow-bellied Glider	V,P	-
Petaurus norfolcensis	Squirrel Glider	V,P	-
Dasyurus maculatus	Spotted-tailed Quoll	V,P	E

Key

V = Vulnerable E = Endangered P = Protected

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,

No. None of the threatened arboreal or terrestrial mammals were recorded on the site. Additionally, the site provides very poor habitat for these species. It is unlikely that any of these species would actually use the site as habitat.

Toronto Wetlands provides slightly better habitat, however, Toronto Wetlands is relatively distant from more extensive areas of habitat. The distance between Toronto Wetlands and other larger areas of habitat mean that it is unlikely that any of the assessed threatened arboreal and terrestrial mammals visit the site. It is unlikely site provides a satisfactory area of suitable habitat allowing any of these species to remain semi-permanently within Toronto Wetland.

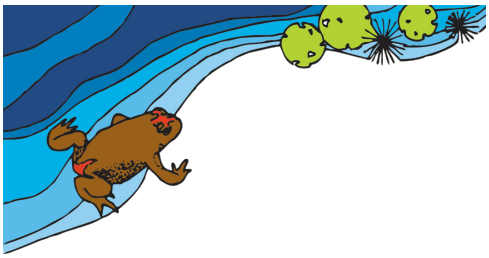
The proposal is unlikely to effect the life cycle of any threatened arboreal or terrestrial mammal such that a viable local population will be placed at risk of extinction.

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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents marginal habitat for threatened arboreal and terrestrial mammals.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides medium quality habitat for threatened arboreal and terrestrial mammals. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The habitat for threatened arboreal and terrestrial mammals on the site is poor. The removal of vegetation and modification of the site is unlikely to cause fragmentation or isolation from other areas of habitat for the assessed threatened arboreal and terrestrial mammals.

The proposal also includes potential hydrological impacts on Toronto Wetland. The impacts include potential changes to both the quality and the characteristics of the flow of stormwater flowing from the site to Toronto Wetland. Additionally, there will be a temporary change to groundwater levels near the South-West corner of Toronto Wetland.

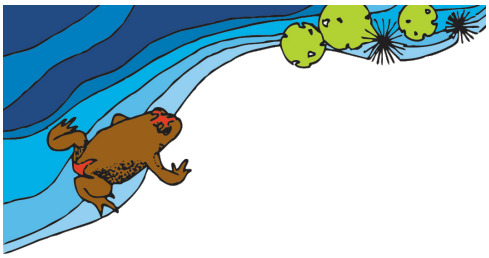
The proposed changes to hydrology are unlikely to cause fragmentation or isolation from other areas of habitat for the assessed threatened arboreal and terrestrial mammals.

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,

Low to negligible. Threatened arboreal and terrestrial mammals were not recorded on the site during the survey. Neither were any threatened arboreal and terrestrial mammals recorded within Toronto Wetland.

While the habitat within Toronto Wetland is low to moderate. The changes in hydrology on impact a very small area of habitat within Toronto Wetland.

It is unlikely that any of the threatened arboreal or terrestrial mammals use Toronto Wetland as habitat. The potential modifications caused by changes in hydrology would only result in very minor changes in habitat for these species.



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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

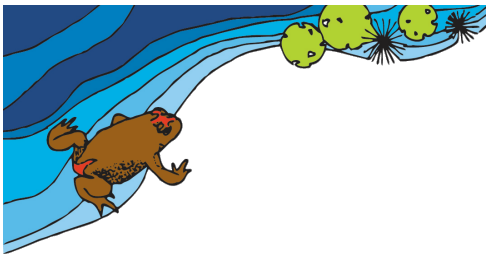
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened arboreal or terrestrial mammals. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on threatened arboreal or terrestrial mammals.

Therefore, a BDAR is not recommended.



Grey-headed Flying-fox

Scientific name	Common name	NSW status	Comm. status
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V

Key

V = Vulnerable P = Protected

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,

No. The Grey-headed Flying-fox may use both the site and Toronto Wetlands. It is also highly mobile. The proposal is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the Grey-headed Flying-fox will be placed at risk of extinction.

A Flying-fox camp site has been reported nearby in Blackalls Park (Lake Macquarie City Council (November 2016)). It is primarily occupied by the Grey-headed Flying-fox. No roosting Grey-headed Flying-foxes were observed within Toronto Wetland during the survey.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

iii. 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

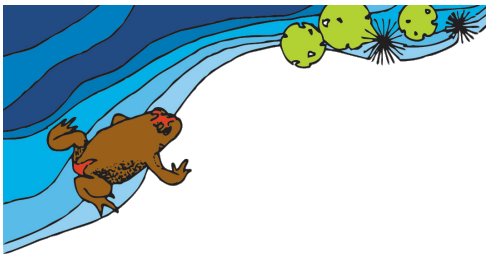
Not applicable. This test is for a threatened species.

iv. 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. This test is for a 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This site provides some foraging habitat for the Grey-headed Flying-fox.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides some areas of foraging habitat for the Grey-headed Flying-fox. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The Grey-headed Flying-fox is highly mobile. It is unlikely that the proposal will cause fragmentation or isolation for the 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,

Low. The site provides only a small amount of foraging habitat for the Grey-headed Flying-fox. All foraging habitat for the Grey-headed Flying-fox will be cleared for the proposal.

Toronto Wetland may be impacted by the proposed hydrological changes. However, any impact on habitat for the Grey-headed Flying-fox will likely be small to negligible.

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),

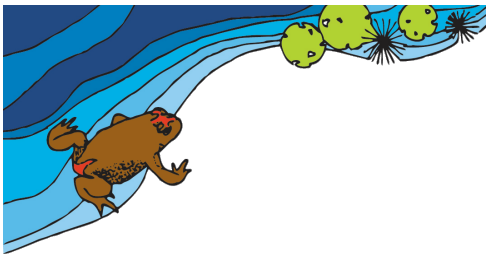
No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the “Clearing of native vegetation”, as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process “Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands”.



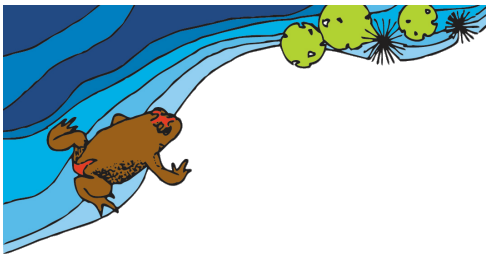
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process “Removal of dead wood and dead trees”.

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the Grey-headed Flying-fox. Key threatening processes are listed in both the NSW BC Act and the Commonwealth’s EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on Grey-headed Flying-fox.

Therefore, a BDAR is not recommended.



Insectivorous bats

Scientific name	Common name	NSW status	Comm. status
Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P	-
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P	
Miniopterus australis	Little Bent-winged Bat	V,P	
Miniopterus orianae oceanensis	Eastern Bentwing-bat	V,P	-
Mormopterus norfolkensis	Eastern Freetail-bat	V,P	-
Myotis macropus	Southern Myotis	V,P	
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P	-
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P	Near Threatened
Vespadelus troughtoni	Eastern Cave Bat	V,P	

Key

V = Vulnerable P = Protected

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,

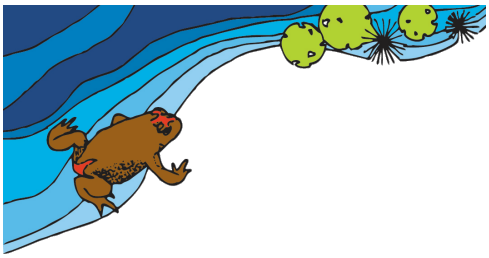
No. The site provides reasonable habitat for threatened microbat species who may forage over the site. Toronto Wetland provides better habitat for threatened microbat species.

Removal of vegetation on the site is likely to change the foraging value of the site for microbats. Modification of hydrology may have a slight impact on Toronto Wetland, however the change is unlikely to have a significant effect on foraging or other habitat for microbats.

The proposal is unlikely to have an adverse effect on the life cycle of the species such that a viable local population of the assessed threatened microbat species is likely to be placed at risk of 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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. The site provides some habitat for microbat species.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Toronto Wetland provides moderate to good habitat for the threatened microbat species. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. Microbats are all reasonably mobile. The proposal is unlikely to cause fragmentation or isolation of habitat for any of the assessed threatened microbat species.

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,

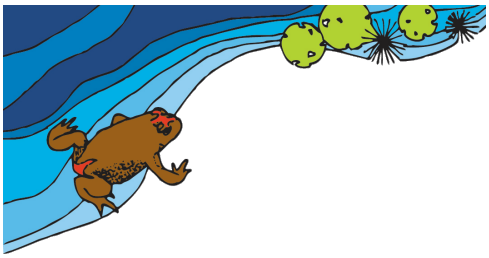
Low. The importance of the habitat on the site for microbats is low. While Toronto Wetland provides better habitat only a (very) small area may be impacted by the proposed changes to hydrology.

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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.



The proposed development will require the “Clearing of native vegetation”, as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process “Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands”.

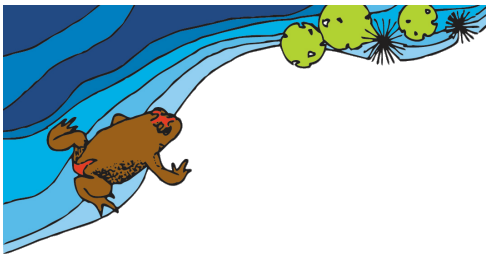
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process “Removal of dead wood and dead trees”.

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened microbats. Key threatening processes are listed in both the NSW BC Act and the Commonwealth’s EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on the Large-eared Pied Bat, Eastern False Pipistrelle, Eastern Coastal Free-tailed Bat, Little Bent-winged Bat, Eastern Bentwing-bat, Eastern Freetail-bat, southern Myotis, Yellow-bellied Sheathtail-bat, Greater Broad-nosed Bat or Eastern Cave Bat.

Therefore, a BDAR is not recommended.



Threatened Ecological Community – Swamp Oak Floodplain Forest

Scientific name	NSW status	Comm. status
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner bioregions	E	E*

Key

E = Endangered (Ecological Community)

E* It is not the objective of this report to determine if the Swamp Oak Floodplain Forest within Toronto Wetland also meets the Commonwealth listed Ecological Community *Coastal Swamp Oak (Casuarina glauca) Forest of South-East Queensland and New South Wales* definition.

a. in the case of a threatened species, whether the action proposed 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,

Not applicable. This five-part test is for an endangered ecological community.

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

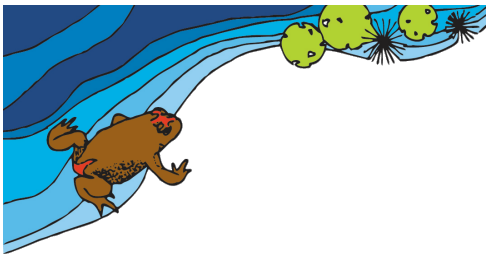
No direct impacts such as clearing of any Swamp Oak Floodplain Forest within Toronto Wetland are included in the proposal.

The proposal includes changes to hydrology. The changes to hydrology may have an impact on Toronto Wetland. However, any impact is likely to be minor.

The proposal is unlikely to have an adverse effect on Swamp Oak Floodplain Forest such that its local occurrence is likely to be placed at risk of extinction.

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

No. The proposed changes to hydrology may cause a slight change to the patterns of rise and fall of the water surface within Toronto Wetland. These changes are unlikely to have a substantial adverse impact on the



composition of Swamp Oak Floodplain Forest. The proposal is unlikely to place Swamp Oak Floodplain Forest at risk of extinction.

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,

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Swamp Oak Floodplain Forest only occupies a portion of Toronto Wetland. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. If changes to habitat occur it is likely that the habitat will migrate slightly upslope. There may be a minor loss of habitat along the water edge of Toronto Wetland for the Swamp Oak Floodplain Forest if the average position of the water edge moves slightly upslope. However, this will likely be compensated by an increased area upslope.

Additionally, the water edge currently fluctuates over time. It will tend to recede downslope during dry periods and the size of Toronto Wetland will increase during wet periods as the water edge migrates upslope.

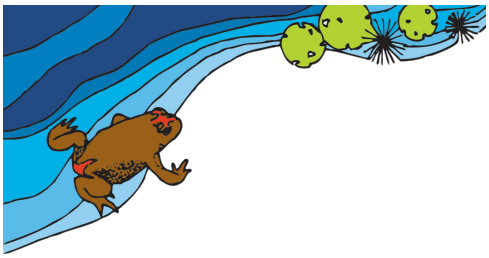
It is unlikely that any area of habitat for Swamp Oak Floodplain Forest will become fragmented or isolated from other areas of habitat because of the proposal.

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,

Low to Negligible. The area of habitat potentially modified by the proposal is relatively small.

Toronto Wetland has some importance for the survival of the ecological community in the locality. The GIS datasets associated with the Greater Hunter Native Vegetation Mapping display other mapped locations of this community including along part of the eastern bank of Stony Creek and near the western shore of Fennell Bay.

The proposal is unlikely to cause any removal, significant adverse modification, fragmentation or isolation of this ecological community within Toronto Wetland. The proposal is unlikely to threaten the survival of the ecological community 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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on Swamp Oak Floodplain Forest. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on Swamp Oak Floodplain Forest in the Sydney Basin Bioregion. Therefore, a BDAR is not recommended.

Threatened Ecological Community – River-Flat Eucalypt Forest on Coastal Floodplains

Scientific name	NSW status	Comm. status
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E	Not listed

Key

E = Endangered Ecological Community

a. in the case of a threatened species, whether the action proposed 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,

Not applicable. This five-part test is for an endangered ecological community.

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

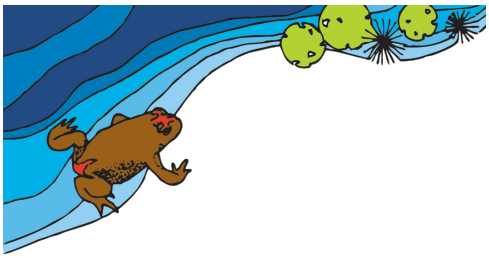
No direct impacts such as clearing of any River-Flat Eucalypt Forest on Coastal Floodplains within Toronto Wetland are included in the proposal.

The proposal includes changes to hydrology. The changes to hydrology may have an impact on Toronto Wetland. However, any impact is likely to be minor.

The proposal is unlikely to have an adverse effect on River-flat Eucalypt Forest such that its local occurrence is likely to be placed at risk of extinction.

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

No. The proposed changes to hydrology may cause a slight change to the patterns of rise and fall of the water surface within Toronto Wetland. These changes are unlikely to have a substantial adverse impact on the composition of River-flat Eucalypt Forest. The proposal is unlikely to place River-flat Eucalypt Forest at risk of extinction.



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,

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. River-Flat Eucalypt Forest only occupies a portion of Toronto Wetland. A (very) small area may be modified due to the proposed changes to hydrology.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. If changes to habitat occur it is likely that the habitat will migrate slightly upslope. There may be a minor loss of habitat along the lower (downslope) edge of the River-flat Eucalypt Forest if the average position of the water edge moves slightly upslope. However, this will likely be compensated by an increased area upslope.

Additionally, the water edge currently fluctuates over time. It will tend to recede downslope during dry periods and the size of Toronto Wetland will increase during wet periods as the water edge migrates upslope.

It is unlikely that any area of habitat for River-flat Eucalypt Forest will become fragmented or isolated from other areas of habitat because of the proposal.

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,

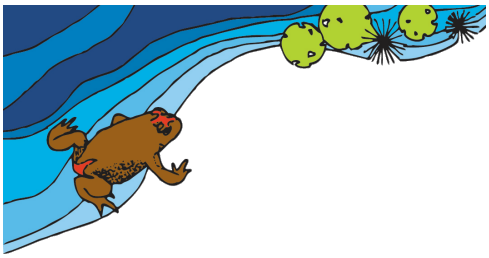
Low to Negligible. The area of habitat potentially modified by the proposal is relatively small.

Toronto Wetland has some importance for the survival of the ecological community in the locality. The document *Volume 2: Vegetation Community Profiles Lake Macquarie Local Government Area – Working Draft v2* prepared by Stephen A.J. Bell (March 2016) provides information about other locations of this community in Lake Macquarie.

The proposal is unlikely to cause any removal, significant adverse modification, fragmentation or isolation of this ecological community within Toronto Wetland. The proposal is unlikely to threaten the survival of the ecological community 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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.



e. **whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

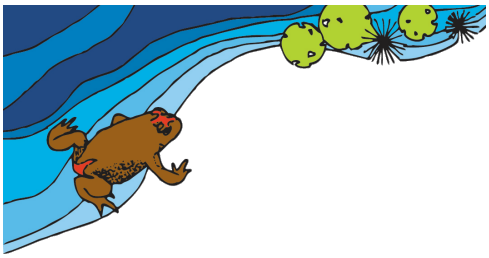
The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on River-Flat Eucalypt Forest on Coastal Floodplains. Key threatening processes are listed in both the NSW BC Act and in Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on River-flat Eucalypt Forest in the Sydney Basin Bioregion.

Therefore, a BDAR is not recommended.



Threatened plant Species

The following threatened plant species have been recorded within a 10 km x 10 km square centred on the site:

Acacia bynoeana,

Angophora inopina,

Caladenia tessellata,

Callistemon linearifolius,

Cryptostylis hunteriana,

Grevillea parviflora subsp. *parviflora,*

Hibbertia procumbens,

Rutidosis heterogama, and

Tetratheca juncea.

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,

No. None of these species were observed on the site or in Toronto Wetland during the survey.

The site is highly disturbed and in general is now dominated by exotic weed species with the occasional occurrence of native species. The proposal is unlikely to have an adverse effect on the lifecycle of these species such that a local viable population would be placed at risk of extinction.

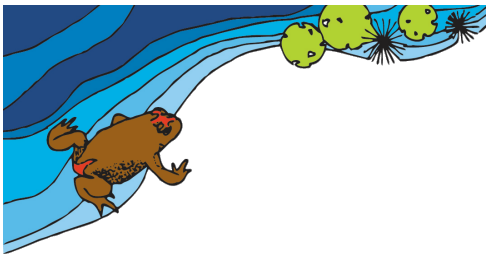
b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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. This test is for a group of 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. This test is for a group of 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 size of the site is approximately 0.6 ha, it is anticipated that all of this will be cleared. This area represents poor or marginal habitat for the threatened plant species assessed in this test.

The size of Toronto Wetland and the adjoining northern watercourse up to Day Street is approximately 4.5 ha. Only a portion of this area represents potential threatened species habitat. A small area may be modified due to the proposed changes to hydrology.

None of the threatened plant species listed above were recorded on the site or within Toronto Wetland and adjoining areas during the survey.

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

No. The habitat for threatened plant species on the site is poor or marginal. The removal of vegetation and modification of the site is unlikely to cause fragmentation or isolation from other areas of habitat for any of the listed threatened plant species assessed in this test.

The proposal also includes potential hydrological impacts on Toronto Wetland. The impacts include potential changes to both the quality and the characteristics of the flow of stormwater flowing from the site to Toronto Wetland. Additionally, there will be a temporary change to groundwater levels near the south-West corner of Toronto Wetland.

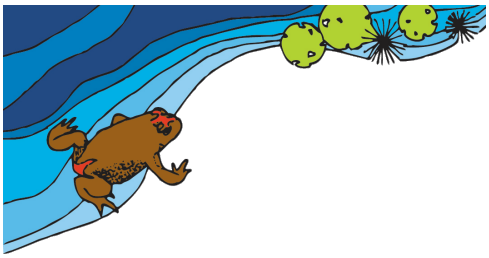
These changes may cause the water levels within Toronto Wetland to fluctuate. However, water levels within Toronto Wetland are already subject to natural fluctuations.

Suitable habitat for the assessed threatened plants is marginal or poor within Toronto Wetland. If suitable habitat occurs within Toronto Wetland it will be the dryland areas and perhaps the slightly damper areas near the water edge. None of the plants assessed in this test are aquatic plants.

It is unlikely that any area of habitat for the assessed threatened plants will become fragmented or isolated from other areas of habitat as a result of the proposal.

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,

Low. None of the threatened plants were observed on the site or within Toronto Wetland. The habitat both within the proposal site and within Toronto Wetland is in general marginal to poor.



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),

No. The site and Toronto Wetland are not included in any declared area of outstanding biodiversity value.

e. whether the proposed development or activity constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Yes. The proposal includes three key threatening processes.

The proposed development will require the "Clearing of native vegetation", as some plant species native to NSW are present on site.

The proposal will temporarily alter groundwater adjacent to Toronto Wetland. Additionally, there will be an alteration of the character of the flow of stormwater to Toronto Wetland. These two changes are included in the description of the key threatening process "Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands".

The proposal will require the clearing the site, inevitably fallen dead wood on the site will be removed. Clearing of deadwood is included in the description of the key threatening process "Removal of dead wood and dead trees".

While the proposal includes three key threatening processes, it is unlikely any of the proposed impacts will have a significant effect on the assessed threatened plants. Key threatening processes are listed in both the NSW BC Act and the Commonwealth's EPBC Act.

Conclusion

The proposed activity is unlikely to have a significant effect on

Acacia bynoeana,

Angophora inopina,

Caladenia tessellata,

Callistemon linearifolius,

Cryptostylis hunteriana,

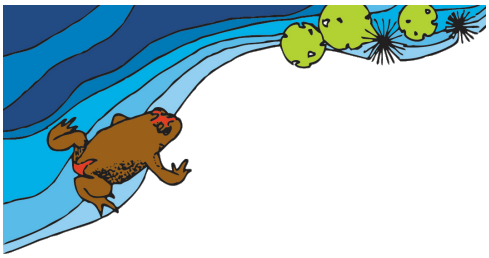
Grevillea parviflora subsp. *parviflora,*

Hibbertia procumbens,

Rutidosis heterogama, and

Tetratheca juncea.

Therefore, a BDAR is not required.



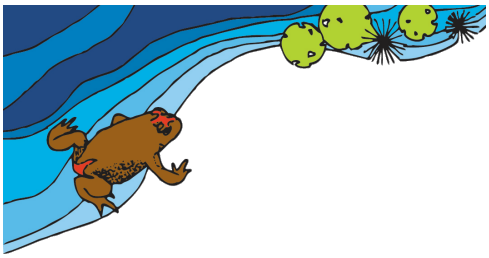
Appendix 2. Flora species list

Two flora lists are provided below. One is for the site the second is for Toronto Wetland. Both lists are extensive but not necessarily completely exhaustive. The field survey was undertaken on the 25 January 2022.

Flora list for the site (114-120 Cary Street, Toronto, 1, 2 & 5 Bath Street, Toronto and 10-12 Bay Street, Toronto)

Note some species were recorded close to the site but may not necessarily be present on-site.

Bryophytes and lichens	
Lichen - Chryothrix candelaris	Moss - Racopilum cuspidatum
Ferns and fern allies	
Chelianthes sieberi	Nephrolepis cordifolia
Gymnosperms – Exotic species	
* Cedrus deodara	
Angiosperms	
Basal angiosperms – Exotic species	
* Cinnamomum camphora	* Persea americana
Monocots – Exotic species	
* Agapanthus sp.	* Cenchrus clandestinus
* Agave americana	* Chloris gayana
* Alstroemeria pulchella	* Cyperus aggregatus
* Anthoxanthum odoratum	* Eragrostis tenuifolia
* Asparagus aethiopicus	* Eragrostis tenuifolia
* Briza subaristata	* Erharta erecta
* Bromus catharticus	* Hyparrhenia hirta
* Canna indica	* Juncus capillaceus



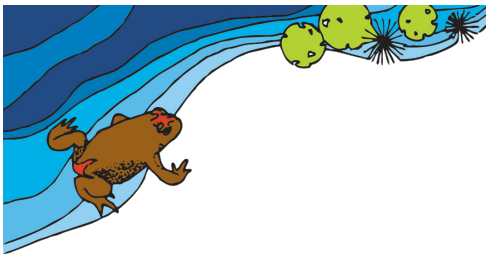
* Juncus cognatus
* Melinis repens
* Nothoscordum gracile
* Panicum maximum
* Paspalum dilatatum
* Paspalum paniculatum
* Paspalum urvelli
* Phoenix canariensis
* Setaria parvifolia
* Stenophratum secundum
* Syagrus romanzoffiana
* Tradescantia albiflora

Monocots – Indigenous species

Commelina cyanea
(Crinum pedunculatum)
Cynodon dactylon
Cyperus mirus
Dianella caerulea var producta
Imperata cylindrica
Juncus (mollis)
Juncus usitatus
Oplismenus aemulus

Eudicots – Exotic species

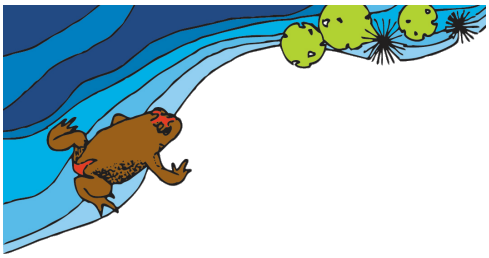
* Ageratina adenophora
* Anagalis arvensis
* Anredera cordifolia
* Aster subulatus
* Bidens pilosa
* Celtis sinensis
* Centarium sp
* Cirsium vulgare
* Conyza sp.
* Cyclophyllum leptophyllum
* Erigeron karvinskianus
* Euphorbia prostrata
* Ficus pumula
* Foeniculum vulgare
* Gamochaeta (americana)
* Gazania rigens
* Hedera helix
* Hypochaeris radicata
* Jacarandah mimosifolia
* Lagerstroemia indica



* Lantana camara
* Ligustrum lucidum
* Ligustrum sinense
* Magnifera indica
* Murraya paniculata
* Nandina domestica
* Nerum oleander
* Ochna serrulata
* Plantago lanceolata
* Polycarpon tetraphyllum
* Portulaca pilosa
* Quercus robur
* Rhododendron sp. (azalea)
* Richardia humistrata
* Rubus anglocandicans
* Senecio madagascariensis
* Senna pendula
* Sida rhombifolia
* Solanum maritanum - seedling
* Sonchus oleraceus
* Taraxacum officinale
* Tecoma stans
* Triadica sebifera (Sapium sebiferum)
* Trifolium repens
* Trifolum deblis
* Verbena bonariensis
* Viburnum tinus
* Vicia sativa

Eudicots – Indigenous species

Acacia longifolia subsp. sophorae
Banksia ericifolia
Calistemon viminalis
Cayratia clematidea
Casuarina glauca
Eucalyptus botryoides
Ficus microcarpa hilli
Geranium sp.
Glochidion ferdinandii
Melaleuca quinquinervia
Melia azedarach
Oxalis sp.
Pittosporum undulatum
Portulaca oleracea
Sannantha (Babingtonia) pluriflora
Solanum americanum



Syzygium australe

Flora list for Toronto Wetland

Note: Only species not previously recorded on the site are listed below. This list also includes species recorded growing in the drain South of the cycling/walking track.

Ferns and fern allies

Azola sp.

Hypolepis muelleri

Pteridium escelentum

Angiosperms

Monocots – Exotic species

(* Aechmea sp.)

* Agave sp.

* Chloris truncata

* Crocosmia x crocosmiiflora

* Cyperus eragrostis

(* Cyperus papyrus)

* Digitaria sanguinalis

* Monstera delicosa

* (Setaria palmifolia)

* Sporobolus africannus

Monocots – Indigenous species

Alisma plantago-aquatica

Alocasia brisbanensis

Carex appressa

Cyperus laevis

(Damasonium minus)

Entolasia marginata

Ficinia nodosa

Gahnia sp.

(Lemna disperma)

Livistona (australis)

Lomandra longifolia

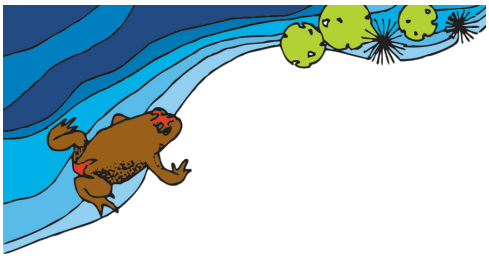
Phragmites australis

Typha sp.

Eudicots – Exotic species

* Acetosa sagitata

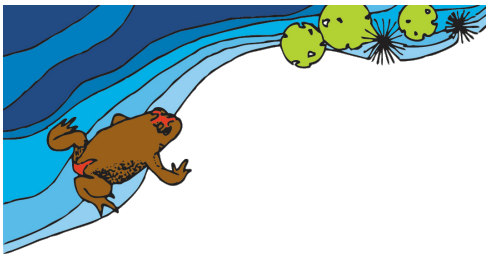
* Ambrosia sp.



* Erechtites valerianifolius	* Medicargo sativa
* Erythrina crista-galli	* Ricinus communis
* Galium aparine	* Trifolium pratense
* Manihot graham	* Verbena officinalis

Eudicots – Indigenous species

(Toona ciliata)	Eclipta prostrata
Acacia frimbriata	Eucalyptus piperita
Acacia parvipinula	Eucalyptus robusta
Acacia podrifolia	Eucalyptus tereticornis
Acmena smithii	Ficus (rubiginosa)
Alphitonia excelsa	Ficus coronata
Alternanthera denticulata	Geranium sp.
Austromyrtus dulcis	Glycine clandestina
Avicennia marina	Hardenbergia violacea
Banksia integrifolia	Kennedia rubicunda
Brachychiton acerifolius	Melaleuca (ericifolia?)
Casuarina glauca - common	Melaleuca erubescens
Centella asiatica	Melaleuca lineariiiolia
Corymbia (torelliana)	Parsonsia straminea
Cupaniopsis anacardioides	Persicaria lapathifolia
Dichondra repens	Viola hederacea



Key

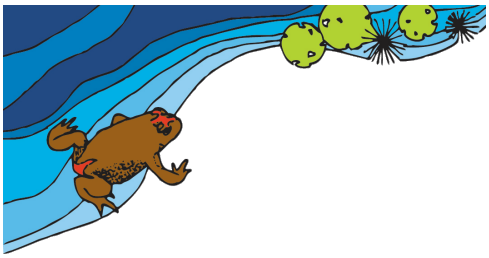
* introduced species

native species not endemic to the remnant plant community

NEALW – National Environmental Alert List Weeds

PW – Priority weeds

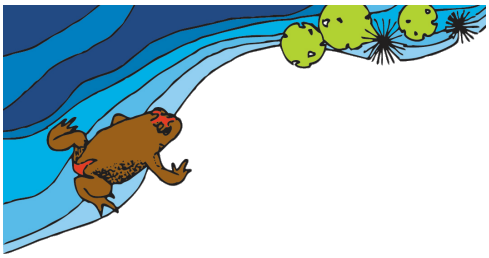
WONS – Weeds Of National significance



Appendix 3. Expected fauna species in the Sydney Basin

Mammals

Common name	Scientific name
White-striped Freetail-bat	*Austronomus australis*
Gould's Wattled Bat	*Chalinolobus gouldii*
Chocolate Wattled Bat	*Chalinolobus morio*
Lesser Long-eared Bat	*Nyctophilus geoffroyi*
Gould's Long-eared Bat	*Nyctophilus gouldi*
Bush Rat	*Rattus fuscipes*
Swamp Rat	*Rattus lutreolus*
Long-nosed Bandicoot	*Perameles nasuta*
Brown Antechinus	*Antechinus stuartii*
Dusky Antechinus	*Antechinus swainsonii*
Yellow-footed Antechinus	*Antechinus flavipes*
Common Wombat	*Vombatus ursinus*
Common Ringtail Possum	*Pseudocheirus peregrinus*
Sugar Glider	*Petaurus breviceps*
Feathertail Glider	*Acrobates pygmaeus*
Eastern Grey Kangaroo	*Macropus giganteus*
Large Forest Bat	*Vespadelus darlingtoni*
Little Forest Bat	*Vespadelus vulturnus*
Common Wallaroo	*Macropus robustus*
Red-necked Wallaby	*Macropus rufogriseus*
Swamp Wallaby	*Wallabia bicolor*
Common Brushtail Possum	*Trichosurus vulpecula*
Greater Glider	*Petauroides volans*
Short-beaked Echidna	*Tachyglossus aculeatus*
Fox	*Vulpes vulpes*
Black Rat	*Rattus rattus*
Rabbit	*Oryctolagus cuniculus*

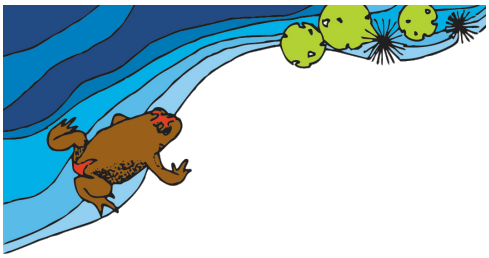


Frogs

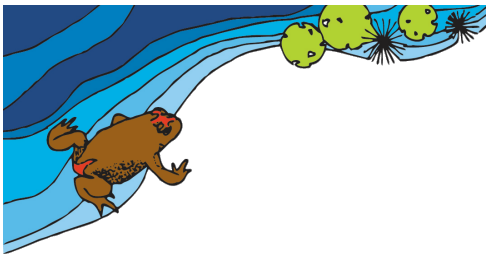
Common Name	Scientific Name
Green Tree Frog	*Litoria caerulea*
Blue Mountains Tree Frog	*Litoria citropa*
Bleating Tree Frog	*Litoria dentata*
Eastern Dwarf Tree Frog	*Litoria fallax*
Jervis Bay Tree Frog	*Litoria jervisiensis*
Broad-palmed Frog	*Litoria latopalmata*
Peron's Tree Frog	*Litoria peronii*
Leaf-green Tree Frog	*Litoria phyllochroa*
Tyler's Tree Frog	*Litoria tyleri*
Verreaux's Frog	*Litoria verreauxii*
Common Eastern Froglet	*Crinia signifera*
Eastern Banjo Frog	*Limnodynastes dumerilii*
Ornate Burrowing Frog	*Limnodynastes ornatus*
Brown-striped Frog	*Limnodynastes peronii*
Spotted Grass Frog	*Limnodynastes tasmaniensis*
Haswell's Froglet	*Paracrinia haswelli*
Smooth Toadlet	*Uperoleia laevigata*
Tyler's Toadlet	*Uperoleia tyleri*

Reptiles

Common Name	Scientific Name
Diamond Python	*Morelia spilota spilota*
Common Death Adder	*Acanthophis antarcticus*
Yellow-faced Whip Snake	*Demansia psammophis*
Common Tree Snake	*Dendrelaphis punctulatus*
Golden-crowned Snake	*Cacophis squamulosus*
Eastern Small-eyed Snake	*Cryptophis nigrescens*
Red-naped Snake	*Furina diadema*
Black-bellied Swamp Snake	*Hemiaspis signata*



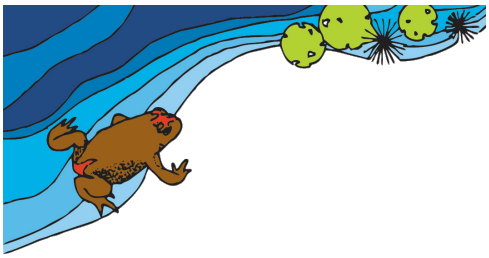
Common Name	Scientific Name
Tiger Snake	*Notechis scutatus*
Red-bellied Black Snake	*Pseudechis porphyriacus*
Eastern Brown Snake	*Pseudonaja textilis*
Dwyer's Snake	*Parasuta dwyeri*
Bandy Bandy	*Vermicella annulata*
Blackish Blind Snake	*Ramphotyphlops nigrescens*
Wood Gecko	*Diplodactylus vittatus*
Lesueur's Velvet Gecko	*Oedura lesueurii*
Broad-tailed Gecko	*Phyllurus platurus*
Thick-tailed Gecko	*Underwoodisaurus milii*
Burton's Snake-lizard	*Lialis burtonis*
Common Scaly-foot	*Pygopus lepidopodus*
Jacky Lizard	*Amphibolurus muricatus*
Bearded Dragon	*Pogona barbata*
Punctate Worm-skink	*Anomalopus swansoni*
Eastern Blue-tongue	*Tiliqua scincoides*
Southern Rainbow-skink	*Carlia tetradactyla*
Cream-striped Shinning-skink	*Cryptoblepharus virgatus*
Robust Ctenotus	*Ctenotus robustus*
Copper-tailed Skink	*Ctenotus taeniolatus*
Mainland She-oak Skink	*Cyclodomorphus michaeli*
Pink-tongued Skink	*Cyclodomorphus gerrardii*
Cunningham's Skink	*Egernia cunninghami*
Black Rock Skink	*Egernia saxatilis*
White's Skink	*Liopholis whitii*
Eastern Water-skink	*Eulamprus quoyii*
Barred-sided Skink	*Eulamprus tenuis*
Dark-flecked Garden Sunskink	*Lampropholis delicata*
Pale-flecked Garden Sunskink	*Lampropholis guichenoti*
Weasel Skink	*Saproscincus mustelinus*
Red-throated Skink	*Acritoscincus platynota*
Three-toed Skink	*Saiphos equalis*



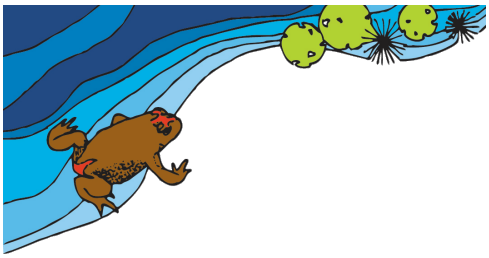
Common Name	Scientific Name
Lace Monitor	*Varanus varius*
Eastern Snake-necked Turtle	*Chelodina longicollis*

Birds

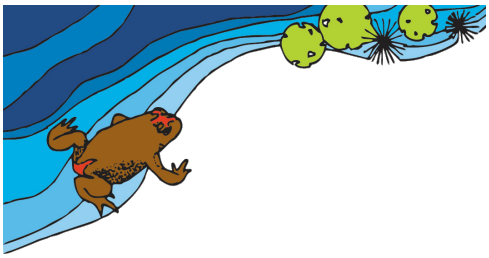
Common Name	Scientific Name
Brown Quail	*Coturnix ypsilophora*
Black Swan	*Cygnus atratus*
Australian Wood Duck	*Chenonetta jubata*
Mallard	*Anas platyrhynchos*
Pacific Black Duck	*Anas superciliosa*
Grey Teal	*Anas gracilis*
Chestnut Teal	*Anas castanea*
Australasian Grebe	*Tachybaptus novaehollandiae*
Great Crested Grebe	*Podiceps cristatus*
Hoary-headed Grebe	*Poliocephalus poliocephalus*
Little Pied Cormorant	*Microcarbo melanoleucos*
Little Black Cormorant	*Phalacrocorax sulcirostris*
Great Cormorant	*Phalacrocorax carbo*
Australian Pelican	*Pelecanus conspicillatus*
White-faced Heron	*Egretta novaehollandiae*
Little Egret	*Egretta garzetta*
White-necked Heron	*Ardea pacifica*
Great Egret	*Ardea alba*
Cattle Egret	*Ardea ibis*
Intermediate Egret	*Ardea intermedia*
Australian White Ibis	*Threskiornis molucca*
Straw-necked Ibis	*Threskiornis spinicollis*
Royal Spoonbill	*Platalea regia*
Black-shouldered Kite	*Elanus axillaris*
Whistling Kite	*Haliastur sphenurus*



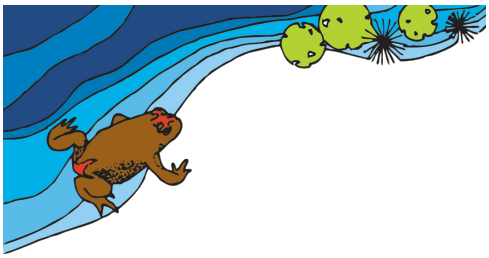
Common Name	Scientific Name
Wedge-tailed Eagle	*Aquila audax*
White-bellied Sea-eagle	*Haliaeetus leucogaster*
Swamp Harrier	*Circus approximans*
Brown Goshawk	*Accipiter fasciatus*
Collared Sparrowhawk	*Accipiter cirrocephalus*
Brown Falcon	*Falco berigora*
Australian Hobby	*Falco longipennis*
Nankeen Kestrel	*Falco cenchroides*
Buff-banded Rail	*Gallirallus philippensis*
Purple Swamphen	*Porphyrio porphyrio*
Dusky Moorhen	*Gallinula tenebrosa*
Eurasian Coot	*Fulica atra*
Latham's Snipe	*Gallinago hardwickii*
Black-winged Stilt	*Himantopus himantopus*
Black-fronted Dotterel	*Elseyornis melanops*
Masked Lapwing	*Vanellus miles*
Silver Gull	*Chroicocephalus novaehollandiae*
Rock Dove	*Columba livia*
White-headed Pigeon	*Columba leucomela*
Spotted Turtle-dove	*Streptopelia chinensis*
Brown Cuckoo-dove	*Macropygia amboinensis*
Emerald Dove	*Chalcophaps indica*
Common Bronzewing	*Phaps chalcoptera*
Crested Pigeon	*Ocyphaps lophotes*
Bar-shouldered Dove	*Geopelia humeralis*
Wonga Pigeon	*Leucosarcia picata*
Topknot Pigeon	*Lopholaimus antarcticus*
Yellow-tailed Black-cockatoo	*Calyptorhynchus funereus*
Galah	*Eolophus roseicapilla*
Long-billed Corella	*Cacatua tenuirostris*
Little Corella	*Cacatua sanguinea*
Sulphur-crested Cockatoo	*Cacatua galerita*



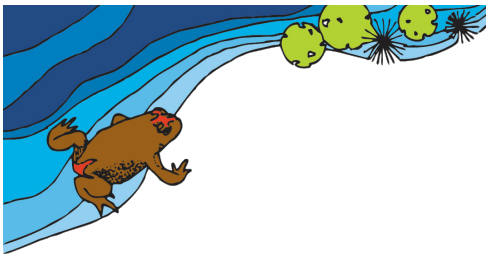
Common Name	Scientific Name
Rainbow Lorikeet	*Trichoglossus haematodus*
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*
Musk Lorikeet	*Glossopsitta concinna*
Australian King-parrot	*Alisterus scapularis*
Crimson Rosella	*Platycercus elegans*
Eastern Rosella	*Platycercus eximius*
Fan-tailed Cuckoo	*Cacomantis flabelliformis*
Horsfield's Bronze-cuckoo	*Chalcites basalis*
Channel-billed Cuckoo	*Scythrops novaehollandiae*
Asian Koel	*Eudynamys scolopaceus*
Southern Boobook	*Ninox novaeseelandiae*
Barn Owl	*Tyto alba*
Tawny Frogmouth	*Podargus strigoides*
White-throated Nightjar	*Eurostopodus mystacalis*
Australian Owlet-nightjar	*Aegotheles cristatus*
White-throated Needletail	*Hirundapus caudacutus*
Laughing Kookaburra	*Dacelo novaeguineae*
Sacred Kingfisher	*Todiramphus sanctus*
Rainbow Bee-eater	*Merops ornatus*
Dollarbird	*Eurystomus orientalis*
Superb Lyrebird	*Menura novaehollandiae*
Satin Bowerbird	*Ptilonorhynchus violaceus*
Superb Fairy-wren	*Malurus cyaneus*
Variegated Fairy-wren	*Malurus lamberti*
Spotted Pardalote	*Pardalotus punctatus*
White-browed Scrubwren	*Sericornis frontalis*
Large-billed Scrubwren	*Sericornis magnirostra*
Brown Gerygone	*Gerygone mouki*
White-throated Gerygone	*Gerygone albogularis*
White-throated Treecreeper	*Cormobates leucophaea*
Brown Thornbill	*Acanthiza pusilla*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*



Common Name	Scientific Name
Yellow Thornbill	*Acanthiza nana*
Striated Thornbill	*Acanthiza lineata*
Buff-rumped Thornbill	*Acanthiza reguloides*
Red Wattlebird	*Anthochaera carunculata*
Little Wattlebird	*Anthochaera chrysoptera*
Noisy Friarbird	*Philemon corniculatus*
Bell Miner	*Manorina melanophrys*
Noisy Miner	*Manorina melanocephala*
Lewin's Honeyeater	*Meliphaga lewinii*
Yellow-faced Honeyeater	*Lichenostomus chrysops*
White-plumed Honeyeater	*Lichenostomus penicillatus*
Brown-headed Honeyeater	*Melithreptus brevirostris*
White-naped Honeyeater	*Melithreptus lunatus*
New Holland Honeyeater	*Phylidonyris novaehollandiae*
Eastern Spinebill	*Acanthorhynchus tenuirostris*
Scarlet Honeyeater	*Myzomela sanguinolenta*
Jacky Winter	*Microeca fascinans*
Rose Robin	*Petroica rosea*
Eastern Yellow Robin	*Eopsaltria australis*
Eastern Whipbird	*Psophodes olivaceus*
Crested Shrike-tit	*Falcunculus frontatus*
Golden Whistler	*Pachycephala pectoralis*
Rufous Whistler	*Pachycephala rufiventris*
Grey Shrike-thrush	*Colluricincla harmonica*
Black-faced Monarch	*Monarcha melanopsis*
Leaden Flycatcher	*Myiagra rubecula*
Restless Flycatcher	*Myiagra inquieta*
Magpie-lark	*Grallina cyanoleuca*
Rufous Fantail	*Rhipidura rufifrons*
New Zealand Fantail	*Rhipidura fuliginosa*
Willie Wagtail	*Rhipidura leucophrys*
Spangled Drongo	*Dicrurus bracteatus*



Common Name	Scientific Name
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
White-bellied Cuckoo-shrike	*Coracina papuensis*
Olive-backed Oriole	*Oriolus sagittatus*
Dusky Woodswallow	*Artamus cyanopterus*
Grey Butcherbird	*Cracticus torquatus*
Australian Magpie	*Cracticus tibicen*
Pied Currawong	*Strepera graculina*
Australian Raven	*Corvus coronoides*
White-winged Chough	*Corcorax melanorhamphos*
Apostlebird	*Struthidea cinerea*
Eurasian Skylark	*Alauda arvensis*
Australasian Pipit	*Anthus novaeseelandiae rogersi*
House Sparrow	*Passer domesticus*
Red-browed Finch	*Neochmia temporalis*
Double-barred Finch	*Taeniopygia bichenovii*
Mistletoebird	*Dicaeum hirundinaceum*
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*Petrochelidon nigricans*
Fairy Martin	*Petrochelidon ariel*
Cicadabird	*Coracina tenuirostris*
Red-whiskered Bulbul	*Pycnonotus jocosus*
Australian Reed-warbler	*Acrocephalus australis*
Little Grassbird	*Megalurus gramineus*
Golden-headed Cisticola	*Cisticola exilis*
Silvereye	*Zosterops lateralis*
Eurasian Blackbird	*Turdus merula*
Common Starling	*Sturnus vulgaris*
Common Myna	*Sturnus tristis*



Appendix 4. Habitat requirements for locally-occurring threatened fauna species

Locally-occurring threatened fauna are defined as:

1. Those species recorded within a 10 km x 10 km square centred on the site;

2. Threatened fauna species recorded since 1 January 1990 within the 10 km x 10 km square.

Birds

Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Rose-crowned Fruit-Dove *Ptilinopus regina* BC Act, Sch. 1., Vul.	Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	The site provides marginal habitat. Toronto Wetlands provides better quality habitat.
White-throated Needletail *Hirundapus caudacutus* BC Act, Sch. 1., Vul.	Spends all or almost all of its time in the air while in Australia. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm (eg termites and ants) or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed.	Probably flies over both the site and Toronto Wetlands on occasions.
Black Bittern *Ixobrychus flavicollis* BC Act, Sch. 1., Vul.	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves.	Some potential habitat occurs within Toronto Wetland. No habitat is present within the site.
White-bellied Sea-Eagle *Haliaeetus leucogaster* BC Act, Sch. 1., Vul.	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh.	Habitat is poor on the site. Better quality habitat exists within Toronto Wetland.
Little Eagle *Hieraaetus morphnoides* BC Act Sch. 1., Vul.	Occupies open Eucalypt forest, woodland or open woodland. She-oak or acacia woodlands and riparian woodlands are also used. Builds a stick nests in winter in tall living trees within remnant patches	Marginal habitat occurs within the site. Better quality habitat occurs within Toronto Wetland.
Eastern Osprey *Pandion cristatus* BC Act Sch. 1., Vul.	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes.	Toronto Wetland provides some habitat.
Pied Oystercatcher *Haematopus longirostris*	Favours intertidal flats of inlets and bays, open beaches and sandbanks.	Toronto Wetland provides some habitat.

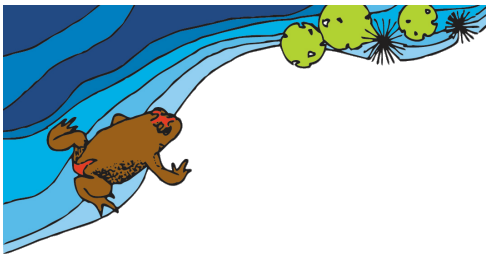
Common name *Scientific name* Schedule listing	Preferred habitat	Comment
BC Act Sch. 1., End.	Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish.	
Sooty Oystercatcher *Haematopus fuliginosus* BC Act Sch. 1., Vul.	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels.	Toronto Wetland provides habitat, perhaps only marginal habitat.
Gang-gang Cockatoo *Callocephalon fimbriatum* BC Act, Sch. 1., Vul.	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands – also in urban areas including parks and gardens. Requires tree hollows for nesting	Marginal habitat occurs on the site. Better quality habitat occurs within Toronto Wetland. However, this species prefers larger less fragmented areas of habitat.
Glossy Black-cockatoo *Calyptorhynchus lathami* BC Act, Sch. 1., Vul.	Found in open forests with Allocasuarina species and hollows for nesting.	Some habitat occurs near the site. Habitat also occurs within Toronto Wetland.
Little Lorikeet *Glossopsitta pusilla* BC Act, Sch. 1., Vul.	Inhabits the open forests and dead timber alongside watercourses. Also occurs in eucalypt forest in mountainous regions.	Suitable foraging habitat occurs on the site and within Toronto Wetland.
Swift Parrot *Lathamus discolor* BC Act, Sch. 1., Vul. EPBC Act, End.	Occurs in a variety of Eucalypt forests. Migrates from Tasmania to the mainland during the winter/autumn months to feed mostly on winter flowering Eucalypts	No suitable foraging habitat occurs on the site. Suitable foraging habitat occurs within Toronto Wetland.
Turquoise Parrot *Neophema pulchella* BC Act, Sch. 1., Vul.	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Marginal habitat occurs on the site and in Toronto Wetland
Barking Owl *Ninox connivens* BC Act, Sch. 1., Vul.	Found in open forests, woodlands, dense scrubs, river red gums and other large trees near watercourses.	Marginal suitable natural habitat occurs on the site. Moderate quality habitat occurs within Toronto Wetland.
Powerful Owl *Ninox strenua* BC Act, Sch. 1., Vul.	Pairs occupy permanent territories in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands and scrubs.	Marginal suitable natural habitat occurs on the site. Moderate quality habitat occurs within Toronto Wetland.
Masked Owl *Tyto novaehollandiae* BC Act, Sch. 1., Vul.	Forests, open woodlands and farms with large trees, e.g. river red gums adjacent to cleared country.	Marginal suitable natural habitat occurs on the site. Moderate quality habitat occurs within Toronto Wetland.
Sooty Owl *Tyto tenebricosa* BC Act, Sch. 1., Vul.	Tall, wet forests in sheltered mountain gullies, usually with an East and South East aspect.	Marginal suitable natural habitat occurs on the site. Moderate quality habitat occurs within Toronto Wetland.
Brown Treecreeper (eastern subspecies)	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and	Marginal habitat occurs on the site and in Toronto Wetland

Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Climacteris picumnus victoriae BC Act, Sch. 1., Vul.	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.	
Regent Honeyeater *Anthochaera phrygia* BC Act, Sch. 1., Crit. End. EPBC Act, Crit. End.	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters 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.	Swamp Mahoganies provide habitat within Toronto Wetland. Marginal habitat within the site.
Varied Sittella *Daphoenositta chrysoptera* BC Act Sch. 1., Vul.	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland	Marginal suitable natural habitat occurs on the site. Better quality habitat occurs within Toronto Wetland.
Dusky Woodswallow *Artamus cyanopterus cyanopterus* BC Act Sch. 1., Vul.	Often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests.	Marginal suitable natural habitat occurs on the site. Moderate quality habitat occurs within Toronto Wetland.

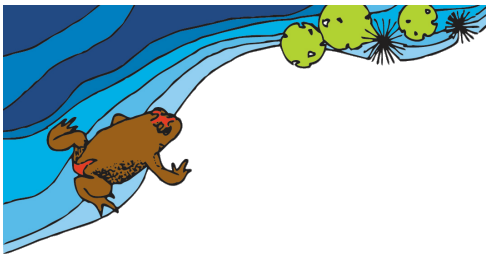
Mammals

Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Spotted-tailed Quoll *Dasyurus maculatus* BC Act, Sch. 1., Vul. EPBC Act, End.	Occurs mostly in sclerophyll forest and woodlands as well as coastal heath lands and rainforests. Requires suitable den sites such as hollows or caves and large areas of intact vegetation.	Marginal habitat occurs on the site and in Toronto Wetland.
Koala *Phascolarctos cinereus* BC Act, Sch. 1., Vul.	Eucalypt forests rich in Swamp Mahogany (E. robusta), Forest Red Gum (E. tereticornis), and Grey Gum (E. punctata).	Marginal habitat occurs on the site and in Toronto Wetland.
Eastern Pygmy-possum *Cercartetus nanus* BC Act, Sch. 1., Vul.	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and	The site does not provide suitable habitat. Marginal habitat occurs in Toronto Wetland.

Common name *Scientific name* Schedule listing	Preferred habitat	Comment
	heath appear to be preferred, except in North-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities.	
Yellow-bellied Glider *Petaurus australis* BC Act, Sch. 1., Vul.	Restricted to tall, mature sclerophyll forests in regions of high rainfall. Requires nesting hollows and a year-round supply of flowering trees.	The site does not provide suitable habitat. Marginal habitat occurs in Toronto Wetland.
Squirrel Glider *Petaurus norfolcensis* BC Act, Sch. 1., Vul.	Inhabits dry sclerophyll forest and woodland. Requires abundant hollow-bearing trees and a mix of Eucalypts, acacias and Banksias. At least one floral species should flower heavily in the winter and one or more species of Eucalypts need to be smooth-barked.	The site does not provide suitable habitat. Marginal habitat occurs in Toronto Wetland.
Grey-headed Flying-fox *Pteropus poliocephalus* BC Act, Sch. 1., Vul. EPBC Act, Vul.	Found in rainforest, wet and dry sclerophyll forest and mangroves. Camps are usually in gullies, close to water and in vegetation with a dense canopy. Feeds on a wide variety of flowering and fruiting plants.	Suitable foraging habitat occurs on the site and in Toronto Wetland.
Eastern Coastal Free-tail Bat *Micronomus norfolkensis* BC Act, Sch. 1., Vul.	Dry sclerophyll forest, woodland, swamp forests and mangrove forests East of the Great Dividing Range. Roosts mainly in tree hollows but will also roost under bark or in man-made structures.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Large-eared Pied Bat *Chalinolobus dwyeri* BC Act, Sch. 1., Vul.	Found in well-timbered areas containing gullies.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Eastern False Pipistrelle *Falsistrellus tasmaniensis* BC Act, Sch. 1., Vul.	Little known of habitat. Has been found roosting in stem holes of living Eucalypts	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Little Bent-winged Bat Miniopterus australis BC Act, Sch. 1., Vul.	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.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Large Bent-winged Bat *Miniopterus orianae oceanensis* BC Act, Sch. 1., Vul.	Well-timbered valleys. Roosts in caves and storm-water channels and similar structures. Does not roost in tree hollows.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland



Common name *Scientific name* Schedule listing	Preferred habitat	Comment
Eastern Freetail-bat Mormopterus norfolkensis BC Act, Sch. 1., Vul.	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests East of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Southern Myotis *Myotis macropus* BC Act, Sch. 1., Vul.	Requires open areas of water over which it hunts. Roosts in caves, under bridges and buildings and sometimes in dense foliage in rainforests. May roost in tree hollows.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Yellow-bellied Sheathtail-bat Saccolaimus flaviventris BC Act, Sch. 1., Vul.	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Foraging habitat occurs on the site. Better quality foraging habitat occurs in Toronto Wetland
Greater Broad-nosed Bat *Scoteanax rueppellii* BC Act, Sch. 1., Vul. EPBC Act, Lower risk (near threatened)	Found in woodlands, moist and dry sclerophyll forests and rainforests. Prefers gullies. Roosts in tree hollows only.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland
Eastern Cave Bat Vespadelus troughtoni BC Act, Sch. 1., Vul.	Very little is known about the biology of this uncommon species. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	Marginal foraging habitat occurs on the site. Suitable foraging habitat occurs in Toronto Wetland



Appendix 5. Habitat requirements for locally-occurring threatened plant species

Locally-occurring threatened flroa are defined as:

1. Those species recorded within a 10 km x 10 km square centred on the site;

2. Threatened flora species recorded since 1 January 1990 within the 10 km x 10 km square.

Botanical name Conservation status	Habitat description	Suitable habitat on site or Toronto Wetland
Acacia bynoeana BC Act, Sch. 1, End. EPBC Act, Vul.	Grows mainly in heath and dry sclerophyll forest, in sandy soils.	Marginal
Angophora inopina BC Act, Sch. 1, End. EPBC Act, Vul.	Occurs most frequently in four main vegetation communities: (i) Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina woodland/forest; (ii) Hakea teretifolia–Banksia oblongifolia wet heath; (iii) Eucalyptus resinifera–Melaleuca sieberi–Angophora inopina sedge woodland; (iv) Eucalyptus capitellata–Corymbia gummifera–Angophora inopina woodland/forest. Is lignotuberous, allowing vegetative growth to occur following disturbance. However, such vegetative reproduction may suppress the production of fruits/seeds, necessary for the recruitment of new individuals to a population, and the time between such disturbance and the onset of sexual reproduction is not known.	Marginal to poor
Caladenia tessellata BC Act, Sch. 1, End. EPBC Act, Vul.	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Marginal
Cryptostylis hunteriana BC Act, Sch. 1., Vul. EPBC Act, Vul.	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland.	Marginal to reasonable
Cynanchum elegans BC Act, Sch. 1, End. EPBC Act, End.	Rare, recorded from rainforest gullies scrub and scree slopes; from the Gloucester district to the Wollongong area and inland to Mt Dangar.	No
Grevillea parviflora subsp. *parviflora* BC Act, Sch. 1., Vul. EPBC Act, Vul.	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. however, other communities occupied include	Marginal

Botanical name Conservation status	Habitat description	Suitable habitat on site or Toronto Wetland
	Corymbia maculata - Angophora costata open forest in the Dooralong area, in Sydney Sandstone Ridgetop Woodland at Wedderburn and in Cooks River / Castlereagh Ironbark Forest at Kemps Creek.	
Hibbertia procumbens BC Act, Sch. 1, End.	Majority of known populations occur within Banksia ericifolia–Angophora hispida–Allocasuarina distyla scrub/heath on skeletal sandy soils. May also be found associated with 'hanging swamp' vegetation communities on sandy deposits.	Marginal
Rutidosis heterogama BC Act, Sch. 1, Vul. EPBC Act, Vul.	Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides.	Marginal
Syzygium paniculatum BC Act, Sch. 1, End. EPBC Act, Vul.	Rainforest and open forest near riparian zones.	No
Tetratheca juncea BC Act, Sch. 1, Vul. EPBC Act, Vul.	It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape.	Marginal

Key

BC Act 2016:

Sch1 = Schedule 1: Endangered species

Part 1: endangered species

Part 2: endangered populations

Part 3: endangered ecological communities

Part 4: species presumed extinct

Sch2 = Schedule 2: Vulnerable species

EPBC Act 1999:

CE = Critically Endangered

E = Endangered

V = Vulnerable

EP = Endangered Population

Appendix 6. Eurofins Environment Testing

Note: The Eurofins Environment Testing report includes three typological errors in the “Client Sample ID” row. The corrections are provided below.

“W2_KERRY STREET STORMWATER” = W2_CARY STREET STORMWATER.

“W3_HILL STREET STORMWATER” = W3_OAK STREET STORMWATER.

“W6_STONEY CREEK” = W6_STONY CREEK

Only the first two pages from the Eurofins Environment Testing Report containing the key results of relevance to this report are provided. The full report is nine pages.

eurofins | Environment Testing

Certificate of Analysis

Aargus Pty Ltd
6 Carter Street
Lidcombe
NSW 2141

NATA Accredited
Accreditation Number 1261
Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Attention: **Nick Kariotoglou**

Report **837227-W**
Project name WATER ANALYSIS
Project ID GS8030
Received Date Oct 28, 2021

Client Sample ID			GW1-GROUND WATER	W2_KERRY STREET STORMWATER	W3_HILL STREET STORMWATER	W4_WETLANDS
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			S21-No04413	S21-No04414	S21-No04415	S21-No04416
Date Sampled			Oct 27, 2021	Oct 27, 2021	Oct 27, 2021	Oct 27, 2021
Test/Reference	LOR	Unit				
Ammonia (as N)	0.01	mg/L	0.11	0.26	0.35	1.6
Dissolved Oxygen	0.01	mg/L	8.6	8.7	5.1	8.0
Oil & Grease (HEM)	10	mg/L	< 10	12	< 10	< 10
pH (at 25 °C)	0.1	pH Units	7.0	7.3	7.5	7.1
Phosphate total (as P)	0.01	mg/L	0.02	0.36	1.6	3.2
Salinity (determined from EC)*	20	mg/L	480	370	290	350
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	570	360	350	390
Total Nitrogen (as N)	0.2	mg/L	0.7	0.8	2.1	4.2
Total Suspended Solids Dried at 103–105°C	5	mg/L	180	70	1000	24
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	0.001	0.002	0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	0.006	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003	< 0.001	< 0.001	< 0.001
Zinc (filtered)	0.005	mg/L	0.071	< 0.005	< 0.005	< 0.005

Client Sample ID			W5_CANALS	W6_STONEY CREEK
Sample Matrix			Water	Water
Eurofins Sample No.			S21-No04417	S21-No04418
Date Sampled			Oct 27, 2021	Oct 27, 2021
Test/Reference	LOR	Unit		
Ammonia (as N)	0.01	mg/L	0.64	0.05
Dissolved Oxygen	0.01	mg/L	3.8	9.3
Oil & Grease (HEM)	10	mg/L	17	14
pH (at 25 °C)	0.1	pH Units	6.6	7.6
Phosphate total (as P)	0.01	mg/L	0.46	0.03
Salinity (determined from EC)*	20	mg/L	100	36000

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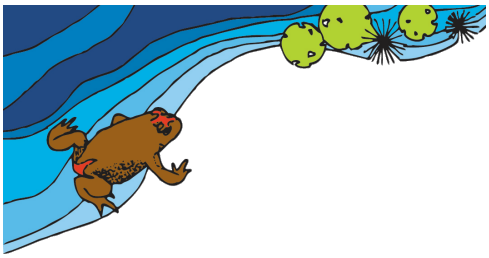
Client Sample ID			W5_CANALS	W6_STONEY CREEK
Sample Matrix			Water	Water
Eurofins Sample No.			S21-No04417	S21-No04418
Date Sampled			Oct 27, 2021	Oct 27, 2021
Test/Reference	LOR	Unit		
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	130	34000
Total Nitrogen (as N)	0.2	mg/L	1.7	0.4
Total Suspended Solids Dried at 103–105°C	5	mg/L	220	13
Heavy Metals				
Arsenic (filtered)	0.001	mg/L	< 0.001	0.002
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	0.001	< 0.001
Zinc (filtered)	0.005	mg/L	0.006	0.005



Appendix 7. Matters of National Environmental Significance

Please see The Protected Matters Search Tool report (May 23 2022) - found in the same folder as this report.

Pages 26 long

Created by Dr Daniel McDonald

Appendix 8. Risk assessment guidelines for groundwater dependent ecosystems

Please see the completed Risk Assessment Guidelines - found in the same folder as this report.

Pages 140 long

Created by Dr Daniel McDonald

Appendix 9. Company Profile

Abel Ecology has been in the flora and fauna consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of five scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 23 January 2023

NPWS GIS data licence number is CON95034

DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 November 2022

DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2022

The Consultancy team

Dr Danny Wotherspoon

BSc, DipEd, MA, PhD, Grad Dip Bushfire Protection,

MECA NSW, MEPLA, MNELA, MESA, MEIANZ, White card.

Danny has practised as an ecological and bushfire consultant since 1991.

He is a consulting ecologist to private developers, State Government agencies and various City Councils on a regular basis, for development applications, government projects, and as expert witness in the NSW Land and Environment Court.

Danny's PhD researched fragmented vegetation and fauna habitat use. He has special expertise in fauna habitat use. Danny has presented invited papers at international conferences since 2001 in Australia, China, South Africa,

Sri Lanka and Israel on his PhD and other research, including golf course habitat management. Danny's scientific papers have been published in both international and Australian academic journals.

Dr Daniel McDonald

BScAgr, MAgr, PhD, Cert IV (GIS), Dip Arb (AQF5), MLinSoc NSW, White card, Snr first aid cert, EWP certificate, QTRA, VTA.

Daniel is an experienced ecologist with expertise in fauna, plant species identification, vegetation assessment, agriculture, conservation genetics and seed collection and preservation. He is accredited both for BioBanking assessments and Biodiversity Certification. His present research interest is in Eastern Suburbs Banksia Scrub and fragmented endangered ecological communities.

Daniel's BAM Assessor Accreditation number is BAAS17056.

Mark Mackinnon

Qualifications: B Env. Sci. (Hons), Grad Dip Bushfire Protection

MEIANZ, White Card,

Accredited Practitioner Level 3 - Bushfire Planning & Design (BPAD), Accreditation number 36395.

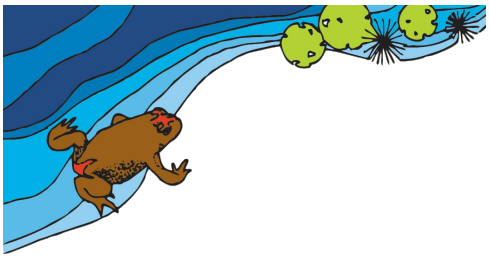
Mark is a passionate and enthusiastic scientist who thrives in the field of natural resource management. He has experience in threatened species, fire ecology, bushfire management, pest plant and animals, and landscape restoration. In particular he specializes in ornithology and bushfire management. Mark has a number of specialized field-based skills including: nest box installation, simple and complex tree climbing, working at heights, general firefighter departmental fire accreditation, venomous snake and reptile handling, immunization to handle bat species, and an A - class bird banding licence with mist-net endorsement. Mark is also skilled in ArcGIS mapping, first-aid, four -wheel-driving.

Dr Warwick Fear

Qualifications: B App. Sci. (Hons); PhD; Grad. Dip. in Bushfire Protection

Bushfire Planning & Design (BPAD), Accredited Practitioner Level 2. Accreditation number 48550, White Card.

Warwick has a background in a number of scientific disciplines and applications. Previous roles include public and private sector work within the human biological sciences and secondary school Science teaching. Warwick has worked within the field of bushfire protection since 2016 and his current role within Abel Ecology is as a Bushfire Scientist.



Dr Alison Hewitt

BSc (Hons), PhD

MESA, MAPS, MASBS, Snr 1st Aid cert, White card

Alison has researched and published on the reproductive biology and ecology of Australian Melaleuca species, native plant responses to fire and the vegetation of western Sydney. Alison's interests include plant ecology and flora survey methodology, bush regeneration, plant identification and gardening. Alison teaches Botany and Ecology sessionally with Western Sydney University.

Alison's BAM Assessor Accreditation number is BAAS19044.

Mark Sherring

BM, MAABR, Cert. Hort., Cert. Bush Regen, Cert. Rural Ops, White Card.

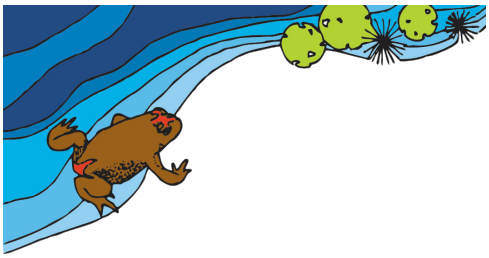
Member of the Australian Association of Bush Regenerators

Mark has extensive knowledge and experience of plant species in New South Wales. He has built up his expert knowledge on NSW native plant species over the many years that he has practised as a Botanist. He is regularly asked to contribute to the extensive (ongoing) flora surveys of the Sydney Basin and Blue Mountains carried out by the Royal Botanic Gardens, Sydney. Mark has extensive field survey experience, having worked for over ten years in various plant-related roles. His role in Abel Ecology is to provide expert advice on flora and on the full range of flora management issues encountered and in the design and management of environmental monitoring projects.

Dr Stephanie Clark

Qualifications: B Sc (Hons), PhD

Stephanie has over 30 years experience in the collection, identification and taxonomy of marine, estuarine, freshwater and terrestrial molluscs. She has conducted numerous targeted surveys for endangered and threatened species (particularly land and freshwater molluscs) in both Australia and the United States. She is particularly interested in the systematics, taxonomy, morphology (external and internal), population and conservation genetics and conservation of molluscs particularly terrestrial (especially the Helicoidea) and freshwater (especially the Hydrobiidae and related families) groups.



Jesse Cass

BSc (Zoology), MEScM (enrolled)

White Card, Working Safely at Heights

Trainee Botanist

Jesse has a bachelor degree and is currently studying his Masters of Environmental Science and Management, online at UNE, as a pathway for a PhD. He is practicing and learning plant identification, as well as fauna identification within the Sydney Basin. His role in Abel Ecology is to provide assistance on field visits and report writing, while gaining knowledge and experience in flora identification.

Nathan Sharman

BSc (Environmental Biology)

Trainee Botanist/Ecologist

Nathan has completed his Bachelor of Environmental Biology at the University of Technology Sydney (UTS). Nathan has experience in bush regeneration, where he developed a strong knowledge of weed species in the Blue Mountains area. He is a keen bushwalker and outdoor enthusiast with a passion for exploring nature. Nathan has roles in both administration and ecology works and is training to become a botanist.

Harry Kirk

BSc (Environmental Biology), Dip., Arb (enrolled)

4WD Training, White Card, NSW LAA (LAA001488)

Trainee Arborist

Harry has a Bachelor of Environmental Biology at the University of Technology Sydney (UTS). Harry has spent the last few years as a Health, Safety & Environment Consultant working on large and national scale projects. Transferring his wide consulting skills to Abel Ecology, Harry has roles in undertaking field work and report writing while completing his Diploma of Arboriculture.