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Dear Sarah

Flora and fauna assessment addendum for North West Treatment Hub

Project no. 40658

Biosis Pty Ltd was commissioned by Sydney Water to complete a flora and fauna assessment addendum to describe the ecological values and constraints associated with the proposed construction of a compound site (Lot 5 DP 1158760) and adjacent access road (part of Lot 3 DP 251094) at Money Close, Rouse Hill (the study area) in New South Wales (NSW). The flora and fauna assessment addendum will also consider the reduction in impacts associated with the removal of a proposed sludge pipeline between the Castle Hill Water Resource Recovery Facility (WWRF), Rouse Hill WRRF, and Riverstone WWRF that was previously included as part of the North West Treatment Hub (NWTH) growth project. The addendum is required to inform a Review of Environmental Factors Addendum (REFA), to be prepared by Sydney Water, under Part 5 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

Flora and fauna addendum

Biosis understands that Sydney Water proposes to construct the additional compound site to facilitate the upgrade of the Rouse Hill WRRF which forms part of the NWTH growth project. The proposed access road will be approximately 350 metres long, extending from the proposed compound site to the northern end of the Rouse Hill WRRF (Appendix 1 Figure 1). It is understood that approximately 120 metres of this road, beginning from the proposed compound site, will be permanent. The remaining length will be used to provide temporary access to the northern end of the Rouse Hill WRRF. It is understood that all vegetation will be removed from the study area, with the exception of vegetation fringing the north-east boundary, which will be trimmed by 10%.

The objective of this flora and fauna assessment addendum is to determine the presence of any threatened ecological communities (TECs) within the study area and, where applicable, assess the impacts of the project on any threatened species, populations and/or ecological communities (entities), or their habitat, listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Biodiversity Conservation Act 2016* (BC Act).

This flora and fauna assessment addendum will discuss the addition of the new site compound and access road within the main sections of this report. The associated reduction in biodiversity impacts due to the removal of the sludge pipeline will only be discussed in under the later section headed, *Updated impacts for the NWTH growth project*.

Background

The study area is approximately 1.33 hectares and is defined as being the entirety of Lot 5 DP 1158760 (the proposed compound site), as well as a strip of Lot 3 DP 251094 (the proposed access road), adjacent and parallel to the Rouse Hill WRRF. The study area is within the Hills Shire Council Local Government Area (LGA)

The study area is situated within an industrial estate, with both it and the surrounding land zoned as E4 – General Industrial under *The Hills Local Environmental Plan 2019*. The study area consists of mostly cleared vegetation in the south of the proposed compound site and intact native vegetation along northern boundary of the proposed compound site and the proposed access road (Appendix 1 Figure 1). The study area is connected to a large patch of vegetation in the north which connects to the vegetated riparian corridor associated with Second Ponds Creek, a Strahler Order 3 watercourse.

Method

Database and literature review

Prior to completing the field investigation, information provided by Sydney Water as well as other key information was reviewed, including:

- Australian Commonwealth Department of Climate Change, Energy, the Environment and Water (Cth DCCEEW) Protected Matters Search Tool for matters protected by the EPBC Act.
- NSW Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) BioNet Atlas of NSW Wildlife, for items listed under the BC Act.
- The NSW Department of Primary Industries (DPI) Spatial Data Portal for *Fisheries Management Act 1994* (FM Act) listed threatened species, populations and communities.
- The NSW DPI WeedWise database for *Biosecurity Act 2015* listed priority listed weeds for the Greater Sydney Local Land Services (LLS) area.
- NSW DCCEEW Vegetation Information System (VIS) mapping, including.
  - *State Vegetation Type Map* (DPE 2023).
  - *Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (SCIVI)* (Tozer et al. 2010).
  - *Remnant Vegetation Mapping of the Cumberland Plain (crown cover less than 10%). VIS_ID 2222* (DCCEEW 2010).

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *Biodiversity Conservation Act 2016* (BC Act).
- *Local Land Services Act 2013* (LLS Act).

- *Biosecurity Act 2016* (Biosecurity Act).
- *Water Management Act 2000* (WM Act).
- *Fisheries Management Act 1994* (FM Act).
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP).
- State Environmental Planning Policy (Central River City) 2021 (Central River SEPP).
- *The Hills Local Environmental Plan 2019* (LEP).
- *The Hills Development Control Plan 2012* (DCP).

Field investigation

A field investigation of the study area was undertaken on 16 April 2024 by Todd Horton and Dylan Mason. Vegetation within the study area was surveyed using the random meander technique (Cropper 1993) over three person hours.

General classification of native vegetation in NSW used in this report is based on the classification system in Keith (2004), which uses three groupings of vegetation: vegetation formation, vegetation class and vegetation type, with vegetation type the finest grouping. The grouping referred to in this report is Plant Community Type (PCT) as defined by the Biodiversity Assessment Method (BAM) (DPIE 2020). Further to this, revised PCTs for Eastern NSW were publicly released in June 2022 and finalised in early 2023 by the NSW DCCEEW. Therefore, this assessment has adopted these revised 'new' PCTs.

The vegetation types, within the study area, were stratified into PCTs broadly based on previous vegetation mapping, and the vegetation boundaries marked with a hand-held GPS in the field. Appropriate PCTs were selected on the basis of species composition and structure, known geographical distribution, landscape position, underlying geology, soil type, and any other diagnostic features.

A habitat-based assessment was completed to determine the presence of suitable habitat for threatened species previously recorded (NSW DCCEEW 2024a) or predicted to occur (Cth DCCEEW 2024) within 5 kilometres. This list was filtered according to species descriptions, life history, habitat preference and soil preference to determine those species most likely to be present within the study area.

Results

The study area is located approximately 80 metres from Second Ponds Creek, in a landscape comprised of industrial land use. Regional soil landscape mapping indicates that the study area occurs on the residual soils of the Blacktown soil landscape (NSW DCCEEW 2024b). The Blacktown soils landscape is characterised by clay and loam soils derived from Wianamatta and Hawkesbury shales. Mapping indicates that the study area occurs close to the intergrade between the residual soils of the Blacktown soil landscape and the erosional soils of the Gymea soil landscape. The Gymea soil landscape is characterised by sandy loam soils derived from Hawkesbury sandstone (NSW DCCEEW 2024c). The composition of the soil is highly influential on the vegetation communities observed.

At the time of the field investigation, the weather was partly cloudy, with temperatures between 22-24°C. Apart from the north-west and north-east edge of Lot 5 DP 1158760, the whole of this lot was observed to have been historically cleared and raised and consisted of largely exotic vegetation (Appendix 2 Photo 7). The north-west and north-east edges were found to consist of intact native vegetation (Appendix 2 Photo 8). The remainder of the study area consisted of intact native vegetation which connected to the vegetated riparian

corridor associated with Second Pond Creek (Appendix 2 Photo 9). The study area was found to be intersected by mountain bike trails which were being actively used at the time of the field investigation. These tracks consisted of trails, berms, and jumps which involved some historical minor earthworks and removal of native vegetation (Appendix 2 Photo 10).

The cleared portion of the study area in the south was noted as being dominated by introduced species, with some introduced species also scattered throughout the intact native vegetation. Five of these species were identified as being priority weeds within the Greater Sydney LLS Region. A complete list of flora species recorded at the study area can be found in Appendix 3.

During the field investigation, a single adult Wedge-tailed Eagle *Aquilla audax* was observed flying above the study area. Several Noisy Miners *Manorina melanocephala* were also observed in the canopy within the study area.

No threatened species were recorded during the field investigation.

Vegetation communities

The vegetation at the study area comprised of several vegetation types including:

- PCT 3616 Sydney Hinterland Grey Gum Transition Forest.
- PCT 3320 Cumberland Shale Plains Woodland, which forms part of the following TECs:
  - *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (Critically Endangered Ecological Community [CEEC], EPBC Act).
  - *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act).
- PCT 3321 Cumberland Shale-Sandstone Ironbark Forest, which forms part of the following TECs:
  - *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (CEEC, EPBC Act).
  - *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* (CEEC, BC Act).
- Urban native/exotic vegetation.

A key focus of the field investigation was to assess the vegetation of the study area against the final determinations for the above listed TECs to determine presence or absence. The structure, floristic composition and condition of these communities are described in Table 1 to Table 4 below. A list of flora recorded within the study area as well as associated photos are provided in Appendix 2 (photos) and Appendix 3 (flora species list).

Table 1 Vegetation communities of the study area – PCT 3616 Sydney Hinterland Grey Gum Transition Forest

PCT 3616	
PCT	PCT 3616 Sydney Hinterland Grey Gum Transition Forest.
Extent within study area	Approximately 0.34 ha of this community occurs throughout the study area. Of this, 0.02 ha was found to be in a high condition, with the remaining 0.32 ha found to be in a moderate condition.

PCT 3616	
Description	In the high condition zones, this PCT occurred as an open woodland, with canopy species including Narrow-leaved Apple *Angophora bakeri*, Hard-leaved Scribbly Gum *Eucalyptus sclerophylla*, and Black She-Oak *Allocasuarina littoralis*. The midstory of this zone was dominated by Native Blackthorn *Bursaria spinosa* subsp. *spinosa*, Narrow-leaved Wattle *Acacia linearifolia*, and Narrow-leaved Geebung *Persoonia linearis*. The grassy understory was dominated by Weeping Grass *Microlaena stipoides* var. *stipoides* and Blady Grass *Imperata cylindrica*. In areas of moderate condition, the woodland was shrubby, with much less grass cover and weed ingress evident, particularly adjacent to the mountain bike tracks which ran throughout this condition zone. The canopy of this zone was found to be dominated by Hard-leaved Scribbly Gum *Eucalyptus sclerophylla* and Grey Gum *Eucalyptus punctata*. The midstory was dominated by Needlebush *Hakea sericea*, Large Mock-olive *Notelaea longifolia*, and Tickbush *Kunzea ambigua*. The groundcover was sparse and mostly rocky, with some Bushy Hedgehog-grass *Echinopogon caespitosus* and Threeawn Speargrass *Aristida vagans* present. Weed species included African Lovegrass *Eragrostis curvula* and Moth Vine *Araujia sericifera*, which were both found along the fence of the existing treatment plant.
Previous 'legacy' PCT	PCT 1081 Red Bloodwood - Grey Gum woodland on the edges of the Cumberland Plain, Sydney Basin Bioregion.
Threatened ecological community	Not listed. This PCT is not associated with any TECs. Previous assessments of the study area have stated this community is consistent with PCT 3629 – Castlereagh Scribbly Gum Woodland which is associated with the TECs *Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion* (Endangered, EPBC Act) and *Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion* (Vulnerable, BC ACT). However, we have assigned PCT 3616 due to species composition (such as low abundance of *Melaleuca* spp., and a high grass cover), as well as soil composition and landscape position. Additionally, historical plot data has been made available for assessment, which has been used for the modelling of PCT 3616 within the study area (NSW DCCEEW 2024d).
Pictures	 **Photo 1 High condition PCT 3616 in the study area with a grassy understory**

PCT 3616	
	 **Photo 2 Moderate condition PCT 3616 in the study area with a shrubby understory**

Table 2 Vegetation communities of the study area – PCT 3320 Cumberland Shale Plains Woodland

PCT 3320	
PCT	PCT 3320 Cumberland Shale Plains Woodland.
Extent within study area	Approximately 0.06 ha of this community occurs in a low condition throughout the study area.
Description	This is a grassy woodland community found on shale-derived soils on the undulating terrain of the Cumberland Plain, in the Sydney Basin Bioregion. This community comprises a tall, open eucalypt canopy with few shrubs in the mid-strata and a ground cover dominated by grasses and sedges. The low condition vegetation was impacted by historic vegetation removal and weed incursion associated with the construction and maintenance of the mountain bike track and the proximity of the patch to the boundary of the Rouse Hill WRRF. The canopy of this community was open and dominated by Forest Red Gum *Eucalyptus tereticornis*. The midstory was sparse, including Native Blackthorn and Rough Saw-sedge *Gahnia aspera*. The grassy understory of this community was dominated by native Blady Grass and Weeping Grass, and exotic Whisky Grass *Andropogon virginicus*. Other exotic weeds found in this community included Paddy's Lucerne *Sida rhombifolia*, Wild Tobacco Bush *Solanum mauritianum*, and Moth Vine.
Previous 'legacy' PCT	PCT 849 Cumberland shale plains woodland.
Threatened ecological community	**BC Act**: Listed; all 0.06 ha of this PCT was found to meet the key diagnostic thresholds for *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC). **EPBC Act**: Not listed; no parts of this PCT were found to meet the condition thresholds outlined in the Listing Advice for the EPBC Act Listed CEEC *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* (TSSC 2009) as the patch size is <0.5 ha and was not found to support a understory of more than 30% native perennial flora species.

Picture	 **Photo 3 Low condition PCT 3320 in the study area**

Table 3 Vegetation communities of the study area – PCT 3321 Cumberland Shale-Sandstone Ironbark Forest

PCT 3321	
PCT	PCT 3321 Cumberland Shale-Sandstone Ironbark Forest.
Extent within study area	Approximately 0.03 ha of this community occurs in a low condition throughout the study area.
Description	This community occurs in the Sydney basin at the intergrade between clay-rich soils derived from shale and coarse sandy substrates derived from sandstone. This community is a tall open sclerophyll forest with a canopy typically consisting of Grey Gum and Narrow-leaved Ironbark *Eucalyptus crebra*. The midstory is usually dominated by Acacia species along with Prickly Beard-heath *Leucopogon juniperinus* and Narrow-leaved Geebung, and the ground story by Weeping Grass and Whiteroot *Lobelia purpurascens*. The moderate condition vegetation in the study area was present as a tall community, with a medium density shrub layer. This community was wholly restricted to the north-eastern boundary of Lot 5 DP 1158760. This community was found to have a canopy layer dominated by Grey Gum and Red Ironbark *Eucalyptus fibrosa* over a midstory dominated by Hickory Wattle *Acacia implexa*, Tickbush, White Dogwood *Ozothamnus diosmifolius*, Gorse Bitter Pea *Daviesia ulicifolia*, Cherry Ballart *Exocarpos cupressiformis* and Narrow-leaved Geebung. The ground cover in this community was found to be dominated by the native species Spiny-headed Mat-rush *Lomandra longifolia*, Kidney Weed *Dichondra repens,* Whiteroot, Mulga Fern *Cheilanthes sieberi* subsp. *sieberi* and the exotic species Parramatta Grass *Sporobolus africanus* and Whisky Grass.
Previous 'legacy' PCT	PCT 1395 Cumberland Shale - sandstone Ironbark Forest.
Threatened ecological community	**BC Act**: Listed; all 0.03 ha of this PCT was found to meet the key diagnostic thresholds for *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* (CEEC). **EPBC Act**: Not listed; no parts of this PCT were found to meet the condition thresholds outlined in the Listing Advice for the EPBC Act Listed CEEC *Shale Sandstone Transition Forest*

	of the Sydney Basin Bioregion (DoE 2014) as the patch was <0.5 ha.
Pictures	 **Photo 4 Moderate condition PCT 3321 in the study area**

Table 4 Vegetation communities of the study area – Urban Native/Exotic Vegetation

Urban Native/Exotic Vegetation	
PCT	Urban Native/Exotic.
Extent within study area	Approximately 0.91 ha of Urban Native/Exotic vegetation was recorded in the study area. This was predominantly confined to the site of the proposed compound facility in the east of the study area.
Description	At the study area, Urban Native/Exotic vegetation was found to exist as a large area of exotic grassland and adjacent patch of woody weeds growing in a swale in the south-west portion of the study area. The exotic grassland patch was dominated by African Lovegrass and Parramatta Grass. This grassland was interspersed with Cobbler's Pegs *Bidens pilosa* and Purpletop *Verbena bonariensis*. The native species Kidney Weed was found to persist in the ground cover, with some isolated White Wattle *Acacia linifolia* also found to occur. In the swale, the dominating woody weeds included Large-leaved Privet *Ligustrum lucidum* and African Olive *Olea europaea* subsp. *cuspidata*. This patch of Urban Native/Exotic vegetation was also found to accommodate some exotic climbing species including Climbing Nightshade *Solanum seaforthianum* and had an understory of mostly Goosegrass *Galium aparine*.
Threatened ecological community	No associated TECs.

Pictures

Photo 5 Urban Native/Exotic vegetation in the study area present as exotic grassland

Photo 6 Urban Native/Exotic vegetation in a swale in the south-west portion of the study area

Threatened species

Background searches identified 42 threatened flora species and 76 threatened fauna species recorded (NSW DCCEEW 2024a) or predicted to occur (Cth DCCEEW 2024) within 5 kilometres of the study area. Those species considered most likely to have habitat within the study area based on the background research are as follows.

Flora

- *Darwinia biflora* (Vulnerable, EPBC Act and BC Act).
- Hairy Geebung *Persoonia hirsuta* (Endangered, EPBC Act and BC Act).
- *Pimelea curviflora* var. *curviflora* (Vulnerable, EPBC Act and BC Act).

Fauna

- Dural Land Snail *Pommerhelix duralensis* (Endangered, EPBC Act and BC Act).
- Glossy Black Cockatoo *Calyptorhynchus lathami* (Vulnerable, EPBC Act and BC Act).
- Gang-gang Cockatoo *Callocephalon fimbriatum* (Endangered, EPBC Act and BC Act).
- Powerful Owl *Ninox strenua* (Vulnerable, BC Act).
- Large Bent-winged Bat *Miniopterus orianae oceanensis* (Vulnerable BC Act).
- Large-eared Pied Bat *Chalinolobus dwyeri* (Endangered EPBC Act and Vulnerable BC Act).
- Eastern False Pipistrelle *Falsistrellus tasmaniensis* (Vulnerable BC Act).
- Eastern Coastal-Free-tailed Bat *Micronomus norfolkensis* (Vulnerable BC Act).
- Little Bent-winged Bat *Miniopterus australis* (Vulnerable BC Act).
- Eastern Freetail-bat *Mormopterus norfolkensis* (Vulnerable BC Act).
- Southern Myotis *Myotis Macropus* (Vulnerable BC Act).
- Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* (Vulnerable, BC Act).
- Greater Broad-nosed Bat *Scoteanax rueppellii* (Vulnerable, BC Act).
- Eastern Cave Bat *Vespadelus troughtoni* (Vulnerable, BC Act).
- Yellow-bellied Glider (*Petaurus australis)* (Vulnerable, BC Act).
- Cumberland Plain Land Snail *Meridolum corneovirens* (Endangered, BC Act).
- Grey-headed Flying Fox *Pteropus poliocephalus* (Vulnerable, EPBC Act and BC Act).

An assessment of the habitat values of the study area is provided in Table 5 for threatened flora species and Table 6 for threatened fauna species.

Table 5 Assessment of habitat for threatened flora species

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
Darwinia biflora	Has been recorded approximately 1.1 km from the study area. *Darwinia biflora* is usually found along the edges of weathered shale-capped ridges near an intergrade with Hawkesbury sandstone.	Not detected during the field investigation. In addition, potential habitat for this species has been subject to previous edge effects which have significantly reduced the quality of the habitat.
Persoonia hirsuta	Dated record approximately 165 m from the study area. Reliable records exist approximately 2 km from the study area. *Persoonia hirsuta* occurs in dry sclerophyll forest on soils derived from sandstone and rarely shale. Known to be locally dense in other areas in the Hills Shire Council LGA, particularly around Baulkham Hills.	Not detected during field investigation, despite being in the survey window. Potential habitat for this species has been subject to previous edge effects which have significantly reduced the quality of the habitat.
Pimelea curviflora* var. *curviflora	Recorded approximately 350 m from the study area. *Pimelea curviflora* var. *curviflora* is found in open woodlands on soils in shale-	Not detected during field investigation, despite being in the tail end of the survey window. Potential habitat for this species has been

Species	Local distribution and habitat requirements	Likelihood of occurrence or impact
	sandstone transition boundaries, often growing amongst dense grasses and sedges.	subject to previous edge effects which have significantly reduced the quality of the habitat.

Based on the size of the study area, the survey effort is considered comprehensive to assess the presence of the flora species outlined in Table 5. Taking all of these factors into consideration, there is a low likelihood of occurrence for the above listed species.

Table 6 Assessment of habitat for threatened fauna species

Habitat feature	Threatened fauna association	Likelihood of occurrence or impact
Feed trees	Angophoras, Eucalypts and other flowering perennial species recorded in the study area may provide nectar resources suitable for a range of arboreal and flying fauna (such as Yellow-bellied Glider and Grey-headed Flying-fox) whilst in flower. The Swamp Oak trees and *Eucalyptus* spp. within the study area may provide foraging resources for the Glossy Black Cockatoo and Gang-gang Cockatoo.	Based on the transient nature of the Glossy-Black Cockatoo and the Gang-gang Cockatoo species, the quantity of surrounding resources and connectivity within the landscape the removal of 1.33 ha is not likely to be an impact to these species. Additionally, due to the lack of hollow-bearing trees within the study area, these cockatoos are only likely to utilise the area as opportunistic foraging. Similarly, as the nearest Grey-headed Flying-Fox camp is approximately 23 kms away, this species is likely to only use these resources as opportunistic foraging resources. Due to context of foraging resources in the broader landscape, it is unlikely that the removal of 1.33 ha would impact this species. Due to the opportunistic nature of the Yellow-bellied Glider and the large quantity of suitable foraging habitat surrounding the study area, the removal of this vegetation is unlikely to be an impact to this species. Additionally, given the proximity of the existing industrial works, noise and light disturbance is likely to further limit the species presence on site.
Hollow-bearing trees	There are no hollow-bearing trees mapped within the study area.	Due to the absence of hollow-bearing trees within the study area, the likelihood of occurrence and potential for impact to species utilising these features is negligible. Hollow-dependent species including Glossy-Black Cockatoo, Gang-gang Cockatoo, Powerful Owl, Eastern False-Pipistrelle, Eastern Coastal Free-tailed Bat, Eastern Freetail Bat, Southern Myotis, Yellow-bellied Sheath tail-bat, Greater Broad-nosed Bat, and Yellow-bellied Glider therefore do not require further assessment relating to breeding habitat.
Rocky outcrops	There are no cliffs, rocky outcrops or other geological features mapped within the study area.	Due to the absence of rocky outcrops within the study area, the likelihood of occurrence and potential for impact to species utilising these features is negligible.

Habitat feature	Threatened fauna association	Likelihood of occurrence or impact
Waterways (creek, river or dam)	There are no waterways mapped within the study area.	Due to the absence of waterways within the study area, the likelihood of occurrence and potential for impact to species utilising waterways is negligible.
Caves and shelters	There are no caves or shelters mapped within the study area.	Due to the absence of caves and shelters within the study area, the likelihood of occurrence and potential for impact to species utilising these features is negligible. Threatened cave-dwelling species recorded within the area including, large-eared Pied Bat, Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis and Eastern Cave Bat, therefore do not require further assessment relating to breeding habitat.
Man-made structures	There are no man-made structures mapped within the study area however the neighbouring lots contain these features.	Due to the absence of man-made structures within the study area, the likelihood of occurrence and potential for impact to species utilising these features is negligible.
Other foraging resources (e.g., leaf litter)	Due to the presence of PCT 3320 and PCT 3321, the Cumberland Plain Land Snail may utilise the leaf litter as habitat. Similarly, PCT 3616 is present on site and may provide habitat for the Dural Land Snail.	Native vegetation to be removed has been calculated as 0.06 ha of PCT 3320, 0.003 ha of PCT 3321 (trimming), and 0.34 ha of PCT 3616. As the removal of this vegetation is minor in the greater context of the surrounding study area, it is unlikely that these species will impacted by the proposed works. However, due to direct impacts to potential habitat for these species, a formal impact assessments (SIC assessments and ToS) have been completed. Pre-clearance surveys are recommended when removing the associated habitat for Cumberland Plain Land Snail and Dural Land Snail. A translocation plan will be required to support the preclearance surveys.

Based on the size of the study area, the survey effort is considered comprehensive to assess habitat presence for the species outlined in Table 6. Due to the removal of potential habitat for Dural Land Snail and Cumberland Plain Land Snail, a SIC assessment has been completed for the EPBC Act listed Dural Land Snail (Appendix 4) and a ToS has been completed for both the BC Act listed Cumberland Plain Land Snail and Dural Land Snail (Appendix 5). These assessments determined that a significant impact is unlikely to occur. Taking all of these factors into consideration, there is a low likelihood of impact for the above listed species.

Priority weeds

Five priority weeds for the Greater Sydney LLS Region, which includes the Hills Shire Council LGA, have been recorded in the study area, and are listed in Table 7, along with their associated Biosecurity Duty in accordance with the Biosecurity Act.

The Biosecurity Act provides for the identification, classification and control of priority weeds with the purpose of determining if a biosecurity risk is likely to occur. A priority weed is any weed identified in a local

strategic plan, for a region that includes that land or area, as a weed that is or should be prevented, managed, controlled or eradicated in the region.

The General Biosecurity Duty as outlined in the Biosecurity Act states:

> *All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*

Table 7 Priority weeds within the study area

Scientific name	Common name	Relevant biosecurity duty
Olea europaea* subsp. *cuspidata	African Olive	General Biosecurity duty
***Rubus fruticosus* species aggregate**	Blackberry	General Biosecurity duty
Asparagus asparagoides	Bridal creeper	General Biosecurity duty
Opuntia stricta	Common pear	General Biosecurity duty
Senecio madagascariensis	Fireweed	General Biosecurity duty

It was also noted that Green Cestrum *Cestrum parqui*, another priority weed in the region, was found growing adjacent to the study area. To prevent biosecurity impacts from occurring as a result of the presence of the above listed priority weeds within the study area, all practical steps should be taken to control and eradicate the weeds from the study area as per the relevant biosecurity duties outlined above, or prior to or during any future vegetation removal.

Assessment against key biodiversity legislation

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the Australian Government's key piece of environmental legislation. The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act. Under the EPBC Act, activities that have potential to result in significant impacts on MNES must be referred to the Commonwealth Minister for the Environment and Energy for assessment.

Two PCTs (3320 and 3321) within the study area have the potential to be associated with TECs listed under the EPBC Act. However, it was determined that these vegetation patches did not satisfy the key diagnostic criteria of their associated EPBC Act listed communities (see Table 2 and Table 3). Therefore no TECs listed under the EPBC Act were recorded within the study area and an assessment against the Significant Impact Criteria (DoE 2013) is not necessary in these cases. A SIC assessment was completed for Dural Land Snail which determined that a significant impact was unlikely to occur as a result of the proposed works (Appendix 4)

On the basis of criteria outlined in Commonwealth of Australia (2013) it is considered unlikely that a significant impact on a Matter of NES would result from the project. As such referral is not recommended. However, Sydney Water may choose to refer the proposed action to the Australian Government Minister for the Environment to determine whether the action requires approval under the EPBC Act.

Biodiversity Conservation Act 2016

Two TECs – *Cumberland Plain Woodland in the Sydney Basin Bioregion* and *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* – were found to occur at the study area. A Test of Significance (ToS) has previously been prepared for these and other TECs found to occur in the original scope of works in the *North West Treatment Hub Flora and fauna assessment report* (Biosis 2022). These ToS assessments concluded that the project was not likely to result in a significant impact on TECs listed under the BC Act. However, the removal of 0.06 ha of *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act) and impacts arising from trimming of 0.03 ha of *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (CEEC, BC Act) within the study area also requires consideration and ToS for each of the impacted communities have been included in Appendix 5. A ToS has also been completed for Cumberland Plain Land Snail and Dural Land Snail (Appendix 5).

These tests determined that a significant impact as a result of the proposed works within the study area is unlikely to occur.

Water Management Act 2000

The WM Act provides for the sustainable and integrated management of the state's water for the benefit of both present and future generations based on the concept of ecologically sustainable development. Under the WM Act an approval is required to undertake controlled activities on waterfront land, unless that activity is otherwise exempt under Section 91E. Waterfront land is defined within the Act as the bed of any river, lake or estuary and any land within 40 metres of the riverbanks, lake shore or estuary mean high water mark.

However, as a public authority, Sydney Water does not need to obtain a controlled activity approval from the NSW DCCEEW for any controlled activities that it carries out in, on or under waterfront land.

While Sydney Water is exempt from the controlled activity approval process, the design considerations and management measures detailed in the relevant WM Act guidelines (DPE 2022) should be considered.

Fisheries Management Act 1994

The FM Act provides for the protection and conservation of aquatic species and their habitat throughout NSW. Impacts to threatened species, populations and communities, and critical habitats listed under the FM Act must be assessed through an Assessment of Significance process.

No predicted habitat for threatened aquatic species is mapped on the DPI Fisheries spatial data portal within the study area (DPI 2023). Second Ponds Creek, a Strahler Order 3 perennial watercourse is the closest Key Fish Habitat, located approximately 80 metres to the north-west of the study area. Appropriate sediment and erosion controls will need to be in place to ensure no indirect impacts occur to this watercourse. There are no records of threatened aquatic species recorded within 5 kilometres of the study area within the BioNet Atlas of NSW (NSW DCCEEW 2024a).

With appropriate mitigation measure to control indirect impacts, the project is unlikely to result in impacts to key fish habitat. Therefore, no further consideration is required.

State Environmental Planning Policies

Biodiversity and Conservation SEPP

Chapter 3: Koala Habitat Protection 2020

This chapter applies to land zoned RU1, RU2 or RU3. As the proposal occurs on land zoned E4, this chapter does not apply.

Chapter 4: Koala Habitat Protection 2021

Chapter 4 Koala Habitat Protection aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. A single record of Koala has been recorded within 5 kilometres of the study area, between 2006 and 2024.

The study area is located within the Hills Shire Council (Council) LGA. Council is not listed under Schedule 2, Chapter 4 of SEPP, and is therefore not subject to the requirements laid out by the policy.

Impact assessment

The proposed addition of the compound area and access road will not result in a significant effect on threatened species, populations or communities listed under the BC Act, and therefore the Biodiversity Offsets Scheme (BOS) is not triggered.

However, the *Sydney Water Biodiversity Offset Guidelines* (Sydney Water 2021) may apply and therefore offsetting recommendations in line with this guidelines have been provided in Table 8 below.

Table 8 Sydney Water Biodiversity Offset Guidelines Assessment

Ecological value	Impacts	Recommendations
Threatened ecological communities	• Removal of 0.06 ha of *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act). • Trimming of 10% of the 0.03 ha patch of *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (CEEC, BC Act). This equates to the removal of 0.003 ha of this community.	• The removal of 0.06 ha of *Cumberland Plain Woodland in the Sydney Basin Bioregion* should be offset in accordance with the Sydney Water Biodiversity Offset Guide (2021). • Impacts to *Cumberland Plain Woodland in the Sydney Basin Bioregion* and *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* must be minimised to the fullest extent possible during further detailed design. • Appropriate no-go fencing should be established around patches of *Cumberland Plain Woodland in the Sydney Basin Bioregion* adjacent to the area of proposed works to avoid further direct and indirect impacts. • To avoid the potential for significant impacts to *Cumberland Plain Woodland in the Sydney Basin Bioregion* the ongoing survival of the retained patch will need to be promoted via undertaking management such as restoration of areas disturbed by mountain bike tracks, ongoing weed control, and ongoing exclusion

Ecological value	Impacts	Recommendations
		of unauthorised access resulting in damaging activities such as creation of bike tracks. • Appropriate no-go fencing should be established within the patch of *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* to physically delineate the 10% being trimmed, from the remainder of the patch being retained.
Threatened flora/fauna habitat	• No key fauna habitat features were noted within the study area. The existing remnant vegetation is edge effected and as such, considered unsuitable habitat for threatened flora species.	• A pre-clearance survey should be undertaken prior to the commencement of works to ensure that no threatened flora or fauna species are present.
Riparian vegetation	• No riparian vegetation will be removed.	• N/A.
Non-threatened native vegetation	• Removal of 0.34 ha of PCT 3616 Sydney Hinterland Grey Gum Transition Forest.	• The removal of 0.34 ha of PCT 3616 Sydney Hinterland Grey Gum Transition Forest should be offset in accordance with the Sydney Water Biodiversity Offset Guide (2021).
Number of locally indigenous native trees and tree hollows to be removed that are not part of a vegetation community	• No hollows or locally indigenous trees, not part of a vegetation community, were recorded within the study area.	• N/A.

Updated impacts for the NWTH growth project

The original *North West Treatment Hub flora and fauna assessment* (Biosis 2022) required the removal of 9.56 hectares of native vegetation. The addition of study area represents an additional 1.33 hectares of vegetation being impacted by the proposed works, most of which consists of urban native/exotic vegetation (0.91 hectares). Impacts to native vegetation account for 0.37 hectares of the total impact and include:

- Removal of 0.34 ha of PCT 3616 *Sydney Hinterland Grey Gum Transition Forest*.
- Removal of 0.06 ha of PCT 3320 *Cumberland Shale Plains Woodland*, which meets the criteria for *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act).
- Trimming by 10% to a 0.03 ha patch of PCT 3321 *Cumberland Shale-Sandstone Ironbark Forest*, which meets the criteria for *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* (CEEC, BC Act).

However, the removal of the proposed 16.5 kilometre sludge pipeline connecting the Castle Hill WRRF, Rouse Hill WWRF, and Riverstone WRRF from the scope of works represents a significant reduction in the area being impacted by the proposed works. A summary of this change in impacts is shown in Table 9, and accounts for impacts inside and outside the North West Growth Area (NWGA).

Table 9 Summary of project impacts under original and revised assessments

Original assessment					Revised assessment			
Non-certified land								
Native vegetation	Direct impact		Indirect impacts (trimming)		Direct impact		Indirect impacts (trimming)	
	9.56 ha		3.71 ha		1.5 ha		0.003 ha	
	Inside NWGA	Outside NWGA	Inside NWGA	Outside NWGA	Inside NWGA	Outside NWGA	Inside NWGA	Outside NWGA
	7.12 ha	2.44 ha	2.46 ha	1.25 ha	0.97 ha	0.53 ha	-	0.003 ha
Urban native/exotic vegetation	Direct impact		Indirect impacts (trimming)		Direct impact		Indirect impacts (trimming)	
	6.66 ha		0.56 ha		4.6 ha		-	
Existing certified land								
	Direct impact		Indirect impacts (trimming)		Direct impact		Indirect impacts (trimming)	
Native vegetation	1.79 ha		0.57 ha		0.97 ha		-	
Urban native / exotic vegetation	9.37 ha		-		6.68 ha		-	

A further breakdown of the impacts to PCTs and associated TECs arising from the NWTH growth project is detailed in Table 10. To align with the Sydney Water Biodiversity Offset Guide (Sydney Water 2021), congruent state and federally-listed threatened ecological communities have been grouped together. These groupings are detailed below:

- **Cumberland Plain Woodland:**
  - *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest of the Sydney Basin Bioregion* (CEEC, EPBC Act).
  - *Cumberland Plain Woodland in the Sydney Basin Bioregion* (CEEC, BC Act).
- **Coastal Freshwater Wetlands:**
  - *Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (Endangered Ecological Community [EEC], BC Act).
- **River-flat Eucalypt Forest:**
  - *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* (CEEC, EPBC Act).

- *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (CEEC, BC Act).

- **Shale-Gravel Transition Forest:**
  - *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest of the Sydney Basin Bioregion* (CEEC, EPBC Act).
  - *Shale Gravel Transition Forest in the Sydney Basin Bioregion* (EEC, BC Act).
- **Shale-Sandstone Transition Forest:**
  - *Shale Sandstone Transition Forest of the Sydney Basin Bioregion* (CEEC, EPBC Act).
  - *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* (CEEC, BC Act).
- **Swamp Oak Floodplain Forest**
  - *Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South East Corner bioregions* (EEC, BC Act).

Table 10 Summary of impacts to native vegetation

Plant Community Type	Associated TEC	Conservation status		Impact area (ha)
		BC	EPBC	
Riverstone Water Resource Recovery Facility[1]				
849 Cumberland Shale Plains Woodland[2]	Cumberland Plain Woodland	CEEC	CEEC	0.24
724 Castlereagh Shale - gravel Transition Forest[2]	Shale Sandstone Transition Forest	CEEC	CEEC	0.37
1800 Cumberland Swamp Oak riparian forest[2]	Swamp Oak Floodplain Forest	EEC	--	0.24
Rouse Hill Water Resource Recovery Facility				
835 Cumberland Riverflat Forest[2]	River-flat Eucalypt Forest	CEEC	CEEC	0.05
3320 Cumberland Shale Plains Woodland	Cumberland Plain Woodland	CEEC	--	0.06
3321 Cumberland Shale-Sandstone Ironbark Forest	Shale Sandstone Transition Forest	CEEC	--	0.003
3616 Sydney Hinterland Grey Gum Transition Forest	--	--	--	0.34

[1] The Riverstone WRRF is located wholly within the NWGA. All PCTs being impacted within this facility are mapped as certified land.
[2] Legacy PCTs used in previous assessments. These have since been decommissioned, however they still align with current TECs, as outlined in the field investigation section above.

Impacts to TECs found to occur in the original scope of works were assessed against the Significant Impact Criteria (DoE 2013) and against the ToS criteria (Section 7.3 of the BC Act) in the *North West Treatment Hub Flora and fauna assessment report* (Biosis 2022). These assessments concluded that the project was not likely to result in a significant impact on TECs listed under the EPBC Act and BC Act respectively. The revised project scope, which includes the removal of the sludge line from the scope of works, reflects an overall reduction in the area and amount of native vegetation being impacted. As the reduced project scope reflects a large reduction in the area and amount of TECs being impacted, the determinations from the original flora and fauna assessment report (i.e., that a significant impact to TECs will not occur) remains unchanged.

Central River City SEPP

An assessment of the original scope of works against the Central River City SEPP was made in the *North West Treatment Hub Flora and fauna assessment* (Biosis 2022). The additional study area (i.e., new compound area and access road) exists beyond the boundary of NWGA as outlined in the Central River City SEPP. Of the broader modified scope (which includes the removal of the two sludge lines), the Riverstone WWRF is the only plant facility within the NWGA.

Prior to any clearing of native vegetation in Existing Non-certified land in the NWGA, Sydney Water are required to notify the Department of Planning as per Section 3.24 of the Central River City SEPP.

"A public authority, or a person acting on behalf of a public authority, must not carry out development comprising the clearing of native vegetation (within the meaning of the Native Vegetation Act 2003) on land that is not subject land (within the meaning of clause 17 of Schedule 7 to the Threatened Species Conservation Act 1995) unless the authority or person has:

a) given written notice of the intention to carry out the development to the Department of Planning and Infrastructure, and
b) taken into consideration any response to the notice that is received from that Department within 21 days after the notice is given."

Clearing of native vegetation is defined as:

a) cut down, fell, uproot, kill, poison, ringbark, burn or otherwise destroy the vegetation, or
b) lop or otherwise remove a substantial part of the vegetation.

Vegetation identified on land mapped as Existing Certified is not subjected to further assessments under the BC Act or EPBC Act, however, is still subject to local planning instruments and development controls under the SEPP.

All vegetation to be cleared located within Existing Non-certified land or not subject to Biodiversity Certification (i.e., outside the NWGA) is subject to further assessment under the BC Act and/or EPBC Act, as contained in this assessment report.

Order to confer biodiversity certification on the SEPP (Growth Centres SEPP) 2021

The Biodiversity Certification Order outlines 41 conditions, known as the Relevant Biodiversity Measures (RBMs), to ensure consistency with the biodiversity certification for the growth centres during future development. A number of these RBMs are relevant to the proposal including:

- RBM 8 and RBM 11 pertaining to removal of vegetation on Existing Non-certified land.
- RBM 12 pertaining to removal of vegetation within special provision area.

RBM 8 and RBM 11 relate to the removal of 'existing native vegetation' (ENV) from Existing Non-certified land and provides details on offsetting requirements for any impacts that may occur.

RBM 8 states that the clearing of any ENV in the Existing Non-certified land will be offset by:

a) the protection of an equal or greater area of existing native vegetation elsewhere in the Growth Centres; or

b) the revegetation and/or restoration of an area of land elsewhere in the Growth Centres, subject to a number of additional conditions relating to the protection, size, ongoing management, and any potential additionally of proposed revegetation/restoration.

Initially, the NWTH growth project was to impact upon 0.49 hectares of ENV subject to RBM 8 and RBM 11. Under the modified scope (i.e., removal of two sludge lines), the project will no longer impact any ENV.

Recommendations

Given the project necessitates the removal of native vegetation including canopy trees, the focus of the recommendations is to minimise disturbance to any surrounding native vegetation and fauna habitat. The recommendations have been separated into Sydney Water standard safeguards Table 11 and Table 12 project specific recommendations.

Table 11 Sydney Water standard safeguards

Safeguard category	Safeguard information	Location
Topography, geology and soils		
2.1	Appropriate erosion and sediment control measures should be installed at all sites to avoid sedimentation of receiving water bodies or other indirect impacts to surrounding biodiversity values including: • Divert surface runoff away from disturbed soil and stockpiles. • Install sediment and erosion controls before construction starts. • Reuse topsoil where possible and stockpile separately. • Inspect controls at least weekly and immediately after rainfall. • Rectify damaged controls immediately. • Remove controls once surfaces have been stabilised, including removing trapped sediment in drainage lines.	All locations
2.2	Minimise ground disturbance and stabilise disturbed areas progressively.	All locations
2.6	Stop work during heavy rainfall or in waterlogged conditions when there is a risk of sediment loss off site.	All locations
2.7	Sweep up any sediment/soil transferred off site at least daily, or before rainfall.	All locations
2.7	Eliminate ponding and erosion by restoring natural landforms to the pre-works condition.	All locations
Water and drainage		
3.6	Bund potential contaminants and store on robust waterproof membrane, away from drainage lines.	All locations
3.8	Locate portable site amenities away from watercourses or drainage lines.	All locations
Flora and fauna		
4.2	Residual impacts to native vegetation and trees will be offset in accordance with the Sydney Water Biodiversity Offset Guideline.	All locations
4.5	Minimise vegetation clearance and disturbance, including impacts to standing dead trees and riparian zones. Where possible, limit clearing to trimming rather than the removal of whole plants.	All locations
4.6	Physically delineate vegetation to be cleared and/or protected on site and install appropriate signage prior to works commencing.	All locations

Safeguard category	Safeguard information	Location
4.7	Adjust methodology (e.g. avoid area, hand excavate, implement exclusion fencing) to protect sensitive areas where possible (such as mature trees, known threatened species, populations or ecological communities).	All locations
4.8	Protect trees in accordance with the requirements of Australian Standard 4970-2009 for the Protection of Trees on Development Sites. Do not damage tree roots unless absolutely necessary, and engage a qualified arborist where roots >50mm are impacted within the Tree Protection Zone	All locations
4.11	Retain dead tree trunks, bush rock or logs in-situ unless they are in the impact area and moving is unavoidable. Reposition material elsewhere on the site or approved adjacent sites. If native fauna is likely to be present, a licenced ecologist should inspect the removal and undertake fauna relocation.	All locations
4.12	Inspect vegetation for potential fauna prior to clearing or trimming. If fauna is present, or ecological assessment has determined high likelihood of native fauna presence, including removal of hollow-bearing trees, engage a licenced ecologist to inspect and relocate fauna before works.	All locations
4.13	If native fauna is encountered on site, stop work and allow the fauna to move away un-harassed. Engage a licenced ecologist if assistance is required to move fauna	All locations
4.17	Stop work immediately and notify the Sydney Water Project Manager if any threatened species (flora or fauna) is discovered during the works. Work will only recommence once the impact on the species has been assessed and appropriate control measures provided.	All locations
4.19	Manage biosecurity in accordance with: • *Biosecurity Act 2015* (see NSW Weedwise), including reporting new weed infestations or invasive pests. • Contemporary bush regeneration practices, including disposal of sealed bagged weeds to a licenced waste disposal facility.	All locations
4.21	To prevent spread of weeds: • Clean all equipment including PPE prior to entering or leaving the work sites. • Wrap straw bales in geo-fabric to prevent seed spread.	All locations
4.27	Minimise impacts on native vegetation in non-certified areas, native vegetation retention areas and areas outside the growth centre. Options to consider where feasible include: • Alternative construction methodologies (under bore vegetation and waterways, compressed construction corridors). • avoiding impact to hollow bearing and habitat trees.	All locations
4.28	Vegetation removal must not occur until the following are complete: • The area to be removed has been physically delineated. • The Contractor's Environmental Representative has confirmed consistency with approval documentation. • Pre-clearing surveys, if relevant. • Written authorisation to commence clearing from Sydney Water Project Manager.	All locations

Table 12 Project specific safeguards

Safeguard information	Location
Any additional stockpile and compound areas are to be located within existing cleared areas and existing access tracks. Temporary compound sites and access tracks will be rehabilitated at the end of construction.	All locations
Pre-clearance inspections for Dural Land Snail and Cumberland Plain Land Snail, including relocation to adjacent retained habitats if individuals are observed during works. A translocation plan will be required prior to the pre-clearance inspections taking place.	Within PCT 3616, 3321 and PCT 3320.
All staff on site are to be educated on the ID characteristics of the threatened species and advised to not handle fauna species under any circumstances during toolbox talks.	All locations
To prevent the spread of weeds: • Vehicles are to kept clean, free of mud and debris. • Straw bales wrapped in geo-fabric are to be placed at relevant places around the site.	All locations
Retained vegetation to be clearly delineated to ensure surrounding area remains undisturbed.	All locations
Impacts to Cumberland Plain Woodland in the Sydney Basin Bioregion and Shale Sandstone Transition Forest of the Sydney Basin Bioregion must be minimised to the fullest extent possible during further detailed design.	PCT 3320
To avoid the potential for significant impacts to *Cumberland Plain Woodland in the Sydney Basin Bioregion* the ongoing survival of the retained patch will need to be promoted via undertaking management such as restoration of areas disturbed by mountain bike tracks, ongoing weed control, and ongoing exclusion of unauthorised access resulting in damaging activities such as creation of bike tracks.	PCT 3320

I trust that this advice is of assistance to you however please contact me if you would like to discuss any elements of this ecological advice further.

Yours sincerely

Todd Horton
Botanist

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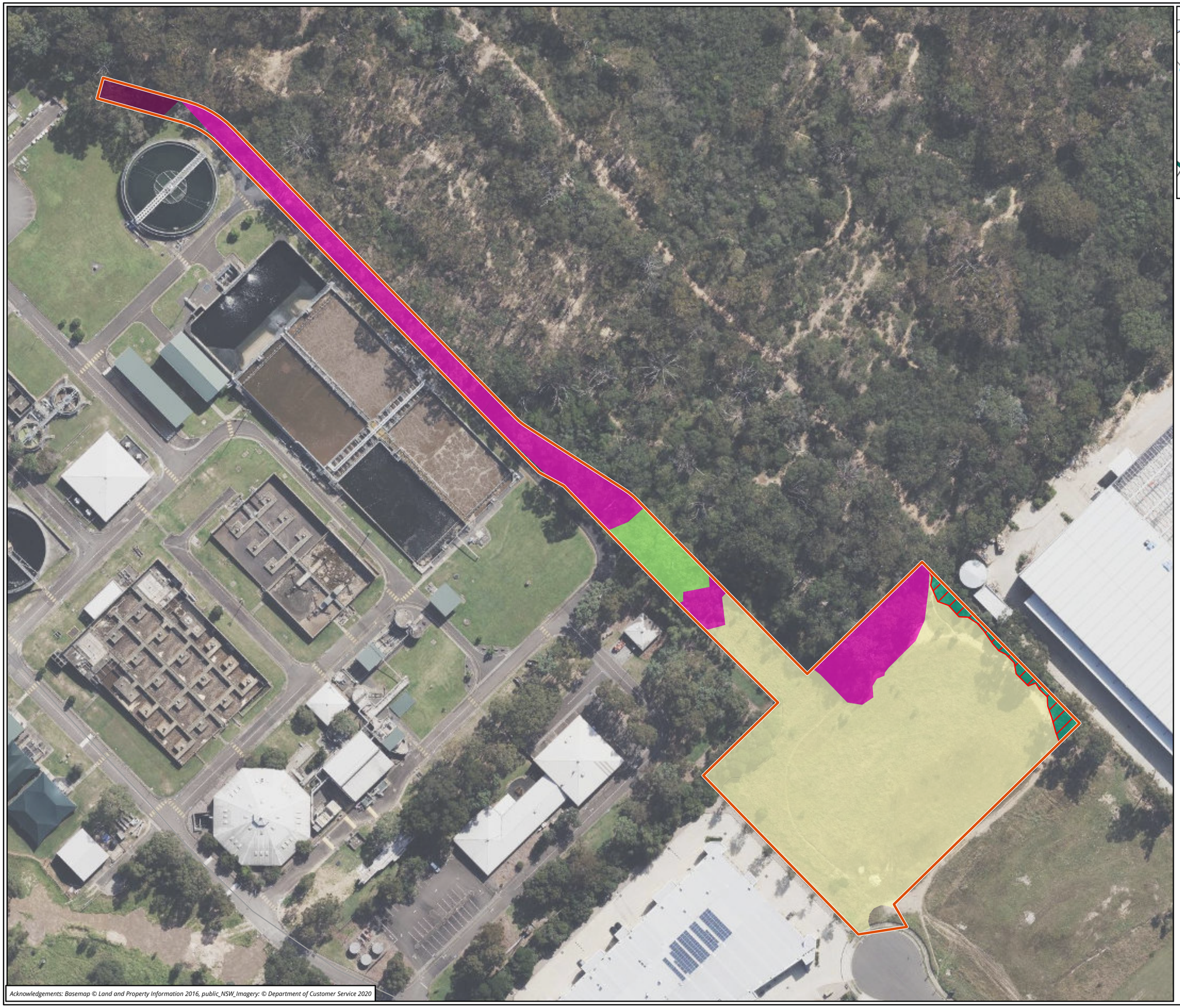
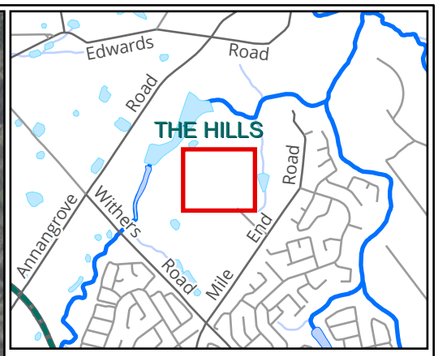
Appendices

Appendix 1 Figures





Legend

- Study area
- Proposed trimming

Vegetation communities - Plant Community Type and condition

- Urban Native/Exotic (Low)
- 3320 - Cumberland Shale Plains Woodland (Low)
- 3321 - Cumberland Shale-Sandstone Ironbark Forest (Moderate)
- 3616 - Sydney Hinterland Grey Gum Transition Forest (High)
- 3616 - Sydney Hinterland Grey Gum Transition Forest (Moderate)

Figure 1 Ecological features of the study area

0 10 20 30 40 50

Metres

Scale: 1:1,300 @ A3

Coordinate System: GDA2020 MGA Zone 56

N

biosis

Matter: 40658, Date: 20 May 2024
Prepared for TOH, Prepared by HL, Last edited by: hliswoyo
Location: P:\40600s\40658\Mapping\40658_NW_Treatment_Hub_Eco.aprx
Layout: 40658_F1_EcoFeatures_Updated20240510

Appendix 2 Photos

Photo 7 Cleared areas with exotic vegetation in the south of the study area

Photo 8 Intact vegetation found to be fringing the northern edges of Lot 5 DP 1158760

Photo 9 **Intact vegetation found within the proposed access road**

Photo 10 **Mountain bike tracks found throughout the study area, as well as evidence of recent track construction**

Appendix 3 Flora

Flora species recorded from the study area

Table 13 Flora species recorded by Biosis, 16/04/2024

Status	Scientific name	Common name
Native species		
	Acacia implexa	Hickory Wattle
	Acacia linearifolia	Narrow-leaved Wattle
	Acacia linifolia	White Wattle
	Allocasuarina littoralis	Black She-Oak
	Angophora bakeri	Narrow-leaved Apple
	Angophora floribunda	Rough-barked Apple
	Aristida calycina	
	Aristida vagans	Threeawn Speargrass
	Billardiera scandens	Hairy Apple Berry
	Bossiaea obcordata	Spiny Bossiaea
	Bursaria spinosa subsp. *spinosa*	Native Blackthorn
	Centella asiatica	Indian Pennywort
	Cheilanthes sieberi subsp. *sieberi*	Rock Fern
	Clematis aristata	Old Man's Beard
	Cymbopogon refractus	Barbed Wire Grass
	Daviesia ulicifolia	Gorse Bitter Pea
	Dianella caerulea	Blue Flax-lily
	Dianella revoluta	Blueberry Lily
	Dichondra repens	Kidney Weed
	Echinopogon caespitosus	Bushy Hedgehog-grass
	Entolasia stricta	Wiry Panic
	Eucalyptus punctata	Grey Gum
	Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
	Eucalyptus tereticornis	Forest Red Gum
	Exocarpos cupressiformis	Cherry Ballart
	Gahnia aspera	Rough Saw-sedge
	Goodenia hederacea	Ivy Goodenia
	Grevillea mucronulata	
	Hakea sericea	Needlebush
	Hardenbergia violacea	False Sarsaparilla
	Hibbertia diffusa	Wedge Guinea Flower
	Hypericum gramineum	Small St John's Wort
	Imperata cylindrica	Blady Grass
	Kunzea ambigua	Tick Bush

Status	Scientific name	Common name
	Lepidosperma laterale	Variable Sword-sedge
	Lissanthe strigosa	Peach Heath
	Lobelia purpurascens	whiteroot
	Lomandra glauca	Pale Mat-rush
	Lomandra longifolia	Spiny-headed Mat-rush
	Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush
	Lomandra obliqua	
	Melaleuca linariifolia	Flax-leaved Paperbark
	Melaleuca nodosa	Prickly-leaved Paperbark
	Microlaena stipoides	Weeping Grass
	Microlaena stipoides var. *stipoides*	Weeping Grass
	Notelaea longifolia	Large Mock-olive
	Ozothamnus diosmifolius	White Dogwood
	Panicum simile	Two-colour Panic
	Paspalidium gracile	Slender Panic
	Passiflora spp.	Passionfruit
	Persoonia linearis	Narrow-leaved Geebung
	Petrophile pulchella	Conesticks
	Pimelea linifolia	Slender Rice Flower
	Polymeria calycina	
	Pultenaea villosa	Hairy Bush-pea
	Styphelia laeta subsp. *laeta*	Five-corners
	Themeda triandra	Kangaroo Grass
	Trachymene incisa subsp. *incisa*	
Exotic species		
	Agave americana	Century Plant
	Andropogon virginicus	Whisky Grass
	Araujia sericifera	Moth Vine
NOX	*Asparagus asparagoides*	Bridal Creeper
	Axonopus fissifolius	Narrow-leafed Carpet Grass
	Bidens pilosa	Cobbler's Pegs
	Briza subaristata	
	Cenchrus clandestinus	Kikuyu Grass
	Ehrharta erecta	Panic Veldtgrass
	Eragrostis curvula	African Lovegrass
	Galium aparine	Goosegrass
	Hypochaeris radicata	Catsear
	Ligustrum lucidum	Large-leaved Privet
	Ligustrum sinense	Small-leaved Privet
NOX	*Olea europaea* subsp. *cuspidata*	African Olive
NOX	*Opuntia stricta* var. *stricta*	Common Prickly Pear

Status	Scientific name	Common name
	Paspalum dilatatum	Paspalum
	Paspalum urvillei	Vasey Grass
	Plantago lanceolata	Lamb's Tongues
NOX	*Rubus fruticosus* sp. agg.	Blackberry complex
NOX	*Senecio madagascariensis*	Fireweed
	Setaria parviflora	Pidgeon Grass
	Sida rhombifolia	Paddy's Lucerne
	Solanum mauritianum	Wild Tobacco Bush
	Solanum nigrum	Black-berry Nightshade
	Solanum seaforthianum	Climbing Nightshade
	Sporobolus indicus	Parramatta Grass
	Taraxacum officinale	Dandelion
	Verbena bonariensis	Purpletop

*NOX = Priority weed, identified as being a priority weed within the Greater Sydney LLS Region

Appendix 4 Significant Impact Criteria assessments

Dural Land Snail

The Dural Land Snail is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is known to occur as far north as St Albans, in East Kurrajong and then south along the footslopes of the Blue Mountains as far south as The Oaks. Southeast from St Albans, the species is found across The Hills Shire Local Government Area and south to Parramatta. The species is found within the Local Government Areas of Blue Mountains City, Penrith City, The Hills Shire, Wollondilly Shire, Hornsby Shire and Parramatta City (NSW Scientific Committee 2015).

An assessment against the Significant Impact Criteria detailed in the *Matters of National Environmental Significance: Significant impact guidelines version 1.1* (DoE 2013) has been undertaken below.

Table 14 SIC assessment for Dural Land Snail

SIC assessment for critically endangered and endangered species
Lead to a long-term decrease in the size of a population.
The Dural Land Snail is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is known to occur as far north as St Albans, in East Kurrajong and then south along the footslopes of the Blue Mountains as far south as The Oaks. Southeast from St Albans, the species is found across The Hills Shire Local Government Area and south to Parramatta. The species is found within the Local Government Areas of Blue Mountains City, Penrith City, The Hills Shire, Wollondilly Shire, Hornsby Shire and Parramatta City (NSW Scientific Committee 2015, TSSC 2014). The Dural land snail occurs in low abundance and individuals are solitary. The species' maximum recorded density is three live snails per hectare (NSW Scientific Committee 2015, TSSC 2014). Migration and dispersal is limited, with overnight straight-line distances of under 1 metre identified in the literature and studies. The species is active from approximately one hour after dusk until dawn and no confirmed diurnal activity is reported. Reproduction rates are very low, with few eggs (about 32) per season. Mortality is 90 % in the first year, and 99.8 % within four-five years (Threatened Species Scientific Committee, 2015). The amount of habitat removal is small (0.4 ha) when the availability of habitat directly to the north of the study area is considered. The habitat to be removed is degraded and breeding is considered unlikely to occur in this habitat. As such, the proposal is considered unlikely 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.
Reduce the area of occupancy of the species.
The proposal will result in the removal of approximately 0.4 ha of potential habitat for this species. The distribution of the Dural Land Snail is estimated to be approximately 2,400 square kilometres (NSW Scientific Committee 2015, TSSC 2014).The extent of impact is considered unlikely to contract the species area of occupation.
Fragment an existing population into two or more populations.
The proposed works occur along the edge of an existing vegetation patch. They will reduce the size of the vegetation patch but they will not lead to any fragmentation of a vegetation patch or a population of the species.
Adversely affect habitat critical to the survival of a species.
No critical habitat has been declared for this species. However, the Dural Land Snail has a strong preference for shale-influenced vegetation types and the shale-influenced habitats along the northwest fringes of the Cumberland Plain are considered important to the species survival (NSW Scientific Committee 2015, TSSC 2014).

SIC assessment for critically endangered and endangered species
Suitable habitat in the study area for this species includes all leaf litter around vegetated areas on the eastern and western side of Old Northern Road. This habitat is identified as suitable for this species based on the shale/sandstone transitional nature of the geology and vegetation. The proposal will result in the removal of approximately 0.10 hectares of potential habitat which may be considered important for this species.
Disrupt the breeding cycle of a population.
A population of this species has was detected within the study area, however there are records of the species in the locality (NSW DCCEEW 2024). Reproduction rates for the species are low, and dispersal is very slow, so any disturbance to this species is likely to disrupt its breeding cycle. However, there is unlikely to be a large population in the potentially impacted habitat and the likelihood of breeding is considered low.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
No individuals of this species have been identified within the study area, but records do exist in the locality. Given the size of the study area (0.4 ha), and the low density of the species (species' maximum recorded density is three live snails per hectare (NSW Scientific Committee 2015, TSSC 2014)), at most the proposal is likely to impact only several individuals. Impacts to individuals will also be mitigated through pre-clearance surveys undertaken prior to vegetation removal. As such, the proposal is unlikely cause this species to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat.
Appropriate controls are required during construction to reduce the spread of weeds (refer to recommendations). Appropriate control of weed material will ensure that invasive plant species are not further spread into the species' habitat. The study area does occur on the edge of a patch of native vegetation, within an area already impacted by weeds. It is unlikely that the works will exacerbate the spread of weeks further such that a population of Dural Land Snail is placed at risk of decline.
Introduce disease that may cause the species to decline.
There are no known disease issues affecting this species in relation to the project. The project would be unlikely to increase feral animal abundance or the potential for significant disease vectors to affect local populations. Infection of native plants by *Phytophthora cinnamomi* has been identified as being spread by construction machinery. This water-borne mould infects the roots of plants and has the potential to cause dieback. Machinery associated with vegetation clearance and subsequent construction for the project has the potential to transmit the fungus to remaining native vegetation remnants of the species. This is a potential indirect impact to the species through the transmission of pathogens into retained habitat near the road. This can be mitigated through the development and implementation of suitable control measures for vehicle and plant hygiene and is unlikely to have a significant impact.
Interfere with the recovery of the species.
A recovery plan does not exist for the Dural Land Snail. However, the following actions have been identified for recovery of this species (TSSC 2014): • Implement an ongoing monitoring program to monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary. • Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions. • Engage local Bushcare groups, such as the Ellerman Park Bushcare Group, to implement recovery actions for the species. • Undertake appropriate maintenance of habitat in which the species may occur e.g. avoid underscrubbing in areas where the species is known to occur and maintain and/or recover coarse woody debris in habitat for this species. • Limit use of pile burning (burning composted material) and/or manage pile burning in areas where the species is known to occur.

SIC assessment for critically endangered and endangered species

- Investigate formal conservation arrangements, management agreements and covenants on private land with known occurrences.
- Provide advice to developers, consultants and approval authorities about the existence of the species and its significance.
- Develop and implement a management plan for the control of weeds currently occurring in the region.
- Where necessary and appropriate, restrict access to important sites by installing gates, fencing and educational signs.

The recovery actions listed above that have been identified by the Threatened Species Scientific Committee (to help recover the Dural Land Snail are largely not applicable to the proposal. The proposal will not significantly interfere with any of these actions and therefore will not affect the recovery of the Dural Land Snail.

Conclusion.

The proposal would result in a small reduction in extent of potential habitat for this species. However, this is unlikely to reduce the population size of the Dural Land Snail or decrease the reproductive success of this species. Similar habitat types occur directly north of the study area, and the proposal will not interfere with the recovery of the Dural Land Snail. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant impact to the Dural Land Snail. The impact is not considered to be of significance having regard to its context and intensity.

Appendix 5 Tests of Significance

The following section provides for Tests of Significance as outlined in Section 7.3 of the BC Act for all species listed as a medium likelihood or greater.

Threatened Ecological Communities

Cumberland Plain Woodland in the Sydney Basin Bioregion

Cumberland Plain Woodland in the Sydney Basin Bioregion is listed as a CEEC under the BC Act. This community occurs on soils derived from Wianamatta Shale, throughout the driest part of the Sydney Basin. It is well adapted to drought and fire and is typically found on heavy clay soils (OEH 2016). This community has undergone significant declines since European settlement with the expansion of Sydney and the outlying regional centres, now only 9 % of the original extent of this community now remains in-tact (OEH 2016) with around 12 % occurring as scattered remnants (DECCW 2010).

Cumberland Plain Woodland within the study area

Cumberland Plain Woodland within the Sydney Basin Bioregion aligns with PCT 3320, and generally occurs in or well-connected remnant within the study area. A total of 0.1 hectares of Cumberland Plain Woodland occurs within the impact area which is subject to assessment under the BC Act.

For this assessment, the local occurrence of Cumberland Plain Woodland within the Sydney Basin Bioregion comprises all PCT 3320 (previously PCT 849) mapped within the study area and any patches that occur in the vicinity up to 100 – 200 metres that could be subject to indirect impacts associated with loss of connectivity. An assessment of the impacts of this vegetation in accordance with the *Threatened species test of significance* is provided below. The local occurrence of Cumberland Plain Woodland is 0.1 hectares in area with 0.06 hectares to be impacted by the proposal.

Table 15 Test of Significance for Cumberland Plain Woodland in the Sydney Basin Bioregion

Test of Significance for Cumberland Plain Woodland in the Sydney Basin Bioregion
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.
Not applicable, not a threatened species.
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*** ***(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.***

Test of Significance for Cumberland Plain Woodland in the Sydney Basin Bioregion

The local occurrence of Cumberland Plain Woodland in the Sydney Basin Bioregion is considered to comprise the areas directly impacted by the proposal, and the areas potentially indirectly impacted through increased fragmentation and isolation. These areas include all contiguous areas of the CEEC extending outside the study area and any patches that occur in the vicinity up to 100 – 200 metres that are considered to be connected.

The local occurrence of the CEEC is 0.1 ha in size and is generally present in low condition and occurs in an edge effected patch adjacent to a larger patch of native vegetation. A total of 60 % (0.06 ha of 0.1 ha) patch of CEEC to be impacted contains a significant level of exotic vegetation cover as land clearing has taken place over the past 150 years, with ongoing disturbance due to the illegal construction of mountain bike tracks. Land use impacts from historical clearing and current unauthorised recreational use have reduced the community integrity and functionality. Clearing for the proposal is unlikely to further reduce species diversity and simplify community structure more broadly. The CEEC already occurs in a patchy and edge effected state, and the proposal will not result in a substantial increase to these negative pressures. The adjacent areas of native vegetation within the broader area will remain intact and is unlikely to suffer substantial changes in species composition. Areas of contiguous vegetation will allow for a high level of connectivity to facilitate geneflow and dispersal across the environment. The vegetation to be directly removed does not comprise any ecological components critical to the survival of the CEEC in the locality.

It should be noted however that the residual (retained) area of the CEEC will be small and already occurs in a degraded condition, as such provided recommendations are to be implemented to prevent further indirect impacts, that could result in further degradation and potentially a significant impact occurring.

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.

The habitat supporting the local occurrence of the CEEC comprises small, fragmented areas where edge effected patches of the community have been able to persist. These areas of habitat occur with a patchy distribution across the study area. The proposal will result in the removal of 60 % (0.06 ha of 0.1 ha) of potential habitat for the CEEC, however areas of contiguous native vegetation to that being removed will be retained, and areas considered subject to some level of connectivity within 100 – 200 metres will also remain present. These areas are already subject to edge effects resulting from the fragmented and patchy landscape within which they occur and the impacts of unauthorised bike track construction, however the proposal is not considered likely to increase the level to which these negative pressures occur. It should be noted however that the residual (retained) area of the CEEC will be small and already occurs in a degraded condition, as such provided recommendations are to be implemented to prevent further indirect impacts, that could result in further degradation and potentially a significant impact occurring.

Test of Significance for Cumberland Plain Woodland in the Sydney Basin Bioregion
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).
Under the BC Act, the Minister for the Environment has the power to declare Areas of Outstanding Biodiversity Value (AOBVs). To date no AOBVs have been declared within the proposal's impact area.
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.
The proposed works have the potential to result in the following key threatening process which is listed under the Schedule 4 of the BC Act, and to which are considered relevant to Cumberland Plain Woodland: • Clearing of native vegetation. The proposed works requires clearing of land where this community occurs, resulting in the removal 0.06 ha of the CEEC. Given some areas of the CEEC to be impacted by the proposal will be in the form of partial clearing, and that areas of contiguous vegetation will be retained with indirect impacts managed, the proposal is unlikely to increase the impact of any key threatening processes.
Conclusion.
The impacts of the proposed works are not considered to be significant on the condition that: • Direct impacts will occur to no more than 60 % (0.06ha of 0.1 ha) of a patch of the CEEC. However, given the residual (retained) area of the CEEC will be small and already occurs in a degraded condition, the following recommendations are to be implemented to prevent further indirect impacts, that could result in a significant impact occurring: – Detailed design of the roadway is to be undertaken to ensure that disturbance is minimised to the fullest extent possible within the CEEC (i.e., avoidance of canopy trees where possible). – No indirect impacts will occur to retained CPW, including during construction, and via future unauthorised use of site for mountain bike tracks or other similar purposes. – Areas of retained CPW, will be maintained and rehabilitated to prevent additional future impacts, and ensure the ongoing survival of the CEEC in this location. Application of the BOS or preparation of a SIS is therefore not required.

Shale Sandstone Transition Forest in the Sydney Basin Bioregion

Shale Sandstone Transition Forest in the Sydney Basin Bioregion is listed as Critically Endangered under the BC Act and occurs only in NSW, within the Sydney Basin Bioregion. The ecological community occurs between other ecological communities found respectively on shale or sandstone substrates. The ecological community is found to the west of Sydney, on the edges of the Cumberland Plain, as well as on the sandstone-dominated Hornsby, Woronora, and Lower Blue Mountains plateaux that adjoin the plain. Shale Sandstone Transition Forest generally occurs in areas receiving between 800 millimetres and 1100 millimetres mean annual rainfall. Typically, it occurs at elevations less than 200 metres above sea level. The vegetation of the CEEC is forest or woodland with an overstorey dominated by various Eucalypt species and an understorey comprising of sclerophyll shrubs, grasses and herbs. The structure and composition of vegetation are primarily determined by the transitional geology between Wianamatta shale and Hawkesbury sandstone and vary considerably depending on the degree and the source of shale influence.

Shale Sandstone Transition Forest within the study area

Shale Sandstone Transition Forest in the Sydney Basin Bioregion aligns with PCT 3321 and occurs in a low condition within the study area. A total of 0.03 hectares of larger 0.08 hectare patch of Shale Sandstone Transition Forest occurs within the study area with 10% (0.003 ha of 0.03 ha) to be impacted by potential trimming. The 0.08 hectare patch being impacted is contiguous with larger patches of vegetation within and outside the study area. An assessment of the impacts of this vegetation in accordance with the *Threatened species test of significance* is provided below.

Table 16 Test of Significance for Shale Sandstone Transition Forest

Test of Significance for Shale Sandstone Transition Forest
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.
Not applicable, not a threatened species.
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*** ***(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.***
The study area contains a 0.03 ha of a larger 0.08 ha patch of Shale Sandstone Transition Forest with 10% (0.003 ha of 0.03 ha) potentially to be impacted by trimming. The project will be limited to trimming and will not involve the complete removal of any vegetation associated with Shale Sandstone Transition Forest at the study area. Trimming of this patch of Shale Sandstone Transition Forest is unlikely to further reduce species diversity and simplify community structure more broadly. As such, the vegetation to be directly removed does not comprise any ecological components critical to the survival of Shale Sandstone Transition Forest in the locality, and this level of impact will not lead to the local occurrence of Shale Sandstone Transition Forest being placed at risk of extinction.
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.***
The habitat supporting the local occurrence of the Shale Sandstone Transition Forest comprises a single linear strip along the north-east boundary of Lot 3 DP 251094. This patch is attached to a broader patch of continuous vegetation connecting it to the vegetated riparian corridor associated with Second Ponds Creek. The proposal will result in trimming impacts to 10% of a 0.03 ha patch of Shale Sandstone Transition Forest, which equates to<10% of the local occurrence (being 0.08ha in area). This patch is already subject to edge effects resulting from the fragmented landscape within which it occurs. Indirect impacts associated with trimming are will not substantially reduce the habitat available to the Shale Sandstone Transition Forest in the locality, nor will it result in isolation or fragmentation of habitats. The area of habitat to be impacted by the proposed works is not considered important to the

Test of Significance for Shale Sandstone Transition Forest
long term survival of the community in the locality.
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).
To date no AOBVs have been declared within the proposal's impact area.
Whether the proposed development or activity is part of a key threatening process or is likely to increase the impact of a key threatening process.
The proposed works have the potential to result in the following key threatening process which is listed under the Schedule 4 of the BC Act, and to which are considered relevant to Shale Sandstone Transition Forest: • Clearing of native vegetation. The proposed works requires trimming of vegetation on land where this community occurs, resulting in trimming of 0.003 ha of Shale Sandstone Transition Forest. Given that the only areas of Shale Sandstone Transition Forest to be impacted by the proposal will be in the form of partial trimming and that the broader patch will be retained adjacent to the study area, the proposal is unlikely to increase the impact of any key threatening processes.
Conclusion.
The proposed works are unlikely to significantly impact Shale Sandstone Transition Forest for the following reasons: • Areas to be trimmed will not result in the removal of additional canopy trees. • The proposed works are localised, and the study area has already been exposed to a number of disturbances which are unlikely to be further exacerbated by the proposed works. • The proposed works is unlikely to significantly alter floristic or structural diversity of the CEEC within the study area, particularly given a portion of the impacts are limited to partial clearance and some under boring. • The localised nature of the proposed works will not significantly trigger or exacerbate any key threatening processes. Application of the BOS or preparation of a SIS is therefore not required.

Cumberland Plain Land Snail and Dural Land Snail

Dural Land Snail

The Dural Land Snail is a shale-influenced-habitat specialist, which occurs in low densities along the western and northwest fringes of the Cumberland IBRA subregion on shale-sandstone transitional landscapes. The species is known to occur as far north as St Albans, in East Kurrajong and then south along the footslopes of the Blue Mountains as far south as The Oaks. Southeast from St Albans, the species is found across The Hills Shire Local Government Area and south to Parramatta. The species is found within the Local Government Areas of Blue Mountains City, Penrith City, The Hills Shire, Wollondilly Shire, Hornsby Shire and Parramatta City (NSW Scientific Committee 2015).

Cumberland Plain Land Snail

Cumberland Plain Land Snail occurs on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton, and from Liverpool west to the Hawkesbury and Nepean River at the base of the Blue Mountains. It primarily inhabits Cumberland Plain Woodland, although it is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest. These communities consist of open woodlands and forests with a grassy understorey. It occupies a variety of

shelters within these communities, often found under litter of bark, leaves and logs, or sheltering in loose soil around grass clumps (DPE 2019).

Table 17 Test of Significance for Cumberland Plain Land Snail and Dural Land Snail

Test of Significance for Cumberland Plain Land Snail and Dural Land Snail
In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.
The Dural Land Snail occurs in low abundance and individuals are solitary. The species' maximum recorded density is three live snails per hectare (NSW Scientific Committee 2015, TSSC 2014).Migration and dispersal is limited, with overnight straight-line distances of under 1 metre identified in the literature and studies. The species is active from approximately one hour after dusk until dawn and no confirmed diurnal activity is reported. Reproduction rates are very low, with few eggs (about 32) per season. Mortality is 90 % in the first year, and 99.8 % within four-five years (NSW Scientific Committee 2015, TSSC 2014). Little is known about the breeding biology of the Cumberland Plain Land Snail. It is known to be hermaphroditic, laying clutches of 20-25 small, round, white eggs in moist, dark areas (such as under logs), with the eggs taking 2-3 weeks to hatch. There is a suggestion that the species breeds throughout the year when conditions are suitable (NSW Scientific Committee 2015, TSSC 2014). The amount of habitat being removed/impacted is small (0.4 ha) when the availability of habitat directly to the north of the study area is considered. The habitat to be removed is degraded and breeding is considered unlikely to occur in this habitat. As such, the proposal is considered unlikely 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.
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*** ***(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.
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.***
The proposal would remove/impact approximately 0.4 hectares of potential habitat. This extent of habitat removal is considered small in the context of the available habitat in the locality. Preclearance surveys to identify individuals prior to clearing will ensure no individuals (either Cumberland Plain Land Snail or Dural Land Snail) are impacted, further reducing the impact to any currently undetected population in the study area. Importantly, the proposal will not result in fragmentation of habitat. No large blocks of high-quality habitat will be broken apart by the proposal. The study area is not considered a critical area for the Dural Land Snail or Cumberland Plain Land Snail. Extensive areas of higher quality habitat occur elsewhere in the locality (i.e., in intact native vegetation located directly to the north) and the current potential for these species to occur based on the presence of potential habitat is expected to remain after completion of the project.

Test of Significance for Cumberland Plain Land Snail and Dural Land Snail
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).
There are no areas of outstanding biodiversity value in the study area or surrounding locality.
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.
Of the 38 listed KTPs under the BC Act, the only KTPs relevant to these species that will be increased by the proposal are clearing of native vegetation and removal of dead wood and dead trees. The clearing of native vegetation and removal of dead wood will be minimal (covering 0.4 ha). Any introduction and spread of exotic pests and predators would not be increased significantly given the marginal clearing occurring along the edge of a vegetation patch. The works will not lead to any fragmentation of habitats.
Conclusion.
The Cumberland Plain Land Snail and Dural Land Snail will suffer a small reduction in extent of habitat from the proposal. The proposal is unlikely to reduce the population size of this species or decrease its reproductive success or movements. No important habitat will be affected, and the proposal will not interfere with the recovery of this species. After consideration of the factors above, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to either of these species.