



Figure 6: Vegetation mapping in the study area as per the SMCMA mapping (OEH 2013)



Figure 7: Validated vegetation communities in the study area

4.2.1 Sandstone Ridgetop Woodland

SRW was recorded in the northern parts of the study area. The patch was present in two condition classes.

Moderate to good condition

The patch in good condition was located along the eastern boundary and comprised of *Eucalyptus resinifera* (Red Mahogany) as well as an unidentified *Eucalyptus* sp., with other smaller trees, such as *Polyscias sambucifolia* (Elderberry Panax), and *Pittosporum undulatum* (Sweet Pittosporum) present. The mid-storey was comprised of a mixture of native and introduced species. Native species in the mid-storey included *Acacia* spp., *Allocasuarina littoralis* (Black She-oak), *Banksia* spp., *Bursaria spinosa* (Native Blackthorn), *Dodonaea triquetra* (Large-leaf Hop-bush), *Ozothamnus diosmifolius* (White Dogwood), *Kunzea ambigua* (Tick Bush), *Leptospermum trinervium* (Flaky-barked Tea-tree) and *Callistemon salignus* (Willow Bottlebrush). Introduced species included *Ligustrum lucidum* (Large-leaved Privet), *Ligustrum sinense* (Small-leaved Privet), *Ochna serrulata* (Mickey Mouse Plant), *Lantana camara* (Lantana), and *Senna pendula*. Common native groundcover species were *Lomandra longifolia* (Spiny-headed Mat-rush), *Pteridium esculentum* (Bracken), *Dianella caerulea* (Blue Flax-lily), *Lomatia silaifolia* (Fern-leaved Lomatia), *Lomandra obliqua*, *Lepyrodia scariosa*, *Cyathochaeta diandra*, *Anisopogon avenaceus*, *Entolasia stricta* (Wiry Panic), and *Lindsaea linearis* (Screw Fern).

The SRW is considered to be in good condition, containing few weed species and an intact canopy, mid-storey and ground cover layers. From the biobanking plot conducted within this community, native over-storey cover was estimated as 16%, while native mid-storey and ground cover were both estimated as covering approximately 50%. SRW also contained habitat features such as stags, hollow-bearing trees, and fallen logs, and canopy species were regenerating in the community.

Low condition

The poorer condition patch of this vegetation community has been mapped as occurring in the riparian zone. This area contained *Eucalyptus resinifera*, *Melaleuca* spp., and *Pittosporum undulatum* in the canopy, with biobanking plot data indicating that only 14% of over-storey was native. This area had a very dense shrub layer of exotics interspersed with some native species *Microlaena stipoides*, *Adiantum* spp., *Pteridium esculentum* (Bracken), *Dianella caerulea*, and *Entolasia stricta* occurred in the ground cover. Whilst it could be argued that the extent of weeds and exotics in this patch are enough to include it in the weeds and exotics category, this report includes it as part of the SRW due to the presence of similar over-storey species to the moderate to good condition SRW.

This community is not consistent with any Endangered Ecological Communities (EECs) listed under the TSC or EPBC Acts.



Figure 8: Sandstone Ridgetop Woodland at northern end of the study area

4.2.2 Weeds and Exotics

Along the western boundary of the study area this vegetation category was dominated by bamboo. Whilst some native species were found in these areas, they were very sparse and considered to be of low ecological value.



Figure 9: Weeds and exotics along western boundary of the study area

4.2.3 Sydney Turpentine Ironbark Forest

STIF was recorded within the northern point of the RMS Site, with the majority of the community located adjacent to the RMS Site within Bundara Reserve. Within the RMS Site, the canopy was comprised of *Eucalyptus resinifera*, *Eucalyptus pilularis* (Blackbutt), *Syncarpia glomulifera* (Turpentine), and *Angophora costata* (Sydney Red Gum). *Elaeocarpus reticulatus* (Blueberry Ash), *Allocasuarina torulosa* (Forest Oak), *Melaleuca styphelioides* (Prickly-leaved Tea-tree), and *Notelaea venosa* (Veined Mock-olive) occurred in the mid-storey of the community. The groundcover included native species such as *Microlaena stipoides* (Weeping Grass), *Glycine clandestina*, *Dianella caerulea*, *Hibbertia dentata* (Trailing Guinea Flower), *Oplismenus aemulus*, *Dichondra repens* (Kidney Weed), and *Geranium solanderi* (Native Geranium), as well as introduced species such as *Tradescantia fluminensis* (Trad) and *Ehrharta erecta* (Panic Veldtgrass).

STIF was in good condition in that it comprised of an intact canopy, mid-storey and ground-storey layers, and was dominated by native species. It contained habitat features such as stags, fallen logs, and a deep leaf litter.

This community is listed as an EEC under the TSC Act as Turpentine-Ironbark Forest in the Sydney Basin Bioregion. The patch of STIF however does not meet the definition of Turpentine Ironbark Forest of the Sydney Basin Bioregion under the EPBC Act as the patch is less than 1 hectare.



Figure 10: Sydney Turpentine Ironbark Forest in the vicinity of the RMS Site and Bundara Reserve

4.3 FLORA

A total of 107 flora species were identified within the study area. Of these, 62 were native and 45 species were introduced. A full list of these species can be found in **Appendix B**.

4.3.1 Threatened Flora

No threatened flora species were observed during the field survey, and although there are a number of records in the locality, the study area is unlikely to provide habitat for any of these threatened flora species.

4.3.2 Noxious Weeds

Of the weeds recorded, 14 are declared as noxious in the Ryde City Council area (DPI 2014) under the *Noxious Weeds Act 1993*. Details have been listed below in **Table 2** together with the control class.

Table 2: Noxious weeds present in the precinct

SCIENTIFIC NAME	COMMON NAME	CONTROL CLASS *	WEED OF NATIONAL SIGNIFICANCE
<i>Asparagus aethiopicus</i>	Asparagus fern	4	Yes
<i>Cestrum parqui</i>	Green Cestrum	3	-
<i>Cinnamomum camphora</i>	Camphor Laurel	4	-
<i>Cortaderia selloana</i>	Pampas Grass	3	-
<i>Cyperus sp.</i>	-	5	-
<i>Lantana camara</i>	Lantana	4	Yes
<i>Ligustrum lucidum</i>	Broad-leaf Privet	4	-
<i>Ligustrum sinense</i>	Narrow-leaf Privet	4	-
<i>Ochna serrulata</i>	Mickey Mouse Plant	4	-
<i>Olea europaea subspecies cuspidata</i>	African Olive	4	-
<i>Phyllostachys sp.</i>	Bamboo	4	-
<i>Ricinus communis</i>	Castor oil plant	4	-
<i>Rubus fruticosus</i>	Blackberry	4	-
<i>Senna pendula</i>		4	-
<i>Tradescantia fluminensis</i>	Wandering Dew	4	-

* Control Class 3: The plant must be fully and continuously suppressed and destroyed. Control Class 4: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed. Control Class 5: There are no requirements to control existing plants of Class 5 weeds. However, the weeds are "notifiable" and a range of restrictions on their sale and movement exists.

4.4 FAUNA

A total of nine birds, three non-flying mammals, six bats, two reptiles and two amphibian species were recorded during the field survey of the whole NRSP (**Appendix C**). Species relevant to the study area are discussed below.

4.4.1 Threatened Fauna

Miniopterus schreibersii oceanensis (Eastern Bentwing-bat) was recorded via echolocation within the study area, results from the echolocation analysis are provided in **Appendix D**.

Mormopterus norfolkensis (East Coast Freetail Bat) was recorded via echolocation at the nearby OSL site and the species has the potential to forage within the study area. *Pteropus poliocephalus* (Grey-headed Flying-fox) was also recorded during the field survey of the nearby OSL site and has the potential to forage within the study area.

Eastern Bentwing-bat, East Coast Freetail Bat, and Grey-headed Flying-fox are listed as vulnerable species under the TSC Act. The Grey-headed Flying-fox is also listed as a vulnerable species under the EPBC Act.

4.5 RIPARIAN CORRIDOR

There is one defined riparian corridor at the northern end of the study area along Porters Creek. The riparian corridor has been classified as a 1st order watercourse as per the *Guidelines for riparian corridors on waterfront land* (NoW, 2012). The watercourse, while not being mapped on current 1:25 000 topographic maps, does have characteristics of a 1st order watercourse. Porters Creek essentially receives urban run-off only. It eventually flows into the Lane Cove River adjacent the northern end of Wicks Road, North Ryde. Lane Cover River is the nearest Key Fish Habitat mapped by NSW Fisheries, therefore works on the bed or banks of Porters Creek do not require a Part 7 Fisheries Management Act permit for dredging or obstruction to fish passage. Large sections of culverts occur between the study site and Lane Cover River, therefore the study site is unlikely to be easily accessible to fish. No threatened aquatic species are likely to occur in the study area, or in the immediate downstream reaches of Porters Creek.

The source of the creek is adjacent to the Northern Bushland Park, with water entering from stormwater pipes collecting an urban catchment of North Ryde. The aquatic and riparian habitat of Porters Creek within the reserve is typical of degraded urban streams in the greater region. This is characterised by:

- dense exotic riparian vegetation (e.g. *Ligustrum* species)
- incised channel from fast flowing urban runoff during heavy rain events
- turbid water during higher flows
- warmer water temperature due to heating from an impervious catchment surface
- rubbish flushed into stormwater drains
- potential heavy metals (dissolved or bonded to sediment).

Aquatic and semi-aquatic fauna that inhabit the creek are mostly likely those tolerant of highly disturbed and polluted environments.

The riparian corridor is vegetated with SRW in poor condition. This area contains *Eucalyptus resinifera*, *Melaleuca* spp., and *Pittosporum undulatum* in the canopy, with Biobanking plot data indicating that only 14% of over-storey was native. This area had a very dense shrub layer of exotics interspersed with

some native species. *Microlaena stipoides*, *Adiantum* spp., *Pteridium esculentum* (Bracken), *Dianella caerulea*, and *Entolasia stricta* occurred in the ground layer (**Figure 11**).



Figure 11: Riparian zone along Porters Creek

4.6 FAUNA HABITAT

Despite the disturbed nature of the vegetation the study area provides a range of fauna habitat features which provides potential foraging, roosting, breeding and nesting resources for fauna species. **Table 3** outlines the habitat features present for fauna groups. The locations of hollow-bearing trees are shown in **Figure 7**.

While the Red-crowned Toadlet has been previously recorded on land adjoining the M2 Site, habitat for the species on the M2 site was assessed as poor and unlikely to provide habitat for the species in the long-term.

The subject site contains habitat features that may be used by both diurnal and nocturnal birds, including hollow bearing trees, stags, flowering Myrtaceous trees and shrubs and the Porters Creek watercourse.

Several large hollows and stags are located near the proposed pipeline (**Figure 7**). Removal of hollow-bearing trees should be avoided. Hollow-bearing trees were generally limited within the remainder of the study area. Hollow-bearing trees may provide suitable roosting habitat for threatened microbats species or common urban species (birds and possums) which have previously been recorded within the study area.

Two culverts are located within the north and south of the drainage line may provide roosting or maternity habitat for threatened microbat species. Two threatened microbats species *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat) and *Mormopterus norfolkensis* (East Coast Freetail Bat) and one fruitbat *Pteropus poliocephalus* (Grey-headed Flying-fox) have previously been recorded by ELA. The Grey-headed Flying-fox is likely to utilise the *Eucalyptus* species for foraging. No roosting habitat for this species occurs within the site.

Culverts are frequently utilised by *Myotis macropus* (Southern Myotis). However, no individuals have been recorded within a 10 km radius of the study area. This species requires a permanent water source for foraging and prefers roosting habitat near or above water. Therefore, it is highly unlikely that the Southern Myotis will utilise the study area. The culvert provides suitable roosting habitat during non-breeding seasons for the Eastern Bentwing-bat. This species will migrate in spring – summer to specific maternity caves. The East Coast Freetail Bat may roost in tree hollows within the site which may include maternity roosts.

The vegetation contains potential foraging habitat for the *Ninox strenua* (Powerful Owl), however, no breeding habitat was located. The proposal will remove a small amount of foraging habitat for the Powerful Owls prey items such as *Trichosurus vulpecula* (Brush-tailed Possum) and *Pseudocheirus peregrinus* (Ring-tailed Possum). Both of these species have been recorded within the site.

Table 3: Habitat features present in the study area for fauna groups

HABITAT FEATURE	VEGETATION TYPE	FAUNA GROUP USING HABITAT FEATURE	RMS SITE	M2 SITE
Hollow-bearing Tree / Stag	SRW	Birds, mammals, microchiropteran bats		x
Stag	SRW, STIF	Birds, including birds of prey	x	x

HABITAT FEATURE	VEGETATION TYPE	FAUNA GROUP USING HABITAT FEATURE	RMS SITE	M2 SITE
Flowering Myrtaceous trees and shrubs	SRW, STIF	Foraging resources for birds, mammals and GHFF	x	x
Fallen timber	SRW, STIF	Small mammals, reptiles, and insects	x	x
Leaf litter	SRW, STIF and Weeds and exotics	Amphibians, reptiles, ground-dwelling mammals	x	x
Decorticating bark	SRW, STIF	Microchiropteran bats, reptiles	x	x
Sandstone Watercourse (Porters Creek)	SRW	Amphibians, birds, reptiles, microchiropteran bats	x	
Dense shrubs	SRW	Small birds and birds common to urban environments, ground-dwelling mammals.		x
Dense exotic shrub and vine layers	Weeds and Exotics	Small birds and birds common to urban environments.		x
Aquatic Habitat	SRW, Weeds and Exotics	Amphibians		x

SRW: Sandstone Ridgetop Woodland., STIF Sydney Turpentine-Ironbark Forest

4.7 THREATENED FLORA AND FAUNA SPECIES LIKELY TO BE IN THE STUDY AREA

Based on the desktop assessment and field survey, the following species have known or potential habitat within the study area and have been considered further for potential impacts from the proposal.

Bats

- *Chalinolobus dwyeri* (Large-eared Pied Bat)
- *Miniopterus australis* (Little Bentwing-bat)
- *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat)
- *Mormopterus norfolkensis* (East Coast Free-tail Bat)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat)

Birds

- *Callocephalon fimbriatum* (Gang-gang Cockatoo population)
- *Glossopsitta pusilla* (Little Lorikeet)
- *Ninox strenua* (Powerful Owl)

Migratory Birds

- *Apus pacificus* (Fork-tailed Swift)
- *Hirundapus caudacutus* (White-throated Needletail)

Amphibians

- *Pseudophryne australis* (Red-crowned Toadlet).

5 Avoidance Measures

Avoidance measures in line with Step 4 of the *Guidelines for threatened species assessment* (DEC and DPI 2005) were used in the development of the NRSP DCP. A 30 m vegetated buffer from the top of bank of Porters Creek to any future development is required per **Section 8.6** of the NRSP DCP.

The riparian corridor along Porters Creek within the Northern Bushland Park will be rehabilitated and regenerated following the removal and installation of the gas pipeline consistent with a Vegetation Management Plan.

A raised timber boardwalk and landing are proposed within the riparian corridor on the southern side of Porters Creek. These structures are consistent within the provisions of the NRSP DCP to provide a “*natural landscape of restored bushland for passive recreation*” and “*access to the general public at all times*” (Table 3, NRSP DCP). The impacts of these structures are assessed in **Section 6**.

The Red-crowned Toadlet has been recorded on several occasions immediately adjacent the study area adjacent to proposed Lot 206. Potential habitat was mapped by ELA (2009) within the western portions of Lots 206 and 109. This potential habitat was considered poor and unlikely to provide long term habitat for the species. A 2.4 m drainage easement and an additional 5.6 m setback for buildings from the western boundary, will allow an 8 m buffer to building footprints for the species to potentially continue to use this area.

The construction of the new gas pipeline alignment has avoided any direct disturbance to the two culverts located within the Northern Bushland Park. The culverts may provide roosting habitat for threatened microbat species. Mitigation measures have been provided to reduce indirect impacts on these species (see **Section 7**).

Sydney Turpentine Ironbark Forest will largely be avoided within the RMS Site and Bundara Reserve. Iterations of the pedestrian / cycle bridge have resulted in most direct impacts being avoided. Impacts of this bridge are discussed in **Section 6**.

6 Impact Assessment

This section of the assessment outlines the anticipated direct and indirect impacts from the proposal on the ecological values of the study area. It also provides information on how the proposal contributes to key threatening processes as identified under the provisions of the TSC Act and EPBC Act where relevant.

Impacts have been assessed in accordance with the *Guidelines for threatened species assessment* (DEC and DPI 2005). The key thresholds include:

- *Whether or not the proposal, including actions to avoid or mitigate impacts or compensate for unavoidable impacts, will maintain and improve biodiversity values.*
- *Whether or not the proposal is likely to reduce the long-term viability of a local population of any species, population or ecological community.*
- *Whether or not the proposal is likely to accelerate the extinction of any species, population or ecological community or place it at risk of extinction.*
- *Whether or not the proposal will adversely affect critical habitat.*

Assessment has also been undertaken to determine whether the proposal may have a significant impact on MNES that are listed under the EPBC Act. The following thresholds are used in determining whether the proposal will have a significant impact. If a significant impact is likely, a referral to the Commonwealth Department of Environment (DotE) is required. For migratory birds, the thresholds are:

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will meet any of the following criteria:

- a) *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species*
- b) *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species*
- c) *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

For other threatened species listed under the EPBC Act, the thresholds for significant impact are:

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- a) *lead to a long-term decrease in the size of an important population of a species*
- b) *reduce the area of occupancy of an important population*
- c) *fragment an existing important population into two or more populations*
- d) *adversely affect habitat critical to the survival of a species*

- e) *disrupt the breeding cycle of an important population*
- f) *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- g) *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat*
- h) *introduce disease that may cause the species to decline*
- i) *interfere substantially with the recovery of the species.*

6.1 DIRECT IMPACTS

6.1.1 Vegetation clearing

The proposal would impact on a total of 0.34 ha of moderate to good condition Sandstone Ridgetop Woodland (SRW) and 0.45 ha of poor condition SRW. The proposal would also impact on a total of 1.55 ha of land containing weeds and exotic species. Minor trimming for the construction of the bridge spanning Epping Road will result in the disturbance to 0.02 ha of STIF. As a precautionary approach, this has been included as clearing. In reality, the trimming is unlikely to result in the clearance of trees. The areas to be cleared and retained are summarised in **Table 4**. The remainder of direct impacts occur on already cleared land. The proposed draft Subdivision Plan is shown overlaying vegetation communities and cleared land in **Figure 7**.

In the Northern Bushland Park a vegetation clearance buffer of 2 m has been applied to the edge of the proposed passive recreation infrastructure, to take into account the work zone and potential indirect impacts in this area. The area indirectly impacted is 0.07 ha. Of the 0.45 ha of poor condition SRW impacted under the proposal, approximately 0.07 ha will be removed for the installation and removal of the gas pipeline within the Northern Bushland Park.

Table 4: Cleared and retained areas of vegetation in the study area

VEGETATION COMMUNITY	TOTAL ON SITE (ha)	CLEARED (ha)	RETAINED (ha)
Sandstone Ridgetop Woodland (SRW)			
<i>Moderate to Good Condition</i>	0.34	0.34	0
<i>Poor Condition</i>	0.77	0.45	0.25
Sydney Turpentine Ironbark Forest	0.49	0.02	0.47
Weeds and Exotics	1.55	1.55	0
Total	3.15	2.29	0.86

Note: totals have been rounded.

6.1.2 Loss of threatened flora habitat

No threatened flora was detected and the study area is unlikely to support threatened flora species (see **Appendix A**). Therefore, habitat for threatened flora species would not be lost.

6.1.3 Loss of threatened fauna habitat

The study area provides habitat for a range of threatened fauna species (see **Sections 4.4** and **4.6**). The removal of vegetation, which supports SRW and Weeds and Exotics, would result in the removal of potential habitat including foraging, roosting/sheltering, and breeding habitat for threatened fauna species in the study area. Six hollow-bearing trees representing potential roosting/breeding habitat for East Coast Freetail Bat, Yellow-bellied Sheath-tail Bat, and Little Lorikeet would be removed. There is potential for additional hollow-bearing trees to be removed during the installation of the high pressure gas pipeline, although the alignment of the pipe has tried to avoid their removal where possible.

To mitigate potential impacts to microbats near the culvert within the Northern Bushland Park, it is advised that construction works are conducted outside of the winter period when the bats are in torpor. If works cannot be conducted prior to May, monitoring surveys should be conducted to identify if microbat are using the culvert. If microbats are detected then exclusion measures should be undertaken to minimise potential impacts during construction. Recommended mitigation measures are provided in **Section 7**, below.

The proposal would also result in the loss of approximately 0.29 ha of moderate to poor quality potential habitat for the Red-crowned Toadlet on the western boundary of the study area. The vegetation is mapped as Weeds and Exotics and is adjacent to known records of the species on the adjoining lot. Core areas of this potential habitat may be able to be retained within the proposed 2.4 m drainage easement.

The amount of habitat that would be directly impacted comprises only a small portion of habitat for threatened fauna throughout the locality. Larger areas of habitat are present in the locality, mostly in a band of vegetation to the east of the study area, within the Lane Cove National Park. The impact of this loss of habitat is included in the assessments on individual threatened species in **Appendix E**.

6.1.4 Riparian impacts

The NRSP DCP 2013 requires a 30 m buffer to be provided from the top of bank of Porters Creek to future development. The development footprints have been setback at least 30 m from the top of bank. Vegetation will be managed in accordance with a Vegetation Management Plan and includes a vegetated 30 m buffer to the waterway (**Figure 12**).

Direct impacts within the riparian corridor would occur due to the proposed construction of the retaining wall to Porters Creek adjacent the Spine Road footpath / cycleway and the raised timber boardwalk and landings. Scour protection works will need to occur to prevent siltation downstream. A small section of Porters Creek will require the removal of rock substrate for the installation of the gas pipe. This section will be concreted following the installation of the pipe. During the construction some disturbance to the soil profile may occur. Measures to mitigate impacts are described in **Section 7**.

Short term impacts to water quality and blockage of fish passage may occur during the construction phase of the retaining wall; appropriate mitigation measures are discussed in **Section 7**. The consequence of proceeding with the proposal without a long term solution to stabilise soil in this location via the retaining wall would lead to water quality and sedimentation issues, via erosion and uncontrolled runoff on this slope.

The proposed raised timber boardwalk has the potential to have both short and long term impacts on the riparian corridor. The proposal would require clearing of vegetation within the footprint and a 2 m buffer for access and works would be required. Short term vegetation disturbance, erosion and sedimentation, noise, light and water quality potential impacts would be managed in accordance with a Construction Environmental Management Plan (CEMP). Long term human disturbance factors such as increased noise, light, vegetation disturbance, litter and water quality have been considered in the design. The original proposed extent of passive recreation infrastructure has been reduced to limit access to the southern bank and over a shorter distance. The boardwalk was raised to minimise clearing and allow habitat for shade seeking species. Impacts to nocturnal fauna will be addressed by avoiding lighting of the boardwalk, which may also reduce human disturbance and noise at night. Increased litter would need to be managed within the public open space. Micro-siting of the boardwalk around particular trees will further minimise potential impacts to native vegetation.

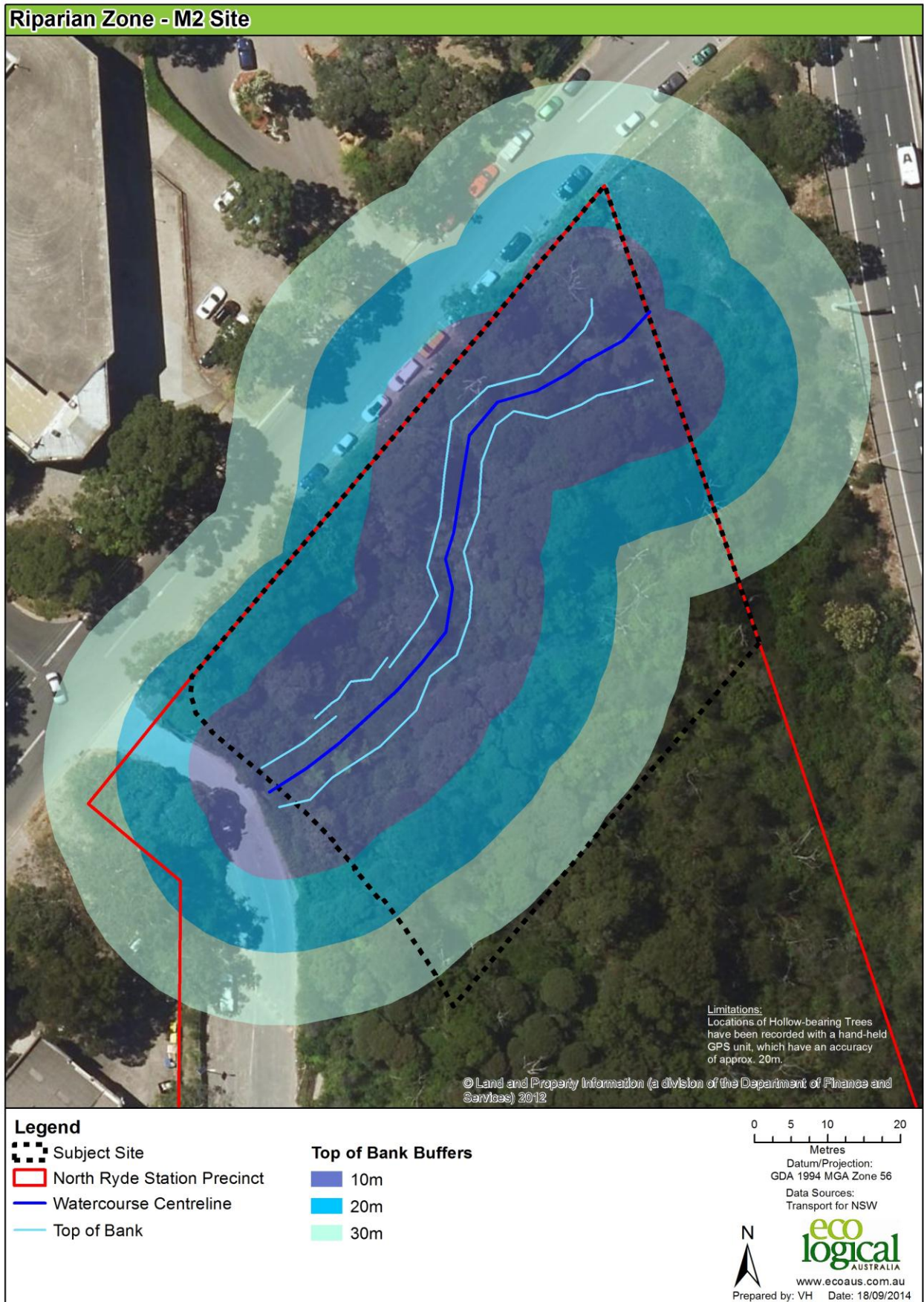


Figure 12: Porters Creek riparian corridor

6.2 KEY THREATENING PROCESSES

The following key threatening processes are considered relevant to the proposal:

- *Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands (TSC Act)*

The proposal would increase the amount of impermeable surfaces which may alter stormwater levels and thus the natural flow of Porters Creek. However, the proposal will retain, protect and rehabilitate the existing riparian area in the north of the study area and include a buffer around the watercourse (no buildings would occur within this buffer area, however a retaining wall and boardwalk for passive recreation are proposed). A Vegetation Management Plan (VMP) has been prepared for the riparian corridor. The proposal will also include source control measures including bioretention raingardens to ensure water quality Water Sensitive Urban Design (WSUD) targets are met. No structures are being built to obstruct or divert water from the creek. Measures to reduce scour following heavy rainfall events will be placed into the creek bed. Mitigation measures to reduce the impact of this activity have been outlined. Given the retention of the riparian corridor and implemented mitigation measures, it is unlikely that the proposal would exacerbate this key threatening process with respect to existing creeks or the downstream catchments of Porters Creek or the Lane Cove River. The construction of the retaining wall within the riparian corridor will provide long term stability of soils adjacent to Porters Creek in this location.

- *Clearing of native vegetation (TSC Act)*

Impacts of the proposal on native vegetation in terms of clearing have been outlined in Section 6.1.1. Given that 0.74 ha of native vegetation would be cleared, the proposal would exacerbate this key threatening process. However, the amount of vegetation to be cleared has been minimised, by conserving vegetation in the north of the study area as far as practicable and that which is being cleared is relatively small in area. Approximately 0.72 ha of the vegetation proposed for clearing does not constitute a threatened ecological community, nor is it regionally or locally significant. A small amount (approximately 0.02 ha) of STIF is to be modified as a result of the bridge construction.

- *Competition and grazing by the feral European rabbit (TSC Act)*

European Rabbit currently inhabits the study area in low numbers. The proposal would disturb vegetated areas which have the potential to harbor feral species such as the European Rabbit. However, the proposal would not exacerbate this key threatening process.

- *Degradation of native riparian vegetation along NSW watercourses (FM Act)*

The proposal has been developed in a manner which minimises the potential impact the Porters Creek riparian corridor. The riparian corridor at present is in poor condition due to weed infestation. The proposal will avoid riparian areas as buildings envelopes will be set back at least 30 m from the top of the bank. Short term impacts due to construction of the retaining wall and raised timber boardwalk and landings will be managed by implementation of a CEMP. Vegetation will be rehabilitated to minimise impacts on the riparian vegetation. This includes establishing a VMP to manage a vegetated riparian buffer of 30 m from top of bank. A VMP has been prepared which will improve the existing condition of the riparian corridor. Erosion and sediment controls will also be placed around construction work areas where there is a risk of sedimentation to the creek lining. Thus, it is likely that the proposal would result in an improvement to the native riparian vegetation.

- *Infection of native plants by *Phytophthora cinnamomi* (TSC Act)*

The proposal will clear vegetation, and the machinery used could carry the spores of the root-rot

fungus, *Phytophthora cinnamomi*, which could result in the infection of native plants. Given that specific mitigation measures have been developed for *P. cinnamomi* (Section 7.2), it is unlikely that native plants will be infected by this fungus.

- *Invasion of native plant communities by exotic perennial grasses (TSC Act)*

There is the potential for the proposal to result in the spread of exotic perennial grasses via vehicle movement throughout the site. A number of mitigation measures (**Section 7**) have been proposed to prevent the spread of weeds and exotic perennial grasses. This will help to reduce the potential for the remaining native vegetation to be invaded by exotic perennial grasses.

- *Loss of hollow-bearing trees (TSC Act)*

The proposal would result in the removal of six hollow-bearing trees and thus, this threatening process would be exacerbated. Despite the removal of hollow-bearing trees, other hollow-bearing trees are present in the locality that could be used by mobile hollow-dependent fauna. The hollows are not developed to the extent that they would be used by larger fauna e.g. Powerful Owl. Mitigation measures for this loss include the establishment of six nest boxes in the riparian corridor (see section 7.2).

- *Predation by feral cats (TSC Act)*

Although they were not recorded during the survey, the presence of feral cats within the study area is likely given the urban matrix. It is unlikely that the proposal would result in increased predation by feral cats.

- *Predation by the European Red Fox (TSC Act)*

The European Red Fox is likely to be present within the study area, although they were not recorded during the survey. The proposal would not exacerbate this key threatening process, with increases due to the proposal likely to be low.

- *Removal of dead wood and dead trees (TSC Act)*

Dead wood is present across the study area and provides habitat for a number of reptile and small mammal species. Dead trees are also present within the study area. The proposal would result in the removal of dead wood and trees in parts of the study area. Thus, this threatening process would be exacerbated. However, dead wood and dead trees are present in the locality and as a mitigation measure; tree hollows and dead wood from the cleared areas are recommended to be relocated to the area being retained.

6.3 INDIRECT IMPACTS

A biodiversity assessment in accordance with the *Guidelines for development adjoining land and water managed by the Department of Environment, Climate Change and Water* (DECCW, 2010) was required by the DGEARs for the following areas:

- Lane Cove National Park particularly those areas within the Porters Creek catchment, downstream of the site
- RMS Site
- Bundara Reserve.

6.3.1 Porters Creek Catchment Area and Lane Cove National Park

The majority of the study area catchment drains to Porters Creek in the north. The Porters Creek catchment area continues downstream and to the north of the study area until it reaches the Lane Cove River approximately 830 m to the northeast. Land within the Porters Creek catchment area is highly disturbed consisting of the M2 Motorway, a Waste Transfer Station, light industrial land use, and public recreation areas owned by Ryde City Council and Crown Land.

Vegetated areas of Lane Cove National Park occur approximately 600 m to the north and 800 m to the east of the study area. There is no continuous corridor of vegetation from the study area to the Lane Cove National Park and fragmented vegetation in this locality is mapped as Weeds and Exotics in the SMCMA mapping (OEH 2013).

No direct impacts from the proposal are expected to occur within the Porters Creek Catchment Area or Lane Cove National Park given proximity of these areas from the study area and separation via the M2 Motorway. Indirect impacts from the proposal are assessed below using the abovementioned guideline.

The guidelines identify a number of issues to be considered (**Table 5**).

Table 5: Issues for development adjoining the Lane Cove National Park

ISSUE	RELEVANCE TO THE PROPOSAL
Erosion and sediment control	Yes. Uncontrolled erosion and deposition of sediments from construction activities has the potential to smother aquatic habitats and block watercourses. Mitigation measures identified in Section 7 will be implemented to prevent sedimentation of Porters Creek and potential downstream impacts on the Lane Cove River. No impacts from direct deposition of materials would occur due to physical separation of these areas from the study area by the M2 Motorway.
Stormwater run-off	Yes. Stormwater run-off from the study area drains along Porters Creek to the Lane Cover River. Construction related stormwater run-off will be managed by appropriate sediment and erosion controls, including sedimentation basin treatment to minimise impacts to the Porters Creek riparian corridor within the study area.

ISSUE	RELEVANCE TO THE PROPOSAL
	Effective implementation and maintenance of these controls will also serve to minimise impacts downstream. Urban development has the potential to impact on downstream environments due to increased run-off and poor water quality. The proposal is implementing a Water Sensitive Urban Design (WSUD) approach which is described in the Stormwater/WSUD report and which will also include an Integrated Water Cycle Management Plan (IWCMP). The WSUD approach involves designing stormwater management to achieve the water quality targets outlined in Managing Urban Stormwater – Environmental targets (DECC 2007). Source control measures include gross pollutant traps and bioretention 'raingardens' that will minimise indirect impacts on both the Porters Creek Catchment Area and Lane Cove River downstream of the study area. WSUD targets have also been incorporated into the Sustainability Strategy for the NRSP.
Wastewater	No. Site will be connected to wastewater system.
Management implications relating to pests, weeds and edge effects	Yes. The study area contains a large number of weed and exotic species along the western boundary of the study area and at the northern end which drains to Porters Creek, likely due to the edge effects created by previous vegetation clearing. A new edge will be created along the boundary of the proposed reserve of SRW in the north of the study area, due to clearing of vegetation for Lot 201. A Vegetation Management Plan (VMP) has been prepared and is currently being reviewed to assess future management of native vegetation and weeds, in order to improve the existing bushland within the northern portions of the study area along the riparian corridor. The VMP provides for the removal of weeds and reinstatement of native species in this area and will therefore improve the existing vegetation both within the study area and minimise the potential for weeds to carry downstream. Due to proximity from the study area no additional edge effects or increased presence of pests would occur for vegetation within the Porters Creek Catchment or Lane Cove National Park.
Fire and the location of asset protection zones	No asset protection zones for fire management would be required within Council or Crown land in Porters Creek Reserve or Lane Cove National Park. Due to its proximity from the study area, increased fire risk to vegetation outside of the study area would not occur due to the proposal.
Boundary encroachments and access through DECCW land	No. Site does not adjoin or require access through the Lane Cove National Park.

ISSUE	RELEVANCE TO THE PROPOSAL
Visual, odour, noise, vibration, air quality and amenity impacts	See technical reports for Visual, Acoustic and Air Quality. Urban development has the potential to increase disturbance of flora and fauna via noise and light spill which is particularly relevant to nocturnal fauna. The Porters Creek riparian corridor within the study area is likely to support nocturnal fauna. Mitigation measures are addressed in Section 7.2 and include lighting to be directed away from these areas and avoidance of lighting within the riparian corridor. The impact of light and noise has been taken into account in the assessments on threatened species (Appendix E).
Threats to ecological connectivity and groundwater dependent ecosystems	No. The SRW vegetation within the study area has limited connectivity to vegetation in the north or east, due to development of the M2 Motorway. Vegetation to the north and east is mapped as Weeds and Exotics (OEH 2013) and is therefore unlikely to be of important ecological connectivity, given the expanse of available connecting habitat within the Lane Cove National Park. There are no Groundwater Dependant Ecosystems within the Porters Creek Catchment that would be impacted upon by the proposal.
Cultural heritage	See technical report for Heritage (European and Aboriginal).

6.3.2 Bundara Reserve and the RMS Site

Bundara Reserve is located approximately 40 m to the south of the study area on the opposite side of a major road (Delhi Road). The Porters Creek catchment does not drain towards this reserve.

Vegetation within Bundara Reserve and on the RMS Site is Sydney Turpentine-Ironbark Forest (STIF). This community is listed as an EEC under the TSC Act as Turpentine-Ironbark Forest in the Sydney Basin Bioregion. The patch of STIF however does not meet the definition of Turpentine Ironbark Forest of the Sydney Basin Bioregion under the EPBC Act as the patch is less than 1 hectare. An assessment pursuant to the EP&A Act has been conducted and is available in Appendix E.

Indirect impacts from the proposal are assessed below using the abovementioned guideline.

The guidelines identify a number of issues to be considered (**Table 6**).

Table 6: Issues for development adjoining Bundara Reserve and RMS Site

ISSUE	RELEVANCE TO THE PROPOSAL
Erosion and sediment control	Yes. Bundara Reserve and the RMS Site may be subject to indirect impacts relating to sediment or erosion control. This would be as a result of the construction works for the pedestrian / cycle bridge. Mitigation measures identified in Section 7 will be implemented to minimise these potential impacts.
Stormwater run-off	Yes.

ISSUE	RELEVANCE TO THE PROPOSAL
	Bundara Reserve and the RMS Site may be subject to indirect impacts of stormwater run-off during the construction phase for the pedestrian / cycle bridge. Potential impacts may include scour from heavy downpour events.
Wastewater	No. The M2 Site will be connected to wastewater system and this will not impact on either Bundara Reserve or the RMS Site.
Management implications relating to pests, weeds and edge effects	Yes. No trees are to be removed, thus not increasing fragmentation at these sites. Some overshadowing of the bridge may result in an increase in shade loving plants. Measures to mitigate this potential impact have been included in Section 7. The construction of the pedestrian bridge is not expected to result in increases in vertebrate pest species. Movement of weed seeds into Bundara Reserve may occur during construction. Erosion and sedimentation measures may limit spread via water. Vehicles and site personnel should adopt a 'clean on entry' protocol.
Fire and the location of asset protection zones	No. Bundara Reserve and the RMS Site have not been identified as bushfire prone lands. No asset protection zones for fire management would be required within Bundara Reserve.
Boundary encroachments and access through DECCW land	Not applicable. The proposed works do not adjoin or require access through DECCW land.
Visual, odour, noise, vibration, air quality and amenity impacts	See technical reports for Visual, Acoustic and Air Quality. Bundara Reserve has been subject to construction related noise and light impacts. The existing continuous noise and light impacts on Bundara Reserve from Delhi Road are unlikely to be increased such that nocturnal species using the STIF vegetation within the reserve would be significantly impacted by the proposal. No floodlights will be erected on the bridge. Lighting on the bridge will be directional and follow the 'dark sky' principle.
Threats to ecological connectivity and groundwater dependent ecosystems	No. Bundara reserve is currently disconnected from native vegetation. The proposal will not decrease connectivity. There are no Groundwater Dependant Ecosystems that would be impacted upon by the proposal. Although NOW consider that STIF may be a GDE, the proposed construction of the bridge is not a water extractive activity.

ISSUE	RELEVANCE TO THE PROPOSAL
Cultural heritage	See technical report for Heritage (European and Aboriginal).

7 Mitigation Measures

7.1 VEGETATION MANAGEMENT PLAN

A Vegetation Management Plan (VMP) has been prepared for areas of retained native vegetation within the Porters Creek riparian corridor. The VMP includes standard management actions including:

- Collection of seed from SRW native vegetation proposed to be cleared at the northern end of the study area
- Weed control
- Management of human disturbance
- Retention of regrowth and remnant native vegetation
- Replanting or supplementary planting where natural regeneration will not be sufficient
- Retention of dead timber
- Erosion control and bank stabilisation
- Retention of rocks.

The principal area of activity will be the Porters Creek riparian corridor within the study area. This 0.36 ha site will be rehabilitated in accordance with a VMP prepared in accordance with the NSW Office of Water *Guidelines for vegetation management plans on waterfront land* (NoW, 2012). The VMP will be prepared in conjunction with the passive recreation infrastructure proposed for the riparian corridor. Within this area selected exotic vegetation will be removed and replanted with native vegetation that is suitable to a riparian environment. Where possible, seeds collected from the site will be used.

7.2 LANDSCAPING OF OPEN SPACE

In addition to the areas of native vegetation to be managed in accordance with the VMP, vegetation will be planted within the proposed Central Park and Linear Park areas. Whilst these plantings are not considered ecological communities, they may provide foraging and nest opportunities for birds and bats. These park areas are shown in **Figure 2**.

7.3 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

As the proposal would clear a portion of the existing vegetation within the proposed development footprint, recommended mitigation measures are primarily related to reducing impacts to retained vegetation in the study area within proposed park areas and impacts on other aspects of the environment e.g. waterways and catchments, air quality. The mitigation measures and ecological management procedures are outlined in **Table 7** and are recommended for implementation during the pre-construction, construction and operational phases of the proposal to reduce impacts on threatened species and ecological communities via preparation of a Construction Environmental Management Plan (CEMP).

Table 7: Mitigation measures during the pre-construction, construction and operational phases

ITEM	MITIGATION MEASURE / ECOLOGICAL MANAGEMENT PROCEDURE	TIMING
1. Site-specific environmental induction	Ensure that all staff working on the proposal will undertake a site-specific environmental induction. The induction should include items such as: • Sensitivity of vegetation in the Porters Creek riparian corridor and adjacent Northern Bushland Park • Sensitivity of Sydney Turpentine Ironbark Forest at Bundara Reserve and the RMS Site • Site environmental procedures (vegetation management, sediment and erosion control, protective fencing, noxious weeds, avoidance of bedrock disturbance) • Presence of threatened fauna species located within hollow-bearing trees and culverts (within the Northern Bushland Park) • What to do in case of emergency (sediment fence failure, injured fauna) • Key contacts in case of environmental emergency e.g. WIRES, Sydney Wildlife Rescue	Pre-construction and during construction for new staff
2. Identification of clearing limits	Accurately and clearly mark out the limits of clearing and trees / vegetation to be retained. Identify, retain and protect trees close to the work areas which are at risk during construction and install protective fencing (temporary fluoro orange 'para-web' fencing or similar). This high visibility fencing would reduce risk during construction phases of the development. Do not store materials / vehicles under the drip-line (canopy) of retained vegetation.	Pre-construction
3. Pre clearing survey	Qualified ecologist to conduct pre-clearing surveys of habitat trees in Sandstone Ridgetop Woodland (SRW) within the site and the weed infested areas adjoining the Red-crowned Toadlet habitat on the western boundary of the M2 site. Pre-clearing surveys required prior to conducting scour protection works.	Pre and during construction
4. Clearing of vegetation	Where trees require felling, retain the timber, particularly sections with hollows - as Coarse Woody Debris for enhancement of the riparian corridor. If hollow-bearing trees are to be removed, an ecologist should be present to safely relocate uninjured fauna to the retained vegetation on-site. A nest box of equivalent dimensions should be installed to compensate for the removal. Cease work immediately if any previously unknown threatened flora or fauna species are encountered. WIRES or Sydney Wildlife Rescue should be consulted if any injured fauna are encountered.	Construction
5. Nest boxes	Construct and place six nest boxes in the riparian corridor. Boxes should be designed for use by micro-chiropteran bats and side entrance nest boxes for possums. Nest boxes should be installed prior to the removal of vegetation.	Pre-construction
Threatened fauna species	Avoid construction works within the Northern Bushland Park during	Pre and during construction

ITEM	MITIGATION MEASURE / ECOLOGICAL MANAGEMENT PROCEDURE	TIMING
	winter. During construction within the Northern Bushland Park outside of winter, works should stop if bats are seen flying out of culvert or if dead bats are found (note wildlife handling should only be done by qualified and vaccinated ecologists). If bats are observed, including any clicking or chattering sounds emanating from the culvert, an ecologist should be called to establish what is occurring in the culvert. Works should also stop in this case. If winter cannot be avoided then: ○ Ecologist to monitor microbat activities up to 2 nights prior to construction activity using echolocation device and stag watches. ○ Observations should be done as close as possible to construction commencing but allowing for 2 nights of observation. This is because the bats may not have a high fidelity to the site. If observations occur too far in advance, there is a risk that bats may move into the culvert between observation and work commencing. ○ A 'one-way' valve should be placed at the entrance closest to works. If no microbat activity then no additional mitigation measures are required. ○ If bats are observed, then the entrance to remain closed for the duration of works that produce noise and vibration. Noise producing equipment, dust or lights are not to be directed near the culvert. Removal of vegetation should be inspected for bird or possum nests. If located, a qualified wildlife handler should be on-site prior to removal. Any hollow bearing trees must be inspected by an ecologist prior to removal.	
6. Management of erosion and sediment control	Provide appropriate controls to manage exposed soil surfaces and stockpiles to prevent erosion and subsequent sediment discharge into surrounding areas including the Porters Creek and Lane Cove River catchments and endangered ecological community at the RMS Site and Bundara Reserve. Clearly identify stockpile and storage locations and provide erosion and sediment controls around stockpiles. Stockpiles of topsoil to be stored in windrows no higher than 2m and be maintained free of weeds. Undertake dust suppression where required in accordance with the <i>Protection of the Environment Operations Act 1997</i> (POEO Act) where there is a risk of increased dust outside of acceptable levels	Pre and during construction
7. Riparian Areas	Clearly demarcate riparian areas from construction / work areas and protect riparian areas with para-web fencing or similar. No access or works would occur outside the 2 m works buffer to the retaining wall or boardwalk.	Pre and during construction

ITEM	MITIGATION MEASURE / ECOLOGICAL MANAGEMENT PROCEDURE	TIMING
	Ensure all works within proximity to riparian zones and sensitive vegetation have adequate sediment and erosion controls, in particular construction of the retaining wall, scour protection structures, raised boardwalk and cycle / pedestrian bridge. Do not store any materials / vehicles within the riparian zone, drip zone of trees or the 30 m creek buffer zone. Works are to be timed to avoid heavy rain periods and no works are to be conducted during rain events. Soils must be immediately stabilised following works to prevent sedimentation of Porters Creek. During scour protection works, do not disturb bedrock. Within the creek, ensure backfilling restores the channel shape and bed level to preconstruction condition. Repair the creek bed and bank to mimic existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse. Bank stabilisation works are required immediately after the construction works to prevent soil erosion.	
8. Stormwater Management	Incorporate stormwater management techniques that control stormwater quality by adopting stormwater treatment measures to remove gross pollutants, including sediments, from urban runoff to mimic pre-construction water quality, minimising impacts on downstream receiving waters.	Pre, post and during construction
9. Site office and plant storage	Ensure these areas are located outside of vegetated areas. No stockpiling or storage of plant and equipment in the drip zones of trees and sensitive vegetation at Bundara Reserve and the RMS Site.	During construction
10. Light Management	No night works would be allowed within the riparian corridor or near the sensitive vegetation at Bundara Reserve and the RMS Site. Use low-pressure sodium lamps instead of high-pressure sodium or mercury lamps where lights are required, where possible. Restrict column heights such that lights are mounted at the lowest heights possible. Avoid lighting of the Northern Bushland Park Reserve raised timber boardwalk and landings to minimise light spill to the riparian corridor and to minimise human disturbance at night. Use directional lighting on the pedestrian bridge to limit light spill into the Bundara Reserve and RMS Site. Do not use any floodlighting in this area.	During and post construction

ITEM	MITIGATION MEASURE / ECOLOGICAL MANAGEMENT PROCEDURE	TIMING
11. Weed and Phytophthora Management	Establish and implement a Hygiene Protocol for vehicles entering and leaving the sites to minimise spread of weeds and other biological risks such as <i>Phytophthora</i> management protocol Inspect all construction machinery and vehicles and thoroughly clean with a high pressure hose or similar prior to entry to site so that no vegetative matter or soil is brought onto the site in tacks or wheels Implement inspection/maintenance procedures to reduce the carriage of weed material on machinery. Implement the Vegetation Management Plan (VMP) within 3 months of completion of works within the Northern Bushland Park to prevent establishment of weeds. The VMP will be in operation for three years from date of initiation. Urban Growth NSW should consider supporting Bushcare works at Bundara Reserve to mitigate against increases in shade loving plants. This should be done in consultation with Ryde City Council's Bushcare Officer.	Pre, post and during construction
12. Monitoring	Develop a monitoring program during construction (including a weekly checklist) to ensure that all mitigation measures proposed have been undertaken. The checklist should include items such as fencing and sediment and erosion control.	Pre, during and post construction
13. Creek repair works	• Within the creek, ensure backfilling restores the channel shape and bed level to preconstruction condition. • Repair the creek bed and bank to mimic existing or natural hydraulic, hydrologic, geomorphic and ecological functions of the watercourse.	During construction
14. Revegetation works	• Bank stabilisation works are required immediately after construction works to prevent soil erosion. • The VMP should be implemented within 3 months of the completion of works to prevent establishment of weeds. • VMP will be in operation for three years from initiation.	Post-construction

8 Conclusions

The proposal is located within a highly urbanised area on land that has limited ecological values due to past disturbance. The proposal will impact on 0.79 ha of Sandstone Ridgetop Woodland which is potential habitat for threatened fauna including bats, birds and one frog species. The construction of the pedestrian bridge will result in the trimming of branches of the EEC Sydney Turpentine Ironbark Forest. This has been estimated at 0.02 ha. These impacts are unlikely to be significant at a local or regional scale and will be mitigated via implementation of a CEMP and Vegetation Management Plan that will rehabilitate riparian SRW within the M2 Site. The developer should consider contributing to Bushcare works in the Bundara Reserve to mitigate against potential impacts as a result of shading from the bridge. Due to the small amount of clearing of native vegetation, an off-site offset is not considered necessary as a mitigation measure.

Off-site impacts on the nearby Porters Creek Catchment Areas, Lane Cove National Park and Bundara Reserve are expected to be minor. Further, the implementation of the VMP in the riparian corridor will improve the condition of the riparian corridor and reduce the weed source that currently exists in this area which drains to Porters Creek.

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Appendix A: Likelihood of Occurrence Tables

Five terms for the likelihood of occurrence of species are used in this report, as defined below:

- “yes” = the species was or has been observed in the study area
- “likely” = a medium to high probability that a species uses the study area
- “potential” = suitable habitat for a species occurs in the study area, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- “unlikely” = a very low to low probability that a species uses the study area
- “no” = habitat in the study area and in the vicinity is unsuitable for the species.

NAME	STATUS		HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE
	TSC ACT	EPBC ACT		
VEGETATION COMMUNITIES				
Blue Gum High Forest of the Sydney Basin Bioregion			A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum <i>Eucalyptus saligna</i> and Blackbutt <i>E. pilularis</i> . Forest Oak <i>Allocasuarina torulosa</i> and Sydney Red Gum <i>Angophora costata</i> also occur. Species adapted to moist habitat such as Lillypilly <i>Acmena smithii</i> , Sandpaper Fig <i>Ficus coronata</i> , Soft Bracken <i>Calochlaena dubia</i> and Maiden Hair <i>Adiantum aethiopicum</i> may also occur. Contains many more species and other references should be consulted to identify these. Originally restricted to the ridgelines in Sydney's north from Crows Nest to Hornsby, and extending west along the ridges between Castle Hill and Eastwood. In 2000, there was less than 200 ha remaining (about 4.5% of its original extent). It only occurs in small remnants of which the largest is	No
	CE	CE		

NAME	STATUS		HABITAT ASSOCIATIONS	LIKELIHOOD OF OCCURRENCE
	TSC ACT	EPBC ACT		
			less than 20 ha. The remnants mainly occur in the Lane Cove, Willoughby, Ku-ring-gai, Hornsby, Baulkham Hills, Ryde and Parramatta local government areas. An example of Blue Gum High Forest can be seen at the Dalrymple-Hay Nature Reserve, St Ives (OEH 2011b).	
Turpentine-Ironbark Forest in the Sydney Basin Bioregion	E	CE	Occurs in Sydney and is heavily fragmented, with only 0.5% its original extent remaining intact. Remnants mostly occur in the Baulkham Hills, Hawkesbury, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Wollondilly local government areas. Good examples can be seen in small reserves such as Wallumatta Nature Reserve and Newington Nature Reserve. Occurs close to the shale/sandstone boundary on the more fertile shale influenced soils, in higher rainfall areas on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus. A transitional community, between Cumberland Plain Woodland in drier areas and Blue Gum High Forest on adjacent higher rainfall ridges (OEH 2011b).	Known
Western Sydney Dry Rainforest and Moist Woodland on Shale		CE	The Western Sydney Dry Rainforest and Moist Woodland on Shale ecological community ranges from a dry rainforest with a closed non-eucalypt canopy that transitions into a moist Western Sydney Dry Rainforest and Moist Woodland on Shale woodland with a relatively more open canopy dominated by eucalypts (TSSC, 2013).	No